HOW DEEPLY HAS GLOBAL FINANCIAL CRISIS ALTERED THE CAPITAL STRUCTURE OF UKRAINIAN ENTERPRISES?

by

Uliana Zabolotna

A thesis submitted in partial fulfillment of
the requirements for the degree of

MA in Financial Economics

Kyiv School of Economics

2013

Thesis Supervisor: _____ Professor Mykhaylo Salnykov

Approved by _____
Head of the KSE Defense Committee, Professor Wolfram Schrettl

_____

_____

_____

Date _____

Kyiv School of Economics

Abstract

HOW DEEPLY HAS GLOBAL FINANCIAL CRISIS ALTERED THE CAPITAL STRUCTURE OF UKRAINIAN ENTERPRISES?

by Uliana Zabolotna

Thesis Supervisor: Professor Mykhaylo Salnykov

This paper adds to the Ukrainian capital structure literature by analyzing the effect of the GFC on the determinants of leverage for Ukrainian companies during 2008-2009 years and comparing it to the periods of 2001-2007 and 2006-2007 years. The data used for this research are provided by National Statistics committee of Ukraine and available from KSE data center. It includes firm-level financial statements (Statement of Financial Position and Income Statement) for 2001-2010 years with up to ten thousands companies for each year. The analysis is provided by dividing the capital structure into three types of leverage: total, long- and short-term, and examining their determinants during each period. It was found that the effect of determinants mainly supports the pecking order theory and that the change in the relationship between different types of leverages and their determinants really occurred between two analyzed periods. On the one hand, this change is found for relationships between leverage ratios and *Size, Profitability, Tangibility, Liquidity and Growth* if comparing the longer pre-crisis period to the crisis period. On the other hand, only relationship between *Profitability* and leverage appears to change if taking the 2006-2007 as the basis period. As a result, all of the other relationships might be thought as not being able to change in such a short time period, or as not being influenced by the GFC.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

I want to express my deepest gratitude to my thesis advisor, Mykhaylo Salnykov, for taking time out of his busy schedule to guiding me with this thesis. This research would not be possible without his valuable advice, concern and patience at our regular meetings.

Special thanks to Oleh Myroshnichenko, Mykhailo Kolisnyk and all Research Workshop Professors for their useful comments and ideas that helped me to work through and complete this thesis.

Finally, I want to express my great appreciation to my classmates and my family for all support, encouragement and inspiration that they provided during the study at KSE.

Chapter 1

INTRODUCTION

The Global Financial Crisis (further - GFC) burst out precisely fifty years after the first notable paper by Modigliani and Miller (1958) on capital structure was published. Though the study suggests irrelevance of capital structure to the value of a firm, the GFC showed exactly the opposite result: according to the level of leverage companies underwent different difficulties that influenced their value (Zarebski and Dimovski, 2012). In fact, the Modigliani and Miller's paper imposes several conditions, for their outcome to be held, which are not consistent with the real market environment, but still the GFC is an important incident that should be investigated in order to verify several capital structure theories.

The scope and magnitude of the GFC's influence was dissimilar among countries owing to the level of the financial markets development and sensitivity to the external financial shocks. Besides, for some countries the time lag of the GFC upshots sprang up, as in the case of Ukraine. The GFC interrupted a strong growth of the Ukrainian economy and caused it to experience one of the most complicated declines among the emerging markets: currency devaluation, fall in real GDP, drop of investments, increased unemployment, reduction of consumer and business confidence (BF, 2009). This primarily resulted from the fall in prices on metals, which constitute a large part of Ukrainian export that in its turn represents near 50% of Ukrainian GDP. Moreover, because of high current account deficit, Ukraine suffered from liquidity crisis, and Ukrainian banks lost their positions mainly because of an huge amount of bad debts. As a result, banks considerably reduced lending to the real sector inducing the most leveraged

companies to face great difficulties with further activity. The response of many enterprises to these incidents was to cut costs (layoffs, wage and work condition adjustments). Moreover, some of them reduced production, stopped wage and tax payments or extended the terms of accounts payable. These and other actions can have a significant influence on the capital structure of Ukrainian enterprises, and the scope along with time frames of this influence is analyzed in the following research.

Explicitly, this study covers the influence of the GFC on the determinants of the capital structure of Ukrainian enterprises, that is – how sensitivity of capital structure to its determinants changed and what other ratios influenced to a greater extent the capital structure during the crisis period. Moreover, this research tries to find out if such a shock as the GFC is another evidence that supports the pecking order and trade-off theories of capital structure, where the first theory argues about the dependence of capital structure on costs of different types of financing, while the second asserts that the optimal level of debt exists, which is defined by the trade-off between costs and benefits of debt. Mainly, an emphasis in this research is made to the analysis of how firms changed their capital sources in response to severe financial conditions, and which types of debt increased first due to periods and components of the GFC.

The main difference of this paper from the previous ones is in the attempt to identify specific variables, such as *Interest coverage ratio* and *Liquidity*, which cover the main effect of the GFC on capital structure, therefore giving the possibility to find what may be the result of similar financial crises in the future.

In general, the main tasks performed by the following research are to divide the capital structure into total, short and long term leverage and to examine determinants of leverages by using the OLS regression on the basis of available

data according to the pre-crisis period of 2001-2007 years and during the crisis period of 2008-2009 years. This allows to determine whether the GFC had any influence on capital structure determinants of enterprises, - that is, whether main determinants and sensitivity of leverage to these factors were the same as before the crisis, or whether there appeared some new indicators during the GFC period.

It is expected that the impact of capital structure determinants changed due to the GFC, but the scope of such change varies depending on the type of leverage: some explanatory variables changed their influence during crisis years in favor of short-term leverage, others in favor of long-term leverage. Besides, *Interest coverage ratio* and *Liquidity* variables are supposed to be significant during crisis years reflecting the presence of the GFC effect on capital structure.

The data used for this research are provided by National Statistics committee of Ukraine and available from KSE data center. It includes firm-level financial statements (Statement of Financial Position and Income Statement) for 2001-2010 years with up to ten thousands companies for each year.

This paper proceeds as follows. Chapter 2 presents the overview of main theories and findings on capital structure and effects of financial crises on its determinants. Chapter 3 provides the methodology used in similar papers and continues with the description of the chosen methodology for this paper. Chapter 4 gives detailed description of the data used. Chapter 5 presents the results and, finally, Chapter 6 completes with the main conclusions.

Chapter 2

LITERATURE REVIEW

2.1 Capital structure and firm value

The paper that began the discussion about the capital structure and its influence on a firm value is written by Modigliani and Miller (1958) where they introduce the world without any frictions (i.e., perfect capital market, no transaction costs, taxes and bankruptcy) and show that capital structure is irrelevant to the value of a firm. However, after allowing for corporate taxes, their next paper in 1963 demonstrates some positive correlation between capital structure and firm value. Later Miller (1977) adds personal taxes and determines that tax-deductibility of interest payments has an effect only at the macro-level but it vanishes at the firm level. Supporting Miller's findings about no tax benefits of debt, Fama and French (1998) obtained even negative relationship between the amount of debt and firm value. Instead, they examined how dividends influence the firm value, and estimated a positive relationship. Furthermore, Myers (1985) indicates that this tax gain can be negative if the marginal tax rate of the company is zero.

This discussion gave rise to many papers on the capital structure with controversial results. Nevertheless, there are two main capital structure theories: trade-off theory and pecking order theory. The trade-off theory was established by Kraus and Litzenberger (1973) and proclaims that optimal debt to equity ratio maximizes firm value. The more debt a firm owns the greater amount of tax-deductible income it has and the greater benefits it receives from lower cost of equity. Nonetheless, the risk of bankruptcy rises as the firm is less able to cover its interest payments. Moreover, it becomes more dependent on its lenders and suffers from excessive attention from them. Therefore, the firm has to optimize

its debt level and, as a result, the right trade-off between benefits and drawbacks of debt generate an optimal capital structure that maximizes the firm value that was showed by Stulz (1990). Similarly, this theory affirms that big and more profitable firms have greater chances to attract new debt, as they are more financially independent.

Contrary to the trading-off the pecking order theory developed by Myers (1984) and Myers and Majluf (1984) rejects the existence of any optimal debt level and asserts that there is a specific order of attracting new capital to the firm, which depends on the cost of such capital. The most preferred and least costly are internal funds, then goes debt and the most expensive and accordingly least preferred – issue of new equity. Thus, the decision to accrue debt arises only due to the absence of available cash flows (that happens during financial difficulties and crisis) and results in avoiding unnecessary additional external dependence. Fazzari, Hubbard, and Petersen (1988) contend that more extensive internal funds usually have larger and more profitable firms than small and startup firms, which are more frequent in emerging market countries.

Similarly, supporting the pecking order theory, Baker and Wurgler (2002) propose the market timing theory, which argues that firms acquire the capital that is mispriced, hence benefiting from the difference in its market price and the cost of it to the firm.

Therefore, according to the above studies, most of them confirm that capital structure influences the cost of capital and thus the value of a firm.

2.2 Determinants of capital structure

Likewise the firm value, there are numerous papers about the factors that determine the capital structure. Firstly, these studies concern the capital structure variable itself, the debt ratio or the leverage. Titman and Wessel (1988) use six different measures of leverage, such as book and market values of short-term debt, long-term debt and total debt to the market debt of equity asserting that there may be different results owing to the type of the debt used. Still, Bowman (1980) shows that errors caused by using book value of debt instead of market are not significant, since the cross-sectional correlation between these two measures of debt are very high.

The main determinants of capital structure discussed in the literature are growth opportunities, profitability, size, tangibility, and other factors. These variables will be discussed in more details below.

Size. Some positive effect of the firm size on the leverage was explored by Rajan and Zingales (1995), who examined non-financial corporations of G-7 countries during 1987-1991[1], and by Deesomsak et al. (2004), who studied the largest companies of 10 analyzed developing countries from 1980 to 1990[2] showing similar results for developed countries. Nevertheless, Kim and Sorensen (1986) found no effect of the firm size on its capital structure, but a positive relation with operating risk was discovered. Thus, results on the sign of the size tend to be ambiguous.

Profitability. Titman and Wessel (1988) and Morri and Beretta (2008) observed the negative relationship between debt levels and profitability, meaning that more

[1] G-7 countries: USA, Japan, Germany, France, Italy, UK, Canada.

[2] The developing countries are: India, Pakistan, Thailand, Malaysia, Turkey, Zimbabwe, Mexico, Brazil, Jordan, and Korea.

profitable firms are likely to use less debt that supports the pecking-order theory. Moreover, they observed that such profitable firms have high operating risk and small opportunities to grow. Rajan and Zingales (1995) confirmed the result, yet under conditions of fixed dividends and investments, and the debt being the main source of external financing.

Tangibility. By Rajan and Zingales (1995) this variable is determined as the ratio of Total assets less Current assets to Total assets. The study concludes that this ratio has negative correlation, meaning that firms with great amounts of fixed assets are likely to be less leveraged.

Growth. The fact that firms which grow significantly tend to have a smaller leverage is confirmed by Kim and Sorensen (1986). Supporting the previous outcome, negative effect of growth opportunities on leverage was also discovered by Deesomsak et al. (2004). Besides, liquidity, non-debt tax shield, and share price were other variables that correlated negatively with the debt ratio.

Other variables. Some papers include other controls, often as various dummy variables as the determinants of capital structure, and the most common is the industry dummy. In particular, Bradley et al. (1984) argues that industry variable should not be omitted, as leverage of a firm depends on the industry the company operates in. Harris and Raviv (1991) observed that leverage ratios are almost identical for the firms in the same industry, yet different between dissimilar industries. Contrary results were received by Hatfield et al. (1994). They state that firms do not move to the industry average due to changing their levels of debt, since there is no significant correlation between the firm's debt level and that of its industry.

Further studies, like Drobetz and Wanzenreid (2004), Ozkan (2001), emphasize the importance of using macroeconomic variables such as GDP, inflation,

interest rates, economic growth, exchange rates, and money supply in determining the capital structure. Though, this is not a common practice, because in the absence of some economic shocks (like financial crisis), such variables are less likely to be significant. What is more, time-series macroeconomic variables are hard to apply in the cross-sectional analysis.

2.3 Capital structure and financial crisis

The evidence that the crisis has an influence on corporate capital structure is confirmed by Davis and Stone (2004). They analyze 59 bank and currency crises in 29 OECD and emerging market countries from 1970 for developed and from 1990 for smaller industrial countries on the basis of non-financial corporate balance sheets and cash flow statements. They argue that during the crisis declines in GDP growth are mainly caused by investment and inventory shrinkages, besides strong correlation between the leverage of a company and levels of investment and inventory changes is found. They obtained greater effect of the banking crisis rather than currency crisis on the corporate sector. This fall in external financing and bank lending is discovered to be even greater in emerging market countries than in OECD countries during both banking and currency crises, since the former are more dependent on external financing and banks, and the latter can benefit from better developed mechanism of attracting finance resources.

Similarly, there was a study performed by Ariff et al. (2008) about the adjustments of capital structure during the Asian financial crisis of 1997-1998 on the basis of data set of financially healthy and distressed firms. They inspected the speed and determinants of such adaptations by introducing lagged leverage variable, firm internal and macroeconomic variables (GDP, exchange rates, money supply).

Their results proved that the crisis altered the capital structure of firms, likewise, Deesomsak et al. (2004) came to the same conclusion. In addition, they found that the adjustment process was slower compared to the developed countries mostly because of lending market inefficiencies. Furthermore, the speed of adjustment is demonstrated to depend on the duration nature of leverage, that is whether it is a long or a short term.

One of the most recent studies by Zarebski and Dimovski (2012) examined capital structure by looking for changes in the effect of each chosen variable on the short term, long term and total leverage of Australian Real Estate Investment Trusts before and after the crisis for the periods of 2006-2007 and 2008-2009. The results are similar to the previous study: they found that the GFC affected the capital structure, but significance of these variations varies depending on the length of leverage.

Another research conducted by Campello et al. (2010) analyzes the usage of credit lines during the financial crisis based on the unique survey of chief directors of nearly 800 firms from 31 countries in Asia, Europe and North America. The results show that the GFC restrained, nevertheless, did not cut off the access to these credit lines. Moreover, this study demonstrates that even companies, which can certainly access credit lines (are more profitable and liquid), prefer to access all its internal options for generating capital first, supporting the pecking order theory.

Finally, the paper by Forsberg (2012) investigates precise effects financial crisis of 2008 had on the market debt ratio of nearly 5,000 companies from COMPUSTAT data base. The main results show that this ratio grew during the crisis on average at 5.5% (from which 5.1 percentage points proved to be the result of the crisis). Additionally, the market debt ratio returned to its pre-crisis

position till the end of 2010 generally meaning that the effects of the GFC on the capital structure faded away.

2.4 Capital structure in Ukraine

There are not many studies that cover leverage issues for Ukrainian enterprises, however, those presented below have made a great contribution to the Ukrainian capital structure papers.

The first paper by Myroshnichenko (2004) investigates leverage determinants of Ukrainian companies during the period of 2000-2002 simultaneously testing classical theories of capital structure. The main result has shown that among the main determinants, tangibility and profitability measurements have negative effect on debt levels, but only on the short-term debt, as well as the size of a company influences positively the long-term leverage. Furthermore, supporting classical theories of capital structure, the study shows that pecking order theory holds in the short run, whereas, the trade-off theory reflects the long-run period of the Ukrainian enterprises activity.

The study by Zheka (2010) examines the adjustment procedures of leverage to its optimal level for the open joint-stock Ukrainian companies during 2000-2007. The results suggest that on average Ukrainian firms adjust their capital structure in two years. Besides, the effect of corporate governance on the capital structure is analyzed. As a consequence, a positive and significant relation is discovered between the corporate governance and the speed of leverage adjustment procedures.

Talavera and Tsapin (2011) analyze the effects of company financial constraints using a panel of 4500 Ukrainian companies from 2000 to 2006. The main results

suggest that the capital structure of more restricted firms reacts to a greater extent to changes in the determinants of the leverage thus corresponding differently to the liquidity risk. Additionally, the paper examines the duration structure of the debt discovered to depend positively on the creditworthiness of a firm and its ability to access the long-term financing but negatively on the firm size. The issue of underdeveloped Ukrainian market in the study concerns more frequently the usage of short-term instead of long-term liabilities by a firm, meaning that market conditions greatly influences the debt maturity structure.

This paper adds to the Ukrainian capital structure literature by analyzing the effects of the GFC on the determinants of leverage for Ukrainian companies during 2008-2009 years and comparing it to the previous period of 2001-2007 and 2006-2007 years using the data provided by National Statistics committee of Ukraine and available from KSE data center. These data includes firm-level financial statements (Statement of Financial Position and Income Statement) for 2001-2010 years with up to ten thousands companies for each year.

Chapter 3

METHODOLOGY

Among the most relevant studies on capital structure the static and dynamic panel regression models are used. Static models serve to investigate the effects of main determinants on leverage ratio (Talavera and Tsapin, 2011), while dynamic models serve to estimate the adjustment process of capital structure to its optimal level (Myroshnichenko, 2004; Ariff et al., 2008; Zheka, 2010). Moreover, some of these papers use several statistical methods for more accurate results and comparability, like Myroshnichenko (2004), who uses dynamic panel model and pooled OLS. However, there are also many studies using the Ordinary Least Squares regression analysis for estimating leverage determinants (Deesomsak et al., 2004; Zarebski and Dimovski, 2012).

In this paper the whole range of data of 2001-2010 is divided into two periods: pre-crisis period of 2001-2007 years, and 2008-2009 years as crisis period for independent variables. Because of the possible problem of endogeneity (many of independent variables can be influenced by the crisis), data is taken with one year lag forward for dependent variable (leverage), so that 2002-2008 is pre-crisis period and 2009-2010 – crisis years(Talavera and Tsapin, 2011; Campello et al., 2010). For each period the average value of every variable is calculated for each company, thus two different regressions are analyzed. Averages are used to minimize the measurement error and effects of random fluctuations for these years. For measuring the influence of the GFC on capital structure the OLS regression analysis is applied, because of small sample period (especially for crisis years), average estimates and because of no interest in adjustment procedures, for which the dynamic panel model analysis is usually used (Zheka, 2010). The

regression contains several control variables, which influence capital structure to capture the impact of recession, and annual dummy variable for capturing financial crisis effects. Besides, some interactions of the year dummy and independent variables are included, which are expected to reflect the most the effect of the GFC.

The regressions take the following form:

$$L_{i,t+1} = \sum_{k=1}^{n} \beta_{ik} X_{k,t} + \sum_{k=1}^{l} \beta_{ik} Z_{k,t} + D_t + \sum_{k=1}^{l} \beta_{ik} D_t Z_{k,t} + I_t + \varepsilon_i \quad (1)$$

Where, $L_{i,t}$– types of leverage of firm *i* in year *t*: total leverage– *Total Liabilities/Total Assets*, long-term leverage – *Total Non-Current Liabilities/Total Assets*, and short-term leverage – *Total Current Liabilities/Total Assets* (Zarebski and Dimovski, 2012). $X_{k,t}$ – independent variables with regression coefficients β_{ik}, $Z_{k,t}$ – independent variables interacted with year dummies D_t, which supposed to capture the impact of recession, and I_t- industry dummies.

As a result, three different regressions are constructed: for each of three different types of leverage.

Among the main independent variables that may influence capital structure are:

Size – natural log for assets as a proxy for the size of a firm. Sales are also sometimes used as a proxy for the firm size (Myroshnichenko, 2004), however, due to reasons of the GFC mentioned above sales were expected to decrease during the crisis, thus capturing the effect of the crisis, and as a result causing correlation between independent variables. Larger companies are expected to have greater sources of revenues, thus facing lower risk and cost of bankruptcy. Moreover, big firms have greater number of debt covenants, hence greater and cheaper access to credit market. As a result the trade-off theory states that there

should be a positive relationship between the firm size and leverage, which also has been verified by Titman and Wessels (1988), and Talavera and Tsapin (2011).

On the other hand, since big companies have greater sources of revenues, they might also receive more internal resources to finance their further activity. Besides, larger companies are more able to issue equity, as they are more carefully analyzed by the greater amount of investors. In this case, the pecking order theory predicts the negative relationship between firm size and leverage.

In this research positive relationship is expected, as revenues are not expected to be influential especially during crisis years, also there are not much companies that can issue new equity owing to weak Ukrainian stock market. Thus, in favor of trade-off theory, larger firms are expected to have better access to outside capital, hence increasing the amount of debt.

Profitability – earnings before interest and tax (*EBIT*) to *Total Assets* as an indicator of profitability proxy used by Titman and Wessels (1988), and Deesomsak et al. (2004). According to the pecking order theory, managers prefer to use retained earnings, since it is a cheaper source than external financing, hence leading to the negative relationship. However, the trade-off theory suggests that possibility to subtract interest payments from taxes encourages more profitable firms to use higher amount of debt. In the following research the pecking order theory is expected to hold, since not many Ukrainian companies have considerable access to external financing.

Tangibility – (*Total Assets - Current Assets*)/ *Total Assets* used by Rajan and Zingales (1995) and Myroshnichenko (2004). If a company holds tangible assets of great value, then according to the trade-off theory this company is more likely to have high leverage ratios, given that firms use tangible assets as collateral for debt they take. This collateral serves as a guarantee of debt repayment mainly for

long-term borrowing. Thus a significant positive relationship is expected, which was also achieved by Titman and Wessels (1988) and Rajan and Zingales (1995). However, the opposite result may be reached, once debt holders tend to monitor such company more severe for taking additional debt. Because such an issue seems to be not common for Ukraine, this research expects positive relationship between company's leverage and tangibility.

Growth opportunities – is a percentage change of *Total Assets* (Zarebski and Dimovski, 2012). The trade-off theory implies the negative relationship, since issuing new debt is more costly for growing companies, which was verified by Titman and Wessels (1988). Typically, when firms are growing, they are profitable. Thus more internal financial sources are accessible, which are less costly than new debt in accordance with the pecking order theory. On the other hand, if the company is growing, this indicates its investment opportunities, which financial institutions consider as favorable sign for its reliability, thus more debt might be offered, resulting in a positive relationship.

Among the variables that are interacted with dummy variables are: *Interest coverage ratio* and *Liquidity*. These independent variables are separated from the others, since their effect on the capital structure is expected to change significantly during the GFC.

Interest coverage ratio – is expressed as *EBIT/Interest Expense* and shows the ability of a firm to repay its liabilities (Zarebski and Dimovski, 2012), the riskiness of a firm. If earnings are low relative to interest expenses, then the company is at greater risk of insolvency. Such situation increases the cost of company's debt, making this kind of financing less desirable. Therefore, positive relationship is expected.

Liquidity - *Current Assets/Current Liabilities* (Deesomsak et al., 2004). Pecking order theory asserts that firms with high liquidity will borrow less. Therefore, a negative relationship is expected.

Industry Dummies – since different industries may be willing to hold various levels of debt, it is required to establish several particular industries and introduce them as dummy values (Myroshnichenko, 2004 – 26 industries). It is also possible to take just one industry that is expected to have the highest distinctive level of debt and prescribe to it the value of 1, and 0 for other industries (Titman and Wessels, 1988 – 1 for firms producing machines and equipment). In this research the first approach was chosen, owing to the desire to compare the GFC effect among the different industries.

Year Dummies – annual dummy variables, measuring other effects not included in control variables. When the influence of dummies to capital structure increases comparing to other variables during the crisis years, this may indicate that some other variables became more determinant showing the effect of the crisis (Myroshnichenko, 2004; Zarebski and Dimovski, 2012).

Therefore, regressions of the form (1) allow to see whether control variables, such as *Interest coverage ratio* and *Liquidity,* changed during the crisis years, which can represent the effect of GFC. However, to observe the effect of GFC on the other relationships of the capital structure and its determinants, for each period (pre-crisis and crisis) the following regression should be used:

$$L_{i,t+1} = \sum_{k=1}^{n} \beta_{ik} X_{k,t} + \sum_{k=1}^{l} \beta_{ik} Z_{k,t} + I_t + \varepsilon_i \qquad (2)$$

At this point six different regressions are constructed: for each of two periods with three different types of leverage. Now, it is possible to test whether the

effect of leverage determinants changed during crisis by testing the difference of coefficients of the independent variables between regressions of different periods.

It is expected that the impact of capital structure determinants changed due to the GFC but the scope of such change varies depending on the type of leverage: some explanatory variables changed their influence during the crisis years in favor of short-term leverage, others in favor of long-term leverage. Besides, relationship between *Interest coverage ratio* and *Liquidity* variables on the one hand and the leverage ratios on the other are supposed to be significant during the crisis years reflecting the presence of the GFC effect on capital structure.

As robustness checking, the same regressions (2) are used to provide an analysis of capital structure determinants comparing the periods of similar length, that is – 2006-2007 as pre-crisis period and 2008-2009 as crisis period. This will allow to find out how quickly the relationships changed through periods if the change really occurred. Specifically, if the difference between coefficients are observed for the larger pre-crisis period, but no difference for shorter pre-crisis period, then such result will indicate that the variable need larger time period to change due to some shocks.

Chapter 4

DATA ANALYSIS

The data for this research are provided by National Statistics committee of Ukraine and available from KSE data center. It includes firm-level financial statements (Statement of Financial Position and Income Statement) for 2001-2010 years with up to ten thousands companies for each year. Prior information for 2001-2007 is used to estimate the ordinary level of the capital structure for the firm (it is better to have as much observations as we could get for the proper estimation, therefore this period includes 7 years); and 2008-2009 is taken to analyze how the GFC altered the determinants of company's leverage.

To remove outliers, which were mainly present in several ratios, the variables are truncated. Variables *Total leverage* and *Growth* are cut at 99th percentile, and *Profitability* is cut at both top and bottom one percent level. Moreover, Liquidity ratio is cut at 95^{th} percentile. After these procedures, the data contain about 22,650 enterprise-year observations in total.

Descriptive statistics of three dependent and five independent variables is provided in the Table A1 in Appendix A. Since two different periods are taken, the data analysis will be provided separately for each of them.

4.1 Pre-crisis period

For this period 15 342 observations were obtained. On average during the pre-crisis period Ukrainian enterprises tended to use more equity than debt, since the *Total leverage* ratio is lower than a half. However, the maximum values of leverages

say that there are firms that use more debt than the total amount of assets they have, as the ratios are higher than one. This can be explained by the fact that several companies have huge accumulated losses, which result in such abnormal values of leverage ratios. If looking at the *Long-* and *Short-term leverages*, the conclusion of greater amount of short-term debt taken by firms can be reached. The first reason for that is primarily the fact that in Ukraine it is not very common for banks to provide companies with the long-term debt. This happens due to instability of the Ukrainian economic situation, where interest rates are high and very volatile; thus financial institutions insure themselves from losses, which may be incurred when lending on longer terms. The second reason might be lack of confidence in financial stability of Ukrainian enterprises. The middle corporate sector in Ukraine is practically missing, and an high amount of startups or small-volume businesses do not contribute to the total financial reliability.

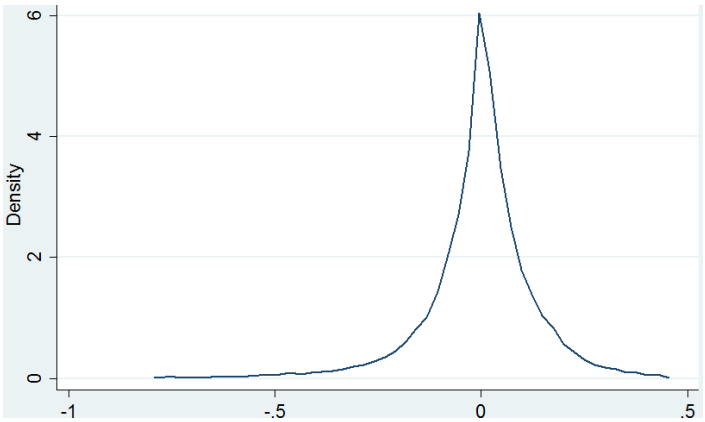


Figure 1. *Profitability* Kernel density estimate

The next interesting fact about the data is that rather small but still negative average value of *Profitability* variable (see Figure 1), which shows that most companies do not operate efficiently in the Ukrainian market. Partly it can be explained by the absence of middle business, because small young firms are more risky, thus it is harder for them to get profits on the regular basis.

Moreover, as a result of existing tax climate (especially before crisis), firms prefer to underreport their profits. Particularly, it is common for small-volume businesses, where there is no need for transparency and presenting of the good performance (Myroshnichenko, 2004).

Due to the data, the *Interest coverage ratio* is very volatile and is present in a less than two thirds of the firm's observations during this period. This volatility is not a strange fact, considering that firms pay various amounts of interests and that not all of them are supposed to have interest payments at all, because companies may simply not have the bearing interest debt. However, since this variable will censor all the other data, if to include it in the regression analysis, it was decided to omit this variable in the further analysis.

Table 1. Companies' ratios between two periods.

Variable	**Pre-crisis (2001-2007) Mean**	**Crisis (2008-2009) Mean**	**Change**
Total Leverage, share	0.44	0.51	+
Long-term leverage, share	0.07	0.10	+
Short-term leverage, share	0.37	0.41	+
Size, ln(€'000)	10.71	11.99	+
Profitability, share	-0.02	0.01	+
Tangibility, share	0.58	0.49	-
Liquidity, share	2.74	2.97	+
Growth, share	0.08	0.16	+
Observations	**15 342**	**7 309**	**x**

Discussing the other variables, on average Ukrainian enterprises have 60% of their assets in non-current assets, their Current Assets are 2.74 times bigger than Current Liabilities and they grow at 8% a year in total assets (see Table 1).

4.2 Crisis period

During the crisis Ukrainian firms obtained higher debt levels, which resulted in 51% of debt in total assets. Even though firms used more frequently short-term debt, the relation of *Short-* and *Long-term leverages* changed a little in favor of long-term debt, from 85 to 81% of the *Total Leverage*. However, it was expected that the crisis shortened the amount of debt that companies were using. One of the reasons for these transformations might be the growing amount of banks and thus higher availability of bank lending as compared to the 2001-2007 years.

Moreover, *Growth* increased to 16% a year and *Profitability* variable became positive but still close to zero. Negative trend was observed only in *Tangibility* ratio. Such unexpected situation can account for the number of observations that decreased more than twice, thus leading to a possible explanation that only stable firms survived in the previous period. What is more, facing some difficulties with acquiring new debt, companies might have started to report their profits correctly, so as banks could consider them as reliable borrowers.

To refer to the crisis these data have to be compared to the 2007-2006 years separately for more accurate explanations (see Table A2 in Appendix B).

If comparing to the two-year pre-crisis period (see Table 2), all the trends except the *Profitability* ratio that decreased remained unchanged. Therefore, on average companies became less profitable during the crisis years than before the equivalent time period.

All the changes in variables were proved to be statistically significant by applying the *t-test*.

Table 2. Companies' ratios between two periods with two-year pre-crisis period.

Variable	Pre-crisis (2006-2007) Mean	Crisis (2008-2009) Mean	change
Total Leverage, share	0.53	0.56	+
Long-term leverage, share	0.11	0.12	+
Short-term leverage, share	0.43	0.44	+
Size, ln(₴'000)	11.71	12.21	+
Profitability, share	0.03	0.01	-
Tangibility, share	0.47	0.44	-
Liquidity, share	4.90	5.77	+
Growth, share	0.26	0.21	+
Observations	**4882**	**4493**	**x**

Kernel density estimates of the main ratios distribution are presented in Appendix C.

In this research data were chosen according to seven industries with the greatest number of observations. These industries are believed to reflect the most the GFC effect, they are: agriculture, light industry, metallurgy, trade, manufacturing, financial and other services (see Table 3).

Table 3. Number of companies in each industry.

Industry	Companies
agriculture	3 562
light industry	4 043
metallurgy	3 046
manufacturing	2 612
trade	3 900
financial services	1 909
other services	3 579
Total	**22 651**

Chapter 5

EMPIRICAL RESULTS

According to the methodology offered in Chapter 3, three different steps will be conducted. The first includes investigating whether the effect of control variables is really observed. With the second approach we will look at the difference in coefficients of the leverage determinants for pre-crisis period with seven years duration (2001-2007) and the crisis period of 2008-2009 years. Finally, we will control for accuracy in measurement of the GFC effect by decreasing the pre-crisis period to two years (2006-2007), so that the comparing periods are equal. Complete regressions are given in Appendices D-F.

Results of the first step indicate that both interacted *Liquidity* ratio and the crisis dummy is statistically significant (see Table A3 in Appendix D). This proves next expectations: that there was some effect of the crisis years on relationships between *Liquidity* and leverage and that some other effects on the leverage ratios appeared during this period that influence leverage ratios, which is represented by significance of the *crisis* dummy coefficient. However, the economic effect of these two variables is, in fact, not very significant, since coefficients are too small. Therefore, to study such results more precisely, outcomes of the next step in our analysis should be described. Dummy variables for industries can be seen in Table A3 in Appendix D with *agriculture* as a basis variable.

In the second approach six different regressions are run: for every type of leverage with each for two different periods. Results will be analyzed for each independent variable separately according to the type of leverage it affects and compared through periods.

Size. The effect of the firm's size is found to be positive and significant for both total and long-term leverage, which corresponds with the expectations (see Table 4). Considering that big firms primarily have lower cost of bankruptcy and thus can borrow at lower rates, such outcome supports the trade-off theory. On the other hand, relationship appeared to be insignificant for the short-term leverage with various signs for different periods. Such insignificance can be explained by the fact that bigger firms are supposed to be more reliable, which is less important for short-term than for long-term financing. Moreover, economic effect of the *Size* variable is not significant either for all the leverage types. As was noted earlier, Ukrainian companies are mostly financed by the short-term debt, so overall effect is supposed to be the same as for *Short-term Leverage*.

Table 4. Regression results with pre-crisis period of 2001-2007 years

Variables	**Total Leverage**		**Long-term Leverage**		**Short-term Leverage**	
Size	0.012	0.022	0.012	0.023	0.001	-0.001
	(0.001)**	(0.002)**	(0.001)**	(0.001)**	(0.001)	(0.002)
Profitability	-0.445	-0.931	-0.036	-0.244	-0.410	-0.687
	(0.019)**	(0.027)**	(0.009)**	(0.017)**	(0.017)**	(0.024)**
Tangibility	-0.573	-0.493	-0.031	-0.008	-0.542	-0.486
	(0.010)**	(0.015)**	(0.005)**	(0.009)	(0.009)**	(0.013)**
Liquidity	-0.028	-0.032	-0.001	0.0001	-0.028	-0.032
	(0.001)**	(0.001)**	(0.0003)	(0.001)	(0.001)**	(0.001)**
Growth	0.091	0.050	0.029	0.005	0.061	0.044
	(0.009)**	(0.010)**	(0.004)**	(0.006)	(0.008)**	(0.009)**
Industry dummies	Not reported		Not reported		Not reported	
constant	0.658	0.505	-0.053	-0.204	0.711	0.709
	(0.018)**	(0.027)**	(0.009)**	(0.016)**	(0.016)**	(0.023)**
R^2	0.30	0.38	0.04	0.08	0.32	0.38
N	15,342	7,309	15,342	7,309	15,342	7,309

Standard errors in parentheses
* $p<0.05$; ** $p<0.01$

As to the effect of the crisis period, the Wald test indicates strong difference of *Size* coefficients between two periods for all except regression with the *Short-term Leverage* (see Table A6 in Appendix G).

Profitability. The effect of this variable also coincides with expectations, since it was found to be negative for all types of leverage during three periods, which relates to the pecking order theory. Moreover, the coefficient of *Profitability* became statistically different during the crisis years leading to greater negative relationship with the leverage ratios. Such results imply that during 2008-2009 companies with higher profitability were using less of debt financing than before that period.

Tangibility. The effect of tangibility on all the leverage ratios (apart from regression with *Long-term Leverage* during crisis period) is found to be statistically and economically negative that contradicts with expectations. However, such unexpected result might have the following explanation: for short-term debt usually more liquid assets are required for collateral if any. Nevertheless, if the amount of tangible assets increase, this certainly means that the amount of current (liquid) assets decrease, thus leaving less opportunities to acquire new short-term debt. And due to the higher amount of short-term debt on the balances of Ukrainian firms, this is an appropriate relationship. A test for checking the difference in coefficients between periods declares an existence of such difference for all the leverage types. In fact, this negative relationship decreased, probably because of the decrease in the *Tangibility* ratios analyzed in the Chapter 4.

Liquidity. Though this variable was found to influence statistically significantly and negatively total and short-term leverage ratios, no economically significant effect was detected, since coefficient values appeared to be very small. But even

so, this effect meets the expectations of the negative effect on leverage ratios and supports the pecking order theory. The effect of the crisis also proves that coefficients are different during periods for total and short-term leverage ratios.

Growth. This variable was found to influence statistically significantly and positively the leverage ratios, that is the higher growth the company experience, the more debt it is expected to have, which shows that the pecking order theory holds, since growing opportunities might be considered as positive sign for company's reliability.

Summary of which capital structure theories the results of this research support are presented in the Table5:

Table 5. Summary of results supporting capital structure theories

Variable	**Effect**	**Theory**
Size	+	Trade-off theory
Profitability	-	Pecking order theory
Tangibility	-	Neither
Liquidity	-	Pecking order theory
Growth	+	Pecking order theory

Another fact that should be mentioned here is a very low value of the R-squared statistic for the *Long-term Leverage* regression. The most probable explanation for that is a very small share of such type of financing in the total company debt. This is due to the fact, that in Ukraine long-term financing is a very scarce and uncommon source of external financing, because of very volatile interest rates and overall unstable situation of the money market in this country. Therefore, to find the relevant determinants of *Long-term Leverage* some other macroeconomic variables should be used apart from the current ones.

Finally, we can apply the above method for the data with two-year pre-crisis period (2006-2007 instead of 2001-2007) to see exactly how the relationships between the leverage ratios and their determinants changed during the crisis compared to the previous period (see Table 6).

Table 6. Regression results with pre-crisis period of 2006-2007 years

Variables	Total Leverage		Long-term Leverage		Short-term Leverage	
Size	0.016	0.018	0.019	0.022	-0.003	-0.003
	(0.003)**	(0.003)**	(0.002)**	(0.002)**	(0.002)	(0.003)
Profitability	-0.871	-1.181	-0.141	-0.279	-0.730	-0.902
	(0.038)**	(0.038)**	(0.022)**	(0.023)**	(0.035)**	(0.035)**
Tangibility	-0.510	-0.443	-0.038	-0.009	-0.472	-0.434
	(0.020)**	(0.021)**	(0.011)**	(0.012)	(0.018)**	(0.019)**
Liquidity	-0.010	-0.009	-0.001	-0.001	-0.009	-0.008
	(0.0005)**	(0.0005)**	(0.0003)	(0.0003)	(0.0004)**	(0.0004)**
Growth	0.051	0.017	0.013	-0.0001	0.038	0.017
	(0.009)**	(0.010)	(0.005)*	(0.006)	(0.008)**	(0.009)
Industry dummies	Not reported		Not reported		Not reported	
constant	0.561	0.505	-0.103	-0.162	0.665	0.667
	(0.036)**	(0.040)**	(0.021)**	(0.024)**	(0.033)**	(0.037)**
R^2	0.29	0.34	0.05	0.08	0.27	0.31
N	4,882	4,493	4,882	4,493	4,882	4,493

Standard errors in parentheses
* $p<0.05$; ** $p<0.01$

As it can be seen from the Table 6, there is no difference in the sign of coefficients of all the leverage determinants. Moreover, no difference is found across the type of leverage. Still, the test on difference in coefficients reports some changes (see Table A6 in Appendix G). The only variable that was discovered to change its effect on all the leverage ratios between the periods is *Profitability*. This again proves that during 2008-2009 companies with higher

profitability were using less of debt financing than before that period. Nonetheless, no statistically significant difference in the effect of *Liquidity* variable is noticed between the periods, in spite of the fact that it was the variable of main interest to reflect the effect of the GFC.

Therefore, results of the research show that the change in the relationship between different types of leverages and their determinants really occurred between two analyzed periods. On the one hand, this change is found for mainly all the leverage explanatory variables, such as *Size, Profitability, Tangibility, Liquidity and Growth* if comparing the average values of variables of 2001-2007 years as the pre-crisis period to the 2008-2009 as the crisis period. On the other hand, only *Profitability* variable appears to change its influence on the leverage ratios if taking the 2006-2007 as the basis period. As a result, all the other variables might be thought as not being able to change in such a short time period owing to some shocks, or as not being influenced by the GFC.

Chapter 6

CONCLUSION

This study covers the influence of the GFC on the determinants of the capital structure of Ukrainian enterprises, that is – how sensitivity of capital structure to its determinants changed and what other ratios influenced to a greater extent the capital structure during the crisis period. Moreover, this research tries to find out if such a shock as the GFC is another evidence that supports the pecking order and trade-off theories of capital structure.

For performing such an analysis, the whole range of data is divided into two periods: pre-crisis period of 2001-2007 years, and 2008-2009 years as crisis period. The capital structure is divided into total, short and long-term leverage and the determinants of leverages are examined by using the OLS regression.

According to the methodology, three different steps are conducted. Results of the first step indicate that there was some effect of the crisis years on relationships between *Liquidity* and leverage and that some other effects on the leverage ratios appeared during this period that influence leverage ratios, which is represented by significance of the *crisis* dummy coefficient.

Second approach estimates the difference in coefficients of the leverage determinants for pre-crisis period with seven years duration (2001-2007) and the crisis period of 2008-2009 years. Results show that the effect of determinants mainly supports the pecking order theory. Besides, the change in the relationship between different types of leverages and their determinants really occurred between two analyzed periods. This change is found for mainly all the leverage explanatory variables, such as *Size, Profitability, Tangibility, Liquidity* and *Growth*.

Finally, third approach controls for accuracy in measurement of the GFC effect by decreasing the pre-crisis period to two years (2006-2007), so that the comparing periods are equal. Results of this approach demonstrate that only *Profitability* and leverage relationship appears to change. As a result, all of the other relationships might be thought as not being able to change in such a short time period, or as not being influenced by the GFC.

However, overall results do not show any difference across relationships between independent variables and each type of leverage, contradicting the outcomes of Zarebski and Dimovski (2012). This can be explained by the next finding of a very low value of the R-squared statistic for the *Long-term Leverage* regression. The most probable reason for that is a very small share of such type of financing in the total company debt. This is due to the fact, that in Ukraine long-term financing is a very scarce and uncommon source of external financing, because of very volatile interest rates and overall unstable situation of the money market in this country. Therefore, to find the relevant determinants of *Long-term Leverage* some other macroeconomic variables should be used apart from the current ones. And this can be an implication for the further research.

WORKS CITED

Ariff, Mohamed, Hassan Taufiq, and Mohamad Shamsher. 2008. How Capital Structure Adjusts Dynamically during Financial Crisis, *Corporate Finance Review*. Vol. 13 (3): 25-33.

Baker, Malcolm and Jeffrey Wurgler. 2002. Market timing and capital structure, *Journal of Finance*. Vol. 57 No. 1: 1-32.

BF. 2009. The Impact of the Global Liquidity Crisis on Ukraine and the Road to Economic Recovery. The Bleyzer Foundation Position Paper. Accessed online at http://usubc.org/reports/TBFPositionPaperForum09En.pdf

Bowman, Robert G. 1980. The Importance of a Market-Value Measurement of Debt in Assessing Leverage. *Journal of Accounting Research*, Vol. 18, No. 1: 242-254.

Bradley, Michael, Gregg A. Jarrell, and E.Han Kim. 1984. On the existence of an optimal capital structure" theory and evidence, *Journal of Finance*, Vol. 39 No. 3: 857-78.

Campello, Murillo, Erasmo Giambona, John R. Graham, and Campbell R. Harvey. 2010. Liquidity Management And Corporate Investment During A Financial, *NBER Working Paper Series*, Working Paper 16309. Accessed online at http://www.nber.org/papers/w16309.pdf?new_window=1

Davis, Philip E. and Mark R. Stone. 2004. Corporate financial structure and financial stability *Journal of Financial Stability*, Vol. 1, Issue 1: 65-91. Accessed online at http://www.ephilipdavis.com/corpstab13.pdf

Deesomsak, Rataporn, Krishna Paudyal, and Gioia Pescetto. 2004. The determinants of capital structure: evidence from the Asia Pacific region, *Journal of Multinational Financial Management*. Vol. 14: 387-405.

Drobetz, Wolfgang and Gabrielle Wanzenried. 2006. What Determines the Speed of Adjustment to the Target Capital Structure? *Applied Financial Economics* 16: 941-958.

Fama, Eugene F. and Kenneth R. French. 1998. Taxes, financing decisions, and firm value, *Journal of Finance*, Vol. 53 No. 3: 819-43.

Fazzari, Steven M., R. Glenn Hubbard, and Bruce C. Petersen. 1988. Financing Constraints and Corporate Investment, *Brookings Papers on Economic Activity*, Economic Studies Program, The Brookings Institution, Vol. 19(1): 141-206.

Fosberg, Richard H. 2012. Capital structure and the financial crisis. *Journal of Finance and Accountancy* Vol. 11. Accessed online at http://www.aabri.com/manuscripts/121213.pdf

Harris, Milton and Artur Raviv. 1991. The Theory of Capital Structure, *Journal of Finance*, Vol. 46 No. 1: 207-355.

Hatfield, Gay B., Louis T.W. Cheng, and Wallace N. Davidson, III. 1994. The determination of optimal capital structure: the effect of firm and industry debt ratios on market value. *Journal of Financial and Strategic Decisions,* Vol. 7, No.3.

Kim, Wi Saeng and Eric H. Sorensen. 1986. Evidence on the impact of agency costs of debt in corporate debt policy, *Journal of Financial and Quantitative Analysis*, Vol. 21 No. 2: 131-44.

Kraus, Alan and Robert H. Litzenberger. 1973. A State Preference Model of Optimal Financial Leverage, *Journal of Finance*: 911-922.

Miller, Merton H. 1977. Debt and taxes, *Journal of Finance*, Vol. 32 No. 2: 261-75.

Modigliani, Franco and Merton H. Miller. 1958. The cost of capital, corporation finance and the theory of investment, *American Economic Review*, Vol. 48 No. 3: 261-97.

Modigliani, Franco and Merton H. Miller. 1963. Corporate income taxes and the cost of capital, *American Economic Review*, Vol. 53 No. 3: 433-43.

Morri, Giacomo and Christian Beretta. 2008. The capital structure determinants of REITs. Is it a peculiar industry?, *Journal of European Real Estate Research*, Vol. 1 No. 1: 6-57.

Myers, Stewart C. 1984. The capital structure puzzle, *Journal of Finance*, Vol. 39 No. 3: 575-92.

Myers, Stewart C. 1985. A comment, In Friedman, B.M. (Ed.), *Corporate Capital Structure in the United States*, University of Chicago Press, Chicago, IL.

Myers, Stewart C. and Nicholas S. Majluf. 1984. Corporate financing and investment decisionswhen firms have information that investors do not have, *Journal of Financial Economics*, Vol. 13 No. 2: 187-222.

Myroshnichenko, Oleh. 2004. Determinants of Capital Structure of Ukrainian Corporations, Accessed online at http://kse.org.ua/uploads/file/library/2004/Myroshnichenko.pdf

Ozkan, Aydin. 2001. Determinants of Capital Structure and Adjustment to Long Run Target: Evidence from UK Company Panel Data. *Journal of Business Finance and Accounting*, 175-198.

Rajan, Raghuram G. and Luigi Zingales. 1995. What do we know about capital structure? Some evidence from international data, *Journal of Finance*, Vol. 50 No. 5: 1421-60.

Stulz, René M. 1990. Managerial discretion and optimal financing policies, *Journal of Financial Economics*, Vol. 26 No. 1: 3-27.

Talavera, Oleksandr, Andriy Tsapin, and Andreas Stephan. 2011. Corporate debt maturity choice in emerging financial markets. *Quarterly Review of Economics and Finance*, Volume 51, issue 2: 141-151.

Titman, Sheridan and Roberto Wessels. 1988. The Determinants of Capital Structure Choice, *Journal of Finance* 43: 1-19.

Zarebski, Paul and William Dimovski. 2012. Determinants of capital structure of A-REITS and the global financial crisis. *Pacific rim property research journal*, Vol. 18: 3-19. Accessed online at http://www.prres.net/papers/Zarebski_Determinants_of_capital_strucure.pdf

Zheka, Vitaliy. 2010. The impact of corporate governance practices on dynamic adjustment of capital structure of companies in Ukraine. *EERC Working Paper Series 10/07e,* EERC Research Network, Russia and CIS.

APPENDIX A

Table A1. Descriptive Statistics with pre-crisis period of 2001-2007 years

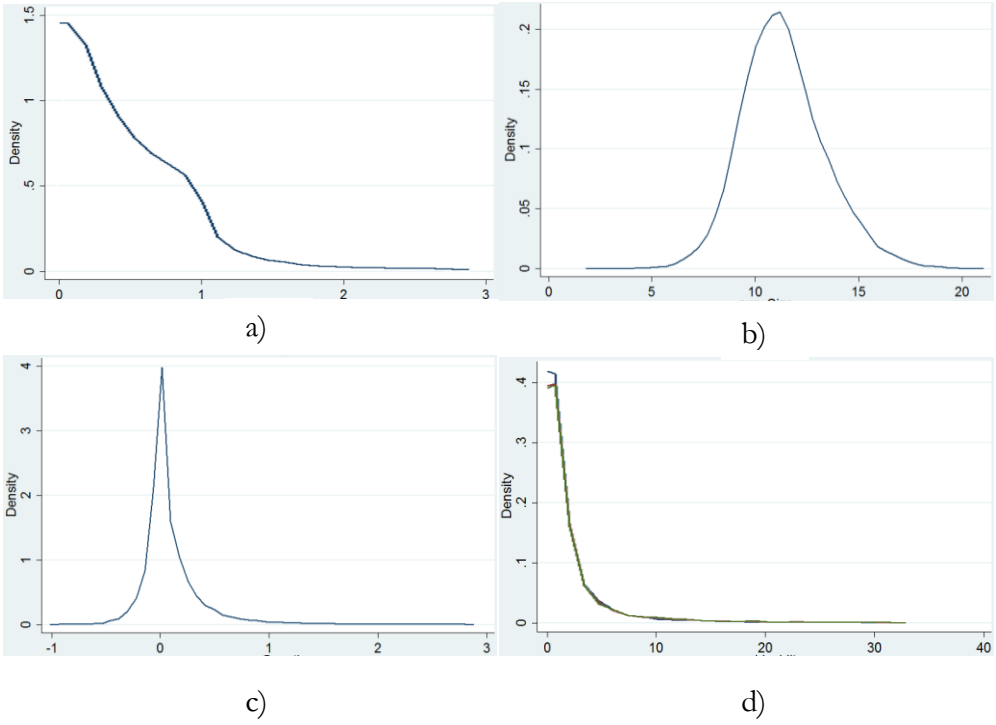
Variable	Observa-tions	Mean	Std. Dev.	Min	Max
Pre-crisis period (2001-2007)					
Total Leverage, share	15 342	0.44	0.36	0.00	2.54
Long-term leverage, share	15 342	0.07	0.15	0.00	2.24
Short-term leverage, share	15 342	0.37	0.33	0.00	2.53
Size, ln(€'000)	15 342	10.71	1.82	1.99	19.75
Profitability, share	15 342	-0.02	0.14	-0.95	0.43
Interest coverage ratio, share	8 625	119.91	3 192.54	-30 137.00	258 787.80
Tangibility, share	15 342	0.58	0.26	0.00	1.00
Liquidity, share	15 342	2.74	3.96	0.00	29.28
Growth, share	15 342	0.08	0.29	-0.64	2.76
Crisis period (2008-2009)					
Total Leverage, share	7 309	0.51	0.40	0.00	2.54
Long-term leverage, share	7 309	0.10	0.20	0.00	2.38
Short-term leverage, share	7 309	0.41	0.35	0.00	2.54
Size, ln(€'000)	7 309	11.99	1.92	2.30	20.61
Profitability, share	7 309	0.01	0.14	-0.94	0.43
Interest coverage ratio, share	4 398	26.83	2 230.76	-128 402.10	41 586.89
Tangibility, share	7 309	0.49	0.27	0.00	1.00
Liquidity, share	7 309	2.97	4.33	0.00	29.17
Growth, share	7 309	0.16	0.38	-1.00	2.78

APPENDIX B

Table A2. Descriptive Statistics with pre-crisis period of 2006-2007 years

Variable	Observations	Mean	Std. Dev.	Min	Max
Pre-crisis period (2006-2007)					
Total Leverage, share	4882	0.53	0.42	0.00	3.57
Long-term leverage, share	4882	0.11	0.21	0.00	1.93
Short-term leverage, share	4882	0.43	0.38	0.00	3.57
Size, ln(₴'000)	4882	11.71	1.97	2.64	19.03
Profitability, share	4882	0.03	0.14	-0.91	0.48
Tangibility, share	4882	0.47	0.28	0.00	1.00
Liquidity, share	4882	4.90	11.34	0.00	101.22
Growth, share	4882	0.26	0.59	-0.96	5.92
Crisis period (2008-2009)					
Total Leverage, share	4493	0.56	0.46	0.00	3.53
Long-term leverage, share	4493	0.12	0.23	0.00	2.38
Short-term leverage, share	4493	0.44	0.41	0.00	3.46
Size, ln(₴'000)	4493	12.21	2.03	2.30	19.60
Profitability, share	4493	0.01	0.15	-0.92	0.48
Tangibility, share	4493	0.44	0.29	0.00	1.00
Liquidity, share	4493	5.77	13.31	0.00	101.77
Growth, share	4493	0.21	0.56	-1.00	6.08

APPENDIX C



a) b)

c) d)

Figure A1. Kernel densities of other ratios
Note: a) Total Leverage; b) Size; c) Growth; d) Liquidity

APPENDIX D

Table A3. Regression results with interactions

Variables	Total Leverage	Long-term Leverage	Short-term Leverage
Size	0.017	0.016	0.001
	(0.001)**	(0.001)**	(0.001)
Profitability	-0.612	-0.111	-0.501
	(0.016)**	(0.008)**	(0.014)**
Tangibility	-0.546	-0.023	-0.524
	(0.009)**	(0.005)**	(0.008)**
Liquidity	-0.027	0.0001	-0.027
	(0.001)**	(0.0003)	(0.001)**
Growth	0.072	0.019	0.053
	(0.007)**	(0.004)**	(0.006)**
light industry	0.125	0.038	0.087
	(0.007)**	(0.004)**	(0.006)**
metallurgy	0.073	0.010	0.062
	(0.008)**	(0.004)*	(0.007)**
trade	0.110	0.034	0.076
	(0.007)**	(0.004)**	(0.007)**
financial services	0.021	0.023	-0.002
	(0.009)*	(0.005)**	(0.008)
other services	0.071	0.030	0.041
	(0.007)**	(0.004)**	(0.007)**
manufacturing	-0.022	-0.013	-0.008
	(0.008)**	(0.004)**	(0.007)
crisis	0.049	0.015	0.034
	(0.006)**	(0.003)**	(0.005)**
Liquidity (interacted with crisis)	-0.008	-0.001	-0.007
	(0.001)**	(0.001)*	(0.001)**
constant	0.566	-0.118	0.684
	(0.015)**	(0.008)**	(0.013)**
R^2	0.33	0.05	0.34
N	22,651	22,651	22,651

Standard errors in parentheses
* $p<0.05$; ** $p<0.01$

APPENDIX E

Table A4. Regression results with pre-crisis period of 2001-2007 years

Variables	Total Leverage		Long-term Leverage		Short-term Leverage	
Size	0.012	0.022	0.012	0.023	0.001	-0.001
	(0.001)**	(0.002)**	(0.001)**	(0.001)**	(0.001)	(0.002)
Profitability	-0.445	-0.931	-0.036	-0.244	-0.410	-0.687
	(0.019)**	(0.027)**	(0.009)**	(0.017)**	(0.017)**	(0.024)**
Tangibility	-0.573	-0.493	-0.031	-0.008	-0.542	-0.486
	(0.010)**	(0.015)**	(0.005)**	(0.009)	(0.009)**	(0.013)**
Liquidity	-0.028	-0.032	-0.001	0.0001	-0.028	-0.032
	(0.001)**	(0.001)**	(0.0003)	(0.001)	(0.001)**	(0.001)**
Growth	0.091	0.050	0.029	0.005	0.061	0.044
	(0.009)**	(0.010)**	(0.004)**	(0.006)	(0.008)**	(0.009)**
light industry	0.111	0.149	0.032	0.045	0.078	0.104
	(0.008)**	(0.014)**	(0.004)**	(0.008)**	(0.007)**	(0.012)**
metallurgy	0.055	0.099	-0.001	0.027	0.056	0.072
	(0.009)**	(0.014)**	(0.005)	(0.009)**	(0.008)**	(0.012)**
trade	0.079	0.171	0.022	0.049	0.057	0.123
	(0.009)**	(0.015)**	(0.004)**	(0.009)**	(0.008)**	(0.013)**
financial services	0.037	0.0003	0.022	0.022	0.016	-0.022
	(0.012)**	(0.015)	(0.006)**	(0.009)*	(0.011)	(0.013)
other services	0.048	0.105	0.019	0.047	0.029	0.058
	(0.009)**	(0.014)**	(0.004)**	(0.008)**	(0.008)**	(0.012)**
manufacturing	-0.041	0.016	-0.019	-0.006	-0.023	0.022
	(0.009)**	(0.015)	(0.005)**	(0.009)	(0.009)**	(0.013)
constant	0.658	0.505	-0.053	-0.204	0.711	0.709
	(0.018)**	(0.027)**	(0.009)**	(0.016)**	(0.016)**	(0.023)**
R^2	0.30	0.38	0.04	0.08	0.32	0.38
N	15,342	7,309	15,342	7,309	15,342	7,309

Standard errors in parentheses
* $p<0.05$; ** $p<0.01$

APPENDIX F

Table A5. Regression results with pre-crisis period of 2006-2007 years

Variables	Total Leverage		Long-term Leverage		Short-term Leverage	
Size	0.016	0.018	0.019	0.022	-0.003	-0.003
	(0.003)**	(0.003)**	(0.002)**	(0.002)**	(0.002)	(0.003)
Profitability	-0.871	-1.181	-0.141	-0.279	-0.730	-0.902
	(0.038)**	(0.038)**	(0.022)**	(0.023)**	(0.035)**	(0.035)**
Tangibility	-0.510	-0.443	-0.038	-0.009	-0.472	-0.434
	(0.020)**	(0.021)**	(0.011)**	(0.012)	(0.018)**	(0.019)**
Liquidity	-0.010	-0.009	-0.001	-0.001	-0.009	-0.008
	(0.0005)**	(0.0005)**	(0.0003)	(0.0003)	(0.0004)**	(0.0004)**
Growth	0.051	0.017	0.013	-0.0001	0.038	0.017
	(0.009)**	(0.010)	(0.005)*	(0.006)	(0.008)**	(0.009)
light industry	0.150	0.169	0.034	0.035	0.116	0.134
	(0.020)**	(0.023)**	(0.012)**	(0.014)*	(0.019)**	(0.021)**
metallurgy	0.101	0.123	0.015	0.025	0.085	0.098
	(0.021)**	(0.024)**	(0.012)	(0.014)	(0.020)**	(0.022)**
trade	0.155	0.226	0.030	0.054	0.125	0.172
	(0.021)**	(0.025)**	(0.012)*	(0.015)**	(0.020)**	(0.023)**
financial services	-0.032	-0.061	-0.009	0.011	-0.022	-0.072
	(0.021)	(0.023)**	(0.012)	(0.014)	(0.020)	(0.021)**
other services	0.128	0.121	0.037	0.049	0.091	0.072
	(0.022)**	(0.025)**	(0.013)**	(0.015)**	(0.020)**	(0.023)**
manufacturing	0.013	0.052	-0.027	-0.005	0.039	0.057
	(0.023)	(0.026)*	(0.014)	(0.016)	(0.022)	(0.024)*
constant	0.561	0.505	-0.103	-0.162	0.665	0.667
	(0.036)**	(0.040)**	(0.021)**	(0.024)**	(0.033)**	(0.037)**
R^2	0.29	0.34	0.05	0.08	0.27	0.31
N	4,882	4,493	4,882	4,493	4,882	4,493

Standard errors in parentheses
* $p<0.05$; ** $p<0.01$

APPENDIX G

Table A6. Wald test results for difference in coefficients between periods

Pre-crisis period of 2001-2007 years	
Variables	Pre-crisis/crisis
TL	
Size	0.0003
Profitability	0.000
Tangibility	0.0001
Liquidity	0.012
Growth	0.006
LL	
Size	0.000
Profitability	0.000
Tangibility	0.036
Liquidity	0.2586
Growth	0.0044
SL	
Size	0.4353
Profitability	0.000
Tangibility	0.002
Liquidity	0.0008
Growth	0.2139

Pre-crisis period of 2006-2007 years	
Variables	Pre-crisis/crisis
TL	
Size	0.5862
Profitability	0.0003
Tangibility	0.0264
Liquidity	0.3388
Growth	0.0229
LL	
Size	0.1938
Profitability	0.0019
Tangibility	0.0921
Liquidity	0.9991
Growth	0.1053
SL	
Size	0.8746
Profitability	0.0355
Tangibility	0.159
Liquidity	0.2881
Growth	0.1484