ARKA JAIN University
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"BANK LINES OF CREDIT DURING MACROECONOMIC CONTRACTION"

-AN IMPIRICAL ANALYSIS OF CREDIT LINE USAGE AND AVAILABILITY.

A

DISSERTATION PROJECT REPORT

SUBMITTED IN THE PARTIAL FULFILMENT OF

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This Dissertation project of "HARSH AGARWAL" titled "BANK LINES OF CREDIT DURING MACROECONOMIC CONTRACTION" is approved in quality and form and has found to be fit for the partial fulfilment of the requirements of ARKA JAIN UNIVERSITY FOR THE AWARD OF DEGREE OF Bachelor of Business Administration.

Approval of the Program coordinator,   Approval of the Dean,

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Approval of External examiner.

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This is to certify that **HARSH AGARWAL**, **University Enrollment No. AJU/00313/17**, a student of BBA (2017-20), has undertaken the Dissertation Project titled "**BANK LINES OF CREDIT DURING MACROECONIMIC CONTRACTION**", for the partial fulfillment of the requirements of **ARKA JAIN University** for the award of the degree of Bachelor of Business Administration, under my supervision.

To the best of my knowledge, this project is the record of authentic work carried out during the academic year (2017-20) and has not been submitted anywhere else for the award of any Certificate/ Degree/ Diploma etc.

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DECLARATION

I, **HARSH AGARWAL**, hereby declare that the project titled "**BANK LINES OF CREDIT DURING MACROECONOMIC CONTRACTION**", has been carried out by me during my '**DISSERTATION**' and is hereby submitted in the partial fulfillment of the requirements of **ARKA JAIN University** for the award of the degree of Bachelor of Business Administration.

　　　　To the best of my knowledge, the project undertaken, has been carried out by me and is my own work. The contents of this report are original and this report has been submitted to **ARKA JAIN University**, Jamshedpur and it has not been submitted elsewhere for the award of any Certificate/Diploma/degree etc.

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CHAPTER 1. EXECUTIVE SUMMARY

This project set out to investigate the usage and availability of bank lines of credit in corporate liquidity management for large public firms during macroeconomic contraction. Corporate liquidity management and especially bank lines of credit are receiving increasing attention, both in the literature and in the marketplace. To investigate this, I employed a random sample of non-bank firms, which is analysed in the 2019-2020 timeframe that entails the financial crisis and the negative effects on the general economic context this brought about. In recent theory, bank lines of credit are believed to be held primarily for liquidity reason and for future capital to engage in investments, but also questioned for their non-contingent characteristics. By applying a combination of Compustat data coupled with analysis of annual financial reports, I set up a series of 16 variables from which the data is correspondingly tested.

My findings indicate that bank lines of credit during stressed scenarios are not used extensively to support either of the two variables liquidity and capital to engage in investments, as otherwise suggested by theory. Credit lines are found to be held in abundance to their need, but that this might be due to firm specific factors affecting the credit deciding decision. In terms of availability during macroeconomic contraction, credit lines are found to be reduced for 20 % of the firms in the sample, with 10 % experiencing a reduction material enough to affect operations. Holding relative to the total number of firm-years analysed in the sample however, material reductions are only found to be taking place in 2.1 % of the observations.

CHAPTER 2. INTRODUCTION

During the past 10 years, the field of financial literature has seen a substantial increase in studies revolving around bank lines of credit. But while the topic has received increased attention, it is only in recent years that credit lines began being investigated empirically, instead of via models and theories. Driving this increase towards more empirical testing has been an increase in the importance of credit lines as a financing tool. Corporate decision makers are putting more and more attention into how credit lines can be used as the marginal source of financing or liquidity, primarily due to the inherent flexibility that characterizes them. As such, credit lines are often held in comparison to cash-holdings, and much has been theorized about their relative usage and application.

Before the focus on empirical testing, earlier studies focused on modelling and scenario construction to determine the role of credit lines in corporate capital structures. This research has revolved around two types of usage for credit lines: Short term liquidity and the ability to supply future capital to engage in investments. Today, these two aspects are still assumed to be at the core of credit line obtainment.

Along with the increasing interest and dependency on credit lines in the markets however, also came important questions of how 'safe' these credit lines are. Credit lines are not uncontingent loans, but in many cases dependant on the firms' ability to comply with a often long series of covenants. Many of which are linked to firm financial performance, primarily profitability and cash flow. Based on this fact, a current discussion in the field of study is how credit lines behave when the firm holding it experience a negative performance and might be needing the credit line more than ever. With the economic paradigm many firms are facing ex-post

the recent financial crisis - funding and capital resources are pushed to be even more important parts of the business landscape than previously seen, especially in terms of liquidity. Having the best liquidity possible becomes paramount for firms in stressed and volatile economic environments, and I find my study to be a mediator in this field by trying to provide new information and insights to the case.

This project is thus set to evaluate and test the use and availability of bank lines of credit for a sample of 95 public non-bank US firms. More specifically, the thesis will investigate to what level bank lines of credit are employed, what they are used to finance and how they behave during stressed economic scenarios.

Supplied with such a scenario in the recent financial crisis, I try to bridge this gap by performing an empirical study of how bank lines of credit are used and perform under negative economic shocks that stresses firms' ability to comply with contingent loan covenants. I do this by extracting and analysing empirical data for a sample of non-bank firms, spanning the recent global financial downturn from 2007 to 2011. The majority of earlier research is based on similar firms, and the selection of these here will help comparability of the results going forward.

To narrow the scope of the analysis, two **limitations** are set up. (1) Credit line usage will only be investigated in relation to short term liquidity and future capital to engage in investments. (2) Covenant violations will only be investigated in regards to the two main measures: Cash-flow and profitability.

RESEARCH QUESTION

The purpose of this project is to investigate statistical and empirical evidence of the usage and availability of credit lines in regards to short term liquidity and future capital to engage in investments by using new primary data, and a comprehensive set of well tested predicting variables.

This leads to the following key research question, with additional sub questions:

Are bank lines of credit durable liquidity tools that can be used to fund short term liquidity and investments, even during negative economic shocks?

- What is the position and dependability of bank lines of credit for public non-bank firm?
- How do bank lines of credit usage behave under a negative economic shock for these firms?
- How contingent are bank lines of credit availability on firm performance for these firms?

CHAPTER 3. REVIEW OF LITERATURE

1. **Boot et al. (1987).** One of the earliest studies regarding credit line usage for investment purposes, is the study in 1987 by Boot et al. (Boot et al. 1987) (See also Kanatas 1987, Houston & Venkataraman, 1990, Maksimovic, 1990.) The study by Boot et al. initially focuses on transaction costs being a motivating factor for bank lines of credit use, but also takes a another perspective on the topic and use game theory to point out that "loan commitments", reduces moral hazard, align incentives between parties and help obtain a better equilibriums in the markets. The conclusion being that lines of credit are used, primarily since they mitigate agency cost between the borrower and the lender in an investment scenario.

2. **Berkovitch and Greenbaum (1991).** Another perspective was put forward the findings of Boot et al., but build upon this early foundation by applying a two stage investment scenario and studying the effect of lines of credit on the ex-post investment decision of firms. Their findings show that using lines of credit can resolve underinvestment problems arising from ordinary debt funding. They do this by decreasing information asymmetry and providing flexibility at the later stages of an investment. Consequently, they view this effect, the investment effect, to be one of the main drivers of bank lines of credit.

3. **Duan and Suk.** In their study of bank lines of credit, Duan and Suk also focuses on how bank lines of credit as a capital tool is used to fund future investment opportunities. The paper uses a model that endogenizes the firm's investment decisions, while analySing the implications of using loan commitments in how firms take investment decisions in competitive

capital markets. The principal hypothesis investigates if a firm with a future investment project is motivated to use lines of credit as a "blank check" to fund a future investment project, rather than wait until a future point in time to borrow at the then prevailing spot rate. Taking out a bank line of credit will allow borrowing up to a pre-determined amount at a pre-determined rate in the future. Constructing this model yields result that show firms over investing when having a line of credit, and that a line of credit to a significant degree can be viewed as a hedging tool which hedges towards future fluctuations in spot rates or access to credit markets that may otherwise defer or prohibit investing.

4. **Martin & Santomero, (1997).** Martin and Santomero models the demand for credit lines, and find that credit lines permit firms to move quickly to take advantage of investment opportunities. They attribute this to the relative speed and flexibility in debt obtainment, presented by credit lines.

5. **Sufi, (2005).** Turning the emphasis over to the aspect of liquidity, and looking at the empirical data on how firms use bank lines of credit in liquidity management, an influential article is made by Amir Sufi. Sufi was one of the first to use Form 10-K data as a source of data for the corporate use of bank lines of credit while systematically analysing it. Analysing the then largest sample in the literature, Sufi investigates a sample consisting of 1.916 firm year observations from 1996- 2003. The approach taken is to look at which firms use bank lines of credit, and how they use them. Similar to the approach taken in this thesis. Taking note from the more theoretical approaches by previous studies – reviewed in the next section in regards to cash - it is acknowledged that there is a need for empirical testing of the different hypothesis previously put forward – primarily the liquidity aspect. His study is boiled down to be focusing on answering the main hypothesis;

that bank lines of credit provide a unique source of financial flexibility to firms that obtain them.

6. **Chava and Roberts, (2008).** The Sufi article further builds upon this argument, by documenting that the important correlation between bank lines of credit, and profitability and cash flow, is heavily driven by financial covenants put down by banks who supply the credit. This is supported by Chava and Roberts. Chava and Roberts finds that covenants, and the potential for violation, are embedded in mostly all loan contracts, and therefore a risk for largely all firms. They also document that in general, declining financial performance of firms is likely to trigger covenant violations leading to amendment of the loan contracts.

CHAPTER 4. PROJECT OBJECTIVES

1. To find the primary tool employed by firms to cope with the adverse effects of a negative economy.
2. How credit line availability during stressed scenarios is linked to firm performance.

CHAPTER 5. RESEARCH METHODOLOGY

RESEARCH DESIGN

I am using a primary inductive methodology approach in this project, since I am trying to use specific observations to create findings that can be applied to a general context. The methodology applied is to begin with a randomly selected sample from which findings are presented, analysed and interpreted. After the primary task of selecting the random sample, my research continues with a set of pre-determined measures and variables for analysis. From these, I will try to detect patterns and regularities in the data in order to form a 'hypothesis' from which I can derive a general conclusion that answers the research questions. A quantitative data technique is used and analysed. The data collected is a secondary data collected from the bank credit lines user website and the working calculation is taken with the help of bank credit lines data review program.

SAMPLE

The sample unit consisted of the employees from various firms and the public in general. To collect the data the sample size taken was from members who shared their views on bank lines of credit. The area selection was not specific as the data is to be taken was for firms related to banking the people were selected at random, a mix of bank employees and the people who are related to it. In order to provide validity of the gathered data in saying something about the usage of bank lines of credit, there is a need to ensure data measures, what 'it is supposed' to measure. To secure that, I here outline which parameters I will look at, and how I will use them in my analysis to derive reliable results.

The dataset will consist of firms with 5 years of data on the following variables:

- Total assets - This item represents the total assets/liabilities of a company at the end of the fiscal year.

- Short term debt - This item is the sum of 3 parameters
  - ☐ Accounts payable (including income taxes payable)
  - ☐ Current liabilities
  - ☐ Debt in current liabilities

- Long term debt - Include debt with a maturity of longer than one year, such as bonds, mortgages, long term lease obligations (capitalized lease obligations) and similar debt.

  Using Compustat data on long term debt does not determine the underlying source of the debt obligations, e.g. whether it be from bank notes, private placements, public issues or important to the study, bank lines credit.

- Cash holdings / balance sheet cash – is defined to represent any immediately negotiable asset or any instruments such as cash, checks, letters of credit, money orders, among others.

CHAPTER 6. DATA ANALYSIS AND INTERPRETATION

To initiate the analysis section of this thesis, I start with a summary analysis of the data collected. In order to investigate the type of firms in the sample, their overall usage of credit lines and their propensity to be affected by negative changes in economy, the sample is analysed based on a set of key measures, as described earlier. The analysis of the measures serves to set the average levels for all the involved variables that will undergo time series analysis. It furthermore helps define each measures corresponding effect in relation to the firm and either is dependency towards or usage of credit lines.

The first half of table 1 represents the summary statistics based on firm characteristics formed from the Compustat data. For the first three measures of cash, assets and debt ratio, I notice the large variation indicated by the standard deviation. It is estimated that the wide array of different firms in terms of size and debt composition leads to extreme outliers, in which case the median, for these three variables might be viewed as the more stable and accurate statistical parameter. For the remaining of the data, I use the mean (average).

Variable	Percentage	Mean	Median	Std. Dev.
Firm Characteristics				
Assets - Cash		407.3	32.792	1132.2
Assets - Total		10063.2	1243.086	28143.4
Debt ratio (short term debt/long term debt)		57.42	0.67	443.93
Cash / short term debt ratio		0.5972	0.2907	1.1199
Long term Debt/Assets		0.2997	0.2051	0.5443
Short term Debt/Assets		0.2296	0.1937	0.1728
Total debt/Assets		0.5293	0.4548	0.5538
Profitability (EBITDA/Assets)		0.1039	0.1070	0.1926
Cash Flow (EBITDA/(Assets-Cash))		0.1055	0.1132	0.3018
Line of credit variables				
Has a line of credit {0,1}	0.87368421			
- No variation over observation period	0.81473684			
Size of credit line		484.1533	120	
Unused line of credit		295.4715	40	
Total line of credit/assets		0.1821	0.1181	0.2285
Used line of credit/assets		0.0575	0.0022	0.1107
Unused line of credit/assets		0.1246	0.0728	0.1649
Cash holdings/assets		0.0998	0.0575	0.1255
Bank liquidity ratio: Total line/(Total line+ cash)		0.5617	0.6262	0.3588
Bank liquidity ratio: Unused line/(Unused line+ cash)		0.4988	0.5412	0.3632

For the random sample, the median cash level is 32.8 million and the median size of the companies (measured in assets) is 1.243 million. On average, cash, a primary source of liquidity, only represents 2.6 % of the total assets of the firm if measured at the media - but there is a large amount of variation included in both these measures. Holding relative to other studies using Compustat data – employs a bigger more statistically valid sample, and find a cash/asset ratio of 2 %, and a Bank line of credit / asset ratio of 15 % (18.2 % for my sample), which indicate that my sample correctly depicts the characteristics of the full sample universe, and that variations are common. The debt ratio median is 0.67 or 67 %. Total debt is an average of 0.529 or 52.9 % of assets, where the long term debt portion of this is 0.29 or 29 % of assets 0.22 or 22 % of assets. Firms with high levels of short term debt will have greater incentives to draw down on their lines of credit in adverse situations to pay off set short term debt. As a result, these companies are also more exposed to reductions and cancellations of their credit lines.

Profitability and cash flow are both approximately at 10 % on average, with profitability averaging 0,1038 or 10,38 %, and cash flow averaging 0,1055 or 10,55 %. At first this strikes as a substantial average cash-flow and profitability. The numbers however, also show that the average firm can be exposed to low or even negative profitability, within a small margin. The data shows standard deviations of .192 and .301 respectively. In both cases a one standard deviation drop from the mean would result in a level so low, it would be assumed a potential covenant breaching level. For cash-flow, the average cash-flow can drop to 0 with a drop from the mean of just 1/3 of standard deviation. Potentially, this low level could also result in a covenant violation.

In sum, the firms in the sample are suggested to be having the right characteristics present to objectively display any effect on liquidity and performance that could arise from reductions or cancellations of their credit lines.

TIME SERIES ANALYSIS OF LINES OF CREDIT USAGE FOR LIQUIDITY

The main goals of this thesis is to analyse how bank lines of credit behave during a stressed economic scenario. This is done to test if their usage and importance increase/decrease, as well as if their availability is contingent on firm performance, and if so – to what extent.

I analyse a total of six measures: total line of credit/assets, used line of credit/assets, unused line of credit/assets, Cash holdings/assets and the two bank liquidity ratios defined in the previous section. To construct the data for the time series analysis, I used the existing data, but segmented this data into each of the five years from 2007 through 2011.

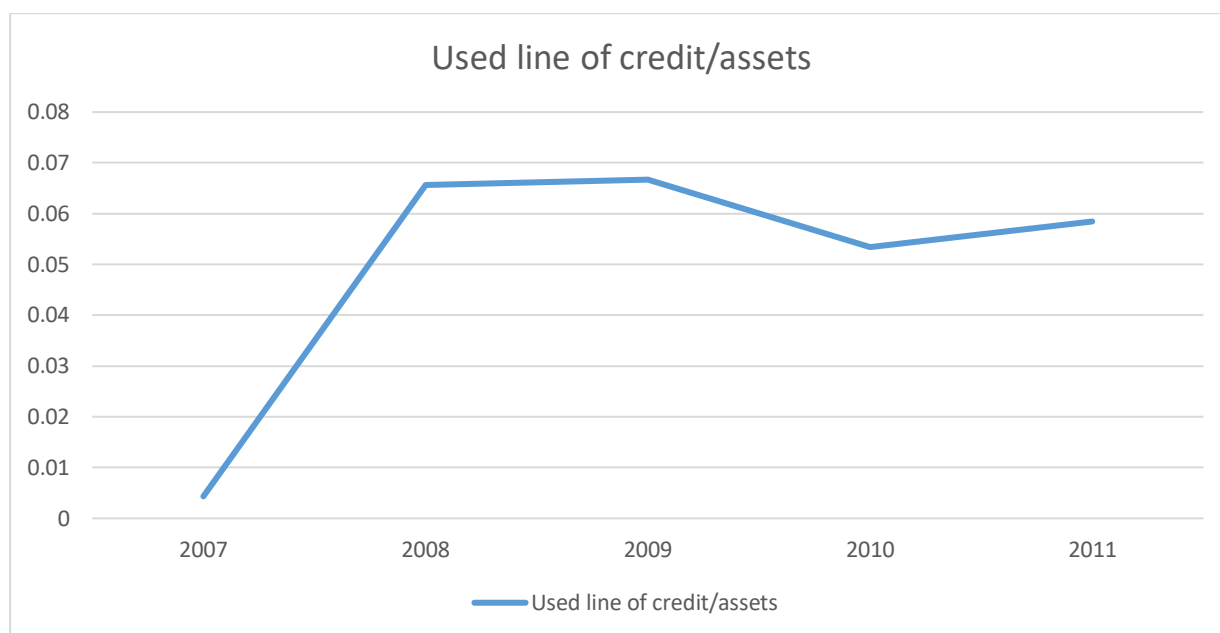| Variable	2007			2008			2009			2010			2011		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Line of credit variables															
Total line of credit/assets	0.1735	0.1291	0.2008	0.1839	0.1291	0.2189	0.1927	0.1240	0.2549	0.1893	0.1011	0.2362	0.1721	0.0917	0.2332
Used line of credit/assets	0.0433	0.0000	0.0917	0.0656	0.0123	0.1094	0.0667	0.0113	0.1232	0.0534	0.0000	0.1052	0.0584	0.0018	0.1225
Unused line of credit/assets	0.1302	0.0845	0.1617	0.1183	0.0631	0.1529	0.1259	0.0585	0.1821	0.1359	0.0732	0.1718	0.1137	0.0676	0.1569
Cash holdings/assets	0.1089	0.0616	0.1365	0.0995	0.0500	0.1383	0.0993	0.0588	0.1102	0.0966	0.0688	0.1162	0.0944	0.0514	0.1266
Total line/(Total line+cash)	0.5741	0.6150	0.3409	0.5920	0.6753	0.3537	0.5619	0.6438	0.3558	0.5530	0.6185	0.3658	0.5277	0.5990	0.3830
Unused line/(Unused line+cash)	0.5166	0.5634	0.3442	0.5122	0.5288	0.3726	0.4785	0.5141	0.3529	0.4966	0.5588	0.3740	0.4948	0.5405	0.3763

TOTAL LINE OF CREDIT/ASSETS
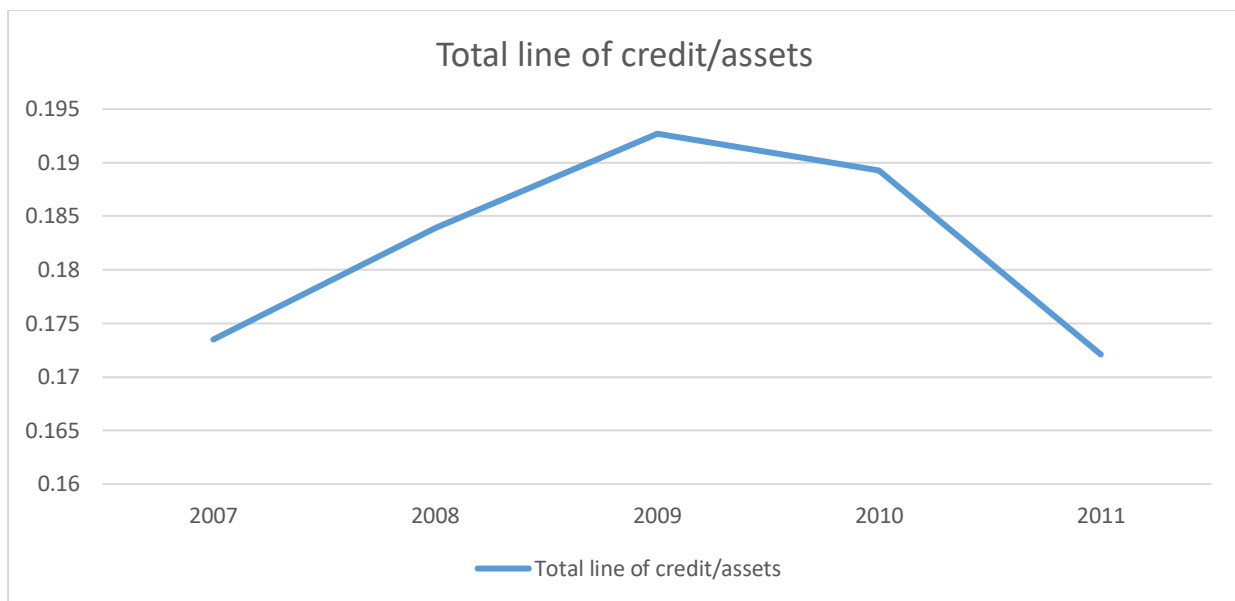
In 2007, the "normal state" year, the Total Line of Credit/Assets ratio was an average of 17.35 % aggregated for the sample. This number translates into every firm having 173.5 million in line of credit for every 1.000 million in assets. Looking at the first half of the time period, this ratio peaked in 2009 at 19.27 % showing an increase of 11.02 % or 19.2 million in the average amount of credit line held. For the second half going from 2009-2011, the ratio drops back and returns to slightly below the initial level at 17.21 %.

The drop from 2009-2011 on the other hand might be due to two factors. (1) Firms that initially increased their liquidity position by increasing their credit line leading up to 2009, may after 2009 be reducing these again. (2) The lagging characteristics of credit lines combined with the escalating crisis makes the effects on availability to first kick in from 2009 and onwards. I find both to be equally likely, but as the data does not go beyond 2011, the trend for the lagging characteristic cannot be verified or credibly determined.

USED LINE OF CREDIT/ASSETS

Used line of credit/assets

[chart: line graph showing "Used line of credit/assets" with y-axis from 0 to 0.08 and x-axis years 2007–2011. Values rise from about 0.004 in 2007 to ~0.065 in 2008, ~0.067 in 2009, dip to ~0.053 in 2010, then rise to ~0.058 in 2011.]

Analysing the actual usage of lines of credit to assets does not indicate to the same extent, that firms collectively drew down their credit lines during the period as a whole, or in the peak year of 2009. The increase in credit line usage went from 4.33 percent in 2007 to 6.67 percent in 2009, suggesting that even though firms secured their liquidity by increasing their max limit availability under their credit lines – they did not draw down on these as extensively to fund set short term liquidity. In percentage terms, the draw downs increased 54 %, but compared to asset size, the increase is not substantial at only 2.34 percent.

Looking more nuanced at this, I include the standard deviation to look for changes that is not captured by the average nature of the mean measure. During the sample period the standard deviation increases about 30 %, from 0.0917 in 2007 to 0.1232 in 2011. What spurred this increase in standard. Deviation is a greater variety in the numbers, meaning that some firms are drawing down more heavily on their credit lines, i.e. exhibiting more reliability on these for liquidity, than

others. Still, on an overarching level, the data does not indicate a substantial increase in the usage of credit lines during the stressed scenario.

UNUSED LINE OF CREDIT/ASSETS
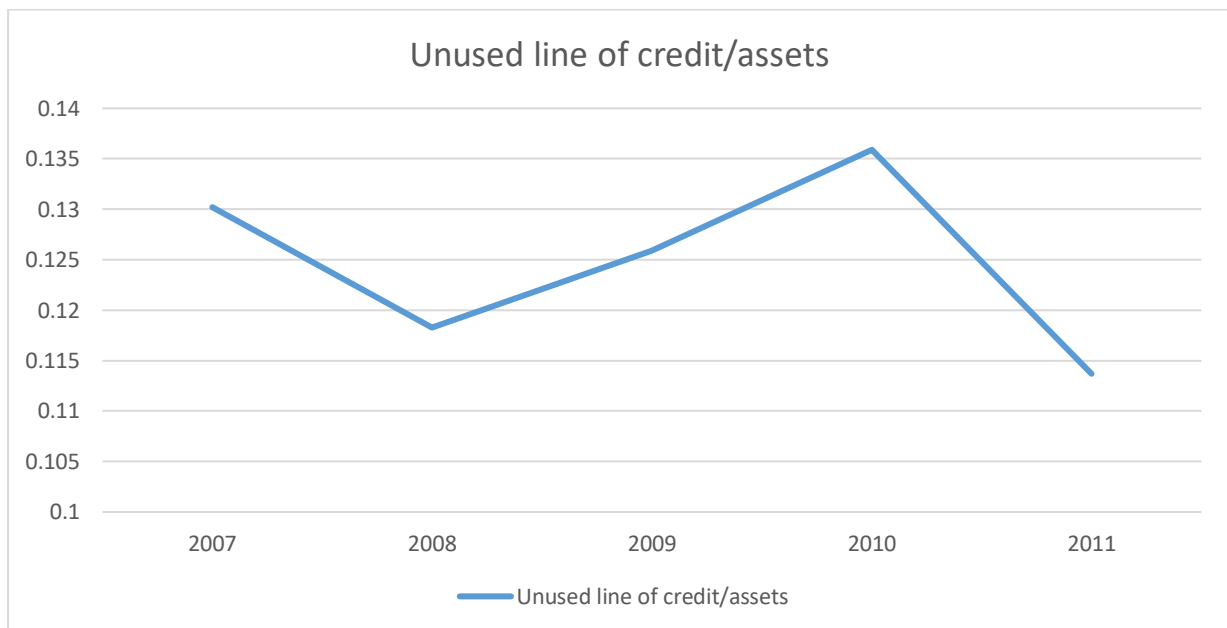
In 2007, the level of line of credit available (total line of credit, reduced by the amount drawn amounted to 13.02 % of assets. During 2008 this amount dropped to 11.83 %, signalling a small drop in liquidity availability, but grew again through 2009 to a period high of 13.59 % in 2010, before dropping to 11.37 % in 2011. The tendency show that despite firms increasing their total line of credit from 2007-2009, the unused line of credit available dropped, indicating that usage for this period was higher. Still however, the trend is not significant enough to classify credit lines as being heavily used by firms in corporate liquidity management. The drop from 2010 to 2011 is unaccounted for, but is likely due to firm specific variations or a result of declining use + declining maintenance of credit lines as the stressed scenario ebbes out.

All in all it's an important finding, especially compared to the general level as well as increase seen for the total line. It raises the question if firms actually obtain and hold significantly larger credit lines than is in reality needed for usage, even during stressed scenarios where the need to draw liquidity from these credit lines should become apparent. Based on the general data, one could argue that firms hold any given (high) level of credit line to protect against scenarios where liquidity becomes scarce. But when such a scenario is tested as it is here and it still do not motivate credit line usage, the general level of credit line held becomes subject to scrutiny.

CASH HOLDINGS/ASSETS

Cash holdings/assets

Again assuming the 2007 data as the 'normal', cash levels dropped from the normal level of 10.89 % of assets in 2007 to 9.95% in 2009 and finally to 9.49 % in 2011. Not a significant drop that could indicate a substitution to cash reserves instead of credit lines as the main liquidity funding tool. The standard deviation

stayed consistent, meaning that there are no large outliers that skew the data or can be ruled as firm specific exemptions from the general trend.

If firm cash holdings had dropped more significantly during the period, it could be indicating either an increased use of cash, or a reduced degree of cash retention as the source of low credit line usage. No such trend was convincingly proved.

BANK LIQUIDITY MEASURES

Bank liquidity ratio: Total line/(total line+cash)
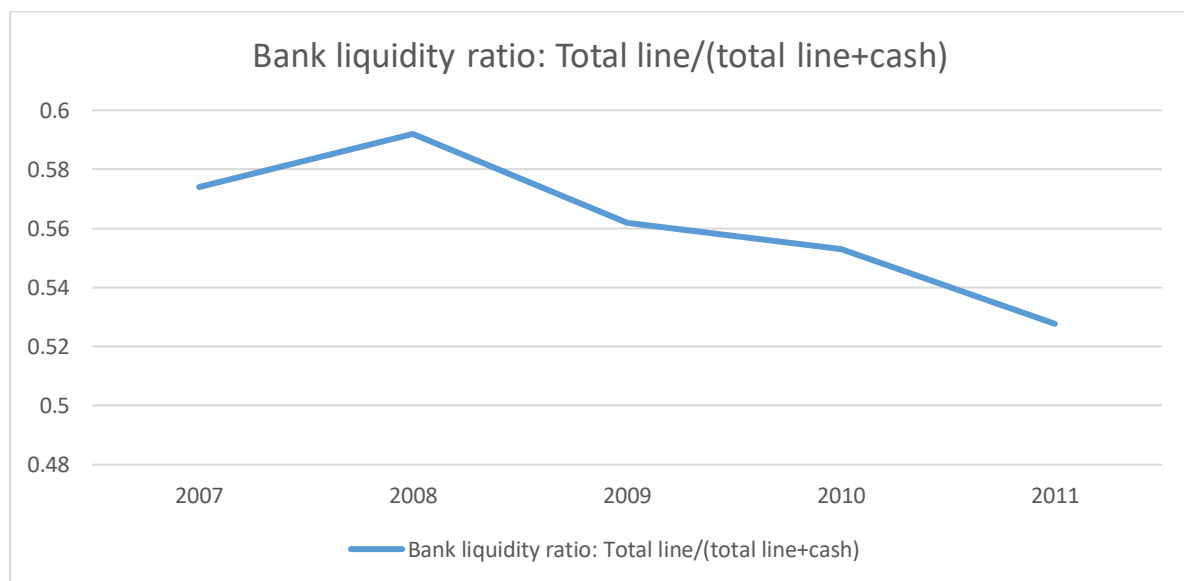
It can be seen that liquidity provided by bank lines of credit totalled 59.2 % of total firm liquidity in 2008, which is the peak in the sample period. From 2008 to 2011, the ratio dropped 6.5 percent to reach 52.7 % in 2011. Although the ratio dropped approximately 6.5 percent, the development still only represents a small to moderate change, and show the same tendency as the previous findings, albeit more distinctive than the development of cash holdings and used line of credit. A limitation is presented again, as the data does not go beyond 2011 to potentially confirm the reduction in bank liquidity that is ongoing up until 2011. While there seem to be a trend of reduction on the credit line availability – it is not possible

to convincingly say how big or what effect the reduction in bank lines of credit may have on driving this downward trend, or if it continues.

INTERPRETATION

The purpose of the time series analysis in this section is to see how bank lines of credit variables (coupled to firm size) behaved during the sample period. The goal is to identify if, on a general basis, the economic distress affected the way firm used bank lines of credit as a liquidity tool. The analysis focuses on the average or collective development for all firms in the sample. To a large extent, this was also examined in relation to cash in order to see if firms distinctively used one or the other in the stressed scenario. The findings show that firms on average increased their line of credit by 19.2 million from 2007 to the peak in 2009, and reduced it back to 2007 numbers by 2011. Neither the used amount of credit lines or cash holdings showed any imperative reduction in their fraction of assets, suggesting that firms in the sample did not apply heavy support from either cash or bank lines of credit to provide liquidity. Rather, and to a larger extent, firms are suggested to be funding short term liquidity with the operating cash flow generated from operations.

The findings based on my empirical data also6 supports earlier theories from studies which suggest that bank lines of credit are used by firms to fund future investments. To be able to shed more light on the relation, I perform more specific in-depth analysis of this to back up the findings so far, and investigate if the investment incentive holds.

PROFITABILITY & CASH-FLOW RATIOS RELATION ON BANK LINES OF CREDIT AVAILABILITY

The effect of bank lines of credit not being unconditional obligations to firms. Specifically the effect of covenant violations and the associated reductions in borrowing capacity during a stressed scenario. Whereas it in this project has so far been concluded that firms do not use bank lines of credit to the extent theoretically argued or held, it has become evident that bank lines of credit are highly valued assets for firms – potentially given firm specific factors. Correspondingly, the analysis of credit lines in terms of how they behave during stressed scenarios has great value.

Credit line availability have been investigated in normal or expanding macroeconomic times, and not with the specific dynamics between bank line of credit availability and covenant related measures in focus. The contributions of my analysis, is to investigate exactly this dynamic by analysing my sample during a time period with a worldwide financial crisis and the worst macroeconomic environment in recent memory. By analysing the data during the financial crisis, I use one of the best possible scenario to stress test bank lines of credit in regards to how affected their availability and size is under stressed economic circumstances. Any trend or predisposition the credit lines would have to be reduced or cancelled due to their non-contingent attributes, will be provided with the best conditions to come to light. I then measure this predisposition via covenant violations and the corresponding reductions in total credit lines.

Companies greatly value bank lines of credit and why a bank lines of credit potentially could be reduced due to drop in certain key financial ratios such as cash-flow and profitability which are the focus here. The reason for these two measures being focused upon, is due to their directly related effect on covenants as suggested by earlier studies (Sufi, 2005, 2009). To provide further backing to

these results and validate the measures for being used in the covenant analysis later, I also perform an analysis of their correlation to covenants and variation in credit line availability. To do so, I first calculate and display both for profitability and cash flow, the fraction of firm year observations with a bank line of credit, segmented into deciles. As the development over time is the primary concern, the top 5 and bottom 5 percentile observations from the Compustat data are eliminated as not to have outliers skew the data. The data is then averaged out for each firm to produce one single measure, which is sorted into deciles depending on the level for the ratios.

The presence of an arbitrary cut-off level to these ratio's in terms of their ability to satisfy credit covenants. The data and analysis also imply that some firms find credit lines less valuable, as they likely rely on internal funding instead. These are specifically firms with high profitability and cash-flow ratios. While these firms should find access and obtainment of credit lines easier, their own ability to supply liquidity via high profitability and cash-flow makes the extra credit capabilities of a credit line irrelevant. In sum, the results support the conclusions of earlier studies, and show that given the two ratios correlation with bank line of credit availability, these are also relevant to measure in terms of determining the degree of covenant violations. I could have chosen to add a selection of other variables to measure, for example tangible net worth, book leverage ratio or interest coverage ratio, but found profitability and cash-flow to be at the core measures affecting bank line of credit availability. Critically, they are also among the measures of financial data that best and most quickly represent and show the effect of the macroeconomic environment on firms' financials.

As an important part of this project is to investigate how bank lines of credit perform during stressed scenarios, I find it important to show how this stressed scenario comes into play. Based on the analysis above, profitability and cash-flow are found to be two of the main criteria for credit line obtainment.

Correspondingly, I find it central to investigate how these two measures behaved during the sample period to prove that a stressed scenario was in fact in play. And To build up the argument for why the sample should showcase any predisposition for reductions in credit lines. As such, I end this section with a time series analysis of both ratios with respect to the 2007-2011 time period. The goal is to use the development in these ratios to derive the effect the negative shock of the macro economy during this period had on the sample population of firms. Based on these findings, I argue that the derived effect from the financial crisis did in fact affect firm related covenant measures, and thus provide the optimal setting for testing covenant violations in estimating the ability for credit lines to be maintained during stressed scenarios.

DEVELOPMENT IN PROFITABILITY AND CASH-FLOW

It becomes evident that the macroeconomic development had a substantial impact on the firms in the sample. Both the profitability and cash-flow measure show this. From the start of 2007 to 2008, the measures drop 17.2 % and 23.5 % respectively. In 2009, the measures have dropped respectively 65.4 % and 76.7 % from the 2007 level. Going forward through 2010 and 2011, both measures recoups, but are still down 17.8 % and 26.9 % from the normal level of 2007.

The tendency showed in clearly indicates 2009 as the most substantial year in terms of the effect on firm financials. Something that is evident in many of the earlier figures as well. The effects captured show how a recession in the macro economy halts growth, cut down consuming and as a result reduces sales and deteriorates profits and cash-flow.

Corresponding to the time series analysis on credit line variables, 2009 was also the year with the largest and clearest divergence from the 2007 value assumed as the 'normal state'. The empirical data in matches what was assumed in the initial of the thesis, namely that the development in the macro economy have a substantial effect on covenant related financial measures of the firms. Based on this finding and confirmation, it is now possible to investigate if the drops in these measures in fact have an effect of firms violating their covenants, and subsequently to what extent these violations potentially result in cancellations or reductions in the firms' access to credit.

CHAPTER 7. FINDINGS AND RECOMMENDATIONS

FINDINGS

Based on my empirical data, I find

1. Cash in the form of operating cash flow, as being the primary tool employed by firms to cope with the adverse effects of a negative economy.

2. My findings indicate firms are increasing their bank lines of credit levels in preparation to the stressed scenario, the measurement of usage of bank lines of credit show only slight actual usage.

3. Credit line usage is found to increase from 4.3 percent of assets to 6.6 percent of assets at most during the sample period. However, to the extent that operating cash flow cannot provide all the liquidity needed – firms are found to be employing bank lines of credit to a slightly bigger degree that cash-holdings.

4. In terms of liquidity provided by the credit lines, this is also found to be reduced during the stressed scenario, despite the increase found to be taking place in the beginning of the period driven by the exercise of options to increase the available amount under the credit lines.

RECOMMENDATIONS

I find several new avenues that could be explored in future research, three of which I highlight here:

1. The limitations of the sample naturally highlights future research that breaks down these limitations. For this project, a future research could be to apply the testing to another sample group – for example a mixed group of big and small, private and public firms to see if different effects may arise for certain types of firms. Such future research could also enjoy from a collection of quarterly data instead of yearly data. As evident from the theory and the results presented here, there are interesting questions regarding credit line usage and reliability/availability still needed to be answered.

2. Investigate how factors such as the overall commitment from the borrower (bank) to the lender (firm) may affect violation sanctions and covenant setting.

3. Investigate if based on the findings of this thesis and in combination with other findings, it is possible to set up a model that estimates the 'optimal' level of credit line, incorporating factors like pricing, the firm specific factor and worst case availability drop statistics. Such a study might have great influence on how firms in the future approach their credit deciding policy and capital structure setup.

CHAPTER 8. CONCLUSION

This project sets out to test the important tool of bank lines of credit, used vastly in today's capital structures of firms. During the last two decades, bank lines of credit have become an increasingly large part of how firm finance themselves. Accordingly, the body of scientific literature surrounding the topic have also increased. Still however, there is much to be investigated. Based on a disconnect from the current studies towards the use of empirical material, I form a sample of public based non-bank firms from which I source empirical data to test some of the theories and estimations made about bank lines of credit. I do so in a stressed economic scenario that should highlight the characteristics of credit lines and their usage plus availability. Specifically, I test two main opinions in the literature concerning the usage of credit lines. Focusing on the usage of credit lines in regards to cash usage, liquidity usage and future investment use, I try to bridge the gap of missing empirical data, and provide new insight to these topics. Furthermore I investigate the concern about how contingent credit lines are on firm performance, by investigating profitability and cash-flow in regards to covenant violations and associated reductions in credit line availability.

In explaining why firms hold bank lines of credit, a main belief is that they are used for either capital to engage in future investments, or liquidity purposes during economic contractions. For the liquidity aspect, it is debated in the literature whether firms draw on their credit lines opposed to cash, when managing their short term liquidity needs during a stressed scenario. The other main belief is that this relation is reversed, and that during economic contractions, cash is primarily used to provide liquidity.

CHAPTER 9. BIBLIOGRAPHY

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