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HOW DO DEBT RENEGOTIATIONS DIFFER BETWEEN NON-DISTRESSED AND DISTRESSED FIRMS?

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ABSTRACT

Using a large sample of US-loan amendments between 1997 and 2010, provided by DealScan, this comparative study aims to evaluate whether debt renegotiations impact differently distressed and non-distressed firms and which changes of the original contracts can be more relevant to reduce financial distress. Focusing on the primary terms of loans (amount, maturity, and spread), this study did not find evidence of this difference. The model generated gives no indication that changes of the original terms of the loan contributes to the reduction of firms' financial distress. Nevertheless, this is an exploratory study which still depends on a better formulation of the concept of financial distress.

Keywords: financial distress, debt renegotiation, loan amendment

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1. INTRODUCTION

One of the first steps of firms in financial distress is to ask their creditors for an alleviation of the terms of their credit contracts. This way, borrowers have enough liquidity to maintain the normal operations while managers search for more profitable investment opportunities. Generally, only after this process has failed and one of the parts (creditors or borrowers) no longer believes in the success of turnaround, the firm files for bankruptcy in the court. Perhaps it was the extreme importance of loan renegotiations for firms in financial distress that has lead authors to analyse the structure of debt contracts in a context of default (Aghion and Bolton (1992), Bolton and Scharfstein (1996), Hart and Moore (1998)). Generally, these studies use accounting data to identify technical default, poor operating performance and high financial leverage (Smith, 1993), all indicators that the worse can happen.

Although more recent studies have tried to fill the gap by looking for debt renegotiations as a whole (Roberts and Sufi, 2009) or for the renegotiation of debt covenants (Denis and Wang, 2014), I am not aware of a comparative study on how debt renegotiations differ between distressed and non-distressed firms. However, there are still questions that remain to be answered: (1) Are these renegotiations successful in helping firms to resolve financial distress and to avoid filing for bankruptcy? (2) Do firms in financial distress try more often to renegotiate their contracts, and are they successful? (3) Are the loan amendments similar or do they have a different magnitude?

In this thesis, I attempt to answer these questions by analysing a sample of loan amendments granted in the US (in US-dollars) between 1997 and 2013 (excluding financial companies) available on LPC-DealScan. This information is combined with two other databases that provide accounting and bankruptcy data – Capital IQ Compustat Database and UCLA-LoPucki Bankruptcy Research Database (BRD), respectively. This rich and detailed

data from LPC-DealScan reports information on new and amended loans, indicating the primary terms of the loan (amount, maturity, and interest rate), debt covenants and, for the amendments, individual comments describing the process and results. I analysed the data to identify any inconsistency and focused my work on changes in amount, maturity, spread, and number of amendments.

The data is analysed to determine the effect of changes of specific loan terms on Z-Score (Altman, 1968), the model chosen to identify financial distress. Literature on financial distress is also very extensive, but there is not a general concept of what financial distress is and how it can be measured. More recent models have emerged, but they remain subjective.

Although the relevance of the questions is unquestionable, this study does not provide new information on the topic. The findings suggest that some variables may have an impact on Z-Score and financial distress, but no pattern can be identified. Therefore, this model must be enhanced to better reflect the reality of debt renegotiations by working with other indicators of financial distress as the dependent variable or including other variables.

The findings do support the hypothesis that changes in the terms of the loan can help firms to reduce their financial distress. We can still not reject the hypothesis that firms in financial distress require a different approach from the remaining companies. Strong banking relationships can also accelerate the renegotiation process, but it is still necessary to identify which terms should be loosed or restricted to better prevent bankruptcy. However, this is an exploratory study which contributes to the growing literature on debt renegotiations and financial distress. It is trying to open a debate on the importance of a comparative study in this topic to help managers and creditors to deal with a firm in financial distress.

The remainder of this paper is structured as follows. Section 2 provides a background on the literature of debt renegotiations and how financial distress has been treated in these studies. Section 3 details the data collection process. Section 4 presents the summary statistics of the

sample, while Section 5 results for my hypothesis on how debt renegotiations differ between distressed and non-distressed firms and how loan amendments can help to reduce firm's Z-Score. Section 7 identify the main remarks of this investigation and concludes.

2. LITERATURE REVIEW

The renegotiation of debt contracts has been extensively studied for the past decades. Nevertheless, Roberts and Sufi (2009) realised that fundamental questions regarding the frequency, the factors and the outcomes of debt renegotiations persisted as most studies had been conducted in a context of default or bankruptcy (Aghion and Bolton (1992); Bolton and Scharfstein (1996); Hart and Moore (1998); von Thadden, Berglöf, and Roland (2010); Gennaioli and Rossi (2013)). Specifically, a default occurs when a firm violates any provision of an agreement with a creditor, either by failing a scheduled payment or by breaching a covenant (with the latter being called a technical default), while bankruptcy implies that the firm's liabilities exceed the value of the assets. To protect the contractual rights of all interested parties, bankruptcy must be formally declared in a court in order to proceed to the reorganization (commonly known by Chapter 11 in US) or the liquidation (Chapter 7) of firm's assets (Altman, Hotchkiss, and Wang, 2019).

The current literature on debt renegotiations has chosen to look for firms in technical default, and more specifically to firms that have breached covenants. Mainstream theories identify moral hazard and monitoring incentives as the main reasons to use covenants (Rajan and Winton (1995); Park (2000)), allowing creditors to identify early signs of firm distress so they can act accordingly, either by calling the debt or granting a waiver (Chen and Wei, 1993). However, Roberts and Sufi (2009) report that only 18% of their renegotiation sample of 1,000

private credit agreements granted between 1996 and 2005 is associated with a covenant violation or payment default. My calculations, in turn, estimate that the percentage of contracts granted in the US (in US-dollars) between 1997 and 2013 (excluding financial companies) with at least one covenant is only about 50%. Therefore, we can have two firms in similar conditions of financial distress requesting a debt renegotiation, with one being considered in technical default while the other is not.

On the other hand, recent trends in the loan market also limit a study on debt renegotiations based on covenant violations. First, Altman, Hotchkiss, and Wang (2019) highlight that an increasing number of loans (around 75% of new institutional loans in 2017) carry affirmative and negative covenants, but not financial covenants. These "covenant-lite" loans may require borrowers to disclose information or maintain a certain behaviour, but they do not limit the firm to specific levels of financial performance. With a low (or inexistent) barrier to alert creditors of technical default, firms can be in financial distress for a long period of time before the creditor notices it.

Second, nonbank financial institutions, which have a relevant role in the syndicated loan market both at the origination of the loan and through turnover in the secondary market (Sufi (2009); Altman, Hotchkiss, and Wang (2019)), grant credit to riskier borrowers with less restrictive covenants (Kang and Zhuang, 2019). According to Kang and Zhuang (2019), this may be because nonbank lenders lack monitoring skills (more costly than traditional banks) and/or have less incentive to monitor their borrowers (shorter-term perspective than traditional banks and/or potential returns through trading). Still, by requiring looser covenants to riskier firms, these banks are reducing the likelihood of technical default from borrowers that are more likely to fall into financial distress. Again, many of these riskier borrowers may try to renegotiate their debt contracts even if there is no covenant violation.

Let us not forget as well that Dichev and Skinner (2002) provided evidence on the debt covenant hypothesis (Watts and Zimmerman, 1990), so managers of firms in financial distress may engage in financial reporting decisions to avoid a technical default. Therefore, I purpose to focus on debt renegotiations from a perspective of financial distress, which ultimately can lead to bankruptcy. To the best of my knowledge, prior literature did not pursue this route, which, I suppose, it is because financial distress lacks a specific and clear definition (Lau (1987), John, Lang, and Netter (1992), Platt and Platt (2006)). It is understandable that authors have preferred to focus on direct and measurable variables, such as technical default and negative operating performance (negative EBIT and negative Net Income), instead of constructed concepts based on those same variables. For this reason, the literature on this topic has a large production with an accounting-perspective, but not a study that considers financial distress more broadly.

Since there is no consensus on what financial distress is – is it just a problematic phase with a possibility of turnaround or is the firm almost bankrupt? –, the development of formal methodologies to predict financial distress has been very limited and often mistaken with models to predict bankruptcy (Platt and Platt, 2008). The difference, however, is crucial as a reliable prediction of financial distress may help managers to identify problems early on and save the company, while filing for bankruptcy can already imply the liquidation of assets (Platt and Platt, 2006).

Although the indicators of financial distress and bankruptcy may be distinct, it seems reasonable to assume that a company with a significant likelihood to file for bankruptcy is already in financial distress. Therefore, I intend to use the extensive research on bankruptcy and their models (Beaver (1966), Altman (1968), Ohlson (1980), Shumway (2001)) to verify whether debt renegotiations help to alleviate firm's distress. Specifically, I will use the Altman's Z-Score method (1968), which is based on a small sample of thirty-three

manufacturing firms, to classify the firms as Distressed if Z-Score is lower than 1.81. It is true that Z-Score should be used with caution given the specificity of the original sample, but predictions of bankruptcy in one year have been greater than 85%, which justifies its common adoption (Altman, Hotchkiss, and Wang, 2019).

3. HYPOTHESIS DEVELOPMENT

To formally measure the impact of debt renegotiations on the firm's ability to turnaround and exit the state of financial distress, I use a linear panel data regression model to estimate how Z-Score changes as the bank accepts to renegotiate the terms of a debt contract, controlling for firm, size, and profitability. I focus on this analysis because debt renegotiations with creditors is an out-of-court restructuring that borrowers prefer to the alternative of filing for bankruptcy (Altman, Hotchkiss, and Wang, 2019). If more beneficial debt conditions have an important role on firms' turnaround, we should observe a decline of financial distress.

Then, my research hypothesis expressed as a null hypothesis is:

H1: Renegotiating the loan conditions provides financial relief to the borrower, so I expect the firm's Z-Score to increase (and consequently the probability of filing for bankruptcy to decrease).

Putting it into a model, we can read it as:

$$log(ZScore_{i,t+1} - ZScore_{i,t-1}) =$$
$$= B_0 + B_1 \Delta Amount_{i,t} + B_2 \Delta Maturity_{i,t} + + B_3 SpreadDecrease_{i,t}$$
$$+ B_4 Purpose\ of\ Loan + B_4 Method\ of\ Distribution$$
$$+ B_4 Number\ of\ Amendments + B_5 Other\ Controls + \varepsilon_{i,t}$$

with i = firm and t = year

The alternative hypothesis can be described as follows:

H0: Renegotiating the loan conditions has no impact in controlling the financial distress of the firm, so the Z-Score either decreases or remains the same.

To complement this analysis, I will also investigate the effects of loan amendments on leverage and credit rating downgrades. Although there is no correlation between the Z-Score and leverage (p = -0.05) and between the Z-Score and credit rating downgrades (p = -0.005), I expect a significant effect of loan amendments on leverage and credit rating downgrades. For these variables, though, loan amendments should lead to a decrease of leverage and credit rating downgrades.

4. DATA AND METHODOLOGY

I begin by analysing the UCLA-LoPucki Bankruptcy Research Database (BRD), which is collected and disseminated by the UCLA School of Law. This database includes all public companies that filed an annual report with the Securities and Exchange Commission (SEC) for a year ending not less than three years before the filing of the bankruptcy since October 1979, and that reported assets worth $100 million or more in 1980 dollars (UCLA-LoPucki Bankruptcy Research Database, 2020). Considering the inflation rate in the US, this amount is equivalent to about $209 million in 2000 dollars and $313 million in today's prices (Webster, 2020).

For this master thesis, I am going to consider only the companies that filed for bankruptcy between 2000 and 2013. This time horizon is expected to provide extensive results as it includes the two darkest times for bankruptcy filings in the last twenty years: the dotcom bubble crash

of 2000-2001 and the subprime mortgage crisis (Altman, Hotchkiss, and Wang, 2019). The database returns 634 entries that meet this criterion, corresponding to 573 companies with a unique Global Company Key (GVKEY: a six-digit number key assigned to each company in the Capital IQ Compustat Database)[1]. The duplicated cases belong to companies that filed for bankruptcy more than once in the selected analysis period. For example, the company US Airways with the GVKEY 010946 filed for bankruptcy for the first time in November 2002, emerged in March 2003, and refiled in September 2004. Since these filings are considered two distinct processes, the company shows up twice in the database.

Having defined the analysis period, I use the Capital IQ Compustat Database to gather the annual accounting data between 1997 and 2013, since I will study the impact on firms in the three years after each loan amendment. At this point, I also compute the potential financial distress of a firm measured by Altman's Z-Score method (1968). This information is complemented with the indicators about leverage and credit downgrades, measured as follows:

(i) *Z-Score*: Combination of five financial indicators according to the original Z-Score (Altman, 1968). I will consider the author's guidelines, in which a Z-Score below 1.81 predicts a bankruptcy in one year and a Z-Score between 1.81 and 2.99 is a "gray area";

(ii) *Leverage*: Total debt (current and long-term) divided by total assets (Compustat [DT/AT]);

(iii) *Credit downgrade*: an indicator variable equal to one if the firm registers a credit rating reduction by Standard and Poor's (Compustat [S&P Domestic Long-Term Issuer Credit Rating]).

[1] The divergence occurs because the field with this number key is empty in one entry, it is "999999" in thirty-three entries, and it is duplicated in twenty-seven other cases. According to the database's protocols, this field is "999999" when Compustat does not provide a GVKEY that qualifies for the inclusion, so I will exclude them from my sample as well as the entry with an empty field.

Then, I move to collect the corporate loans from the Loan Pricing Corporation Deal Scan (LPC DealScan). This database contains mostly commercial syndicated loans granted to US and foreign corporations and provides exhaustive information on loan pricing and contract details (Wharton Research Data Services, 2010). The data begins in the 1980s and it is based on SEC filings – Chava and Roberts (2008) estimate that public information is about 60% of all data –, reports from the credit industry, and other internal sources. According to Carey and Hrycay (1999), the coverage of the global commercial loan market in the US was between 50% and 75% until the mid-1990s but increased significantly from 1995 onwards.

Each observation on LPC DealScan corresponds to a facility, which contains information such as the type of loan, amount, maturity, etc. Each facility, in turn, can be grouped into a package (or deal), that represents a contract signed between a borrower and a lender on a specific date. For example, in September 2005, the company Johnson & Johnson signed a $1.5 billion syndicate agreement with Citibank, JP Morgan and Bank of Ireland, which included two loans of $750 million each: a 364-day loan and a five-year revolver line.

In WRDS, LPC DealScan provides twenty-one datasets with diverse information about the borrower, the lender, the purpose of the loan, etc. For this research, I use the following:

(i) Facility, which contains multiple information about each loan;

(ii) Current Facility Pricing, describing the amount the borrower pays per facility over reference rates (Prime, LIBOR);

(iii) Facility Amendment, which describes all amendments, including comments from the lender, disclosed for each facility;

(iv) Deal Amendment, which describes all amendments at the package level;

(v) Financial Covenant, containing the financial covenant types and initial ratios per package, and;

(vi) Net Worth Covenant, containing the type of covenant and the base amount.

I restricted the sample to all commercial loans denominated in US dollars, made to US borrowers excluding financial firms (SIC codes 6000-6999), and active between 1997 and 2010. Since LPC DealScan does not provide information about the borrower besides the name and the ticker, I use the Roberts Dealscan-Compustat Linking Database (Chava and Roberts, 2008) to match the GVKEY to each facility. Approximately 45000 loans involving 6694 companies meet these criteria. Next, I require the companies to have at least one observation of a valid credit rating and available information to compute variables of financial distress, reducing the sample to 19724 loans from 1639 companies. Lastly, I completed the sample with information about pricing, covenants, and amendments. Finally, I obtain a sample of 4068 loans (from 1046 non-financial companies) that have been amended between 1997 and 2010.

As Hertzel and Officer (2012) observed, the several facilities that make a deal are not independent, with many loan conditions being defined at the deal level. On average, each deal includes 1.4 facilities (in line with Ivashina (2009)), increasing slightly to 1.7 when considered only amended loans. Following prior literature (Ivashina (2009), Hertzel and Officer (2012)), I also select the largest facility (by value) of a deal whenever possible. Still, one of the following exceptions can occur: (i) a deal has multiple facilities with the largest amount, so one is picked randomly; (ii) the largest facility is dropped due to any inconsistency (missing amendments, inactive loans at the time of the amendment, etc), picking the second largest or; (iii) the deal is excluded due to any inconsistency in the comments. These situations are rare and affect neither the distribution of loan type, nor the degree of representativeness of the facility. This results in a sample of 2360 deals involving 1042 companies (only four companies were excluded in this step).

After cleaning the data, I build a panel data of firms with the amendments on a yearly basis between 1997 and 2000. To avoid overweight the companies with multiple amendments in a single year, I select the deals with the most significant changes regarding the amount, maturity,

or pricing. If a facility was amended several times in one year, I consider the total change of the loan terms in that year. Loan conditions are often renegotiated during the duration of the contract and even more crucial when new information arrives about the borrower's credit quality (Altman, Hotchkiss, and Wang, 2019), so I will look to the following:

(i) percentage changes in the loan amount, as banks may agree to issue more debt to guarantee the firm's liquidity, so normal operations are assured while managers assess the business' direction;

(ii) percentage changes in the maturity, helping with the firm's liquidity by delaying debt repayments when the firm is struggling;

(iii) reduction of spread, decreasing the costs of debt;

(iv) number of amendments, which can reveal some insights about the degree of financial distress (more trials to renegotiate a loan may be associated with a missing payment or other term of the contract).

As Roberts and Sufi (2009) report, changes that were predicted in the original contract do not generate a new amendment; instead, amendments in a context of performance pricing are conditional to the variation of other variables, such as financial covenants and credit rating. Given the complexity of this treatment and current time constraints, the percentage change of pricing is not computed. The description of each variable included in the final sample can be found in Appendix I.

5. SUMMARY STATISTCS

I combine all databases described in the sections above to build an unbalanced firm-year panel data. It is unbalanced because firms do not amend their loans every year and because

necessary accounting information is often not provided, especially in the first years of my sample. This sample has 3410 amendments, which refer to 2360 deals involving 1042 firms, in the period range between 1997 and 2013. Each year can have only one observation, which corresponds to the most significant amendment of the firm in that year.

The sample includes amendments that did not produce any changes on the primary terms of the loan, either because the process did not reach any results or because the terms amended are not being analysed (pricing grid, for example). Surprisingly, the number of amendments that changed any term of the analysis (amount, maturity, and spread) is around 40% for all categories of the firms (distressed, firms in the "gray" zone, and non-distressed firms). On total, 1278 debt contracts were amended.

Table 1 illustrates the main characteristics of these amendments. Panel A indicates that 755 loan amendments refer to 208 firms that were in financial distress in the year prior to an amendment. Although the number of amendments is high, most firms only amended one loan in a single year and did not originate significant changes on the primary terms of the loans. Percentual changes on the amount and maturity are zero both for the 25% and 75% percentile. This also happens for firms in non-distressed firms (Panel B).

In absolute terms, the numbers are a slightly more revealing. Around 50% of the loan amendments of firms in financial distress show changes to the amount in the original contract. However, contrary to the expected, most of them reduce the original amount (~27%). We can interpret it as a concern regarding the future payment, but, most likely, this result may be explained by the fact that creditors often award a new loan to repay the old debt instead of increasing the original amount. Roberts and Sufi (2009) reported that around 50% of tentative renegotiations of their sample generated independent observations in LPC DealScan.

On the other hand, non-distressed firms behave just like as expected. These firms have probably a growing business and more investment opportunities, so when they seek a

Table 1
Sample summary statistics – loan amendments and firm characteristics

Panel A: Sample summary statistics of financial distressed firms (Z-Score < 1.81)							
Statistic	**N**	**Mean**	**St. Dev.**	**Min**	**Pctl(25)**	**Pctl(75)**	**Max**
Loan amendments							
Number of amendments	755	0.92	1.30	0.00	0.00	1.00	9.00
Result of amendment (with changes = 1)	755	0.39	0.49	0.00	0.00	0.00	1.00
Δ Amount (%)	755	0.00	0.24	-1.00	0.00	0.00	2.50
Δ Maturity (%)	755	0.03	0.18	-0.73	0.00	0.00	1.00
Spread (increase = 1)	755	0.19	0.39	0.00	0.00	0.00	1.00
Spread (decrease = 1)	755	0.03	0.18	0.00	0.00	0.00	1.00
Purpose of Loan (Debt Repayment | DIP = 1)	755	0.20	0.40	0.00	0.00	0.00	1.00
Method of Distribution (Sole Lender = 1)	753	0.01	0.09	0.00	0.00	0.00	1.00
Firm characteristics							
Z-Score	208	9.94	61.56	-0.64	1.02	2.26	781.73
Leverage	208	0.45	0.14	0.10	0.34	0.56	0.84
Rating	208	10.40	1.94	2.00	9.16	11.47	18.40
Control variables							
Size (Total Assets)	208	4544.74	9330.06	150.12	697.80	3503.96	86772.64
Market-to-Book	208	3.59	8.31	0.17	1.14	2.84	78.94
Return on Assets (ROA)	208	0.10	0.06	-0.12	0.08	0.14	0.29

Panel B: Sample summary statistics of financial non-distressed firms (Z-Score >= 2.99)							
Statistic	**N**	**Mean**	**St. Dev.**	**Min**	**Pctl(25)**	**Pctl(75)**	**Max**
Loan amendments							
Number of amendments	2256	0.83	1.29	0.00	0.00	1.00	20.00
Result of amendment (with changes = 1)	2256	0.02	0.24	-1.00	0.00	0.00	2.57
Δ Amount (%)	2256	0.04	0.39	-0.82	0.00	0.00	15.67
Δ Maturity (%)	2256	0.11	0.32	0.00	0.00	0.00	1.00
Spread (increase = 1)	2256	0.02	0.14	0.00	0.00	0.00	1.00
Spread (decrease = 1)	2256	0.20	0.40	0.00	0.00	0.00	1.00
Purpose of Loan (Debt Repayment | DIP = 1)	2256	0.02	0.14	0.00	0.00	0.00	1.00
Method of Distribution (Sole Lender = 1)	2251	0.36	0.48	0.00	0.00	1.00	20.00
Firm characteristics							
Z-Score	700	110.42	1222.13	-3.36	2.89	7.72	27512.21
Leverage	700	0.31	0.19	0.01	0.20	0.38	1.69
Rating	700	12.19	2.85	1.00	10.00	14.00	22.33
Control variables							
Size (Total Assets)	700	4840.60	212.40	102.86	808.69	3706.92	302149.82
Market-to-Book	700	6.17	0.05	0.00	1.42	3.61	744.11
Return on Assets (ROA)	700	0.14	0.00	-0.50	0.10	0.18	0.64

renegotiation of their loan agreements, they are looking for an increase in the amount of the loan (35%) and an extension of the maturity (20%). Still, the extension of the maturity can also be related with the purpose of the loan: in this sample, around 75% of debt renegotiations occur in revolver lines for non-distressed firms.

Interest rates generally increase for firms in financial distress, while they decrease in non-distressed firms. It is not a surprising result, since firms with good financial performance are expected to have a higher power to bargain.

Looking to the firm characteristics, non-distressed firms are larger (even though Table 1 indicates the same average to both categories, the standard deviation on distressed firms is much higher than on non-distressed firms), have higher market-to-book ratio, and have higher return on assets. Generally, small firms struggle more to be profitable and the stock price reflects it, so the results here are in line with the expected. Plus, non-distressed firms show a lower leverage – with similar standard deviation of distressed firms – and higher credit ratings. Even though the difference on credit ratings seems not to be significant – on average, BBB to non-distressed firms and BB to distressed firms (Standard & Poor's, 2019) –, it is enough for distressed firms to be considered speculative and, consequently, to be regarded as a non-investment firm.

6. RESULTS

This study attempts to evaluate how debt renegotiations help firms to reduce their financial distress, here measured by Z-Score (Altman, 1968). The analysis was conducted as an event analysis by determining the effects of loan amendments on Z-Score until three years after the renegotiation. The model is defined as follows, while the results can be found in Table 2.

$$log(ZScore_{i,t+1} - ZScore_{i,t-1}) =$$

$$= B_0 + B_1 \Delta Amount_{i,t} + B_2 \Delta Maturity_{i,t} + + B_3 SpreadDecrease_{i,t}$$

$$+ B_4 Purpose\ of\ Loan + B_4 Method\ of\ Distribution$$

$$+ B_4 Number\ of\ Amendments + B_5 Other\ Controls + \varepsilon_{i,t}$$

with i = firm and t = year

For a better interpretation of the effects of changes in debt agreements, I also estimate the effects of the same dependent variables above on proxies for leverage and credit rating downgrades. The results for these regressions can be found in the Appendix IV. Estimation for all regressions is a robust covariance matrix of parameters for firm-fixed effects according to the White (1980) method. To mitigate the effect of outliers in the analysis, I winsorize the computed dependent variables (Z-Score and leverage) and the independent variables with a high range (total assets and market-to-book)[2]

Considering the large scale of values of Z-Score, I defined a log-log fixed effects regression, so any percentage change of an independent variable determines an equally percentage change in the dependent variable.

To capture the evolution of Z-Score, I compute the change between the prior year of the amendment and the following years up until three years. For example, the first amendment of US Airways Group dates from April, 2001. So, it is computed the change of Z-Score from 2000 to 2002 (1 year), to 2003 (2 years), and to 2004 (3 years).

As explained previously, the independent variables include the percentage changes in the amount and maturity, the number of amendments by firm, and the dummy variables for the purpose of the loan (=1 if related to debt repayment or debtor-in-possession) and the method of distribution (=1 if sole lender). The selected control variables are firm-size, market-to-book,

[2] Computed both at 95% and 99% level, resulting in very similar results.

Table 2
Determinants of changes in Z-Score

Effects									
	Distressed Firms			**Firms in "Gray" Zone**			**Non-Distressed Firms**		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
Δ Amount (%)	0.171	-0.213	-0.285	2.222**	-0.563	-1.150*	0.109	-0.397	-0.357
	(0.449)	(0.481)	(0.396)	(1.028)	(0.510)	(0.661)	(0.294)	(0.425)	(0.407)
Δ Maturity (%)	0.711**	0.155	0.106	-0.271	1.485**	0.216	-0.012	0.002	-0.337
	(0.357)	(0.574)	(0.575)	(0.369)	(0.699)	(0.963)	(0.445)	(0.279)	(0.258)
Spread (decrease = 1)	0.101	-0.349	-0.679	1.243*	0.720	0.234	-0.401	0.279	-1.263***
	(0.344)	(0.604)	(0.476)	(0.709)	(0.439)	(0.618)	(0.328)	(0.443)	(0.462)
Purpose of Loan	0.287	-0.056	0.878	-0.490*	-0.465	-0.548	-0.525**	0.301	-0.305
(Debt Repayment | DIP = 1)	(0.334)	(0.446)	(0.593)	(0.295)	(0.468)	(0.377)	(0.224)	(0.265)	(0.255)
Method of Distribution	-0.943*	0.867	-0.609	-2.445*	-5.206***	-7.743***	-0.084	0.826	-2.687
(Sole Lender = 1)	(0.537)	(0.706)	(0.586)	(1.419)	(0.651)	(1.060)	(1.044)	(0.704)	(1.926)
Number of amendments	0.112	0.038	0.178	-0.389*	0.495***	0.053	0.012	-0.084	0.018
	(0.104)	(0.215)	(0.257)	(0.221)	(0.117)	(0.167)	(0.069)	(0.072)	(0.039)
Control variables									
Size (Total Assets)	0.121	0.278	0.180	-1.022***	-0.728*	-0.846**	-0.647***	-0.021	-0.642**
	(0.186)	(0.398)	(0.493)	(0.261)	(0.442)	(0.417)	(0.210)	(0.308)	(0.264)
Market-to-Book	-0.001	0.003**	-0.031*	-0.005	-0.150	0.045	-0.009	0.006	0.034
	(0.002)	(0.002)	(0.017)	(0.019)	(0.109)	(0.038)	(0.024)	(0.009)	(0.034)
Return on Assets (ROA)	7.087***	4.007	8.297***	8.789***	4.874**	4.687	7.793***	3.914*	4.955***
	(1.398)	(2.576)	(2.443)	(2.393)	(2.144)	(3.421)	(1.315)	(2.122)	(1.883)
Fixed effects									
Firm-specific effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time trend	No	No	No	No	No	No	No	No	No
Observations	257	272	252	126	125	121	685	698	672
R^2	0.157	0.046	0.126	0.454	0.318	0.333	0.127	0.034	0.099
Adjusted R^2	-0.998	-0.988	-0.995	-0.624	-0.966	-0.667	-0.946	-1.117	-0.913
F Statistic	2.236** (df = 9; 108)	0.698 (df = 9; 130)	1.760* (df = 9; 110)	3.885*** (df = 9; 42)	2.232** (df = 9; 43)	2.664** (df = 9; 48)	4.953*** (df = 9; 307)	1.252 (df = 9; 318)	3.855*** (df = 9; 316)

Note: *p<0.1 **p<0.05 ***p<0.01

and firm-profitability (measured by return on assets). Return on assets seem to be statistically different from zero for all categories, no matter if we are analysing Z-Score, leverage, or credit rating downgrades. Size is also significant, but only for non-distressed firms and with small parameters. This may indicate that any significant change in one of the terms of the loan will have the same impact in all distressed firms, no matter the size. On the other hand, market-to-book is, generally, not significantly different from zero.

Unfortunately, when looking to the parameters we cannot identify an independent variable that has a clear impact on the dependent variable, either by increasing or decreasing Z-Score. None of the primary term loans has an impact in the three years in one of the categories or an impact in the same post-year for different categories.

According to this data, a decrease of the spread is associated with a 1.26% reduction of Z-Score in the third year after the amendment (1% level) , while an extension of maturity generates a predicted 0.71% increase (5% level). Changes on the amount are not statistically significant for distress and non-distressed firms.

On the other hand, the method of distribution may be relevant. Amending debt contracts granted by a single lender may be associated with a reduction on Z-Score. The independent variable is statistically significant for firms in the "gray" zone for three years and the impact is consistent and growing (10% level in the first year, but 1% for the remaining period), with the Z-Score predicted to reduce almost % in the three years. Similarly, amending loans from a sole lender is the only statistically significant variable predicted to reduce Z-Score – for the first year, the coefficient indicates an expected reduction of 0.9%.

The disappointing results take us to R^2. The category of firms in the "gray" zone have the highest R^2, rounding the 40% (in the first year is higher than 45%). The number of observations used for each regression is ranging between 30% and 40%. The difference from firms in the "gray" zone and the other two categories is most likely related to the independent variable

regarding the method of distribution, which is highly significant for the former. The regressions on leverage and credit downgrades do not show any significant variable, as well.

When defining the hypothesis for this thesis, I intended to do an additional step in order to link bankruptcy through a probit regression with the same independent variable. However, these results are not very promising and any tentative to estimate the parameters to predict bankruptcy was unsuccessful.

Since I did not find a study to the one I am conducting, it is not possible to compare the results. Roberts and Sufi (2009) has been the most referred as they address changes on primary term loans, but the conclusions are generalised for industries and do not focus financial distress. Other studies are more related to debt covenant renegotiations (Denis and Wang, 2014), which do not apply to this study.

The existence of some statistically significant variables seems to indicate that a better model can help to determine the real impact of these changes, but current investigation is inconclusive and implies that changes of the original terms of the loan does not contribute to reduce financial distress.

7. CONCLUSIONS

In this study, I was not able to prove the hypothesis that changes on the primary terms of the loan effectively reduce the financial distress of a company. Since there are so many firms requiring a debt renegotiation before moving to a more formal bankruptcy, it seemed logical to think that these changes could in fact reduce financial distress in the following years. Although some variables have significant parameters, there is not a pattern that indicates a factor of reduction of firms' financial distress.

Nonetheless, this study sheds light on debt renegotiation in a perspective of financial distress, a route that literature has not pursued. In order to be a relevant approach to analyse this topic, financial distress still needs a better clarification. Not only the models are subjective, the concept itself is not consensual. Still, there is room for future literature to integrate financial distress in this analysis to help creditors and firms to react faster to the situation and maybe preventing future bankruptcy. If a creditor identifies a firm as distressed, this creditor may act differently and offer more specific options to change loan agreements.

On the other hand, the model used in this study was elementary. It does not include information on follow-up loans, which is a frequent reality when borrowers require a debt renegotiation. The extensive literature on covenant violations must also be used to enlarge the quality of the results. Bank relationships, as well, play a key role in debt renegotiations and impact significantly the terms obtained by the borrowers. Finally, future research must consider the several models on financial distress that can be more reliable than the original measure of Z-Score.

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APPENDIX

I. Variable definitions

Variable	Source	Definition
GVKEY	Compustat	It stands for Global Company Key, a Standard & Poor's identifier for a 10-K filingcompany.
FYEAR	Compustat	Fiscal year of the current fiscal year-end month.
SIC	Compustat	Standard Industrial Classification Code
SICINDUSTRY	Fama and French's	Industry categories (12) based on SIC as defined by Fama and French[3]
CONM	Compustat	Company Name
AT	Compustat	Total Assets (million)
WCAP	Compustat	Working Capital (Balance Sheet)
RE	Compustat	Retained Earnings
EBIT	Compustat	Earnings Before Interest and Taxes
MKVALT	Compustat	Market Value – Total (including trading and non-trading issues)
DT	Compustat	Total Debt Including Current
SALE	Compustat	Net Sales
MB	Compustat	Price-to-Book
ROA	Compustat	Return on Assets
LEVERAGE	Manual	Compustat$DT / Compustat$AT]
LEVERAGE_1Y	Manual	$LEVERAGE_{t+1} - LEVERAGE_{-1}$
LEVERAGE_2Y	Manual	$LEVERAGE_{+2} - LEVERAGE_{-1}$
LEVERAGE_3Y	Manual	$LEVERAGE_{+3} - LEVERAGE_{-1}$
ZSCORE	Manual	Computed as defined by (Altman, 1968) 1.2*A+1.4*B+3.3*C+0.6*D+1.0*E A = compustat$WCAP / compustat$AT B = compustat$RE / compustat$AT C = compustat$EBIT / compustat$AT D = ompustat$MKVALT / compustat$DT) E = compustat$SALE / compustat$AT
ZSCORE_1Y	Manual	$ZSCORE_{t+1} - ZSCORE_{t-1}$
ZSCORE_2Y	Manual	$ZSCORE_{t+2} - ZSCORE_{t-1}$
ZSCORE_3Y	Manual	$ZSCORE_{t+3} - ZSCORE_{t-1}$
RATING	Compustat	S&P Domestic Long-Term Issuer Credit Rating
numberRATING	Manual	Attribution of a number to each rating
changeRATING_1Y	Manual	$numberRATING_{t+1} - numberRATING_{t-1}$
changeRATING_2Y	Manual	$numberRATING_{t+2} - numberRATING_{t-1}$

[3] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html

changeRATING_3Y	Manual	$numberRATING_{t+3} - numberRATING_{t-1}$
dummyDISTRESSED	Manual	Dummy = 1 if Z-Score in the year prior to any amendment was lower than 1.81
dummyNONDISTRESSED	Manual	Dummy = 1 if Z-Score in the year prior to all amendment was higher than 2.99
dummyAMEND	Manual	Dummy = 1 if firm has at least one amendment in that year
numberAMEND	Manual	Number of amendments of a firm in that year
AMENDED	Manual	Dummy = 1 if amendment originates effective changes to the primary terms (amount, maturity, spread) of the original contract
AMENDEDDATE	LPC-DealScan	
PACKAGEID	LPC-DealScan	Unique Reuters system-generated identifier for a package (commonly known as a deal). A deal may have one or more facilities/tranches.
FACILITYID	LPC-DealScan	Unique Reuters system-generated identifier for a facility/tranche.
dummyREF	LPC-DealScan	Dummy = 1 if loan was granted for debt repayment or as debtor-in-possession.
dummyLENDER	LPC-DealScan	Dummy = 1 if loan is granted by a single lender
FACILITYAMT	LPC-DealScan	The actual amount of the facility commited by the facility's lender pool.
COMMITMENT	LPC-DealScan	The change in facility commitment amount through the given amendment.
AMENDEDAMT	Manual	New amount of the facility committed by the facility's lender pool after amendment.
changeAMT	Manual	Percentage change of the facility commitment amount to the original amount.
FACILITYSTARTDATE	LPC-DealScan	The date at which the facility was issued.
FACILITYENDDATE	LPC-DealScan	The date representing the maturity date for the facility.
AMENDMAT	Manual	Based on variable ExpirationDate from LPC-DealScan: the new maturity date given to the facility through the given amendment. It was modified to reflect changes in the maturity from prior amendments.
changeMAT	Manual	Percentage change of the facility maturity extension / reduction to the original maturity
dummySPREADINC	Manual	Dummy = 1 if spread has increased.
dummySPREADDEC	Manual	Dummy = 1 if spread has decreased.
dummyFILED	UCLA-LoPucki BRD	Dummy = 1 if firm filed for bankruptcy
dummyREFILED	UCLA-LoPucki BRD	Dummy = 1 if firm refiled for bankruptcy
comment	LPC-DealScan	Text detailing specific information related to the facility through the amendment.

II. Variable definitions

Determinants of changes on Leverage									
	Distressed Firms			**Firms in "Gray" Zone**			**Non-Distressed Firms**		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
Δ Amount (%)	0.026	0.005	0.028	-0.042	-0.022	-0.139*	0.033	0.068***	0.039
	(0.029)	(0.032)	(0.033)	(0.043)	(0.057)	(0.072)	(0.025)	(0.025)	(0.033)
Δ Maturity (%)	-0.037	-0.022	-0.043	-0.017	-0.042	0.016	0.011	0.004	0.005
	(0.058)	(0.045)	(0.040)	(0.034)	(0.037)	(0.064)	(0.024)	(0.025)	(0.021)
Spread (decrease = 1)	-0.019	0.004	0.075*	-0.115***	-0.246**	-0.240	-0.010	0.025	0.060
	(0.036)	(0.037)	(0.045)	(0.042)	(0.112)	(0.167)	(0.040)	(0.044)	(0.059)
Purpose of Loan	-0.046	0.005	-0.016	0.002	0.009	0.081*	0.002	-0.011	-0.017
(Debt Repayment | DIP = 1)	(0.029)	(0.032)	(0.040)	(0.037)	(0.035)	(0.045)	(0.015)	(0.021)	(0.026)
Method of Distribution	-0.019	-0.066	0.038	0.107	0.053	0.123	0.074	0.050	0.241
(Sole Lender = 1)	(0.029)	(0.046)	(0.079)	(0.101)	(0.113)	(0.191)	(0.075)	(0.051)	(0.169)
Number of amendments	0.004	-0.013	-0.012	0.002	0.010	-0.013	0.008*	0.001	-0.007
	(0.007)	(0.008)	(0.009)	(0.010)	(0.013)	(0.019)	(0.005)	(0.004)	(0.006)
Control variables									
Size (Total Assets)	0.032	0.049	-0.020	0.035	0.029	0.111***	0.042***	0.058***	0.067***
	(0.021)	(0.037)	(0.043)	(0.032)	(0.034)	(0.032)	(0.014)	(0.017)	(0.024)
Market-to-Book	0.0002	-0.0001	-0.0003	0.001	-0.001	-0.0002	0.0002	0.001	-0.006***
	(0.0005)	(0.0004)	(0.001)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Return on Assets (ROA)	-0.166*	-0.257**	-0.436***	-0.082	-0.197	-0.221	-0.352***	-0.334***	-0.321**
	0.032	0.049	-0.020	0.035	0.029	0.111***	0.042***	0.058***	0.067***
Fixed effects									
Firm-specific effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time trend	No	No	No	No	No	No	No	No	No
Observations	614	577	526	278	254	225	1,379	1,380	1,311
R^2	0.039	0.050	0.088	0.034	0.071	0.146	0.056	0.061	0.071
Adjusted R^2	-0.440	-0.428	-0.395	-0.749	-0.716	-0.543	-0.543	-0.545	-0.525
F Statistic	1.844* (df = 9; 409)	2.258** (df = 9; 383)	3.692*** (df = 9; 343)	0.602 (df = 9; 153)	1.163 (df = 9; 137)	2.351** (df = 9; 124)	5.541*** (df = 9; 843)	6.076*** (df = 9; 838)	6.797*** (df = 9; 798)

Note: *p<0.1 **p<0.05 ***p<0.01

Determinants of changes on Credit Ratings Downgrades

	Distressed Firms			Firms in "Gray" Zone			Non-Distressed Firms		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
Δ Amount (%)	0.127	-0.171	-0.455	0.031	0.224	0.316	-0.017	-0.061	0.438
	(0.468)	(0.533)	(0.547)	(0.745)	(1.026)	(0.732)	(0.218)	(0.192)	(0.333)
Δ Maturity (%)	2.544**	2.336***	3.385***	0.492**	1.509***	1.166	-0.189	-0.182	-0.197
	(1.083)	(0.850)	(0.927)	(0.198)	(0.435)	(0.977)	(0.229)	(0.250)	(0.286)
Spread (decrease = 1)	-0.485	-0.497	-0.689	0.062	0.111	1.643	0.169	0.425	0.143
	(0.319)	(0.491)	(0.475)	(0.154)	(0.317)	(1.375)	(0.287)	(0.323)	(0.503)
Purpose of Loan	-0.352	-0.352	-0.104	-0.273	-0.507	-0.215	0.373**	0.302	0.649**
(Debt Repayment | DIP = 1)	(0.359)	(0.570)	(0.653)	(0.244)	(0.455)	(0.517)	(0.150)	(0.219)	(0.293)
Method of Distribution	-4.508***	6.108***		-1.128*					
(Sole Lender = 1)	(0.588)	(0.850)		(0.587)					
Number of amendments	-0.171	-0.351***	-0.182	0.080	0.071	-0.246	-0.018	-0.116*	-0.126**
	(0.123)	(0.128)	(0.118)	(0.089)	(0.142)	(0.221)	(0.071)	(0.059)	(0.061)
Control variables									
Size (Total Assets)	-0.319	0.281	0.505	0.110	-0.013	-0.109	0.410**	0.352*	0.923***
	(0.320)	(0.360)	(0.455)	(0.421)	(0.424)	(0.517)	(0.159)	(0.197)	(0.303)
Market-to-Book	0.034*	0.014***	-0.007	0.039*	-0.108**	0.027	-0.005	0.001	-0.011***
	(0.019)	(0.005)	(0.018)	(0.022)	(0.052)	(0.221)	(0.006)	(0.005)	(0.004)
Return on Assets (ROA)	3.295**	4.638**	3.648**	4.979*	6.502*	5.959*	5.556***	6.786***	8.050***
	-0.319	0.281	0.505	0.110	-0.013	-0.109	0.410**	0.352*	0.923***
Fixed effects									
Firm-specific effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time trend	No	No	No	No	No	No	No	No	No
Observations	504	469	424	217	195	172	1,001	944	883
R^2	0.102	0.131	0.106	0.135	0.177	0.111	0.117	0.115	0.142
Adjusted R^2	-0.365	-0.328	-0.375	-0.624	-0.596	-0.652	-0.539	-0.534	-0.498
F Statistic	4.165*** (df = 9; 331)	5.146*** (df = 9; 306)	4.079*** (df = 8; 275)	1.997** (df = 9; 115)	2.691** (df = 8; 100)	1.442 (df = 8; 92)	9.477*** (df = 8; 574)	8.859*** (df = 8; 544)	10.490*** (df = 8; 505)

Note: *p<0.1 **p<0.05 ***p<0.01