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Management from the Nova School of Business and Economics.

**The Impact of Unemployment Subsidies on Firms'
Corporate Finance Choices and Credit Ratings
An Analysis on the Effects of Firms' Size and Age**

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PART I – GROUP COMPONENT

Abstract

This paper studies the relation between unemployment subsidies, considered as a proxy for the unemployment risk, and corporate finance decisions. It is empirically demonstrated that a decrease in the generosity of unemployment compensations - because of the lower reciprocity rate - is associated with lower debt levels, partly to mitigate the greater risk of costly layoffs faced by employees. The reduction in leverage is particularly severe for large and mature firms. Furthermore, the paper proves the absence of a relation between changes in unemployment benefits and firms' default risk, as their credit ratings and interest coverage ratios remain constant.

Keywords

Labor Economics; Unemployment Subsidies; Capital Structure; Leverage; Credit Ratings; Default Risk; U.S.; Size; Age.

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1. Introduction

Unemployment is a phenomenon that significantly affects workers and companies. Laid-off employees often experience a decline in consumption (J. Gruber 1997), long periods before re-employment (Katz e Meyer 1990), and considerable wage cuts when returning to work (Farber 2005). On top of this, jobless workers suffer psychological and social costs as well. Workers' costs of unemployment are found to strongly influence corporate finance decisions; Agrawal and Matsa (2013) empirically demonstrated that firms opt for more conservative financial policies as means to protect workers from costly layoffs. Indeed, the higher the unemployment risk, the larger the size of the premium – in the form of additional wage benefits – demanded ex ante by workers to bear the additional risk exposure (Topel, Equilibrium earnings, turnover, and unemployment: new evidence 1984). Wage premiums vary by industry and represent up to 14 percent of total wages according to the unemployment risk (Abowd e Ashenfelter 1981). Therefore, firms select conservative financial policies that decrease their risk of bankruptcy in order to reduce the amount of compensation provided to employees for bearing costly layoffs.

This relation can be expressed as an additional term in the trade-off theory of capital structure (Agrawal e Matsa 2013):

$$(1) \text{ NPV (Debt Issue) } = \text{ NPV (Tax Shield) } + \text{ NPV (Cost of Financial Distress) } + \Delta \text{ Labor Expense}$$

In the traditional trade-off theory, firms finance their operations by selecting the amounts of debt and equity that maximize the interest tax shields, while minimizing the increased default risk which might lead to direct and indirect costs of financial distress. The additional term in **Equation (1)** describes the increased compensation demanded by workers for bearing a higher unemployment risk.

The current study aims at empirically examine the relation between workers' exposure to unemployment risk and firms' capital structure decisions. Indeed, in the existing literature,

changes in the maximum amount of unemployment insurance (UI) benefits are considered a proxy for workers' exposure to unemployment risk. The underline assumption is that a change in UI benefits alters workers' unemployment risk, and in turn, it affects firms' capital structure decisions. According to Topel (1984), when the generosity of UI benefits increases, job losses are less costly, and workers reduce the compensation demanded for facing the unemployment risk. In turn, companies can increase their levels of leverage and take advantage of higher interest tax shields and other benefits related to debt (Agrawal e Matsa 2013). However, a more indebted capital structure lowers the interest coverage ratio, hence firms are less able to repay interest expenses and more exposed to default risk.

The current study follows this approach and examines the relation between a shock in the unemployment risk and US firms' corporate finance decisions during the period 2007-2017. The dataset compiled consists of US public firms, excluding financials and utilities, and the empirical models used include firms' financial characteristics, macroeconomic indicators, firm-fixed effects, and year fixed effects. Control variables guarantee that results reflect changes in the capital structure of an average firm, not affected by specific financial characteristics, national trends, or macroeconomic events.

The findings of regression analysis suggest that an increase in the generosity of UI benefits stimulates firms to decrease their leverage ratios, while maintaining unchanged the interest coverage ratio. These results are opposed to the existing literature as the relation between UI benefits and levels of debt is found to be negative. However, several factors are analyzed to explain the different findings. First, the period examined includes the 2008 Financial Crisis, which significantly impacted both unemployment risk and firms' corporate finance decisions. Indeed, firms were already highly indebted and experienced high layoff rates; these factors most likely influenced the decision of reducing their levels of leverage. Second, between 2008 and 2013, jobless workers were provided with additional benefits - namely the Extended Benefits

(EB) and the Emergency Unemployment Compensation (EUC) - which are not object of this study but protected workers from costly layoffs. Hence, this study recognizes their potential influence on firms' capital structure choices. Last, the main determinant of the different findings is to be found in the reciprocity rate, meaning the number of unemployed workers receiving UI benefits over the total number of claimants. Data on maximum UI benefits and reciprocity rates are compiled for the years 2007 and 2016; while the generosity of the UI benefits increased by 10 percent during this timeframe, the reciprocity rate declined by 28 percent. Therefore, the weighted benefits, meaning the maximum UI benefits multiplied by the reciprocity rate, declined by 13 percent. As it was more difficult for claimants to receive the benefits, they indirectly demanded to be compensated for the higher unemployment risk faced. Following the rationale already explained, firms opted for less indebted capital structures to reduce the risk of costly layoffs. This finding is striking as it demonstrates that the relation between UI benefits and corporate finance choices is mediated by the reciprocity rate.

After having empirically examined the existence of a relation between the generosity of UI benefits and corporate finance decisions, the current study aims at individuating whether the change in firms' capital structures impacts their credit ratings. Indeed, if firms react to a change in the maximum UI benefits by reducing their leverage ratios, their exposure to the default risk decreases and their credit rating might improve. To empirically test this relation, firms are given a credit rating score ranging from one to four, one being the highest value. The regressions' findings demonstrate that there is no statistical relation between changes in the amount of maximum UI benefits and firms' credit ratings. Conversely to the hypothesis developed, this result suggests that the reduction in leverage is not sufficient to significantly reduce firms' default risk, thus their credit ratings stay constant.

The results of the leverage and credit rating regressions leave room to perform deeper analysis on specific scenarios. The current study deepens the research by examining how shifts

in unemployment compensations affect leverage and credit ratings, conditional on firms' size and age. It is found that firm's size effects are present when analyzing the reaction of capital structures changes due to increase in unemployment subsidies for U.S. publicly traded firms. Indeed, large firms are more propense to lay-off workers in period of economic downturns, therefore their employees face greater unemployment risks, and companies compensate them by decreasing leverage to a greater proportion compared to smaller firms. Additionally, firms' age also leads to different reactions to changes in UI maximum benefits. More mature firms have higher leverage and less urgency to grow and expand; these factors allow them to decrease their leverage ratio by a higher percentage compared to younger firms. Finally, the results of the credit rating regressions align with previous findings: there is no statistical relation between the changes in UI benefits and default risk.

2. Institutional Background

The following chapter aims at describing the unemployment insurance system (UI) in place in the U.S. by giving a broad overview on its characteristics, its main drivers, and on how the unemployment compensation affects both companies and employees.

2.1 Unemployment insurance system

The unemployment insurance system (UI) was first introduced in 1935 by the Social Security Act, signed by Franklin D. Roosevelt, and nowadays it still provides a financial buffer against the knock-on impacts of unemployment (U.S. Department of Labor 2019). Indeed, the program supports unemployed workers through a partial weekly wage substitution for a determined amount of time, while the recipients look for a job. The UI program is mainly designed to offer financial aids to jobless workers, however, during recessions it also fosters economic activity and stimulates job creation (Stone e Chen 2014). As outlined by the U.S.

Department of Labor (2019), the UI program is based on Federal law, however each state has the autonomy to administer the compensation under the State law to a certain extent.

The compensation released to each eligible claimant has three distinct features regulated by State laws: eligibility, wage benefit amount, and duration of the benefit. In order to qualify for the benefit, each claimant must be unemployed because of causes outside his/her own fault, must be able to work, and be actively looking for employment. The amount released to the jobless worker is based on a benefit formula: the highest wage obtained by the worker in the previous four quarters is selected, and then it is replaced by about 50 percent through the release of weekly payments, which are subject to specific bounds set by states (Agrawal e Matsa 2013). The variation in compensation benefits between different states and over time is caused either by changes in the maximum benefit amount, or in the duration of the program. Usually, the maximum duration is 26 weeks, but some states provide a greater number of weeks under certain circumstances, while few states guarantee uniform durations, usually of 26 weeks, for all eligible unemployed workers (U.S. Department of Labor 2019).

This social insurance scheme is unique as it is totally financed by employers' payroll taxes, with the exception of few states – namely Alaska, New Jersey, and Pennsylvania - where employees are required to contribute with taxes. In general, to finance the UI program employers pay two different payroll taxes: one based upon the State Unemployment Tax Act (SUTA), and the other based on the Federal Unemployment Tax Act (FUTA). Employers are required to pay the federal unemployment tax if they paid salaries totaling \$1,500 or above during any calendar quarter of the current or prior year, or if they employed one or more workers for at least 20 weeks out of the previous or current calendar year (U.S. Department of Labor 2019).

As discussed by Agrawal and Matsa (2013), unemployment insurance benefits are influenced by both economic and non-economic forces. Economic conditions like

unemployment rates, higher salary averages and industrial urbanization, positively impact unemployment benefits. Additionally, in the past, political dynamics and lobbying efforts also influenced law decisions regarding UI benefits. For example, in 2002 the state of California increased the weekly benefit amount by \$100 for the first time after a decade of stability. This increase was in conjunction with political elections, as it fostered political support of the incumbent governor (Agrawal e Matsa 2013).

Furthermore, unemployment benefits have a considerable impact on both unemployed workers and firms. Indeed, a study conducted by Gruber (1997) found strong evidence that unemployment insurance smooths individual consumption: it was estimated that in the absence of unemployment benefits, jobless workers' consumption would fall by roughly 22 percent (J. Gruber 1997). Moreover, it has been demonstrated that a social insurance like UI has a clear impact on household investment and saving decisions (Gormley, Liu e Zhou 2010).

From firms' perspectives, the unemployment insurance system significantly impacts their actions and corporate finance decisions. First, managers are more propense to fire employees when benefits are higher as workers face lower unemployment costs (Agrawal e Matsa 2013). Second, as previously described, changes in the generosity of UI benefits are found to influence leverage ratios and, ultimately, companies' net present value (**Equation 1**).

3. Leverage and Unemployment Subsidies

This chapter aims at analyzing the relation between UI benefits and corporates' leverage for a panel of U.S. public firms, and it is framed as follows: Section 3.1 presents the methodology applied to collect data and the resulting empirical framework. Section 3.2 comments on the robustness of the panel-data model created. Section 3.3 reports and analyzes Ordinary Least Squares (OLS) regressions' findings, while limitations are discussed in Section 3.4.

3.1 Data and empirical framework

Agrawal and Matsa (2013) demonstrate the negative correlation between workers' unemployment costs and firms' leverage. In fact, the higher the layoff propensity, the higher the unemployment risk which, in turn, leads companies to select more conservative financial structures – meaning with lower levels of debt - to protect workers from costly layoffs. The main hypothesis of this section is that leverage and UI benefits - a proxy for workers' cost of unemployment – are positively associated. Indeed, it is expected that an increase in the generosity of UI benefits would reduce the unemployment risk, allowing firms to rise their leverage ratios.

To empirically examine this relation, a dataset combining UI benefits' information and firms' financial data is created for the period 2007-2017. Information on UI benefits are collected from the US Department of Labor, “*Archived Significant Provisions of State UI Laws*”. These data are released in January and July of each year, and they describe the UI benefits granted to eligible claimants by each State, according to the duration, expressed in number of weeks, and the benefit amount. The generosity of the UI benefit that a claimant can receive in a specific year and state is calculated as the natural logarithm of the product of the maximum number of weeks granted, and the maximum weekly benefit amount (Agrawal e Matsa 2013); further information is detailed in **Table A.1** (Appendix). The mean of *log max benefit (t-1)* is 9.168, corresponding to around yearly \$9,585.44.

Figure 1 and **Figure 2** display the percentage change in the generosity of UI benefits for the sub-periods 2007-2011 and 2012-2017, respectively, where darker blue colors are associated with larger increases in the metric. The maps clearly highlight the substantial variation in the maximum UI benefits across states and over time. While different states report different maximum amounts of wage compensations, a common pattern lies in the larger

increase in their generosity during the first sub-period considered, 2007 to 2011, while UI benefits appear to increase at a much lower pace during the second sub-period, 2012 to 2017.

FIGURE 1

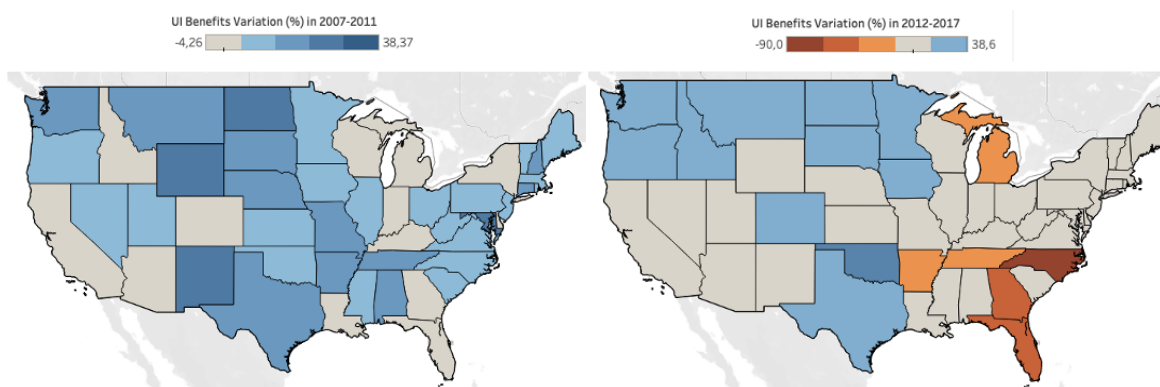
Impact of unemployment insurance laws (UI) on firms' financial choices – Percentage Change in the Generosity of UI Benefits by State for the period 2007-2011.

The figure displays the change in the generosity of UI benefits, expressed in percentage terms, in each State from 2007 to 2011. Darker colors are associated with higher percentage increases, while lighter colors might also indicate a reduction in UI benefits, as described in the legend. Overall, during 2007-2011 almost all states seem to have significantly increased the maximum amount of benefits provided to jobless workers.

FIGURE 2

Impact of unemployment insurance laws (UI) on firms' financial choices – Percentage Change in the Generosity of UI Benefits by State for the period 2012-2017.

The figure displays the change in the generosity of UI benefits, expressed in percentage terms, in each state from 2012 to 2017. Darker blue colors are associated with higher percentage increases, while lighter and red colors might also indicate a reduction in UI benefits, as described in the legend. Conversely to Figure 1, during 2012-2017 almost all states slowed the rate of increase in UI benefits, and several states even decreased the maximum amount provided to jobless workers.



Source: Authors' own findings.

The dataset also compiles firms' balance sheet and income statement information retrieved from the Capital IQ - Compustat database.

The initial sample accounted for 7,911 firms and 684,219 firm-year observations; however, several filtering procedures were performed: 1) all firm-year observations with any missing information were deleted; 2) following existing research on the topic, the current analysis considers January UI benefits only; to be consistent, only firms' financial information for the month of January are presented; 3) as standard in literature, financial and utility companies – with GICS codes 4010, 4020, 4030, 5510, see **Table A.2** (Appendix) - are excluded from the

sample as they follow different accounting standards; 4) all inactive companies are excluded; and 5) all financial data are winsorized at the 1st and 99th percentile to reduce the impact of outliers that are not representative of the sample. The resulting unbalanced panel yields a sample of 376 publicly traded US firms and 3,001 firm-year observations across 52 states (including District of Columbia, Puerto Rico, and Virgin Islands) and 11 years, with summary statistics reported in **Table 1**.

Based on this sample, a panel regression analysis is performed with the following model:

$$(2) \frac{Total\ Debt_{it}}{Total\ Assets_{it}} = \alpha_0 + \alpha_1 \log(UI_max_benefit)_{it-1} + \alpha_2 X_{it} + W_t + V_i + \varepsilon_{it}$$

where the subscripts i and t are for firm and year, respectively. **Equation (2)** is an adaptation of Agrawal and Matsa (2013), where the dependent variable defines the proportion of debt over the firm's total assets (book value or market value), while the independent variables are: 1) the logarithm of the maximum UI benefits in the preceding year; 2) controls for firm financial characteristics and macro-economic conditions (X_{it}); 3) year-fixed effects (W_t); and 4) firm-fixed effects (V_i). The controls include a set of financial variables typically used to perform leverage regressions (Agrawal e Matsa 2013), (Shen 2022): the proportion of fixed assets, identifying new investments undertaken; the logarithm of sales, describing firm's size; the return on assets, a proxy for firm's profitability; the modified Altman Z-score, assessing firm's financial distress; and the market to book ratio, describing the overall value of the business and hence guiding investment decisions. Furthermore, controls include two macro-economic variables, namely the unemployment rate and the GDP growth. Model variables are further detailed in **Table A.3** (Appendix) and summary statistics are presented in **Table 1**.

As the generosity of UI benefits depends on each state's legislation, standard-errors have been clustered at state-level to account for potential within-cluster residual dependencies.

TABLE 1

Impact of unemployment insurance laws (UI) on firms' financial choices - Summary Statistics.

This table summarizes the descriptive statistics of the variables included in the leverage regression (Equation 2). Data refer to a sample of 3,001 firm-year observations from 2007 to 2017, excluding financials and utilities, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
<i>Panel A: Dependent variables</i>					
Total debt / Total assets	0.603	0.155	0.366	0.591	0.887
Total debt / Enterprise value	0.998	0.002	0.995	0.999	1.000
Log interest coverage ratio	2.047	1.141	0.272	2.063	4.026
<i>Panel B: Unemployment insurance</i>					
Log max benefit $t-1$	9.168	0.239	9.057	90.572	9.633
<i>Panel C: Control variables</i>					
Roa	0.150	0.071	0.050	0.143	0.285
Z-score	1.909	1.244	0.344	1.864	3.888
Proportion fixed assets	0.053	0.057	0.010	0.035	0.167
Market to book ratio	3.053	3.225	0.726	2.199	8.016
Log revenue	8.839	1.372	6.750	8.722	11.311
GDP growth	0.675	3.530	-5.700	0.700	7.800
Unemployment rate	0.063	0.019	0.036	0.062	0.093

Source: Authors' own findings.

3.2 Validity test

Before performing OLS regressions, the dataset created was tested for multicollinearity through the computation of the correlation matrix between independent variables. If the correlation among predictors is equal or higher than 0.65, there is a multicollinearity problem which reduces the statistical significance of the results (Gupta 2021) (de S. Murcia, et al. 2014). As shown in **Table A.4** (Appendix), the variables included in the leverage regressions present correlation values between 0.0041 and 0.3998, hence there is no multicollinearity problem.

3.3 Findings and discussion

Three regressions have been performed using different dependent variables: the ratio of total debt over total assets, the ratio of total debt over enterprise value, and the natural logarithm of the interest coverage ratio. Additionally, for each dependent variable the inclusion of

companies' financial indicators and economic indicators was alternated as an attempt to isolate the effects that the introduction of the regressors has on the dependent variable.

Panel A of **Table 2** displays the regressions having the ratio of total debt to total assets as dependent variable. **Column 1** summarizes the results of a regression that excludes companies' financial indicators while including economic indicators, namely GDP growth and unemployment rate. In this scenario, UI benefits are statistically significant, at 10 percent significance level, and have a negative linear association with leverage. Indeed, a 1 percent increase in UI maximum benefits is associated with a drop by 7.5 percentage points in the debt to assets ratio. Moreover, the model seems to well explain the observed data, having an adjusted R^2 of 83.6 percent. **Column 2** displays the results of the regression that excludes economic indicators but includes financial metrics, namely the return on assets, the z-score, the proportion of fixed assets, the market to book ratio and the logarithm of revenues. Again, UI benefits are statistically significant, at 5 percent significance level. In this scenario, a 1 percent increase in UI benefits is associated with a fall by approximately 7.4 percentage points in the leverage ratio. Furthermore, the model explains 86.4 percent of the variability observed in the dependent variable. The complete model, including year fixed effects, firm fixed effects, macroeconomic and firms' financial indicators is presented in **Column 3**. Being the regressor statistically significant at 5 percent level, an increase of 1 percent in UI benefits is associated with a decrease of 7.0 percentage points in the considered ratio. This is the model that best explains the variability of the dependent variable, with an adjusted R^2 of 86.4 percent. This happens because the model includes: local macro-economic conditions, which might cause the results to be spurious; firm-fixed effects, to reduce the impact of omitted variable bias; and year-fixed effects, to capture time-trends that might affect the dependent variable (Shen 2022).

Panel B of **Table 2** summarizes the results of the regressions having as dependent variable the ratio between total debt and enterprise value. It is immediately clear that in these regressions

none of the UI benefits' coefficients is significant. However, the reason behind the lack of significance might be embedded in the low coefficient values. Indeed, in all three regressions the considered coefficients are close to zero, meaning that the probability of them being exactly equal to zero and have a null impact on the ratio is high. Therefore, an increase in UI benefits might negatively affect the leverage ratio, but the effect would be so small that it is negligible.

Furthermore, the numerator of both total debt to total assets and total debt to enterprise value corresponds to the book value of debt, hence the reason behind the different impact of UI maximum benefits on the two ratios lies in the denominator. The enterprise value can rise and drop quickly according to several factors such as demand and supply, macroeconomic events, and company-specific news, to name a few. Hence, it is more impacted by market volatility, which was extremely high during the timeframe analyzed, making harder to isolate the effect of the sole UI benefits on the ratio. Furthermore, as already mentioned, all financial metrics included in the current study are based on the month of January to be consistent with the release of the UI benefits' legislations. The same rationale was applied to calculate firms' market capitalization – a component of the enterprise value – which is the product of the number of shares outstanding and the share prices, based on the month of January only. This procedure, however, might involve a selection bias and lead to unreliable results. Indeed, if firms' stocks prices fluctuated during the year to a great extent, the resulting market capitalizations would vary accordingly, and the choice of the month of January only might be incorrect. On the other hand, the book value of total assets is a more stable measure as it is not affected by market fluctuations. Therefore, even though the limitations connected with book values are acknowledged, it is considered a more reliable measure to confirm the linear relation between UI benefits and firms' leverage ratios.

Lastly, **Panel C** of **Table 2** displays the results of the regressions having the logarithm of the interest coverage ratio as dependent variable. Again, UI benefits are not statistically

significant, meaning that a variation in the maximum unemployment compensation does not affect firms' ability to repay interest expenses.

More information about specific variables' coefficients is to be found in **Table A.5** (Appendix).

TABLE 2

Impact of unemployment insurance laws (UI) on firms' financial choices – OLS regressions' findings.

This table summarizes the findings of the OLS regressions having as dependent variables the ratio of total debt over book value of assets (Panel A), the ratio of total debt over market value of assets (Panel B), and the logarithm of the interest coverage ratio (Panel C). Regressors include the logarithm of UI benefits, taken at one-year lag, and a set of controls. Controls in all regressions comprise firm fixed effects and year fixed effects. Where shown, controls also include state economic indicators and firm financial controls. Standard errors are clustered at state level and *, **, and *** are used to describe the significance at 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)	(3)
Panel A: Total debt / Total assets			
Log max benefit t-1	-0.0750*	-0.0736**	-0.0704**
P-value	<i>0.0824</i>	<i>0.0425</i>	<i>0.0478</i>
Adjusted R ²	0.8357	0.8639	0.8642
Panel B: Total debt / Enterprise value			
Log max benefit t-1	-8.15e-01	-0.0003	-0.0002
P-value	<i>0.8667</i>	<i>0.5302</i>	<i>0.5709</i>
Adjusted R ²	0.7167	0.7722	0.7724
Panel C: Log interest coverage ratio			
Log max benefit t-1	0.1066	0.0712	0.0689
P-value	<i>0.6487</i>	<i>0.6756</i>	<i>0.6846</i>
Adjusted R ²	0.7212	0.8430	0.8428
Control variables			
State economic indicators	Yes	No	Yes
Firm financial controls	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Estimation method	OLS	OLS	OLS

Source: Authors' own findings.

Overall, the regressions demonstrate that when states increase the generosity of UI benefits, firms adopt more conservative capital structures by decreasing their leverage ratios, even

though maintaining the same ability to repay interests. These results diverge from previous literature where an increase in the generosity of the UI benefits was associated with an increase in firms' debt levels (Agrawal e Matsa 2013).

It is reasonable to assume that the main motivation behind this difference is to be found in timeframe analyzed, which includes the 2008 Financial Crisis that significantly impacted firms' financial choices, especially regarding their highly indebted capital structures. Indeed, the burst of the Housing Bubble determined a fall in lending activities between banks and the resulting credit crunch, causing a drop in the funds available for corporates and private investors (Hemmelgarn e Nicodeme 2010). To exclude the effects of the financial crisis, a subsample of the initial dataset for the period 2011-2017 was analyzed. **Table A.6** (Appendix) shows that there is no relation between UI benefits and firms' leverage. Therefore, other reasons need to be investigated.

A second explanation lies in the total amount of benefits that jobless workers could receive. In response to the global Financial Crisis and due to unexpectedly high unemployment rates, during the period 2008-2013 the UI system was extended to provide additional emergency benefits, namely the Extended Benefits (EB) and the Emergency Unemployment Compensation (EUC) (Congdon e Vroman 2021). These additional programs allowed eligible claimants to receive UI benefits for a number of weeks longer than the typical 26-weeks maximum duration, even reaching 99 weeks (Congressional Research Service 2014). In the current study, the leverage regression is performed based on the generosity of the regular UI benefits only, without considering any additional programs. However, the sole UI benefits might not be sufficient to reduce the unemployment risk, pushing firms to assume less risky behaviors and deleveraging their capital structures to protect workers from an already high layoff risk. On the other hand, the consideration of the total amount of benefits receivable by eligible claimants -

namely the UI benefits, the EB, and the EUC – might confirm the relation identified in prior literature.

Lastly, if during the Great Recession the UI program played a major role in stabilizing the national economy, in the following years its support against unemployment risk diminished significantly. It became harder for jobless workers to apply for UI benefits, either because of tighter eligibility criteria, or because of process obstacles. For example, even though unemployed workers were initially qualified for the benefits, the risk of being disqualified due to non-compliance during the unemployed period increased. In fact, continuity eligibility conditions like the work search requirement were enforced in a stricter manner and, consequently, many initially eligible claimants lost their right to receive the benefits (Wentworth, National Employment Law Project 2017). On top of this, nine states reduced the maximum duration below 26 weeks. *“As a result [of all the previous restrictions and impediments], the share of jobless workers receiving unemployment insurance has fallen by 25 percent since 2007, even though unemployment rates have been comparable. Since 2014, only slightly more than one in four unemployed workers is receiving a state unemployment insurance benefit”* (Wentworth, National Employment Law Project 2017). As reported by Wentworth (2017), the following states experienced the greatest declines in the recipiency rate: North Carolina, Florida, South Carolina, Tennessee, Georgia, Idaho, Indiana, Alabama, Nebraska and Louisiana. For example, the state of North Carolina paid out around \$903M in UI benefits in 2007, while only \$219M in 2016 thanks to a cut in both benefits’ duration and amount. As a consequence, in 2016 only 40 percent of jobless workers received the UI benefits compared to 2007 (Wentworth, National Employment Law Project 2017). As **Table A.7** (Appendix) demonstrates, in almost every state the percentage of jobless workers receiving unemployment insurance declined. In 2007 there were only two states (South Dakota and Texas) with a recipiency rate lower than 20 percent, while this metric increased to twelve in 2016. The decline

in the reciprocity rate is of great importance to understand the inverted relation between UI benefits and firms' debt levels. Indeed, even if the generosity of UI benefits increased by 10 percent during 2007-2016, the reciprocity rate decreased by 28 percent. The resulting "weighted benefits", meaning the maximum benefits weighted for the reciprocity rate, experienced a decline of 13 percent. Therefore, even if the maximum amount receivable increased, there was a reduction in the probability of obtaining the mentioned benefits, hence increasing the wage premium demanded by employees to be compensated for the higher unemployment risk faced.

To summarize, the main reason behind different findings from existing literature lies in the diminished effectiveness of the UI program during the period 2012-2017. Tighter restrictions, higher disqualifications, and strict documentation requirements drastically reduced the reciprocity rate, hence increasing unemployment risk. Consequently, firms adjusted their capital structures towards lower levels of leverage in order to protect employees from costly layoffs (Agrawal e Matsa 2013).

3.4 Limitations

This section aims at identifying some limitations inherent in the analysis performed that might diminish the validity of the findings.

First, the logarithm of UI benefits is taken at 1-year lag to describe the causal relation between an increase in the maximum benefits' amount and the consequential adjustment of firms' capital structures. The lag of 1 year is standard in literature, but this study acknowledges that firms might take more time to react to changes in UI benefits.

Another limitation common in previous papers regards with firms headquarter location. Indeed, the Compustat database associates each firm with the state of their current headquarter, which, however, could differ from the historical location. Also, firms' facilities might be located in states others than the headquarters' state. In this case, they should follow a different UI legislation (Agrawal e Matsa 2013) with a possible variation in the maximum UI benefits.

However, a previous study highlighted that “*only 118 firms out of a sample of 5000 firms relocated their headquarters*” (Ririnsky e Wang 2006), and hence it is assumed that the measurement error does not significantly affect the findings.

4. Credit Ratings and Unemployment Subsidies

Credit ratings are opinions issued by rating agencies to describe the ability of the issuer to meet its financial obligations, in full and on time (Global Standard & Poor's 2022). Credit ratings affect firms' ability to raise money in the capital markets, their cost of debt, and their financial structure. Therefore, firms cautiously consider the impact of any business decisions on their credit rating (Gray, Mirkovic e Raganathan 2006).

Credit ratings classify companies between Investment Grade and Speculative Grade firms. Investment Grade refers to issuers with high levels of financial stability and credit quality. On the other hand, Speculative Grade, also called Non-Investment Grade issuers, are currently able to meet their financial commitments but face major uncertainties, such as adverse financial or business conditions, which might affect their creditworthiness (Global Standard & Poor's 2022).

As reported by the Global Standard & Poor's (2022) guide, many financial and non-financial indicators drive companies' credit ratings. Examples of determinants are key performance measures, the quality of management, the industry and the company competitive position, economic factors, and geopolitical risks. Furthermore, adjustments in credit ratings might be needed because of shifts in the business climate, changes in the economy environment, or specific events related to the industry or the entity.

The present study focuses on the credit ratings released by the rating agency S&P Global Ratings, which measures the issuers' creditworthiness on a scale ranging from 'AAA' to 'SD'. More details about the description of single ratings are reported in **Table A.8** (Appendix).

After having empirically verified the linear association between UI benefits and the proportion of leverage in firms' capital structures, this study aims at identifying whether unemployment subsidies impact corporates' credit ratings. The main hypothesis tested in this section is the existence of a relation between UI benefits and firms' credit ratings, meaning that an increase in the generosity of wage compensations is associated with an improvement in firms' credit ratings.

This chapter is framed as follows: Section 4.1 presents the methodology applied to collect data and the resulting empirical framework. Section 4.2 discusses the robustness of the panel-data model created, while Section 4.3 reports and analyzes the regressions' findings, from a statistical and economical perspective. Lastly, limitations are discussed in Section 4.4.

4.1 Data and empirical framework

To empirically examine the previously mentioned relation, information on UI benefits, firms' credit ratings, and the factors influencing credit ratings are compiled. As previously stated, UI benefits' figures are collected from the US Department of Labor, while other financial information are gathered from the Compustat database for the period 2007-2017. The choice of this timeframe arises from several reasons: 1) to be consistent with the leverage regression previously performed; 2) credit ratings became an important indicator of default risk only after the 2008 Global Financial Crisis (Gupta 2021); and 3) the Compustat S&P Ratings database was discontinued from February 2017 on.

The credit ratings' regressions have been run over the same sample as of the leverage regression in order to guarantee consistency and link the findings. Therefore, the same filtering procedures were applied and the resulting unbalanced panel accounts for 376 publicly traded U.S. firms and 3,001 firm-year observations across 52 states and 11 years.

Regarding the credit ratings, the present study focuses on S&P Long-Term credit ratings only for the following motivations: 1) this approach is in line with prior literature (Gupta 2021),

(Gray, Mirkovic e Raganathan 2006); 2) few companies in the Compustat database present both short-term and long-term credit ratings, leading to a significantly smaller number of firm-year observations and to a potential selection bias; and 3) the panel data analysis studies changes in credit ratings over time, hence considering long-term credit ratings appears more accurate. Based on the resulting sample, a regression analysis is performed with the following model:

$$(3) \text{ Credit Rating}_{it} = \beta_0 + \beta_1 \log(\text{UI_max_benefit})_{it-1} + \beta_2 V_{it-1} + W_t + Z_j + \varepsilon_{it}$$

where the subscripts i , t , and j are for firm, year, and industry-group, respectively. **Equation (3)** is an adaptation of Gupta (2021) equation, where the dependent variable is the Credit Rating, and the independent variables are: 1) the natural logarithm of the maximum UI benefit, calculated as previously stated; 2) financial determinants of credit ratings (V_{it-1}); 3) year-fixed effects (W_t) and industry-groups effects (Z_j). All independent variables are widely documented in the empirical corporate finance research of Gupta (2021), Gray et al. (2006), and in the S&P Global guide. Control variables are a set of financial variables typically used to assess credit ratings: net profit margin and revenue growth gauge on firm's profitability; interest coverage ratio and current ratio determine the company's ability to meet its financial obligations; the logarithm of total assets is a proxy of the economic value owned by a firm; and the Herfindahl-Hirschman Index (HHI) measures market competitiveness. Furthermore, regressors are lagged by 1-year to reflect the causality effect between independent and dependent variables, as well as to account for the time needed by rating agencies to adapt their analysis and modify credit ratings when needed. Model variables' summary statistics are presented in **Table 3**, with further details in **Table A.9** (Appendix), **Table A.10** (Appendix), and **Table A.11** (Appendix).

Furthermore, an OLS regression requires the Credit Rating – which is a descriptive variable - to be converted into a numerical variable. As performed in prior studies from Devos and Rahman (2017), and Murcia, Rover et al. (2014), the following procedures were replicated: 1) ratings were initially classified into 7 numerical categories; 2) adjustments were made as some

categories accounted for a few observations only: categories 1 and 2 were combined into a single category, marked as 1, and the same procedure was applied to categories 5, 6, and 7, ultimately marked as 4. As a result, a four-level classification is implemented in the current study, as reported in **Table A.8** (Appendix). The higher class, **Class 1**, accounts for 836 observations and comprises investment grade companies with strong capacity to meet their financial requirements. This class covers observations ranging from credit rating AAA to A-. **Class 2**, including 1,074 observations, comprehends investment grade companies with an adequate ability to meet financial requirements but that are more vulnerable to economic conditions with respect to the previous class. This rating class includes observations of firms with the following ratings: BBB+, BBB and BBB-. Then, **Class 3** includes 761 speculative grade firm-year observations, which therefore encounter more uncertainties given adverse economic, business, and financial conditions. Credit ratings included in this class are BB+, BB and BB-. Finally, the lowest class, **Class 4**, includes 376 observations ranging from BB+ to SD. Companies included in this group are highly vulnerable to changing economic, financial, and business conditions, and span from firms still able to meet their financial requirements in the short term to companies from which default is expected. Overall, the four-category classification has been performed for two main purposes: firstly, to incorporate credit ratings classes accounting for only a few observations, as those classes alone would not be representative; second, to identify whether changes in the generosity of the UI benefits significantly impact a company's ability to meet its financial obligations.

Regarding the empirical model, the dependent variable Credit Rating is a qualitative, ordinal variable, meaning that “*only the order among the various credit rating values can be inferred, but not the actual difference among them*” (Gupta 2021). The OLS model applied in the case of an ordinal-dependent variable is the Linear Probability Model (LPM), which estimates the probability that an event occurs. In order to apply the LPM, the dependent variable must be a

binary variable taking the value of one when a certain event occurs, and zero otherwise. The purpose of this chapter is to test whether a change in the generosity of the UI benefits alters a company's credit rating.

As a first step, the changes in credit ratings have been calculated by doing the difference between the class associated to a specific firm i in the year t , and the class associated to the same firm in the preceding year, as shown in **Equation (4)**:

$$(4) \text{ Change} = \text{Class}_{it} - \text{Class}_{it-1}$$

For example, a company with a credit rating class equal to 3 in 2008 and to 2 in 2009 would generate a change equal to -1. Based on the structure of the credit rating scale where 1 refers to the best credit ratings and 4 to the worst ones, a negative change suggests an improvement in the rating, while a positive change is associated to its downgrading. Given that the dataset is referred to the period 2007-2017, ten credit rating changes have been calculated for firms with credit ratings in every year. On the other hand, if the credit rating was missing in a specific year, changes were not calculated.

Then, two separate models have been created. The first model tests the probability that the credit rating improves because of a change in the maximum benefits. Therefore, the dependent variable is coded as 1 for negative changes, and 0 when there is no change. If the change is positive, meaning that there is a downgrading, the observation is left blank. Conversely, the second model tests the probability of a decrease in the credit rating because of a change in the maximum benefits. In this case, the dependent variable is coded as 1 for positive changes, as 0 when there is no change, and it is left blank for negative changes.

Based on the procedures described, two linear probability models were run generating the results described in Section 4.3.

TABLE 3

Impact of unemployment insurance laws (UI) on firms' credit ratings - Summary Statistics.

This table summarizes the descriptive statistics of the variables included in the credit rating regressions (Equation 4). Summary statistics of the dependent variable are based on the four-level classification previously described. The dataset is the same used in the leverage regression, consisting of 3,001 firm-year observations from 2007 to 2017, excluding financial and utility firms, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
<i>Panel A: Dependent variable</i>					
Credit Rating	2.209	0.982	1.000	2.000	4.000
<i>Panel B: Control variables</i>					
Log max benefit $t-1$	9.168	0.239	9.057	9.057	9.633
Net profit margin $t-1$	0.074	0.066	0.000	0.059	0.213
Revenue growth $t-1$	0.025	0.177	-0.255	0.025	0.289
Interest coverage ratio $t-1$	14.608	26.660	0.232	7.459	51.808
Current ratio $t-1$	1.781	0.825	0.774	1.597	3.457
Log total assets $t-1$	9.002	1.351	6.987	8.889	11.456
HHI $t-1$	163.320	231.180	9.346	99.517	421.350

Source: Authors' own findings.

4.2 Validity test

As for the leverage regression, the dataset created was tested for multicollinearity. **Table A.12** (Appendix) summarizes the results of the correlation matrix: the financial variables present correlation values between 0.0007 and 0.3253, hence there is no multicollinearity problem. Furthermore, robust standard errors are used as standard errors are always heteroskedastic in a linear probability model.

4.3 Findings and discussion

Table 4 demonstrates that the coefficient of UI benefits is not statistically significant in both regressions, hence a change in the generosity of UI benefits does not affect corporates' credit ratings.

The combination of these findings with the leverage regressions' ones suggests that when the generosity of wage compensations decreases – because of the lower reciprocity rate - firms adopt less indebted capital structures but maintain the same default risk and interest coverage ratio. It is therefore inferred that the reduction in debt levels is not sufficient to enhance

companies' ability to repay their interest expenses and, more broadly, to meet their financial commitments.

These findings are also in line with the fact that the average value of the Z-score, a proxy of the bankruptcy risk, does not vary considerably during the years examined. Indeed, the lower average value is 1.63 in 2015, while the higher average value is 2.04 in 2007. Therefore, on average, firms' level of financial distress is rather constant during the period analyzed.

Regarding the fit of the model, the adjusted R^2 is equal to 1.55 percent in the increasing model, and 2.67 percent in the decreasing model, signaling that almost all the variation in the dependent variable is not explained by the model. However, in a LPM the regression line never fits the data perfectly because the dependent variable is ordinal, while regressors are continuous. Hence R^2 has no meaningful interpretation (Hill, Griffiths e Lim 2011).

Lastly, the signs of the regressors' coefficients in the decreasing model mostly confirm the ones predicted. Indeed, positive coefficients imply a change in credit ratings to a class closer to one, hence an upgrading, while negative coefficients suggest a downgrading.

The results of the LPM for the decrease in credit ratings suggest that net profit margin, revenue growth, and interest coverage ratio have a strong influence on the dependent variable. This aligns with what previously forecasted: a lower profitability determines a deterioration in the company's financial health since it has less resources to pay its debtholders and deliver returns to shareholders; hence, credit rating is expected to downgrade. Second, a decrease in revenue growth suggests that the company will generate lower cash flows and might be forced to look for external resources to repay debtholders and finance its operations; this leads to an increase in the cost of capital and a decline in the credit rating. Again, a lower interest coverage ratio gauges a lower ability to generate enough cash flows to cover interest expenses, thus increasing the default risk and reducing the credit rating valuation. On the other hand, the

regression demonstrates that UI benefits, liquidity, growth, and market concentration do not influence credit ratings. These results are partially in line with Gupta (2021).

TABLE 4

Impact of unemployment insurance laws (UI) on firms' credit ratings – Linear Probability Models' Findings.

This table summarizes the results of the LPMs used to test the relation between a change in the generosity of UI benefits and firms' credit ratings. Control variables include firm-financial characteristics, industry fixed effects, and year fixed effects. All regressors are taken at one-year lag to express the causal relation between their change and a consequent variation in the credit rating score. Robust standard errors are used and *, **, *** describe the significance at 10 percent, 5 percent, and 1 percent levels, respectively.

	Credit Rating Upgrading	Credit Rating Downgrading
Firm financial controls		
Log max benefit t-1	-0.0192	0.0182
<i>P-value</i>	0.2334	0.2842
Log tot assets t-1	-0.0049	0.0032
Current Ratio t-1	0.0021	0.0044
Net Profit Margin t-1	0.0914	-0.2071***
Revenue Growth t-1	0.0015	-0.0734***
Interest Coverage Ratio t-1	-0.0002	-0.0004**
HHI t-1	1.1357e-05	8.3765e-05
Control variables		
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Adjusted R²	0.0155	0.0267
Estimation method	LPM	LPM

Source: Authors' own findings.

4.4 Limitations

As for the leverage regression, this section identifies the limitations of the analysis performed that might diminish the validity of the credit ratings' findings.

First, this study considers only credit ratings delivered by Standard and Poor's; including measures from other rating agencies such as Moody's and Fitch might avoid the subjectivity embedded in each agency's evaluation. For example, rating agencies might consider different determinants of credit rating, or they might attribute a different weight on the same factors.

Second, the linear probability models created have low adjusted R^2 . These results arise from two main aspects: first, as previously stated, the use of a LPM inevitably leads to a low value of R^2 ; second, several factors influence firms' credit ratings, hence this field of study has an inherently greater amount of unexplained variation. Indeed, this paper focuses mostly on financial metrics, as in prior studies, and includes only the HHI index as a non-financial indicator describing market competition. However, other non-financial indicators such as management, governance, or government influence, might have an impact on credit ratings as well (Global Standard & Poor's 2022), thus increasing the adjusted R^2 .

Third, credit ratings have initially been classified into four categories, ranging from 1 to 4, where each one incorporates several credit ratings values. Then, changes in credit ratings have been calculated by doing the difference from one class to another class in two adjacent periods. This procedure aims at identifying only changes generating a substantial variation in the company's ability to meet its financial obligations; however, this method hides minor within-class variations in the credit rating. For example, the model marks as change the variation from the credit rating BBB to A, as this determines the shift from class 2 to class 1, but it does not acknowledge a change from CCC to B-, as they belong to the same class 4.

Lastly, the relation between UI benefits and credit ratings has been examined with the linear probability model, which is an adaptation of the OLS method used in the case of ordinal-dependent variables. However, this model has severe limitations: the error term is heteroskedastic and predicted probabilities might lie outside the acceptable probability range of 0 to 1. Instead, ordered probit or ordered logit models represent better alternatives leading to more reliable findings (Gupta 2021).

PART II – INDIVIDUAL COMPONENT: FEDERICA BRESCANZIN

5. Size and Age Effects

After having examined the impact of UI maximum benefits on leverage and credit ratings, in Chapter 3 and Chapter 4, this chapter aims at deepening the analysis by comparing the effects of unemployment compensations based on firm specific characteristics. In particular, the differences in unemployment benefits' impact between smaller and bigger firms and younger against more mature firms will be studied.

Section 6.1 provides an overview on the topic and the related literature review, while Section 6.2 presents the methodology applied to collect data and the resulting empirical framework. In Section 6.3, the main findings related to differences of UI benefits impacts on leverage and credit ratings depending on the size of the firm will be discussed.

Ultimately in Section 6.4 will be presented an analysis on differences of unemployment compensations on leverage and credit ratings depending on firms' age. Section 6.5 outlines the main limitations of the study.

6.1 Institutional background

Firms might react differently to shifts in unemployment subsidies due to specific factors that characterize them. In particular, firms' size and age, in terms of number of years that the firm is quoted in the public market, can affect capital structure and reaction to external events. With this regard, literature is conflicting in assessing how firms' leverage change when companies become larger in terms of size and more mature.

A large portion of literature in corporate finance aims researching how different frictions in the process of raising funds from external sources can lead to financial constraints for companies (Hadlock e Pierce 2010). In a study conducted by Hadlock and Pierce (2010), it has

been demonstrated that age and firm's size are effective predictors of firms' financial constraints levels. The term financial constraints outline all the factors that limit the amount and the quality of investment choices. These constraints have a substantial influence on companies' major decisions, for example firms' capital structure and investment decisions (Hadlock e Pierce 2010). The model proposed by Hadlock and Pierce (2010), indicates that when small and young companies mature, the associated financial constraints decrease; meaning that it is easier for those companies to raise external capital, including debt. Moreover, they empirically demonstrated that the relation of these two factors with financial limitations is not linear, but it rather can be expressed by the following quadratic formula, SA index (Size-Age index):

$$(5) SA\ index = (-0.737 * Size) + (0.043 * Size^2) - (0.040 * Age)$$

In **Equation (5)**, the factor *Size* is the logarithm of inflation adjusted book value of assets, and the factor *Age* is the number of years the company has been present on Compustat without a missing stock price. For mature or very large companies, the relation between these factors and financial limitations tends to be flat. However, below certain thresholds, it is estimated a quadratic relation between size and financial constraints and a linear one between age and financial limitations.

On the other hand, Huynh and Petrunia (2009) analyzed the relation between firms' age and size on companies' growth and reached different conclusions. Whenever a new firm enters the market, it has incomplete information regarding the industry, and it gains more expertise and information through time and production. This is a valid reason for which age effects persist even after controlling for financial variables (Huynh e Petrunia 2009). The study conducted by Huynh and Petrunia (2009) demonstrated a negative relationship between companies' leverage and age, as firms age they increase equity to a higher extent with respect to debt. Regarding the

size, the estimates produced by the model suggest that the size factor captures the growth of equity; indeed, larger firms should have more equity with less need to become larger.

Starting from these studies and based on this paper prior findings, the following sections will discuss how UI benefits influence firms' leverage and credit ratings, depending on their specific characteristics.

6.2 Data and empirical framework

In order to test the differences previously outlined, the same dataset of Chapter 3 and 4 has been used. Hence, the initial dataset is an unbalanced panel, which comprehends 3,001 firm-year observations of 376 publicly traded U.S. companies from 2007 until 2017.

To examine how firms of different sizes react to changes in the amount of unemployment compensations, the dataset has been split between smaller and bigger firms. To be more precise, both the book value of total assets and the market capitalization of the company have been taken into consideration as proxies for firms' size. Firms have been categorized as big or small depending on whether their size was equal/above or below the median value, respectively. The median value for total assets is \$7,257 millions, while for market capitalization is \$5.74 millions.

Meanwhile, to analyze the impact of firms' age on the reaction to changes in UI maximum benefits the following procedure has been done. Starting from the initial dataset including 3,001 firm-year observations of 376 publicly traded companies, they have been split based on the year in which Compustat started reporting the prices, assuming this date being the IPO date. The year median value was 1967, companies started being traded before that date are considered as mature while the ones started being traded after are considered as young. Summary statistics for all firms' categories are reported in tables ranging from **Table B.23** (Appendix) to **Table B.28** (Appendix).

6.3 Findings and discussion for size effects

To study the relationship between unemployment compensation and firms' leverage, three regressions have been run using different dependent variables: the ratio of total debt to total assets, the ratio between total debt and enterprise market value, and the logarithm of the interest coverage ratio. Additionally, for all regressions state economic indicators, firm financial controls, firm fixed effects, and year fixed effects have been used. **Columns 1 and 3 of Table 7** reports the regressions' results using the value of total assets as a proxy for firms' size, while the regressions using market capitalization as proxy for companies' dimensions are reported in **Column 2 and 4**. The regressions' results comprehending the coefficients for control variables are displayed in **Table B.29** (Appendix).

Panel A of Table 7 displays the regressions having as dependent variables the ratio between total debt and total assets. Both using total assets and market capitalization as proxies for firms' size, the logarithm of maximum UI benefits is significant at 5 percent significance level for small and big firms. When classifying firms based on total assets, UI maximum benefits coefficient equals -0.0729 for larger firms, **Column 1**, and -0.0696 for smaller ones, **Column 3**. When considering market capitalization as a proxy for firms' size, the coefficient of *Log max benefit_{t-1}* is -0.0727 for big firms, **Column 2**, and -0.0697 for small companies, **Column 4**. This means that whenever unemployment benefits increase by 1 percent, larger firms tend to decrease their leverage ratio by a higher percentage with respect to firms of smaller dimensions. Specifically, when UI maximum benefits increase by 1 percent, big firms decrease their leverage ratio by approximately 7.28 percentage points. On the other hand, an increase of 1 percent in unemployment compensation is associated with a 6.965 percentage points decrease in leverage ratio for small firms.

Panel B and C show regressions having as dependent variables the ratio of total debt to enterprise value and the logarithm of interest coverage ratio, respectively. The results confirm

what already examined in Section 3; unemployment subsidies do not significantly impact the market value of debt nor the ability of a firm to repay interests.

TABLE 7

Impact of unemployment insurance laws (UI) on firms' financial choices – OLS regressions' findings of Big against Small firms, considering total assets and market capitalization as proxies for firms' size.

This table summarizes the results of the OLS regressions run to test the relation between changes in the generosity of UI benefits and a set of variables. Dependent variables are the leverage ratio using total assets, the leverage ratio using enterprise value, and the natural logarithm of the interest coverage ratio. All regressions include a set of controls for firm financial characteristics, state economic indicators, firm fixed effects, and year fixed effects. Standard errors are clustered at state levels and *, **, and *** are used to describe the significance at 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)	(3)	(4)
	Big Firms	Big Firms	Small Firms	Small Firms
	Total assets	Market cap	Total assets	Market cap
Panel A: Total debt / Total assets				
Log max benefit t-1	-0.0729**	-0.0727**	-0.0696**	-0.0697**
	(0.0158)	(0.0163)	(0.0232)	(0.0264)
Adjusted R ²	0.8943	0.9008	0.8549	0.8555
Panel B: Total debt / Enterprise value				
Log max benefit t-1	-0.0005	-0.0006	0.0002	-0.0002
	(0.1571)	(0.1754)	(0.5068)	(0.3967)
Adjusted R ²	0.8277	0.8109	0.7950	0.8035
Panel C: Log interest coverage ratio				
Log max benefit t-1	0.0927	0.1800	0.1978	-0.1294
	(0.6779)	(0.4170)	(0.4355)	(0.6273)
Adjusted R ²	0.8778	0.8661	0.8258	0.7903
Control variables				
State economic indicators	Yes	Yes	Yes	Yes
Firm financial controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	OLS	OLS	OLS	OLS

Source: Author's own findings.

From the previous analysis conducted in Chapter 3, it has emerged that despite the apparent increase in the UI maximum benefits the reciprocity rate has substantially decreased. Indeed, it became harder for unemployed workers to apply for UI benefits, either because of tighter

eligibility criteria, or because of increasing process obstacles to apply for the program. The reduction in the actual enlargement of unemployment compensation justifies the fact that companies decreased their levels of leverage in order to offer more protection to workers.

Additionally, to deal with the challenges introduced by the Financial Crisis of 2008-2009, many firms opted for retrenchment strategies (Yanqing, et al. 2015). These involve Human Resource Management strategies tailored to decrease labor-related costs, for example downsizing, working hours reduction, and freezing wages. A study conducted by Vieira (2016) demonstrated that during recession periods big firms are more propense to rely on personnel cuts compared to smaller firms. Indeed, even if larger firms tend to be more resilient in periods of economic downturn, they are more likely to lay off employees (Vieira 2016). This might be caused by the fact that periods of economic downturn encourage reviews of all formal HR practices, and bigger firms tend to have more formal practices with respect to smaller firms, which have more informal and ad-hoc practices (Yanqing, et al. 2015). This tendency explains the reason behind a greater decrease in leverage ratio for bigger firms compared to smaller ones. Indeed, as employees of large companies face a greater risk of being laid off, companies compensate the risk by decreasing the leverage ratio by a higher proportion.

To examine the relationship between UI maximum benefits and credit ratings, among large and small firms, the Linear Probability Model has been used. Two different regressions have been run for both large and small firms. One in which the dependent variable takes value equal to 1 when the credit rating improves from a year to the subsequent one, and value 0 when there is no change, **Column 1 and 3 of Table 8 and Table B.30** (Appendix). In the other regressions the dependent variable takes value 1 when the credit rating deteriorated from a year to another, and 0 when there is no change, **Column 2 and 4**. The credit rating regressions' results using market capitalization as a proxy for firms' size are reported in **Table B.31** (Appendix).

Similar to the results reached in Chapter 4, the regressions run by dividing firms between smaller and bigger ones confirm that there is no linear relationship between the logarithm of UI maximum benefits and changes in credit ratings. This means that whenever unemployment compensation increase, this positively impacts firms' leverage but does not significantly affects credit ratings.

TABLE 8

Impact of unemployment insurance laws (UI) on firms' credit ratings – Linear Probability Models' Findings of Big against Small firms, using total assets as a proxy for firms' size.

This table summarizes the findings of the four Linear Probability Models used to test the relation between UI benefits and firms' credit ratings. Firms are separated into two samples, namely Big and Small firms. Column (1) reports the results when testing for an upgrade in the credit ratings of big firms; Column (2) reports the results when testing for a downgrade in the credit ratings of big firms; Column (3) reports the results when testing for an upgrade in the credit ratings of small firms; Column (4) reports the results when testing for a downgrade in the credit ratings of small firms.

	(1)	(2)	(3)	(4)
	Big Firms	Big Firms	Small Firms	Small Firms
	Upgrading rating	Downgrading rating	Upgrading rating	Downgrading rating
Log max benefit t-1	-0.0087	0.0365	0.0315	0.0134
	0.7350	0.1972	0.1709	0.6380
Adjusted R ²	0.0190	0.0204	0.0200	0.0430
Control variables				
Firm financial controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	LMP	LMP	LMP	LMP

Source: Author's own findings.

6.4 Findings and discussion for age effects

To study the relationship between UI benefits and leverage, three regressions have been performed with different dependent variables for both young firms and mature ones: one having as dependent variable the ratio between total debt to total assets, the second one having as response variable the total debt to enterprise value ratio, and the last one having the logarithm

of interest coverage ratio as dependent variable. **Table 9** reports the results of the regressions performed, where **Column 1** refers to younger firms and **Column 2** to more mature companies.

Panel A of **Table 9** displays the results of the regression having total debt to total assets as response variable. The coefficient of the logarithm of unemployment maximum benefits for young firms equal -0.0635 and -0.0706 for mature firms, both significant at 5 percent significance level. This means that for the same increase in UI maximum benefits, leverage ratio of more mature companies drops by a higher percentage compared to the one of young firms. Indeed, when unemployment compensation increases by 1 percent, young firms' leverage decrease by 6.35 percentage points. Additionally, 86.2 percent of the dependent variable's variation is explained by the model. Meanwhile, when UI maximum benefits increases by 1 percent, total debt to total assets ratio decreases by 7.06 percentage points, with 87.1 percent of the response variable's variation is explained by the model. The complete regressions' results, comprehending the coefficients for control variables, are reported in **Table B.32** (Appendix).

TABLE 9

Impact of unemployment insurance laws (UI) on firms' financial choices – OLS regressions' findings of Young against Mature firms.

This table summarizes the results of the OLS regression run to test the relation between changes in the generosity of UI benefits and a set of variables. Dependent variables are the ratio of debt over total assets (Panel A), the ratio of debt over enterprise value (Panel B), and the natural logarithm of the interest coverage ratio. All regressions include a set of controls for firm financial characteristics, state economic indicators, firm fixed effects, and year fixed effects. Standard errors are clustered at state levels and *, **, and *** are used to describe the significance at 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)
	Young Firms	Mature Firms
<i>Panel A: Total debt / Total assets</i>		
Log max benefit t-1	-0.0635**	-0.0706**
	(0.0369)	(0.0264)
Adjusted R ²	0.8615	0.8708
<i>Panel B: Total debt / Enterprise value</i>		
Log max benefit t-1	-0.0004	0.1684

	(0.2661)	(0.8624)
Adjusted R ²	(0.8078)	0.7534
Panel C: Log interest coverage ratio		
Log max benefit t-1	-0.0676	0.2393
	(0.7729)	(0.3599)
Adjusted R ²	0.8579	0.8165
Control variables		
State economic indicators	Yes	Yes
Firm financial controls	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Estimation method	OLS	OLS

Source: Author's own findings.

From a study conducted by Cooley and Quadrini (2001) it emerged that young firms have a restricted amount of equity, which increases as the company becomes more mature. The increase in equity leads to a lower reliance on debt. At the same time, from previous studies it has been proved that mature firms have fewer financial constraints, meaning that it is easier for these companies to raise capital from external source (Hadlock e Pierce 2010). Therefore, it is reasonable to assume that more aged firms have higher amounts of debt. In light of these findings, our results are justified by the fact that as more mature firms have more debt and less need to grow, compared to younger companies, they are able to drop their leverage ratio by a higher percentage. For these structural reasons, for the same level of UI maximum benefits mature firms can drop a higher amount of leverage with respect to newer firms.

To study the relationship between UI maximum benefits and credit ratings, conditional on firms' age, the Linear Probability Model has been used. Two different regressions have been run for both young and mature firms. One in which the dependent variable takes value equal to 1 when the credit rating improves from a year to the subsequent one, and value 0 when there is no change, **Column 1 and 3 of Table 10**. While the other regressions' the dependent variable takes value 1 when the credit rating deteriorated from a year to another, and 0 when there is no

change, **Column 2** and **4**. The complete regressions' results, comprehending the coefficient values for control variables, are reported in **Table B.33** (Appendix).

Similar to the results reached in previous chapters, the regressions run by dividing firms between young and mature ones confirm that there is no linear relationship between the logarithm of UI maximum benefits and shifts in credit ratings classes. This means that whenever unemployment compensation increases, this impacts firms' leverage but does not significantly affect credit ratings.

TABLE 10

Impact of unemployment insurance laws (UI) on firms' credit ratings – Linear Probability Models' Findings of Young against Mature firms.

This table summarizes the findings of the four Linear Probability Models used to test the relation between UI benefits and firms' credit ratings. Firms are separated into two samples, namely Young and Mature firms. Column (1) reports the results when testing for an upgrade in the credit ratings of young firms; Column (2) reports the results when testing for a downgrade in the credit ratings of young firms; Column (3) reports the results when testing for an upgrade in the credit ratings of mature firms; Column (4) reports the results when testing for a downgrade in the credit ratings of mature firms.

	(1)	(2)	(3)	(4)
	Young Firms	Young Firms	Mature Firms	Mature Firms
	Upgrading rating	Downgrading rating	Upgrading rating	Downgrading rating
Log max benefit t-1	-0.0163	0.0212	-0.0167	0.0354
	(0.5567)	(0.4598)	(0.2602)	(0.1325)
Adjusted R ²	0.0063	0.0439	0.0147	0.0259
Control variables				
Firm financial controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	LMP	LMP	LMP	LMP

Source: Author's own findings.

6.5 Limitations

Section 6.6 aims at identifying limitations in the analysis just performed, which might harm the conclusions previously reached. These limitations are to be considered in addition to the

limitations outlined in Chapter 3 and Chapter 4, as the initial dataset and the models used to perform the regressions are the same.

The main limitation identified in the study conducted is related to the small difference between coefficients of small and big firms, and young against mature firms. Indeed, as the two coefficients are slightly different between each other is hard to conclude whether the difference between them is statistically significant.

Another limitation identified in the research performed is related to the absence of data on small and young firms. In fact, the Compustat dataset used to perform the research comprise information on publicly traded U.S. firms. Therefore, what considered in this examination are firms already quoted in the financial markets, therefore relatively large and mature.

Additionally, regarding the credit ratings regressions, by using the Linear Probability Model the dependent variables' variability is weakly explained by the model, consequently the values of the R^2 s are low

6. Conclusions

This paper offers several contributions to the existing literature on unemployment subsidies. Starting from a study of Agrawal and Matsa (2013), the impact of shocks in UI benefits on corporates' leverage was analyzed on a different timeframe (2007-2017). Then, a potential linear relation between UI compensations and credit ratings was investigated. Lastly, the paper elaborated on the same relations when classifying firms according to different inherent characteristics: cyclicalities, size, and age.

First, the current study confirms the existence of a linear association between unemployment subsidies and leverage for U.S. public firms. While the research of Agrawal and Matsa (2013) demonstrates a positive linear relation between the two metrics, the regressions performed in the present study highlight a negative relation. The reason is to be found in the different time frame analyzed, which includes the 2008 Financial Crisis and its aftermath. From 2007 to 2016, the generosity of UI benefits increased by 10 percent, while the reciprocity rate dropped by 28 percent; hence, weighted benefits declined by 13 percent. As it became harder for jobless workers to apply for UI benefits, they faced greater layoff costs, and, consequently, US public firms adjusted their capital structures by decreasing their leverage ratios. Therefore, this paper discovers that the relation between UI benefits and corporate finance choices is mediated by the reciprocity rate, a factor not examined in prior literature.

Furthermore, this paper investigates a potential relation between UI subsidies and credit ratings. The results of the LPMs show that UI benefits do not impact firms' ability to meet their financial commitments. Hence, the impact of the benefits enlarged by the UI system on firms' capital structures is significant but not sufficient to influence companies' credit ratings. However, the LPM is not the most accurate model to describe this type of relation, which would

be better investigated by the Probit Model. With this regard, the current paper can be considered as a starting point to develop further research on the topic.

Moreover, the paper contributes to the existing literature by analyzing how size and age effects impact the previously studied relations, namely leverage and credit ratings. It is concluded that larger firms react more intensively to changes in UI benefits. Indeed, even though big firms are more resilient in periods of economic downturns, they are more propense to lay off employees. Therefore, workers of large firms bear a greater risk of unemployment. Hence, these companies protect them by decreasing at a higher percentage the portion of debt, whenever the amount of UI subsidies decreases. Furthermore, the paper concludes that as firms age, they have fewer financial constraints and less need to grow and expand compared to younger companies. Hence, they are able to decrease their leverage ratio by a higher percentage in order to protect their workers when facing greater costs of being laid off.

To conclude, by isolating cyclicity, size, and age effects it is confirmed that changes in the unemployment compensation impact US public firms' capital structures, even though not affecting firms' ability to meet their financial commitments.

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Appendix

Appendix A: Group Component

Table A.1

Impact of unemployment insurance laws (UI) on firms' financial choices - Unemployment Insurance Benefits by State (2007-2017).

The following table contains information on each state UI benefits manually collected from the U.S. Department of Labor in the section “*Significant Provisions of state UI Laws*”, for the period 2007-2017. Each year there are two issues, in January and July, but for the purpose of this study and following prior literature only the January issue is considered. This tables highlights, for each state, the mean value of the maximum weekly benefits (\$), the mean value of the maximum duration (expressed in weeks), and the mean value of the maximum total UI benefits (\$).

State	Avg. Max Weekly Benefit (\$)	Avg. Max Duration (Weeks)	Avg Max Total UI Benefit (\$)
AL	258,18	26,00	6.712,73
AK	406,73	26,00	10.574,91
AZ	240,00	26,00	6.240,00
AR	439,91	24,55	10.781,09
CA	450,00	26,00	11.700,00
CO	495,00	26,00	12.870,00
CT	634,73	26,00	16.502,91
DE	330,00	26,00	8.580,00
DC	365,00	26,00	9.490,00
FL	275,00	21,18	5.825,00
GA	328,18	22,18	7.272,73
HI	542,18	26,00	14.096,73
ID	366,82	26,00	9.537,27
IL	552,09	26,00	14.354,36
IN	390,00	26,00	10.140,00
IA	477,00	26,00	12.402,00
KS	443,45	26,00	11.529,82
KY	413,73	26,00	10.756,91
LA	252,36	26,00	6.561,45
ME	547,45	26,00	14.233,82
MD	410,91	26,00	10.683,64
MA	984,18	30,00	29.525,45
MI	362,00	23,27	8.424,73

MN	583,45	26,00	15.169,82
MS	230,00	26,00	5.980,00
MO	316,36	23,27	7.352,73
MT	437,00	28,00	12.236,00
NE	346,55	26,00	9.010,18
NV	397,73	26,00	10.340,91
NH	422,00	26,00	10.972,00
NJ	611,73	26,00	15.904,91
NM	462,00	26,00	12.012,00
NY	409,55	26,00	10.648,18
NC	443,27	24,18	10.888,73
ND	493,45	26,00	12.829,82
OH	537,55	26,00	13.976,18
OK	420,91	26,00	10.943,64
OR	512,36	26,00	13.321,45
PA	569,82	26,00	14.815,27
PR	133,00	26,00	3.458,00
RI	684,36	26,00	17.793,45
SC	323,91	23,82	7.710,36
SD	325,36	26,00	8.459,45
TN	288,64	26,00	7.504,55
TX	428,36	26,00	11.137,45
UT	467,45	26,00	12.153,82
VT	426,64	26,00	11.092,55
VA	373,82	26,00	9.719,27
VI	468,27	26,00	12.175,09
WA	588,64	26,00	15.304,55
WV	419,55	26,00	10.908,18
WI	364,09	26,00	9.466,36
WY	440,73	26,00	11.458,91

Source: Authors' own findings.

Table A.2

Impact of unemployment insurance laws (UI) on firms' financial choices – GICS Groups.

This table reports the Global Industry Classification Standard (GICS), a universal classification widely accepted as an industry framework, developed by S&P Dow Jones Indices and MSCI. The GICS structure identifies 11 sectors, which are then articulated in industry groups, industries, and sub-industries. This classification has been

used in the present study to create the initial dataset, to account for GICS group-fixed effect in the credit risk regression, and to separate cyclical to non-cyclical industries in the Individual Component of Francesca Mazzali.

Sector		Industry Group		Industry		Sub-Industry	
10	Energy	1010	Energy	101010	Energy Equipment & Services	10101010	Oil & Gas Drilling
						10101020	Oil & Gas Equipment & Services
				101020	Oil, Gas & Consumable Fuels	10102010	Integrated Oil & Gas
						10102020	Oil & Gas Exploration & Production
						10102030	Oil & Gas Refining & Marketing
						10102040	Oil & Gas Storage & Transportation
						10102050	Coal & Consumable Fuels
15	Materials	1510	Materials	151010	Chemicals	15101010	Commodity Chemicals
						15101020	Diversified Chemicals
						15101030	Fertilizers & Agricultural Chemicals
						15101040	Industry Gases
						15101050	Specialty Chemicals
				151020	Construction Materials	15102010	Construction Materials
				151030	Containers & Packaging	15103010	Metal & Glass Containers
						15103020	Paper Packaging
				151040	Metals & Mining	15104010	Aluminum
						15104020	Diversified Metals & Mining
						15104025	Copper
						15104030	Gold
						15104040	Precious Metals & Minerals
						15104045	Silver
				15104050	Steel		
				151050		15105010	Forest Products

					Paper & Forest Products	15105020	Paper Products		
20	Industrials	2010	Capital Goods	201010	Aerospace & Defense	20101010	Aerospace & Defense		
				201020	Building Products	20102010	Building Products		
				201030	Construction & Engineering	20103010	Construction & Engineering		
				201040	Electrical Equipment	20104010	Electrical Components & Equipment		
						20104020	Heavy Electrical Equipment		
				201050	Industrial Conglomerates	20105010	Industrial Conglomerates		
				201060	Machinery	20106010	Construction Machinery & Heavy Trucks		
						20106015	Agricultural & Farm Machinery		
						20106020	Industrial Machinery		
				201070	Trading Companies & Distributors	20107010	Trading Companies & Distributors		
		2020	Commercial & Professional Services	202010	Commercial Services & Supplies	20201010	Commercial Printing		
						20201050	Environmental & Facility Services		
						20201060	Office Services & Supplies		
						20201070	Diversified Support Services		
						20201080	Security & Alarm Services		
				202020	Professional Services	20202010	Human Resources & Equipment Services		
						20202020	Research & Consulting Services		
				2030	Transportation	203010	Air Freight & Logistics	20301010	Air Freight & Logistics
								20302010	Airlines
								20303010	Marine
203040	Road & Rail	20304010	Railroads						
		20304020	Trucking						

				203050	Transportation Infrastructure	20305010	Airport Services		
						20305020	Highways & Railtracks		
						20305030	Marine Ports & Services		
25	Consumer Discretionary (Consumer Cyclical)	2510	Automobiles & Components	251010	Auto Components	25101010	Auto Parts & Equipment		
						25101020	Tires & Rubber		
				251020	Automobiles	25102010	Automobile Manufacturers		
						25102020	Motorcycle Manufacturers		
				2520	Consumer Durables & Apparel	252010	Household Durables	25201010	Consumer Electronics
								25201020	Home Furnishings
		25201030	Homebuilding						
		25201040	Household Appliances						
		25201050	Housewares & Specialties						
		252020	Leisure Products			25202010	Leisure Products		
		252030	Textiles, Apparel & Luxury Goods			25203010	Apparel, Accessories & Luxury Goods		
						25203020	Footwear		
				25203030	Textiles				
		2530	Consumer Services	253010	Hotels, Restaurants & Leisure	25301010	Casinos & Gaming		
						25301020	Hotels, Resorts & Cruise Lines		
						25301030	Leisure Facilities		
						25301040	Restaurants		
253020	Diversified Consumer Services			25302010	Education Services				
				25302020	Specialized Consumer Services				
2550	Retailing	255010	Distributors	25501010	Distributors				
				255020	Internet & Direct Marketing Retail				
				255030	Multiline Retail	25503010	Department Stores		
						25503020	General Merchandise Stores		
				255040	Specialty Retail	25504010	Apparel Retail		

						25504020	Computer & Electronics Retail
						25504030	Home Improvement Retail
						25504040	Specialty Stores
						25504050	Automotive Retail
						25504060	Home furnishing Retail
30	Consumer Staples (Consumer Defensive)	3010	Food & Staples Retailing	301010	Food & Staples Retailing	30101010	Drug Retail
						30101020	Food Distributors
						30101030	Food Retail
						30101040	Hypermarkets & Super Centers
		3020	Food, Beverage & Tobacco	302010	Beverages	30201010	Brewers
						30201020	Distillers & Vintners
						30201030	Soft Drinks
				302020	Food Products	30202010	Agricultural Products
						30202030	Packaged Foods & Meats
						302030	Tobacco
		3030	Household & Personal Products	303010	Households Products		
				303020	Personal Products		
35	Health Care	3510	Health Care Equipment & Services	351010	Health Care Equipment & Supplies	35101010	Health Care Equipment
						35101020	Health Care Supplies
				351020	Health Care Providers & Services	35102010	Health Care Distributors
						35102015	Health Care Services
						35102020	Health Care Facilities
						35102030	Managed Health Care
				351030	Health Care Technology	35103010	Health Care Technology
				3520		352010	Biotechnology
						352020	Pharmaceuticals

			Pharmaceuticals, Biotechnology & Life Sciences	352030	Life Science Tools & Services	35203010	Life Science Tools & Services
40	Financials	4010	Banks	401010	Banks	40101010	Diversified Banks
						40101015	Regional Banks
				401020	Thriffs & Mortgage Finance	40102010	Thriffs & Mortgage Finance
		4020	Diversified Financials	402010	Diversified Financial Services	40201020	Other Diversified Financial Services
						40201030	Multi-Sector Holdings
						40201040	Specialized Finance
				402020	Consumer Finance	40202010	Consumer Finance
				402030	Capital Markets	40203010	Asset Management & Custody Banks
						40203020	Investment Banking & Brokerage
						40203030	Diversified Capital Markets
						40203040	Financial Exchange & Data
				402040	Mortgage Real Estate Investment (REITs)	40204010	Mortgage REITs
		4030	Insurance	403010	Insurance	40301010	Insurance Brokers
						40301020	Life & Health Insurance
						40301030	Multi-line Insurance
						40301040	Property & Casualty Insurance
						40301050	Reinsurance
45	Information Technology	4510	Software & Services	451020	IT Services	45102010	IT Consulting & Other Services
						45102020	Data Processing & Outsourced Services
						45102030	Internet Services & Infrastructure
		451030	Software	40103010	Application Software		
				40103020	Systems Software		
		4520		452010	Communications Equipment	45201020	Communications Equipment

			Technology Hardware & Equipment	452020	Technology Hardware, Storage & Peripherals	45202030	Technology Hardware, Storage & Peripherals		
				452030	Electronic Equipment, Instruments & Components	45203010	Electronic Equipment & Instruments		
						45203015	Electronic Components		
						45203020	Electronic Manufacturing Services		
						45203030	Technology Distributors		
		4530	ertis & Semiconductor Equipment	453010	Semiconductors & Semiconductor Equipment	45301010	Semiconductor Equipment		
						45301020	Semiconductors		
50	Communicati on Services	5010	Telecommunicati on Services	501010	Diversified Telecommunication Services	50101010	Alternative Carriers		
						50101020	Integrated Telecommunication Services		
				501020	Wireless Telecommunication Services	50102010	Wireless Telecommunication Services		
				5020	Media & Entertainment	502010	Media	50201010	Advertising
		50201020	Broadcasting						
		50201030	Cable & Satellite						
		50201040	Publishing						
		502020	Entertainment			50202010	Movies & Entertainment		
						50202020	Interactive Home Entertainment		
		502030	Interactive Media & Services	50203010	Interactive Media & Services				
		55	Utilities	5510	Utilities	551010	Electric Utilities	55101010	Electric Utilities
						551020	Gas Utilities	55102010	Gas Utilities
551030	Multi-Utilities					55103010	Multi-Utilities		
551040	Water Utilities					55104010	Water Utilities		
551050	Independent Power & Renewable Electricity Producers					55105010	Independent Power Producers & Energy Traders		
						55105020	Renewable Electricity		
60	Real Estate	6010	Real Estate	601010		60101010	Diversified REITs		

					Equity Real Estate Investment Trusts (REITs)	60101020	Industrial REITs
						60101030	Hotel & Resort REITs
						60101040	Office REITs
						60101050	Health Care REITs
						60101060	Residential REITs
						60101070	Retail REITs
						60101080	Specialized REITs
				601020	Real Estate Management & Development	60102010	Diversified Real Estate Activities
						60102020	Real Estate Operating Companies
						60102030	Real Estate Development
						60102040	Real Estate Services

Source: Adaptation of (MSCI 2022).

Table A.3

Impact of unemployment insurance laws (UI) on firms' financial choices – Model Variables.

This table describes the variables used to estimate the leverage regressions. These controls are widely used in prior literature on UI benefits, and they are collected for the period 2007-2017. All financial data from Compustat are winsorized at 1 percent and 99 percent to remove the effect of outliers that are not representative of the sample, and thus creating a more stable dataset. All variables are taken at time t , while the logarithm of UI benefits is taken at time $(t - 1)$ to describe the causal relation between a change in the benefit's generosity and the following variation in companies' debt levels and interest coverage ratios.

Variable	Description
Total Debt / Total Assets	This ratio measures the proportion of debt over the total assets of the firm (in book values).
Total Debt / Enterprise Value	This ratio measures the proportion of debt over the enterprise value of the firm, calculated by summing the book value of debt to the market capitalization.
Log (Interest Coverage)	This metric represents the natural logarithm of the ratio of EBIT to Interest and Related Expenses. The interest coverage ratio is set to zero when EBIT is negative.
Log (UI Benefit_{t-1})	Control variable describing the generosity of UI benefits as the product of the maximum duration (expressed in number of weeks) and the maximum amount per week. This variable is taken at 1-year lag to demonstrate the causal relation between an increase in UI benefits and the following alteration in the firm's financial policy.
CAPEX / Total Assets	Control variable measuring the proportion of fixed assets, and it is included in the regression to isolate the effect of new investments that a company might undertake in order to grow or maintain its business.
Log (Sales)	Control variable describing the firm size.
Return on Assets (ROA)	Control variable measuring the firm profitability.

Modified Altman Z-score

The modified Altman Z-score (MacKie-Mason 1990) is a control variable assessing the level of firms' financial distress by combining measures of liquidity, profitability, efficiency, and net worth. It is calculated with the following formula:

$$\begin{aligned} \text{Altman Zscore} = & 1.2 \times \frac{\text{Working Capital}}{\text{Total Assets}} + 1.4 \times \frac{\text{Retained Earnings}}{\text{Total Assets}} \\ & + 3.3 \times \frac{\text{Earnings before Interest and Taxes}}{\text{Total Assets}} \\ & + 1.0 \times \frac{\text{Sales}}{\text{Total Assets}} \end{aligned}$$

Market-to-Book Ratio	Control variable measuring the overall value of the business and identifying undervalued or overvalued stocks. It is a metric used to guide investment decisions.
Unemployment Rate	This metric indicates the unemployment level by state, and it is seasonally adjusted in order to remove seasonal and/or calendar influences that take place during a calendar year. Time-series are collected from the US Bureau of Labor Statistics which releases the Local Area Unemployment Statistics (LAUS): monthly and annual reports investigating unemployment and other factors for each state. For the scope of this analysis, unemployment rates for the month of January are the sole considered, and they are included in the regression to control for local macro-economic conditions.
GDP Growth	This metric describes the percentage change in the real GDP from the preceding period (annualized), by state. These data are collected from the US Bureau of Economic Analysis, and they are included in the regression to control for local macro-economic conditions.
Year Fixed Effects	Dummy variables for each year of the period 2007-2017 are included to outline possible macro-economic conditions that could affect the dependent variable.
Firm Fixed Effects	Dummy variables for each company are included to identify firm-specific conditions that could affect the dependent variable. Each company is labelled by a Global Company Key (GVKEY), "a unique six-digit number key assigned by each company in the Capital IQ Compustat database" (wrds, Wharton Research Data Service s.d.)

Source: Authors' own findings.

Table A.4

Impact of unemployment insurance laws (UI) on firms' financial choices – Correlation Matrix.

This table summarizes the correlation values between the independent variables used in the leverage regressions.

	Log max benefit $t-1$	Roa	Z-score	Proportion fixed assets	Log revenue	Market to book ratio	Unemployment rate	GDP growth
Log max benefit $t-1$	1,0000	0,0265	0,0788	-0,0863	0,0253	0,0206	0,0842	0,0629
Roa	0,0265	1,0000	0,3998	0,1992	0,2020	0,3808	-0,0331	0,0075
Z-score	0,0788	0,3998	1,0000	-0,2471	0,2905	0,2047	0,0511	-0,0041
Proportion fixed assets	-0,0863	0,1992	-0,2471	1,0000	-0,1399	-0,0556	-0,0754	0,0180
Log revenue	0,0253	0,2020	0,2905	-0,1399	1,0000	0,1306	0,0107	0,0107
Market to book ratio	0,0206	0,3808	0,2047	-0,0556	0,1306	1,0000	-0,0948	-0,0077
Unemployment rate	0,0842	-0,0331	0,0511	-0,0754	0,0107	-0,0948	1,0000	0,1630

GDP growth 0,0629 0,0075 -0,0041 0,0180 0,0107 -0,0077 0,1630 1,0000

Source: Authors' own findings.

Table A.5

Impact of unemployment insurance laws (UI) on firms' financial choices – Complete OLS regressions' findings.

This table summarizes the findings of the OLS regressions having as dependent variables the leverage ratio using total assets (Panel A), the leverage ratio using enterprise value (Panel B), and the natural logarithm of the interest coverage ratio (Panel C). Regressors include the logarithm of UI benefits, taken at one-year lag, and a set of controls. Controls in all regressions comprise firm fixed effects and year fixed effects. Where shown, controls also include state economic indicators and firm financial controls, otherwise "NA" is stated. Standard errors are clustered at state level and *, **, and *** are used to describe the significance at 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)	(3)
Panel A: Total debt / Total assets			
Log max benefit t-1	-0.0750*	-0.0736**	-0.0704**
	<i>P-value</i> 0.0824	0.0425	0.0478
ROA	NA	-0.2383***	-0.2404***
Z-score	NA	-0.0139***	-0.0141***
Proportion Fixed assets	NA	-0.2147***	-0.2183***
Market to Book Ratio	NA	0.0149***	0.0149***
Log Revenue	NA	0.0027	0.0027
GDP Growth	0.0005	NA	0.0007*
Unemployment Rate	-0.4694	NA	-0.4992
Adjusted R ²	83.57%	86.39%	86.42%
Panel B: Total debt / Enterprise value			
Log max benefit t-1	-8.15e-01	-0.0003	-0.0002
	<i>P-value</i> 0.8667	0.5302	0.5709
ROA	NA	-0.0044***	-0.0044***
Z-score	NA	-0.0003***	-0.0003***
Proportion Fixed assets	NA	-0.0039***	-0.0039***
Market to Book Ratio	NA	-5.8945e-05***	-5.8904e-05***
Log Revenue	NA	-8.5832e-05	-8.5762e-05
GDP Growth	3.3223e-06	NA	7.5545e-06
Unemployment Rate	-0.0020	NA	-0.0053
Adjusted R ²	71.67%	77.22%	77.24%
Panel C: Log interest coverage ratio			
Log max benefit t-1	0.1066	0.0712	0.0689
	<i>P-value</i> 0.6487	0.6756	0.6846
ROA	NA	9.9755***	9.9749***

Z-score	NA	0.1328***	0.1329***
Proportion Fixed assets	NA	2.0158***	2.0183***
Market to Book Ratio	NA	-0.0270***	-0.0270***
Log Revenue	NA	-0.0138	-0.0140
GDP Growth	0.0036	NA	0.0006
Unemployment Rate	-1.2900	NA	0.4003
Adjusted R ²	72.12%	84.30%	84.28%
Control variables			
State economic indicators	Yes	No	Yes
Firm financial controls	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Estimation method	OLS	OLS	OLS

Source: Authors' own findings.

Table A.6

Impact of unemployment insurance laws (UI) on firms' financial choices – OLS regressions' findings for time frame 2011-2017.

This table reports the results of OLS regressions run on the dataset restrained to the sub-period 2011 to 2017. This procedure aims at eliminating the effects that the 2008 Financial Crisis might have on the relation between generosity of UI benefits and corporates' finance decisions.

	Values
Panel A: Total debt / Total assets	
Log max benefit t-1	-0.0348
<i>P-value</i>	0.2214
Adjusted R ²	0.9085
Panel B: Total debt / Enterprise value	
Log max benefit t-1	8.7053e-05
<i>P-value</i>	0.7405
Adjusted R ²	0.8977
Panel C: Log interest coverage ratio	
Log max benefit t-1	-0.0793
<i>P-value</i>	0.7189
Adjusted R ²	0.9109
Control variables	
State economic indicators	Yes
Firm financial controls	Yes
Firm fixed effects	Yes

Year fixed effects	Yes
Estimation method	OLS

Source: Authors' own findings.

Table A.7

Impact of unemployment insurance laws (UI) on firms' financial choices – Comparison between UI Benefits in 2007 and 2016 according to maximum generosity and reciprocity rate.

This table aims at identifying changes in the UI benefits of 2007 and 2016 according to two parameters: the maximum generosity and the reciprocity rate. This table is an adaptation of Wentworth (2017).

<i>PANEL A: Comparison of UI Benefits in 2007 and 2016</i>						
State	Max Benefits (2007)	Reciprocity Rate (2007)	Weighted Benefits (2007)	Max Benefits (2016)	Reciprocity Rate (2016)	Weighted Benefits (2016)
DE	8.580	58%	4976,40	8.580	31%	2.659,80
NY	10.530	41%	4317,30	11.050	35%	3.867,50
OH	12.454	30%	3736,20	15.262	23%	3.510,26
VA	9.022	27%	2435,94	9.828	18%	1.769,04
PA	13.728	61%	8374,08	14.794	40%	5.917,60
NJ	13.936	62%	8640,32	17.602	47%	8.272,94
WI	9.230	50%	4615,00	9.620	32%	3.078,40
MN	13.546	40%	5418,40	17.758	41%	7.280,78
GA	8.320	26%	2163,20	4.620	12%	554,40
WA	12.896	32%	4126,72	17.706	26%	4.603,56
IN	10.140	39%	3954,60	10.140	19%	1.926,60
MD	8.840	34%	3005,60	11.180	26%	2.906,80
MA	25.860	54%	13964,40	33.090	54%	17.868,60
NV	9.412	42%	3953,04	11.076	27%	2.990,52
TX	9.464	19%	1798,16	12.818	29%	3.717,22
NC	11.882	37%	4396,34	4.200	11%	462,00
FL	7.150	30%	2145,00	3.300	9%	297,00
MO	7.280	30%	2184,00	6.400	20%	1.280,00
CT	14.508	49%	7108,92	17.966	42%	7.545,72
IL	12.948	41%	5308,68	15.938	31%	4.940,78
OK	8.892	20%	1778,40	13.260	26%	3.447,60
TN	7.150	28%	2002,00	7.150	13%	929,50
MI	9.412	40%	3764,80	7.240	27%	1.954,80
AR	10.270	41%	4210,70	9.020	30%	2.706,00
LA	6.708	23%	1542,84	6.422	12%	770,64
OR	11.570	45%	5206,50	15.340	30%	4.602,00

RI	15.990	47%	7515,30	18.382	33%	6.066,06
SC	7.878	31%	2442,18	6.520	14%	912,80
UT	10.556	23%	2427,88	13.624	21%	2.861,04
CA	11.700	40%	4680,00	11.700	36%	4.212,00
KY	10.426	29%	3023,54	10.790	23%	2.481,70
HI	12.350	41%	5063,50	15.392	36%	5.541,12
Total Amount	352.628		140.279,94	387.768		121.934,78
Average Rate		38%			27%	

PANEL B: Analysis

Percentage Change in the Maximum Benefits: 10%

Percentage Change in the Reciprocity Rate: -28%

Percentage Change in the Weighted Benefits: -13%

Source: Authors' own findings.

Table A.8

Impact of unemployment insurance laws (UI) on firms' credit ratings – Credit ratings' categories.

The following table describes the S&P Rating Scale (Global Standard & Poor's 2022). Each Credit Rating has been assigned to an initial category described with a number from 1 to 7. However, some classes accounted for few observations, hence they were regrouped with other classes. The final classification has four groups for a total of 3,001 firm-year observations.

	Rating	Description	Original Class	Final Class	No. Observations
Investment Grade	AAA	Extremely strong capacity to meet financial commitments.	1	1	836
	AA+, AA, AA-	Very strong capacity to meet financial commitments.			
	A+, A, A-	Strong capacity to meet financial commitments, but somewhat susceptible to economic conditions and changes in circumstances.	2		
	BBB+, BBB, BBB-	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions.	3	2	1,074
	BB+, BB, BB-	Less vulnerable in the short-term, but faces major ongoing uncertainties to adverse business, financial and economic conditions.	4	3	761
Speculative Grade	B+, B, B-	More vulnerable to adverse business, financial and economic conditions, but currently able to meet financial commitments.	5	4	376
	CCC+, CCC, CCC-	Currently vulnerable and dependent on favorable business, financial and economic conditions to meet the financial commitments.	6		
	CC	Highly vulnerability, default is expected.	7		
	C	High vulnerability with ultimate recovery lower than that of higher rated obligations.			

D, SD	Payment default on a financial commitment, or when a bankruptcy petition (or similar) has been filed.	Total	3,001
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Source: Authors' own findings, (Global Standard & Poor's 2022).

Table A.9

Impact of unemployment insurance laws (UI) on firms' credit ratings – Models' variables description.

This table reports the variables used to estimate the credit ratings' regressions. These controls are widely used in prior literature on UI benefits and by the rating agency S&P Global Ratings. All data are collected for the period 2007-2017, and financial variables from the Compustat database are winsorized at 1 percent and 99 percent. The dependent variable is taken at time t, while all independent variables at time (t-1) to describe the causal relation between a change in the independent variable and the following potential variation in the firm's credit rating.

Variable	Description
Credit Rating	Dependent variable describing the company's Long-Term Credit Rating.
Log (UI Benefit_{t-1})	As for the leverage regression, the logarithm of UI benefits is calculated as: $\text{Log} (\text{max number weeks} \times \text{max weekly amount})$ It is a proxy for leverage and refers to the amount of leverage decreased by the company following an increase in the state UI benefits [because of the decreased reciprocity rate].
Log (Total Assets_{t-1})	It is a proxy for size.
Current Ratio_{t-1}	The current ratio is calculated as (current assets / current liabilities), and it is a proxy for liquidity.
Net Profit Margin_{t-1}	The net profit margin is calculated as (net income / sales), and it is a proxy for profitability. Values are corrected to zero when negative.
Interest Coverage Ratio_{t-1}	The interest coverage ratio is calculated as (EBIT/interest expenses), and it measures the firms' ability to service debt. Values are corrected to zero when negative.
Revenue Growth_{t-1}	Revenue growth is calculated as: $\frac{\text{Total Sales}_t - \text{Total Sales}_{t-1}}{\text{Total Sales}_{t-1}}$ and it is a proxy for growth.
HHI_{t-1}	It is a proxy for the industry competition.
Year Fixed Effects	Dummy variables for each year of the period 2007-2017 are included to outline possible macro-economic conditions that could affect the dependent variable.
GICS Group Fixed Effects	Dummy variables for each GICS Group are included to identify within-group specific conditions that could affect the dependent variable. Each group is labelled by a unique four-digit number.

Source: Authors' own findings.

Table A.10

Impact of unemployment insurance laws (UI) on firms' credit ratings – Predicted relation between independent variables and credit ratings.

The table describes the predicted relation between independent variables and the dependent variable, described as "+" ("−") when the independent variable is expected to have a positive (negative) relation with the dependent variable, thus leading to an upgrading (downgrading) of the credit rating. Naturally, the relation between an independent variable and the dependent variable is predicted assuming everything else equal.

Variable	Predicted relations with credit rating
----------	--

	-
Log (UI Benefit)	Log (UI Benefit) is a proxy for leverage. The higher the leverage, the higher the default risk of the company. A more indebted corporate structure is likely to downgrade the credit rating of the company.
	+
Log (Total Assets)	Big-caps (compared to small-caps) have greater resources and opportunities to diversity risks across products and markets, which makes them less vulnerable to negative events. Large caps represent a safer investment and, thus, they are expected to have higher credit ratings (Aman e Nguyen 2013).
	+
Current Ratio	The higher the current ratio, the higher the ability of the company to use its current assets to meet its short-term liabilities. Therefore, a company with a high current ratio is more attractive to investors (because safer), and it is predicted to have a higher credit rating.
	+
Net Profit Margin	A high net profit margin indicates that the company is generating enough income after taxes to cover operating and non-operating costs, thus it has a strong financial health. Furthermore, according to Aman & Nguyen (2013) a high net profit margin gauges that the company has more resources to pay its debtholders and it is expected to have a higher credit rating.
	+
Interest Coverage Ratio	A high interest coverage ratio indicates that the company generates enough earnings to repay the interest expenses arising from its outstanding debt, thus reducing its default risk. High interest coverage positively affects credit ratings.
	+
Revenue Growth	Similar to the net profit margin, high revenue growth gauges the company's ability to generate large, future cash flows available to pay all debtholders and face uncertainties in the market. Furthermore, earnings are usually reinvested into the business, thus reducing the need to look for external resources and so the cost of capital. High growth companies attract investors and are expected to have higher credit ratings.
	+
HHI	<p>The Herfindahl-Hirschman index (HHI) is a measure of market concentration, and it seeks to quantify the competitive position of a firm in a market. It is calculated by summing the squares of the market shares of all firms competing in a market:</p> $HHI = \sum_{i=1}^n (MS_i)^2$ <p>where the market share (MS) is the ratio of the revenue generated by a company in a specific industry to the total revenue of that industry. The higher the HHI, the higher the industry concentration (and the lower the competition). For example, a firm operating as a monopolist faces less uncertainty and can generate more profits than a firm operating in a very competitive industry. Furthermore, <i>"firms facing less competition are less sensitive to economic cycles and are more able to access capital at a lower cost"</i> (Gray, Mirkovic e Ragunathan 2006). If cash flows are more stable, the levels of business risk and credit risk decrease, hence credit ratings are expected to improve when the industry's concentration increases.</p> <p>In the present study, industries correspond to the GICS Groups retrieved from the Compustat database, based on a four-digit classification.</p>

Source: Authors' own findings.

Table A.11

Impact of unemployment insurance laws (UI) on firms' credit ratings – Sample observations over time, industry, and Rating Category.

This table describes the distribution of the 3,001 firm-year observations used in the current study over time (2007-2017), industry (GICS Groups), and Credit Ratings.

	AAA	AA+, AA, AA-	A+, A, A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+, B, B-	Below B-	Total
Panel A: Firm's Credit Ratings by Year												
2007	5	12	74	32	38	31	20	28	27	29	1	297
2008	4	12	71	30	41	33	21	28	23	37	2	302
2009	5	13	67	28	39	35	18	26	20	43	7	301
2010	4	13	63	29	41	33	13	28	25	34	7	290
2011	4	12	66	31	40	34	19	25	28	31	3	293
2012	4	11	64	35	37	32	26	27	26	31	2	295
2013	4	11	64	29	45	33	25	31	22	28	1	293
2014	4	14	66	29	47	33	24	29	25	33	1	305
2015	3	15	66	35	46	32	33	30	22	39	1	322
2016	3	16	60	34	52	33	34	32	19	33	12	328
2017		1	5	1	4	2	3	3	1	1		21
Total	40	130	666	313	430	331	236	287	238	339	37	3,001
Panel A: Firm's Credit Ratings by GICS Group												
1010	10	10	48	17	61	31	19	40	35	60	11	342
1510			46	47	73	31	66	46	24	34	4	371
2010		23	149	42	63	57	40	52	30	19	1	476
2020			20	18	20	9	12	16	19	5		119
2030	1	5	19	37	33	13	5	2	10	31	4	160
2510			5	3	2	3	9	7	14	10	2	55
2520		3	22	16	16	21	12	3	12	19	3	127
2530			14	3	11	11	3	29	9	21	4	105
2550			52	14	19	33	29	23	15	25	4	214
3010		15	10		12	3			12	4		56
3020		4	71	36	33	34	9	6	4	14	1	212
3030		21	9	8	2	1	2	6				49
3510		9	49	31	13	12	6	18	22	28		188
3520	13	27	38	2	18	7	1			3		109
4510	16	7	23	7	13	11	5	7		3		92
4520		6	21	13	16	34	8	7	11	10		126
4530			33	1	11	1	1	4	11	18	1	81
5010			16	4	4	15	2	9				50
5020			21	14	10	4	7	12	9	35	2	114
6010									1			1

Total	40	130	666	313	430	331	236	287	238	339	37	3,001
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Source: Authors' own findings.

Table A.12

Impact of unemployment insurance laws (UI) on firms' credit ratings – Correlation Matrix.

This table presents the correlation between the independent variables used in the credit ratings' regressions.

	Log max benefit $t-1$	Net profit margin $t-1$	Revenue growth $t-1$	Interest Coverage Ratio $t-1$	Current ratio $t-1$	Log total assets $t-1$	HHI $t-1$
Log max benefit $t-1$	1,0000	0,0309	-0,0070	0,0842	0,0585	0,0031	0.0031
Net profit margin $t-1$	0,0309	1,0000	0,0225	0,2666	0,0728	0,3253	0.0507
Revenue growth $t-1$	-0,0070	0,0225	1,0000	-0,0036	0,0539	0,0467	0.0255
Interest Coverage Ratio $t-1$	0,0842	0,2666	-0,0036	1,0000	0,1065	0,1642	0.0959
Current ratio $t-1$	0,0585	0,0728	0,0539	0,1065	1,0000	-0,3233	-0.0501
Log total assets $t-1$	0,0031	0,3253	0,0467	0,1642	-0,3233	1,0000	0.1744
HHI $t-1$	0.0131	0.0507	0.0255	0.0959	-0.0501	0.1744	1,0000

Source: Authors' own findings.

Appendix B: Individual Component – Federica Brescanzin

Table B.23

Impact of unemployment insurance laws (UI) on firms' corporate financial choices and credit ratings - Summary Statistics for Big Firms, using total assets as a proxy for market size.

This table summarizes the descriptive statistics of the dependent and independent variables included in the leverage regression. Data refer to a subsample of the full dataset comprehending 3,001 firm-year observations from 2007 to 2017, excluding financials and utilities, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
<i>Panel A: Dependent variables</i>					
Total debt / total assets	0.6109	0.1563	0.3712	0.6006	0.8875
Total debt / enterprise value	0.9981	0.0016	0.9952	0.9985	0.9997
Log interest coverage ratio	2.2222	1.0914	0.5001	2.2280	4.1196
<i>Panel B: Unemployment insurance</i>					

Log max benefit $t-1$	9.1640	0.2091	9.0572	9.0572	9.6288
Panel C: Control variables					
Roa	0.1545	0.0695	0.0546	0.1465	0.2875
Z-score	1.8525	1.0323	0.4421	1.6918	4.0260
Proportion fixed assets	0.0528	0.0509	0.0089	0.0363	0.1579
Market to book ratio	3.1259	2.9914	0.8550	2.3430	7.7116
Log revenue	9.8321	1.0560	8.1190	9.7389	11.716
GDP growth	0.7083	3.6041	-5.7000	0.8000	7.8000
Unemployment rate	0.0631	0.0187	0.0360	0.0620	0.0910
Panel D: Control variables for Credit Rating regressions					
Net profit margin $t-1$	0.0890	0.0726	0.0000	0.0749	0.2397
Revenue growth $t-1$	0.0317	0.1839	-0.2570	0.0252	0.3081
Interest Coverage Ratio $t-1$	17.1020	29.7010	0.7512	8.8812	59.9350
Current ratio $t-1$	1.5468	0.6879	0.7555	1.3730	2.8661
Log total assets $t-1$	10.1050	0.8945	8.9687	9.9820	11.9640
HHI $t-1$	201.0200	265.4500	9.6474	125.0100	616.2100

Source: Authors' own findings.

Table B.24

Impact of unemployment insurance laws (UI) on firms' corporate financial choices and credit ratings - Summary Statistics for Small Firms, using total assets as a proxy for market size.

This table summarizes the descriptive statistics of the dependent and independent variables included in the leverage regression. Data refer to a subsample of the full dataset comprehending 3,001 firm-year observations from 2007 to 2017, excluding financials and utilities, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
Panel A: Dependent variables					
Total debt / total assets	0.5948	0.1524	0.3639	0.5800	0.8846
Total debt / enterprise value	0.9982	0.0015	0.9954	0.9986	0.9998
Log interest coverage ratio	1.8679	1.1632	0.1432	1.8958	3.8681
Panel B: Unemployment insurance					
Log max benefit $t-1$	9.1720	0.2658	9.0264	9.0572	9.6530
Panel C: Control variables for Leverage regression					
Roa	0.1454	0.0715	0.0421	0.1383	0.2807
Z-score	1.9659	1.4222	0.0730	1.9950	3.7977
Proportion fixed assets	0.0535	0.0627	0.0102	0.0338	0.1777
Market to book ratio	2.9799	3.4421	0.6202	2.0302	8.5458

Log revenue	7.8446	0.8226	6.3929	7.8673	9.0632
GDP growth	0.6421	3.4541	-5.700	0.7000	7.8000
Unemployment rate	0.0635	0.0193	0.0360	0.0630	0.0930
Panel D: Control variables for Credit Rating regressions					
Net profit margin _{t-1}	0.0591	0.0540	0.0000	0.0496	0.1592
Revenue growth _{t-1}	0.0175	0.1694	-0.2558	0.0247	0.2674
Interest Coverage Ratio _{t-1}	12.1180	22.972	0.0000	6.1891	42.0220
Current ratio _{t-1}	2.0153	0.8819	0.8301	1.8608	3.7187
Log total assets _{t-1}	7.9014	0.6514	6.6444	8.0086	8.7974
HHI _{t-1}	125.6900	183.4700	9.3456	72.3120	385.1800

Source: Authors' own findings.

Table B.25

Impact of unemployment insurance laws (UI) on firms' corporate financial choices and credit ratings - Summary Statistics for Big Firms, using market capitalization as a proxy for market size.

This table summarizes the descriptive statistics of the dependent and independent variables included in the leverage regression. Data refer to a subsample of the full dataset comprehending 3,001 firm-year observations from 2007 to 2017, excluding financials and utilities, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
Panel A: Dependent variables					
Total debt / total assets	0.5897	0.1529	0.3475	0.5853	0.8549
Total debt / enterprise value	0.9976	0.0017	0.9943	0.9980	0.9994
Log interest coverage ratio	2.4780	0.9840	0.9906	2.4206	4.3787
Panel B: Unemployment insurance					
Log max benefit _{t-1}	9.1747	0.2260	9.0572	9.0572	9.6509
Panel C: Control variables for Leverage regression					
Roa	0.1721	0.0703	0.0746	0.1622	0.3063
Z-score	2.0638	1.0415	0.6083	1.9207	4.1486
Proportion fixed assets	0.0551	0.0548	0.0098	0.0368	0.1665
Market to book ratio	3.7541	3.4968	1.0048	2.8573	9.8398
Log revenue	9.7360	1.1259	7.9805	9.6504	11.716
GDP growth	0.7247	3.6007	-5.7000	0.8000	7.8000
Unemployment rate	0.0623	0.0183	0.0360	0.0600	0.0910
Panel D: Control variables for Credit Rating regressions					
Net profit margin _{t-1}	0.1002	0.0689	0.0072	0.0868	0.2436
Revenue growth _{t-1}	0.0343	0.1711	-0.2250	0.0322	0.2895

Interest Coverage Ratio $t-1$	20.4090	31.9610	1.9936	11.0610	76.1110
Current ratio $t-1$	1.6208	0.7813	0.7636	1.3949	3.1452
Log total assets $t-1$	9.9677	1.0443	8.4028	9.9332	11.9650
HHI $t-1$	200.6400	266.8200	10.0590	118.4500	856.3700

Source: Authors' own findings.

Table B.26

Impact of unemployment insurance laws (UI) on firms' corporate financial choices and credit ratings - Summary Statistics for Small Firms, using market capitalization as a proxy for market size.

This table summarizes the descriptive statistics of the dependent and independent variables included in the leverage regression. Data refer to a subsample of the full dataset comprehending 3,001 firm-year observations from 2007 to 2017, excluding financials and utilities, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
Panel A: Dependent variables					
Total debt / total assets	0.6160	0.1551	0.3876	0.5994	0.9046
Total debt / enterprise value	0.9987	0.00103	0.9969	0.9990	0.9999
Log interest coverage ratio	1.5925	1.1191	-0.0662	1.6258	3.4393
Panel B: Unemployment insurance					
Log max benefit $t-1$	9.1612	0.2515	9.0264	9.0572	9.6331
Panel C: Control variables for Leverage regression					
Roa	0.1278	0.0636	0.0336	0.1233	0.2404
Z-score	1.7544	1.4007	0.0224	1.8107	3.5301
Proportion fixed assets	0.0513	0.0592	0.0096	0.0337	0.1690
Market to book ratio	2.3513	2.7556	0.5581	1.7016	5.5596
Log revenue	7.9407	0.9423	6.3929	7.8815	9.6602
GDP growth	0.6256	3.4572	-5.7000	0.7000	6.3600
Unemployment rate	0.0643	0.0196	0.0360	0.0680	0.0930
Panel D: Control variables for Credit Rating regressions					
Net profit margin $t-1$	0.0480	0.0501	0.0000	0.0388	0.1338
Revenue growth $t-1$	0.0149	0.1826	-0.2620	0.0156	0.2901
Interest Coverage Ratio $t-1$	8.8258	18.2890	0.0000	4.6462	28.3020
Current ratio $t-1$	1.9412	0.8361	0.8023	1.8046	3.6039
Log total assets $t-1$	8.0397	0.8388	6.6445	8.0247	9.4714
HHI $t-1$	126.1200	181.7100	9.1371	76.5260	340.5800

Source: Authors' own findings.

Table B.27

Impact of unemployment insurance laws (UI) on firms' corporate financial choices and credit ratings - Summary Statistics for Mature Firms

This table summarizes the descriptive statistics of the dependent and independent variables included in the leverage regression. Data refer to a subsample of the full dataset comprehending 3,001 firm-year observations from 2007 to 2017, excluding financials and utilities, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
Panel A: Dependent variables					
Total debt / total assets	0.6149	0.1463	0.4073	0.5992	0.8932
Total debt / enterprise value	0.9981	0.0014	0.9956	0.9985	0.9996
Log interest coverage ratio	2.1929	1.0078	0.6116	2.2288	3.8294
Panel B: Unemployment insurance					
Log max benefit $t-1$	9.1874	0.2421	9.0572	9.0572	9.6455
Panel C: Control variables for Leverage regression					
Roa	0.1515	0.0668	0.0539	0.1443	0.2842
Z-score	2.0305	0.8971	0.7440	1.9093	3.7644
Proportion fixed assets	0.0457	0.0381	0.0102	0.0342	0.1235
Market to book ratio	3.3272	3.2891	0.8780	2.4048	8.9488
Log revenue	9.2295	1.2338	7.4191	9.1632	11.436
GDP growth	0.7334	3.4019	-5.7000	0.8000	7.8000
Unemployment rate	0.0637	0.0187	0.0360	0.0660	0.0930
Panel D: Control variables for Credit Rating regressions					
Net profit margin $t-1$	0.0786	0.0612	0.0000	0.06956	0.2032
Revenue growth $t-1$	0.0093	0.1609	-0.2594	0.0155	0.2365
Interest Coverage Ratio $t-1$	14.8470	23.7380	1.3149	8.9939	45.3240
Current ratio $t-1$	1.6777	0.6938	0.8095	1.5432	3.0272
Log total assets $t-1$	9.3509	1.2712	7.3374	9.2967	11.5980
HHI $t-1$	137.9300	214.1100	9.3456	76.3880	397.8800

Source: Authors' own findings.

Table B.28

Impact of unemployment insurance laws (UI) on firms' corporate financial choices and credit ratings - Summary Statistics for Young Firms

This table summarizes the descriptive statistics of the dependent and independent variables included in the leverage regression. Data refer to a subsample of the full dataset comprehending 3,001 firm-year observations from 2007 to 2017, financials and utilities, and removing all firms with missing observations. Data are winsorized at 1 percent and 99 percent to remove the effect of outliers.

	Mean	Standard deviation	5th percentile	Median	95th percentile
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<i>Panel A: Dependent variables</i>					
Total debt / total assets	0.5911	0.1614	0.3399	0.5842	0.8812
Total debt / enterprise value	0.9982	0.0016	0.9952	0.9986	0.9998
Log interest coverage ratio	1.8993	1.2447	0.0588	1.8598	4.1561
<i>Panel B: Unemployment insurance</i>					
Log max benefit $t-1$	9.1490	0.2348	9.0572	9.0572	9.6331
<i>Panel C: Control variables for Leverage regression</i>					
Roa	0.1485	0.0741	0.0449	0.1405	0.2869
Z-score	1.7909	1.4974	0.0224	1.8046	4.1174
Proportion fixed assets	0.0604	0.0701	0.0095	0.03611	0.2051
Market to book ratio	2.7857	3.139	0.5942	2.0184	7.1300
Log revenue	8.4579	1.3938	6.4549	8.2872	11.1930
GDP growth	0.6185	3.6497	-5.7000	0.6000	7.8000
Unemployment rate	0.0630	0.0193	0.0360	0.0600	0.0930
<i>Panel D: Control variables for Credit Rating regressions</i>					
Net profit margin $t-1$	0.0696	0.0694	0.0000	0.0503	0.2371
Revenue growth $t-1$	0.0403	0.1909	-0.2553	0.0329	0.3452
Interest Coverage Ratio $t-1$	14.3740	29.2390	0.0000	5.9610	61.8400
Current ratio $t-1$	1.8825	0.9243	0.7351	1.6731	3.7910
Log total assets $t-1$	8.6614	1.3407	6.7289	8.4699	11.2350
HHI $t-1$	188.1200	244.2500	9.4271	124.3200	435.7500

Source: Authors' own findings.

Table B.29

Impact of unemployment insurance laws (UI) on firms' financial choices – Complete OLS regressions' findings considering total assets and market capitalization as proxy for firms' size.

This table summarizes the results of the OLS regression run to test the relation between changes in the generosity of UI benefits. Dependent variables are the leverage ratio using total assets, the leverage ratio using enterprise value, and the natural logarithm of the interest coverage ratio. All regressions include a set of controls for firm financial characteristics, state economic indicators, firm fixed effects, and year fixed effects. Standard errors are clustered at state levels and *, **, and *** are used to describe the significance at 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)	(3)	(4)
	Big Firms	Big Firms	Small Firms	Small Firms
	Total assets	Market cap	Total assets	Market cap
<i>Panel A: Total debt / Total assets</i>				
Log max benefit $t-1$	-0.0729**	-0.0727**	-0.0696**	-0.0697**
	(0.0158)	(0.0163)	(0.0232)	(0.0264)

ROA	-0.0941**	-0.1041***	-0.3205***	-0.3312***
Z-score	-0.0028	-0.0116**	-0.0132***	-0.0145***
Proportion Fixed Assets	-0.1353	-0.0514	-0.2519***	-0.3013***
Market to Book Ratio	0.0125***	0.0137***	0.0170***	0.0159***
Log Revenue	0.0142*	0.0268***	-0.0172	0.0034
Unemployment rate	-0.7176*	-0.8507**	0.0320	-0.0475
GDP growth	0.0009	0.0005	0.0007	0.0012*
Adjusted R ²	0.8943	0.9008	0.8549	0.8555
Panel B: Total debt / Enterprise value				
Log max benefit t-1	-0.0005	-0.0006	0.0002	-0.0002
	(0.1571)	(0.1754)	(0.5068)	(0.3967)
ROA	-0.0015***	-0.0022***	-0.0055***	-0.0037***
Z-score	-0.0007***	-0.0008***	-0.0001***	-0.0001***
Proportion Fixed Assets	-0.0038***	-0.0049***	-0.0024***	-0.0029***
Market to Book Ratio	-7.57e-05***	-4.89e-05***	-3.78e-05***	-3.08e-05***
Log Revenue	0.0004***	0.0006***	-0.0002*	0.0002***
Unemployment rate	-0.0037	-0.0038	-0.0051	0.0005
GDP growth	8.48e-07	5.79e-06	1.39e-05*	7.03e-06
Adjusted R ²	0.8277	0.8109	0.7950	0.8035
Panel C: Log interest coverage ratio				
Log max benefit t-1	0.0927	0.1800	0.1978	-0.1294
	(0.6779)	(0.4170)	(0.4355)	(0.6273)
ROA	9.0296***	8.1411***	11.1385***	11.9427***
Z-score	0.0544	0.0972***	0.1186***	0.1379***
Proportion Fixed Assets	2.1356***	2.0528***	1.9601***	2.3115***
Market to Book Ratio	-0.0169**	-0.0241***	-0.0379***	-0.0318***
Log Revenue	-0.0249	-0.0684	0.1425	-0.0789
Unemployment rate	-0.2432	0.3265	0.4540	1.0943
GDP growth	0.0018	0.0060	0.0004	-0.0051
Adjusted R ²	0.8778	0.8661	0.8258	0.7903
Control variables				
State economic indicators	Yes	Yes	Yes	Yes
Firm financial controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	OLS	OLS	OLS	OLS

Table B.30

Impact of unemployment insurance laws (UI) on firms' credit ratings – Complete Linear Probability Model results using total assets as a proxy for firms' size.

This table summarizes the findings of the four Linear Probability Models used to test the relation between UI benefits and firms' credit ratings. Firms are separated into two samples, namely big and small firms. Column (1) reports the results when testing for an upgrade in the credit ratings of big firms; Column (2) reports the results when testing for a downgrade in the credit ratings of big firms; Column (3) reports the results when testing for an upgrade in the credit ratings of small firms; Column (4) reports the results when testing for a downgrade in the credit ratings of small firms.

	(1)	(2)	(3)	(4)
	Big Firms	Big Firms	Small Firms	Small Firms
	Upgrading rating	Downgrading rating	Upgrading rating	Downgrading rating
Log max benefit t-1	-0.0087	0.0365	0.0315	0.0134
	0.7350	0.1972	0.1709	0.6380
Log tot assets t-1	0.0085	-0.0089	0.0081	0.0436
Current Ratio t-1	-0.0094	0.0072	0.0019	0.0060
Net Profit Margin t-1	-0.0661	-0.1643*	-0.0983	-0.4778***
Revenue Growth t-1	0.0071	-0.0338	-0.0121	-0.1620***
Interest Coverage Ratio t-1	0.0003	-0.0001	9.88e-05	-0.0004
HHI t-1	1.90e-05	3.60e-05	-9.76e-05	8.81e-05
Adjusted R ²	0.0190	0.0204	0.0200	0.0430
Control variables				
Firm financial controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	LMP	LMP	LMP	LMP

Table B.31

Impact of unemployment insurance laws (UI) on firms' credit ratings – Complete Linear Probability Model results using market capitalization as a proxy for firms' size.

This table summarizes the findings of the four Linear Probability Models used to test the relation between UI benefits and firms' credit ratings. Firms are separated into two samples, namely big and small firms. Column (1) reports the results when testing for an upgrade in the credit ratings of big firms; Column (2) reports the results when testing for a downgrade in the credit ratings of big firms; Column (3) reports the results when testing for an upgrade in the credit ratings of small firms; Column (4) reports the results when testing for a downgrade in the credit ratings of small firms.

	(1)	(2)	(3)	(4)
	Big Firms	Big Firms	Small Firms	Small Firms
	Upgrading rating	Downgrading rating	Upgrading rating	Downgrading rating

Log max benefit t-1	-0.0116	0.0282	0.0241	0.0367
	0.6281	0.1761	0.3063	0.2578
Log tot assets t-1	0.0102*	-0.0037	0.0096	0.0310***
Current Ratio t-1	-0.0018	-0.0027	0.0026	0.0088
Net Profit Margin t-1	-0.0303	-0.0835	-0.1553	-0.4637**
Revenue Growth t-1	0.0014	-0.0022	-0.0152	-0.1325**
Interest Coverage Ratio t-1	0.0002	-5.19e-05	0.0007	-0.0004
HHI t-1	6.27e-05	6.71e-05	-8.75e-06	0.0001
Adjusted R ²	0.0255	0.0168	0.0274	0.0409
Control variables				
Firm financial controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	LMP	LMP	LMP	LMP

Source: Author's own findings.

Table B.32

Impact of unemployment insurance laws (UI) on firms' financial choices – Complete OLS regressions' findings of Young against Mature firms.

This table summarizes the results of the OLS regression run to test the relation between changes in the generosity of UI benefits. Dependent variables are the leverage ratio using total assets, the leverage ratio using enterprise value, and the natural logarithm of the interest coverage ratio. All regressions include a set of controls for firm financial characteristics, state economic indicators, firm fixed effects, and year fixed effects. Standard errors are clustered at state levels and *, **, and *** are used to describe the significance at 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)
	Young Firms	Mature Firms
<i>Panel A: Total debt / Total assets</i>		
Log max benefit t-1	-0.0635**	-0.0706**
	(0.0369)	(0.0264)
ROA	-0.2182***	-0.2390***
Z-score	-0.0131***	-0.0123**
Proportion Fixed Assets	-0.2704***	-0.0603
Market to Book Ratio	0.0158***	0.0142***
Log Revenue	0.0191**	-0.0045
Unemployment rate	-0.4290	-0.4377
GDP growth	0.0009	0.0004
Adjusted R ²	0.8615	0.8708

Panel B: Total debt / Enterprise value

Log max benefit t-1	-0.0004 (0.2661)	0.1684 (0.8624)
ROA	-0.0039***	6.5641***
Z-score	-0.0002***	0.6467***
Proportion Fixed Assets	-0.0034***	4.4086
Market to Book Ratio	-6.00e-05***	-5.70e-05***
Log Revenue	0.0001	-0.2321
Unemployment rate	-0.0122**	-2.4121
GDP growth	8.44e-06	0.0043
Adjusted R ²	(0.8078)	0.7534
Panel C: Log interest coverage ratio		
Log max benefit t-1	-0.0676 (0.7729)	0.2393 (0.3599)
ROA	10.2676***	9.1264***
Z-score	0.1318***	0.0897**
Proportion Fixed Assets	1.4604***	4.1693***
Market to Book Ratio	-0.0352***	-0.0402***
Log Revenue	-0.1289	0.0633
Unemployment rate	2.0190	-2.6397
GDP growth	0.0026	-0.0007
Adjusted R ²	0.8579	0.8165
Control variables		
State economic indicators	Yes	Yes
Firm financial controls	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Estimation method	OLS	OLS

Source: Author's own findings.

Table B.33

Impact of unemployment insurance laws (UI) on firms' credit ratings – Complete Linear Probability Model findings of Young against Mature firms.

	(1)	(2)	(3)	(4)
	Young Firms	Young Firms	Mature Firms	Mature Firms
	Increasing rating	Decreasing rating	Increasing rating	Decreasing rating
Log max benefit t-1	-0.0163	0.0212	-0.0167	0.0354

	(0.5567)	(0.4598)	(0.2602)	(0.1325)
Log tot assets t-1	-0.0025	0.0034	-0.0017	0.0013
Current Ratio t-1	-0.0067	0.0075	0.0168**	0.0034
Net Profit Margin t-1	0.1730	-0.0941	-0.0104	-0.3211***
Revenue Growth t-1	-0.0205	-0.0752**	0.0121	-0.0552
Interest Coverage Ratio t-1	-0.0004	-0.0007***	2.89e-05	-2.41e-05
HHI t-1	0.0001	6.6e-05	5.3e-05	0.0014
Adjusted R ²	0.0063	0.0439	0.0147	0.0259
Control variables				
Firm financial controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	LMP	LMP	LMP	LMP

Source: Author's own findings.