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Understanding the effects unionization rates have on companies' capital structure around the Covid crisis

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Abstract

In this paper, I analyse the effects unionization rates have on US public companies' capital structure, in particular, the leverage and cash to assets ratios, prior and during the Covid crisis, in order to determine whether these effects are intensified or mitigated in the presence of the crisis. Furthermore, I investigate whether union density, financial distress and profitability (considered individually) lead to similar or contrasting, more or less pronounced, effects.

Keywords: Labor unionization, Corporate Finance, Labor market, Capital structure, Unionization rate, Covid crisis

[1] I would like to thank Professor Rui Silva for his guidance and support throughout this whole process.

1. Introduction

The effects unionization rates have on capital structure and company decisions have been studied for a few decades, and while these might not be definitive for every situation, it is reasonable to conclude labor unions present difficulties to firms, in terms of management, strategy, capital structure decisions, among others. In this paper, I aim to assess these effects in a crisis environment, in particular, the Covid crisis (2020-2021), and conclude on whether this crisis mitigates, intensifies or preserves these effects.

Labor unions play a preponderant role in worker's representation and collective bargaining for higher wages and better working conditions, and while labor union rates have decreased over the years, from around 20% in 1983 to 10% in 2020[2], they are still bound to pose a great obstacle to firms, which normally oppose them, as labor costs usually constitute one of the most sizeable portions of a firm's total costs.

Thus, while labor unions certainly do not influence capital financing decisions as strongly as distress costs and changes to the tax rate, past literature has proven that firms do in fact base their decisions on cash reserves, leverage and even dividend payment, for instance, in order to avoid losing bargaining power with labor unions. Lending from past literature, keeping smaller cash reserves, being more leveraged and cutting dividend payments are ways to do so. Regarding the first, as shown in Klasa, Maxwell and Ortiz-Molina (2008), by keeping a lower cash reserve, the firm is more susceptible to liquidity constraints, which in turn make it less able to raise wages, for example. Secondly, "by taking on additional debt and thereby increasing the demands on their cash flow, firms can credibly take a tougher stand when negotiating with workers" (Matsa 2010). Lastly, as DeAngelo and DeAngelo (1991) show, by cutting dividends, the company is more capable of convincing the union that, since the shareholders are making

[2] From the US Bureau of Labor Statistics' "Union Members Summary", dated 22/01/2021 (https://www.bls.gov/news.release/union2.nr0.htm)

sacrifices, they should too. Furthermore, as is shown in Lee and Mas (2012), labor unionization can affect the market value of equity negatively, when the labor force is sufficiently large.

Even though there is substantial literature on labor unionization and how it affects company decisions and firm value, there is a lack of it during crises periods, especially when considering the unprecedented nature of Covid-19. In fact, an exogenous shock to all firms (such as a crisis event) provides an opportunity to directly compare the changes in capital structure in firms with different union rates. Thus, in this paper, I focus my attention on the effects labor unionization and the Covid crisis have on companies' capital structure, in particular, on its debt to assets and cash to assets ratios.

Overall, would one expect the effects on a firm's capital structure due to its unionization rate to be more severe, milder or remain unchanged in the presence of the covid crisis? When considering a crisis event, labor unions could create more obstacles if threatened by downsizing, for instance. On the other hand, in a difficult situation, they may lessen their demands to avoid the risk of further negatively affecting a firm that is quite likely already under difficulties. Therefore, in theory, it is not clear whether a crisis would soothe or not these effects. Ultimately, it is essential to empirically test them.

The remainder of this paper is structured as: Section 2 explains how this paper builds on past literature's findings with a unique take on the subject matter. Section 3 sheds light on the data used and how it was worked. Additionally, it also explains the methodology used. Section 4 presents the results and takeaways from the statistical analysis. Finally, section 5 concludes the paper.

2. Literature Review

In this paper, I investigate how labor unions relate with leverage and cash holdings, which has been a subject of study across the last decades, in works such as Matsa (2010) and DeAngelo and DeAngelo (1991). What makes this paper stand out is the fact it is set in a crisis.

In fact, there is little literature on these relationships and how they react to an exogeneous shock such as a crisis. Out of the literature I came across, only Akdogu, Aktas and Simsir (2021) explores a similar relationship (unions and merger activity). Additionally, the Covid crisis serving as setting for this study could provide interesting results due to its unprecedented nature. Lastly, as Mishel, Rhinehart and Windham (2020) show, union rates in the United States, specifically in the private sector, have significantly declined in the past decades, mainly through less union friendly labor laws. This makes for another relevant feature of this paper: the low average of union rates (compared to past papers) due to its recency in data (2018-2021). Investigating these relationships with a different average union density could provide new findings.

3. Data and Methodology

3.1 Data, sample and variables

The sample is obtained from COMPUSTAT North America, which comprises data from U.S and Canadian publicly held companies, active and inactive. Given the focus of this study is on U.S companies, all Canadian firms were filtered out of the sample. Inactive firms were also taken out of the sample, since it is crucial to observe the evolution of the companies throughout all the years in the sample. I also exclude firms with the financial format tag, as it essentially creates duplicates for some of the observations. I drop observations that have missing values for the variables used to generate the treatments and controls of this paper: *assets total*, *cash*, *capex*, *ebit*, *net income*, *total debt*, *lt debt total* (long term debt), *lt debt issuance* (long term debt issuance), *retained earnings*, *ppe* (property, plant and equipment), *revenue*, *working capital*, *equity*, *dividends*, *income taxes*, *unionrate* (unionization rate), *employees*, *naic match* (NAIC code) and *market value*, given these could bias the remaining sample of non-missing observations. I also drop observations with negative values for *assets total*, *cash*, *total debt*, *lt debt total*, *lt debt issuance*, *revenue*, *equity*, *dividends*, *employees* and *market value*,

since these should be impossible to exist and would therefore disrupt the sample[3]. Ultimately, all of which amount to around 16k observations, which results in a sample of around 10k observations. The sample period comprises the years 2018-2021, in order to include statistics prior and during the covid crisis.

After collecting data on companies' fundamentals and market information, I needed to match that data with information on labor unionization rates, which is defined as the number of employees who are union members out of the total of employees, in a defined framework (enterprise, occupation, economic sector). In order to do so, I first collected data on industry unionization rates from unionstats.com (given how scarce and hard to navigate the information is for companies individually). These files, divided by year, include figures on each industry's total number of employed individuals and the fraction of those in a union. Given that the industries are divided according to their CIC code, I further match them with their respective NAIC (North American Industry Classification) code[4], through the info found on census.gov "Industry and Occupation Code Lists & Crosswalks" section. Since the crosswalk list does not include every NAIC code down to its six digit iteration, I match the sample observations NAIC to the most specific code possible from the crosswalk list (in other words, the largest available). After this, all that is left is to match the sample companies' NAIC to the corresponding unionization rate.

Industries' unionization rate, a covid crisis dummy and the interaction between the two are the "treatment" variables in this study. Therefore, I created a dummy variable, *crisis indicator*, to specify whether each observation is during the covid crisis (takes the value 1) or

[3] Capex, union rate, ppe and naic match have no negative observations.

[4] "The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy" (census.gov). It is a 2 to 6 digit code, with more digits meaning an increasing degree of specificity.

prior to it (0) and the interaction term (*crisis unionization*) is simply generated by multiplying the unionization rate with the crisis indicator dummy variable.

For the y variables of analysis, which are the debt to assets and cash to assets ratios, I also populate several control variables. All the variables are in the form of ratios, with most being scaled by total assets, as this helps prevent size effects from contaminating and biasing the variables. It also makes it much clearer to understand the effect of the regressors on the dependent variable.

With regards to debt, the control variables are those typically used in leverage regressions, most of which as mentioned in Matsa (2010): collateral, as a proportion of fixed assets; return on assets (ROA), as a measure of profitability; market-to-book ratio, as a measure of investment opportunities; size (ln(sales)), as measure of firm size; net working capital, as a measure of short term liquidity; tax rate, as it impacts the tax shield, like economic theory and practice show. Regarding cash, the control variables follow closely the ones used in Ahmad and Kowalewski (2021), Klasa, Maxwell and Molina (2008) and Zhenxu Tong and Hui Huang (2018): return on assets (ROA), as a measure of profitability; market-to-book ratio, as a measure of investment opportunities; size (ln(sales)), as measure of firm size; net working capital, as a measure of short term liquidity; dividend paying dummy (which takes the value of 1 if the firm pays dividends and 0 otherwise), as it is a channel for the use of cash.

3.2 Empirical study and descriptive statistics

In my econometric analysis, I employ an OLS regression on US public companies with the goal of assessing whether the effect that the labor unionization rate has on the capital structure of companies, in particular, the leverage and cash to assets ratio, is intensified, mitigated or constant in the presence of the covid crisis. The sample dataset comprises the years of 2018-2021, with March of 2020 marking the beginning of the covid crisis. By having a small panel window, I isolate more accurately the effect of the crisis. Moreover, it is also a way to

keep time series effects to a minimum, which is useful since these are harder to analyse than cross sectional ones.

Initially, to smoothen the effect extreme and illogical outliers might have on the analysis' statistical efficiency and robustness of statistical inferences, I drop some observations from some variables entirely and winsorize[5] other variables. For tax rate, which is obtained as the absolute ratio of income taxes to EBIT, I delete all observations where it is higher than 1. For size, which is obtained as the natural logarithm of assets, I drop the observations where it is lower than zero (minimal number of observations). For ROA, which is obtained as net income over total assets, I delete observations below -1 and above 1, since these mean the net income (loss) is higher than total assets. For market-to-book, which is the ratio of the market value of a company and its book value of equity, I winsorize it (in other words, limit it) by the 1st and 95th percentiles. In fact, the values for M/B above the 95th percentile, 16.6, are incredibly rare and some completely preposterous (the maximum value is 15900). As a side note, Tesla's M/B as of 23rd of November 2021 (from Yahoo Finance) is around 40, and the company is notorious for being strongly overvalued. The reasoning for winsorising at the 1st percentile is similar, but regarding the bottom observations. For tobin's Q, the ratio of market value and total assets, I winsorize it at the 1st and 99th percentiles, in a similar fashion as market-to-book. Lastly, for dividends to assets, which is the ratio of dividends to total assets, I drop the observations where it is higher than one since dividends are not higher than total assets. Additionally, given that more than half of the observations are equal to zero, I generate a dividends dummy, which takes the value 1 in case the firm pays them and 0 otherwise.

Focusing now my attention on the unionization rate, it is noticeable how different it is across industries, even just by looking at the 2-digit NAIC codes, which is indicative of

[5] "Winsorizing is the transformation of statistics by limiting extreme values in the statistical data to reduce the effect of possibly spurious outliers". For example, if I winsorize at the 10th and 90th percentile, then the observations below the 10th will be modified to equal the 10th percentile and the ones above the 90th will equal the 90th percentile. I use the command winsor2 on Stata to do this.

significant cross sectional (across industries) variation[6]. NAIC codes 22 (utilities), 48/49 (transportation and warehousing) are the only industry codes with mean rates above 20%, while NAIC codes 23 (construction) and 61 (educational services) have mean rates between 10% and 20%, with the remaining industries displaying mean rates below 10%. In order to assess the variation in unionization rates more carefully, I regress it on industry NAIC code dummies (the full 2 to 6 digit codes) and attain an adjusted R-squared of 95%[7]. This is a clear indicator that most variation in unionization rates is cross-sectional and time series variation is minimal. To further support this, by running a descriptive analysis of the variable unionization rate through the sample years (as table 1 shows), it seems time series variation is kept to a minimum throughout the sample years, displaying a slight decreasing trend from 2017 onwards, from closely 5% to around 4.5%.

Year	Average	St. Dev
2017	4.91%	5.41%
2018	6.05%	6.80%
2019	5.20%	6.41%
2020	5.27%	6.54%
2021	4.48%	5.13%
Total	5.46%	6.53%

Table 1: Mean and standard deviation of unionization rates across the sample years

Lastly, in order to run a valid linear regression analysis, one must strive for unbiased estimators. Accounting for some of the issues that lead to bias in a study, I start by running a correlation matrix of all the variables of focus, to guarantee none of them are too highly correlated with one another. In fact, only tobin's Q and market-to-book are, with a correlation coefficient of 0.77. Given this, I decide to remove tobin's Q from the analysis. Next, although

[6] Refer to appendix 1.
[7] Refer to appendix 2.

omitted variable bias is always a possibility, I include a series of control variables (lending from past literature), while also accounting for fixed effects (present in panel data analysis), to make sure bias is kept to a minimum. Furthermore, through the clustering of the standard errors, I guarantee that they are robust to heteroskedasticity and robust to serial correlation. Finally, I can also be confident that the sample is at least asymptotically Normal, as the sample is sufficiently large. Overall, it is reasonable to assume my t-tests and F-tests will be correctly distributed.

4. Results and discussion

4.1 Theoretical reasoning

What would be the logical signal of the coefficients of the variables in this paper?

Considering debt to assets as the dependent variable: A unionization rate increase is expected to lead to an increase in the y variable, as firms with more liquidity will be more pressured by unions to raise wages. Thus, by increasing their financial constraints, they can more easily take a tougher stand in wages negotiations. Next, with the covid crisis (*crisis_indicator*), it is not certain what the effect on the leverage ratio would be. On the one hand, firms might need more financial resources since the crisis affects their cash flows. On the other hand, since banks and other financial institutions reduce their credit supply, firms might end up using less debt. Regarding the interaction term, it is also not transparent what the effect would be. For one, labor unions could create even more obstacles if threatened by downsizing, i.e. On the other hand, in a difficult situation, they may lessen their demands since that may further negatively affect a firm that is quite likely already under difficulties. As for the control variables, having more size can either affect positively or negatively the debt ratio. Having more collateral is expected to affect the leverage ratio positively, as firms can more easily access debt. Likewise, more net working capital (in other words, liquidity) is expected to affect the leverage ratio positively, as the firm becomes more capable of paying their regular debt

obligations. Contrary to these, a higher market-to-book ratio, being synonymous with more growth opportunities, is also synonymous with firms lacking stable cash flows, and thus, having less access to debt resources. Next, the effect of ROA is unclear. A more profitable firm may more easily access debt, but it may also try to steer away from it. Finally, an increase in the tax rate is expected to increase the leverage ratio, as the tax shields to be gained from it increase.

Considering cash to assets as the dependent variable: A unionization rate increase is expected to lead to a decrease in the y variable, since the firm wants to have less available reserves in order to more easily avoid labor unions demands (raise wages, for example). Regarding the crisis, its effect is unclear. Although the firm is likely to take a toll on its cash flows, it might also not engage in as much investment opportunities, deciding to hold onto their cash reserves. Next, I believe the effect of the interaction term is uncertain as well. Similarly to the reasoning used for the variable's effect on the leverage ratio, the union's demands could either intensify or soften (or remain unchanged), and so would the response of the firm. Moving on, an increase in size (ln of assets) can either have a positive or negative effect on the cash ratio. Contrarily, a higher M/B ratio, being synonymous with more growth opportunities (which means investing of resources), will leave the firm with a lower cash ratio. Although a firm with a higher net working capital could also have a higher cash ratio, one could argue that an already more liquid firm (with a higher net working capital) would release its cash reserves more easily, to invest, for instance. Regarding the dividends dummy, firms that pay them are to see their cash ratio reduced. Finally, although the growth of ROA can lead to higher cash flows, it may also demand higher investments to achieve it (using cash, i.e.). Thus, the effect on the cash ratio is unclear.

4.2 Regression analysis

Having delved on the theoretical reasoning behind the coefficients of the variables with the leverage and cash ratio as dependent variables, it is time to test them empirically around the

Covid crisis. I account for industry fixed effects using the -xt Stata commands, due to the fact these remove possible omitted variable bias that stem from time-invariant differences between industries (in this case)[8]. Moreover, I cluster the standard errors at the industry level to make them robust to heteroskedasticity and serial correlation.

Firstly, I run the main treatment variables on the leverage ratio. The coefficient for unionization is the only one statistically significant at the 5% level. It being approximately 0.42 indicates that, on average and ceteris paribus, if the unionization rate rises by 1%, then the debt to assets ratio is expected to increase by 0.42 percentage points. Ultimately, not taking into consideration control variables is bound to contaminate the treatment variables with bias. It's also worth noting that most variation in the y variable is not explained by the regressors (R-squared less than 10%). Lastly, as table 2 shows, when adding control variables, the treatment variables are no longer statistically significant, only being jointly significant when all considered together. Besides this, and perhaps unsurprisingly, collateral is a statistically significant regressor at all conventional levels and also the one with most economic relevance, as it is the variable with the most direct influence on leverage. For a 1% increase in collateral, on average and ceteris paribus, there's an expected increase in the debt to assets ratio of 0.26 percentage points It's also worth noting how market-to-book and net working capital have all contrary coefficient signals to the ones theoretically hypothesized, even though none are very economically significant. This could be due to bias from omission of variables or reverse causality, with leverage affecting the control variables and not the other way around. Regardless, this 2nd regression model presents the highest R-squared. The regressors explain 24.1% of the variation in the leverage ratio.

[8] For simplification purposes, I control for industry fixed effects using the 2-digit NAIC code for every observation in the sample. Essentially, if the observation's NAIC code is, i.e., 3354, it is turned into its broader version 33. This way, there are 22 industry codes in the sample.

	(1)	(2)
unionizationrate	0.423**	-0.035
	(0.183)	(0.105)
crisis_indicator	0.017	0.005
	(0.011)	(0.010)
crisis_unionization	0.044	0.092
	(0.074)	(0.073)
roa		-0.081***
		(0.020)
collateral		0.259***
		(0.027)
market_to_book		0.007***
		(0.001)
size		0.030***
		(0.002)
net_wc_assets		-0.079***
		(0.011)
taxrate		-0.030
		(0.018)
_constant	0.193***	-0.061***
	(0.010)	(0.014)
Observations	9,737	9,737
Industry FE	YES	YES
Adjusted R-squared	0.016	0.241

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 2: Regression results with the leverage ratio as the dependent variable

Afterwards, in table 3, I run the main treatment variables on the cash to assets ratio. Unionization, the crisis indicator and the interaction term are statistically significant at the 5%, 1% and 10% significance levels, respectively. It is worth noting how, during the crisis, for a 1% increase in unionization, it is expected that, on average and ceteris paribus, the cash to assets ratio decreases by 0.85 percentage points (-0.74-0.11). Thus, during the covid crisis, firms are expected to respond even more aggressively to unions demands by reducing their cash reserves and limiting union's bargaining power. When adding control variables, all variables, except for the interaction term, are statistically significant at the 10% level. This indicates that the expected decrease in the cash to assets ratio due to an increase in unionization of 1%, which is 0.36 percentage points, does not change in the covid crisis, relative to the prior crisis period. The unionization's coefficient of 0.36 of is less than half of the same coefficient in the regression

without control variables. Most likely, the lack of control variables was contaminating the coefficient through omitted variable bias. The Covid crisis, despite being a significant event at the 1% level, only leads to an increase in the cash to assets ratio of 5 basis points. Ultimately, aside from the unionization rate, only ROA and net working capital have a relevant and strong effect on the dependent variable. An increase of 1% in both is expected to decrease the cash to assets ratio in 0.17 and 0.27 percentage points, respectively and on average. Lastly, close to 29% of all variation in the cash to assets ratio is explained by the treatment and control variables.

	(1)	(2)
unionizationrate	-0.744**	-0.360*
	(0.343)	(0.185)
crisis_indicator	0.0628***	0.0526***
	(0.00900)	(0.00947)
crisis_unionization	-0.111*	-0.121
	(0.0620)	(0.0807)
roa		-0.171***
		(0.0543)
market_to_book		0.00420*
		(0.00210)
size		-0.0266***
		(0.00169)
dividend_dummy		-0.0292*
		(0.0145)
net_wc_assets		-0.272***
		(0.0744)
_constant	0.227***	0.391***
	(0.0178)	(0.0302)
Observations	9,737	9,737
Industry FE	YES	YES
Adjusted R-squared	0.051	0.288

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 3: Regression results with the cash to assets ratio as the dependent variable

4.3 High union vs Low union

As a way to robust test these results, I divide the sample in firms with high unionization rates and firms with low unionization rates, with the median unionization rate (2.8%) of the

sample serving as the boundary. In fact, firms in the two sides of the spectrum could react in a different way to changes in the treatment variables. This leads to the high union firms having a mean and median unionization of 9.4% and 7.7%, respectively, while the low union firms, 1.5% and 1.6%. Additionally, while the low union firms' union rates are all contained between 0% and 2.8%, the high union firms display a much larger deviation from the mean, with union rates ranging from 2.9% to 64.8%.

	Average	St. Dev	Max	Min
Higher union	9.43%	7.34%	64.80%	2.90%
Lower union	1.52%	0.76%	2.80%	0.00%
All firms	5.46%	6.53%	64.80%	0.00%

Table 4: Descriptive statistics of unionization rates across firms with higher and lower union density

Initially, by running a regression with the leverage ratio as the y variable and with no control variables (appendix 3), the unionization rate is only statistically significant for low union firms (at the 1% level), while the crisis indicator is only for high union firms, at the 10% level. The interaction term, however, is not statistically significant for both. Additionally, this regression explains less than 10% of within and between variation in the leverage ratio, which demands the inclusion of additional variables. As I include control variables, none of the treatments are statistically significant for high union firms, while only the crisis indicator is not for low union firms (by a close margin). Interestingly, one could argue that low union firms take measures to reduce union's collective bargaining power (in this case, by increasing their debt obligations) because they are trying to prevent it from solidifying its position as a labor force representation tool. On the other hand, high union firms, which already have a solid union position, see less reasons to do so. In low union firms, a 1% increase in the unionization rate is expected to result in a strong increase in the leverage ratio of 1.47 percentage points, on average and ceteris paribus. If it is during the covid crisis, this effect is highly mitigated, leading the

leverage ratio to only increase, on average, 0.4 percentage points (1.47-1.07). When testing for joint significance, the treatment variables are jointly significant for the below union firms and for the above union firms. Regarding the controls, given its very palpable influence on debt decisions, collateral is significant for all firms at the 1% level while being the most economically relevant, with a 1% increase in it being expected to lead to an increase in the leverage ratio of 0.22 and 0.28 percentage points, for high and low union firms, respectively. Ultimately, this is the unsurprisingly the best fit for the leverage ratio out of the two regressions, since the adjusted R-squared is 20.9% and 23.7% for low and high union firms, respectively.

	High union	Low union
unionizationrate	-0.151	1.475**
	(0.0915)	(0.565)
crisis_indicator	0.0122	0.0247
	(0.0108)	(0.0154)
crisis_unionization	0.0614	-1.080*
	(0.0776)	(0.577)
roa	-0.0875***	-0.0852***
	(0.0209)	(0.0119)
collateral	0.220***	0.282***
	(0.0333)	(0.0445)
market_to_book	0.00615***	0.00841***
	(0.00139)	(0.00143)
size	0.0320***	0.0271***
	(0.00238)	(0.00206)
net_wc_assets	-0.0775***	-0.0757***
	(0.0232)	(0.0111)
taxrate	-0.0656**	0.00136
	(0.0300)	(0.0287)
_constant	-0.0332	-0.0896***
	(0.0226)	(0.0160)
Observations	4,844	4,893
Industry FE	YES	YES
Adjusted R-squared	0.237	0.209

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 5: Union robust - Regression with the leverage ratio as the dependent variable

Next, considering only treatments, the unionization rate negatively affects the cash to assets ratio of all firms (appendix 4), but while this effect is mitigated during the covid crisis for low union firms, it is not for high union firms. By adding control variables (table 6), all

treatments are no longer statistically significant at any of the conventional levels, except for the crisis indicator for high union firms, which is at the 10% level. Regardless, the treatments are jointly significant. Out of all variables, the net working capital bears the highest influence on the y variable. A 1% increase in it is expected to decrease 0.14 and 0.36 percentage points of the cash to assets ratio for high and low union firms, respectively.

	High union	Low union
unionizationrate	-0.153	-0.0937
	(0.108)	(0.403)
crisis_indicator	0.0189*	0.0277
	(0.0106)	(0.0255)
crisis_unionization	0.0831	1.900
	(0.0797)	(1.408)
roa	-0.0668*	-0.155***
	(0.0370)	(0.0308)
market_to_book	0.00603***	0.00248
	(0.00106)	(0.00267)
size	-0.0226***	-0.0280***
	(0.00114)	(0.00207)
dividend_dummy	-0.0155	-0.0261
	(0.0103)	(0.0188)
net_wc_assets	-0.147***	-0.361***
	(0.0347)	(0.0948)
Constant	0.303***	0.435***
	(0.0176)	(0.0263)
Observations	4,844	4,893
Industry FE	YES	YES
Adjusted R-squared	0.202	0.281

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 6: Union robust - Regression with the cash to assets ratio as the dependent variable

4.4 Financial distress (by Z-score)

As another way to test the robustness of these regressions, one should consider how financial distress might alter the effect union rates have on the dependent variables. In fact, these effects, or lack thereof, could be, to some extent, driven by financial distress and not union rates. For instance, the fact union rates bear no significant effect on the leverage ratio, as shown in table 2, could be due to the inclusion of distressed firms in the sample, which have less flexibility to change their leverage ratios. To perform this robust test, I assign to each

observation its z-score[9], based on Altman's model (1968), which informs us whether the firm is in distress (<4.5), financially safe (>=5.85) or in a "gray zone" (4.5< and <5.85). This score is then used to categorize in groups the firms in the sample.

With leverage as the y variable, by running a regression with only the treatment variables (appendix 5), it is immediately striking how unionization and the crisis dummy are only statistically significant for financially safe firms. This might be indicative that the company is only capable of raising its leverage ratio to reduce unions increasing pressure when they have some window of opportunity to do so. Essentially, the threat of unionization is not larger than the threat of financial distress. For financially safe firms, on average and ceteris paribus, a 1% increase in unionization is expected to increase the leverage ratio by 0.43 percentage points, while the covid crisis is only expected to lead to an increase of closely 2 basis points. For distressed firms, none of the treatments are statistically significant, while for firms in the gray zone, the interaction term is at the 5% level. Presumably, while a growth in unionization itself is not sufficient to bear an increase in the leverage ratio, in a crisis event (Covid, in particular), it is. Overall, while in safe firms, employees may not feel as threatened by the crisis (hence why the interaction term is not significant), in a "gray zone" company, they might, which could lead unions to make stronger demands on behalf of them, which in turn leads the firm to react by increasing the leverage ratio. Following this reasoning, why would the interaction term not be significant for distressed firms? Given their perilous state, and the existence of a crisis on top of it, unions might prefer not to make additional demands, which leads the interaction term to not have an effect on the leverage ratio.

. Lastly, in table 7 (with controls), only unionization, out of all treatment variables, is significant at the 5% level for financially safe firms. Its coefficient's strength also pales in comparison with the previous regression, as a 1% increase in unionization is expected to raise

[9] z_score = 6.56 * (working_ca / assets_total) + 3.26 * (retained_earnings / assets_total) + 6.72 * (ebit / assets_total) + 1.05 * (equity_parent / total_debt) + 3.25

the leverage ratio by 99 basis points, on average. Additionally, only for financially safe firms, are the treatment variables jointly significant. Overall, as expected, this regression bears the strongest R-squared: 27.5%, 23.1% and 18% for financially safe, distressed and "gray zone" firms, respectively.

	Distressed	Healthy	"Gray zone"
unionizationrate	-0.147	0.0996**	0.0109
	(0.121)	(0.0464)	(0.169)
crisis_indicator	-0.000700	0.00724	-0.00191
	(0.0195)	(0.00648)	(0.0140)
crisis_unionization	0.0551	0.0365	0.137
	(0.0991)	(0.0657)	(0.113)
roa	0.0357***	0.0572***	0.360***
	(0.0105)	(0.0136)	(0.0578)
collateral	0.227***	0.114***	0.0435
	(0.0315)	(0.0312)	(0.0307)
market_to_book	0.00545**	0.00510***	0.00542***
	(0.00205)	(0.000283)	(0.00150)
size	0.0280***	0.0276***	0.0129***
	(0.00261)	(0.00148)	(0.00249)
net_wc_assets	0.0798***	-0.0106	0.265***
	(0.0275)	(0.0195)	(0.0818)
taxrate	0.0433*	-0.0254*	0.0365
	(0.0229)	(0.0136)	(0.0231)
Constant	0.127***	-0.0788***	0.228***
	(0.0168)	(0.00963)	(0.0277)
Observations	2,100	6,428	1,209
Industry FE	YES	YES	YES
Adjusted R-squared	0.231	0.275	0.18

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 7: Distress - Regression results with the leverage ratio as the dependent variable

Next, in appendix 6 (only treatments), it is noticeable how, for all firms, the covid crisis has a statistically significant (at all levels) and positive impact (albeit not very economically relevant) on the cash to assets ratio. Regarding the unionization's impact, for financially safe and distressed firms, it is expected that, on average and ceteris paribus, a 1% increase will lead to a 0.76 and 0.62 percentage points decrease in the cash to assets ratio, respectively. It seems logical that this effect on the regressand is stronger in financially stable firms, as they have

more flexibility to respond to unions' pressure than their counterparts. As for firms in the "gray zone", unionization is only statistically significant during the covid crisis.

	Distressed	Healthy	"Gray zone"
unionizationrate	-0.242	-0.426**	-0.0559
	(0.168)	(0.178)	(0.102)
crisis_indicator	0.0404***	0.0608***	0.0266***
	(0.0123)	(0.0149)	(0.00462)
crisis_unionization	-0.0796	-0.124	-0.0804
	(0.0945)	(0.119)	(0.0569)
roa	-0.235***	-0.238***	-0.456***
	(0.0580)	(0.0596)	(0.124)
market_to_book	0.00392***	0.00523**	0.00879***
	(0.00139)	(0.00249)	(0.00190)
size	-0.0120***	-0.0300***	-0.0183***
	(0.00224)	(0.00241)	(0.00260)
dividend_dummy	-0.0197	-0.0396**	-0.0113**
	(0.0189)	(0.0165)	(0.00413)
net_wc_assets	-0.235***	-0.401***	-0.389***
	(0.0650)	(0.0784)	(0.0592)
Constant	0.202***	0.468***	0.219***
	(0.0130)	(0.0350)	(0.0234)
Observations	2,100	6,428	1,209
Industry FE	YES	YES	YES
Adjusted R-squared	0.245	0.37	0.428

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 8: Distress - Regression results with cash to assets ratio as the dependent variable

Considering now the control variables, in table 8, it is immediately noticeable how unionization is no longer statistically significant at any of the conventional levels for distressed firms, yet still is for financially safe ones. Once again, reinforcing the point made previously. On average and ceteris paribus, an increase of 1% in the unionization rate is expected to lead to a decrease of the cash to assets ratio of financially safe firms of 0.42 percentage points. Next, the crisis is still significant at all levels for all firms, despite its mild impact on the cash to assets ratio. Contrarily, the interaction term is not statistically significant for any firm. Additionally, for distressed and "gray zone" firms, only when considering all 3 treatment variables, are they jointly significant. For financially safe firms, unionization and the interaction term alone are

also jointly significant. Regarding the control variables, all are statistically significant at the 5% level (except for the dividend dummy for distressed firms). Market-to-book's coefficient is the opposite signal to the one I theorized, regardless, it has a very low economic significance. On the other hand, ROA and net working capital have a high impact on the dependent variable. The more constrained financially the firm is, the less negative impact net working capital has on the cash to assets ratio. Lending from past reasoning in this paper, the fact a firm is more financially safe could mean it has more freedom to release part of its cash resources when its liquidity position (through net working capital) improves. Overall, this regression model explains 37% and 42.8% of variation in the cash to assets ratio for safe and "gray zone" firms, respectively, while for distressed firms, only 24.5%.

4.5 High ROA vs Low ROA (profitability measure)

To serve as a final robust test for this sample, I divide the observations in firms with higher and lower ROA rates, with the median ROA rate (1.2%) serving as the boundary. While higher ROA firms have a mean and median unionization of 7.99% and 6.08%, respectively, lower ROA firms have -21.29% and -12.69%. It becomes clear that lower ROA firms have mostly negative observations (4421 out of 4869), which implies many of these firms have net losses, thus being unprofitable. In fact, the inclusion of unprofitable firms in the original sample could have driven, to some extent, the results in tables 2 and 3. Therefore, it becomes important to run the original regressions by dividing the original sample into more and less profitable firms.

	Average	St. Dev.	Median	P25	P75
Higher ROA	7.99%	7.21%	6.08%	3.70%	9.81%
Lower ROA	-21.29%	23.11%	-12.69%	-33.18%	-3.05%
All firms	-6.65%	22.53%	1.21%	-12.70%	6.08%

Table 9: Descriptive statistics of unionization rate across more and less profitable firms

Firstly, by running a regression with the leverage ratio as the y variable and only the treatment variables as regressors (appendix 7), it is apparent how the unionization rate, for higher ROA firms, is the only statistically significant variable. Given how this regression explains less than 10% of within and between variation in the leverage ratio, it is crucial to add additional variables.

	High ROA	Low ROA
unionizationrate	0.106	-0.157
	(0.114)	(0.182)
crisis_indicator	-0.00459	0.00209
	(0.00655)	(0.0143)
crisis_unionization	0.138**	-0.00504
	(0.0572)	(0.104)
roa	-0.431***	-0.0593**
	(0.0900)	(0.0230)
collateral	0.143***	0.314***
	(0.0312)	(0.0343)
market_to_book	0.00986***	0.00744***
	(0.00198)	(0.00145)
size	0.0216***	0.0376***
	(0.00239)	(0.00223)
net_wc_assets	-0.119***	-0.0703***
	(0.0257)	(0.00984)
taxrate	-0.166***	0.0261
	(0.0394)	(0.0256)
Constant	0.0663**	-0.104***
	(0.0243)	(0.0214)
Observations	4,868	4,869
Industry FE	YES	YES
Adjusted R-squared	0.261	0.27

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 10: ROA robust - Regression with the leverage ratio as the dependent variable

In table 10, with the inclusion of control variables, the regression explains 26.1% and 27% of variation in the leverage ratio of above and below median ROA firms, respectively. Particularly, there is one change in the pattern of the treatment variables: for higher ROA firms, the unionization rate is no longer statistically significant, but the interaction term is (at the 5% level). Essentially, while a change in the unionization rate itself is not sufficient to reflect a change in the leverage ratio, a change in it during the covid crisis, is. On average and ceteris

paribus, a 1% increase in the unionization rate (during the covid crisis) is expected to lead to an increase in the debt to assets ratio of 0.14 percentage points. Furthermore, one could argue that the same variable is not statistically significant for lower ROA firms, which can to some extent be referred to as less profitable firms, due to the fact these companies, many of which with net losses, will not preoccupy themselves with changing their leverage ratio over a change in the unionization rate. In fact, given their lack of profitability, it is likely the unions will put less pressure on the management teams for higher benefits, which contributes to the firm's "indifference" to a change in the unionization rate. Regardless of this, unionization and the interaction term are jointly significant at the 5% level for both lower ROA and higher ROA firms. Additionally, all controls are statistically significant at the 5% level (except for tax rate for lower ROA firms).

	High ROA	Low ROA
unionizationrate	-0.211*	-0.530*
	(0.103)	(0.299)
crisis_indicator	0.0287***	0.0714***
	(0.00563)	(0.0104)
crisis_unionization	-0.0428	-0.0646
	(0.0448)	(0.0515)
roa	0.411***	-0.189***
	(0.0751)	(0.0368)
market_to_book	0.00182	0.00311
	(0.00108)	(0.00277)
size	-0.0218***	-0.0219***
	(0.00137)	(0.00256)
dividend_dummy	-0.0211**	-0.0509***
	(0.00895)	(0.0155)
net_wc_assets	-0.182***	-0.338***
	(0.0180)	(0.0958)
Constant	0.293***	0.381***
	(0.0114)	(0.0419)
Observations	4,868	4,869
Industry FE	YES	YES
Adjusted R-squared	0.25	0.259

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 11: ROA robust - Regression with cash to assets ratio as the dependent variable

Afterwards, with the cash to assets ratio as the dependent variable, I start by running a regression with only the treatment variables (appendix 8): for all firms, both the unionization and the crisis dummy are statistically significant (at the 5% level), with a negative and positive coefficient, respectively. As I add control variables (table 11), the treatment variables preserve the same pattern. This is also the pattern displayed when running the robust-free regression, which could be indicative that a divergence in ROA/profitability does not lead to a divergence in how the treatment variables affect the cash to assets ratio. To conclude, for all firms, around 25% of variation in the y variable is explained by the regressors.

5. Conclusion

In this paper, I have analysed the effect unionization has on the capital structure of publicly listed US companies, in particular, on their leverage and cash to assets ratios, prior and during the Covid crisis. When it comes to the leverage ratio, I reach divergent conclusions in comparison to past literature, as I provide evidence that the unionization rate is not expected to have an effect on the debt to assets ratio, positive or negative, even if during the covid crisis. On the other hand, and coinciding with previous studies, the unionization rate is expected to affect the cash to assets ratio negatively, although this effect remains constant in the presence of the crisis.

While aiming to dig deeper on the subject matter, I performed a series of robust tests, focused on assessing whether these relationships between the unionization rate and the leverage and cash to assets ratio, prior and during the covid crisis, preserve the same nature. In fact, these relationships are to some extent heterogeneous across firms.

On more unionized companies, the unionization rate, prior and during the crisis, bears no effect on the leverage ratio. On less unionized firms, however, it bears a positive effect, which is mitigated in the presence of the crisis. Furthermore, regardless of the union density of the firm, unionization has no effect on the cash to assets ratio.

Amongst financially distressed firms, the unionization rate has no significant effect on either the leverage or cash to assets ratios. On the other hand, amongst financially healthy firms, it affects them positively and negatively, respectively, although these effects remain constant throughout the covid crisis.

Lastly, on more profitable firms, while the unionization rate only affects the leverage ratio during the covid crisis, and positively, it affects the cash to assets ratio negatively and in a constant way prior and during the crisis. On less profitable firms, the unionization rate has no significant effect on the leverage ratio, but it affects the cash to assets ratio negatively and in a constant way prior and during the crisis.

Ultimately, it was essential to test the robustness of the initial results, as I conclude that changes in the unionization rate do in fact have an effect on the leverage ratio: for low unionized firms, financially healthy firms and more profitable firms. Contrarily, while changes in the union rates have an effect on the cash to assets ratio for firms in general, they do not for low unionized firms, high unionized firms and financially distressed firms.

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Appendix

Appendix 1

NAIC	Average	St. Dev.
11	1.75%	0.56%
21	5.03%	3.89%
22	22.50%	2.73%
23	13.50%	0.08%
31	9.52%	4.35%
32	3.64%	4.50%
33	5.81%	5.25%
42	3.84%	2.76%
44	3.37%	4.08%
45	3.36%	1.37%
48	22.70%	14.70%
49	20.80%	0.61%
51	3.47%	4.29%
52	1.51%	0.41%
53	4.52%	0.82%
54	1.64%	0.92%
56	5.23%	4.77%
61	18.30%	12.40%
62	6.85%	3.24%
71	6.19%	2.36%
72	2.96%	2.73%
81	2.43%	1.76%
Total	5.46%	6.53%

Table 12: Mean and standard deviation of unionization rates across NAIC industries

Appendix 2

	Union rate
Observations	9737
Adjusted R-squared	0.951

Table 13: Regression of unionization rate on every industry code (naic match)

Appendix 3

	High union	Low union
unionizationrate	0.186	1.127***
	(0.141)	(0.369)
crisis_indicator	0.0269*	0.0301
	(0.0143)	(0.0209)
crisis_unionization	0.00317	-0.383
	(0.101)	(0.813)
_constant	0.230***	0.163***
	(0.0143)	(0.00993)
Observations	4,844	4,893
Industry FE	YES	YES

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 14: Union robust - Regression with the leverage ratio as the dependent variable

Appendix 4

	High union	Low union
unionizationrate	-0.368*	-0.663**
	(0.184)	(0.293)
crisis_indicator	0.0166	0.0201
	(0.0142)	(0.0227)
crisis_unionization	0.137	3.101*
	(0.106)	(1.545)
Constant	0.166***	0.256***
	(0.0179)	(0.00645)
Observations	4,844	4,893
Industry FE	YES	YES

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 15: Union robust - Regression with the cash to assets ratio as the dependent variable

Appendix 5

	Distressed	Healthy	"Gray zone"
unionizationrate	0.380	0.433***	0.138
	(0.266)	(0.144)	(0.175)
crisis_indicator	0.000835	0.0172**	-0.0194
	(0.0171)	(0.00727)	(0.0146)
crisis_unionization	-0.00516	-0.0238	0.220**
	(0.123)	(0.0573)	(0.101)
Constant	0.358***	0.115***	0.366***
	(0.0160)	(0.00678)	(0.0119)
Observations	2,100	6,428	1,209
Industry FE	YES	YES	YES

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 15: Distress - Regression with the leverage ratio as the dependent variable

Appendix 6

	Distressed	Healthy	"Gray zone"
unionizationrate	-0.627*	-0.760**	-0.366
	(0.335)	(0.344)	(0.222)
crisis_indicator	0.0534***	0.0698***	0.0611***
	(0.0126)	(0.0143)	(0.00797)
crisis_unionization	-0.0649	-0.0911	-0.216**
	(0.0945)	(0.0975)	(0.0796)
Constant	0.212***	0.247***	0.109***
	(0.0196)	(0.0158)	(0.0145)
Observations	2,100	6,428	1,209
Industry FE	YES	YES	YES

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 16: Distress - Regression with cash to assets ratio as the dependent variable

Appendix 7

	High ROA	Low ROA
unionizationrate	0.380***	0.376
	(0.129)	(0.286)
crisis_indicator	0.0167	0.0182
	(0.0102)	(0.0148)
crisis_unionization	0.0290	0.0134
	(0.0694)	(0.128)
Constant	0.204***	0.186***
	(0.00849)	(0.0135)
Observations	4,868	4,869
Industry FE	YES	YES

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 17: ROA robust - Regression with the leverage ratio as the dependent variable

Appendix 8

	High ROA	Low ROA
unionizationrate	-0.390**	-0.879**
	(0.148)	(0.382)
crisis_indicator	0.0315***	0.0696***
	(0.00604)	(0.0113)
crisis_unionization	-0.0448	-0.0473
	(0.0333)	(0.0809)
Constant	0.153***	0.290***
	(0.00949)	(0.0178)
Observations	4,868	4,869
Industry FE	YES	YES

Notes: Robust standard errors are in parenthesis, clustered at the industry level. Asterisks indicate significance levels of 10% (*), 5% (**) and 1% (***).

Table 18: ROA robust - Regression with cash to assets ratio as the dependent variable