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Summary of WP Student Team

Unemployment insurance benefits and firms' profitability

Group constitution:

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Reading observations for jury:
Group part – pages 1 to 22
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A Work Project, presented as part of the requirements for the Award of a Master's degree in Management from the Nova School of Business and Economics.

Unemployment insurance benefits and firms' profitability

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11-01-2023

Abstract

This paper analyzes the effects of unemployment insurance benefits on firms' profitability and the impact of unemployment insurance costs and labor productivity changes in this relation. Using panel regression analysis with data from heterogeneous firms across multiple industries and US states, we find that there is no statistically significant relation between unemployment subsidies and firms' profitability, except when we narrow our analysis to specific industries or dimensions. Additionally, our findings suggest a negative significant impact of firms' costs with unemployment insurance benefits on profitability.

Keywords

Unemployment insurance; Firm profitability; Unemployment risk; Taxable wage bases; Payroll tax rates.

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

Unemployment insurance benefits and firms' profitability - Group part

Introduction

The unemployment insurance (UI) system of the USA was created in 1935, as an element of the Social Security Act, as a consequence of the Great Depression of 1929. The program's aim is to provide an adequate replacement of income to unemployed people while they search for a new job, and to serve as a mechanism that contributes to the stabilization of the economy and of employment (Luigjes, Ficher and Vandenbroucke, 2019).

The UI program can play an important role on companies' profitability, since it can have a significant impact, both positive and negative, in many different variables on which profitability depends. The positive effects include a much studied one that has to do with the fact that this system leads to a decrease of the wage premiums demanded by employees (Topel, 1984 and Agrawal and Matsa, 2013), which consequently contributes to the increase of companies' operating profits. UI benefits can also bring consumption smoothing benefits to workers (Gruber, 1997), which may be beneficial for companies' net sales. Additionally, it can bring increases in labor productivity, due to improved job-match quality either because of increased job search efforts by unemployed workers or the creation of better and more productive jobs by employers to attract more prudent talent. However, there are also negative impacts that need to be taken into consideration. First and foremost, companies are responsible for UI benefits financing, through state payroll tax rates and taxable wage bases (Vroom and Woodbury, 2014). Each state defines its own method to calculate the payroll tax rates, but all are based on an experience rating system, which means that the payroll tax rate each company is charged with depends on its recent layoff history. Furthermore, the UI program can lead to a decrease of the incentive to do income smoothing, (Ng, Ranasinghe, Shi and Yang, 2019), resulting in a higher volatility of earnings. Due to these contradictory effects, it remains uncertain whether UI benefits have a positive or negative impact on companies' profitability.

Ultimately, this matter depends on which effect dominates over the other and, as literature on this topic is still somewhat scarce, this paper's goal is to reach a definitive conclusion.

In order to analyze the relation between UI benefits and companies' profitability, net income (loss) is used as an indicator of profitability. As for the UI benefits, they are calculated through reports, from 1980 to 2019, that can be found on the US Department of Labor. Various regressions are run in order to be able to ascertain the effect of each set of controls and assumptions added, however, all the results obtained through panel data regression are reported as statistically insignificant.

As inconclusive results are reached with the first regression analysis conducted, further studies are proceeded to get a clearer insight on the relation of UI benefits and companies' profitability. This is done by separately analyzing industries and companies according to the following dimensions: industries with high and low annual layoffs and discharges levels, companies with positive and negative net income, companies with high and low leverage and larger and smaller companies in firm size, as measure by the logarithm of total assets. Additionally, we also investigate whether considering different time periods, alternative measures for profitability and inflation-adjusted figures influences the results. Panel data regression is once again used, and the results confirm that there is a statistically significant and economically meaningful relation between the natural log of maximum UI benefits and profitability for companies with a positive net income. The results from the regression conducted for companies with low leverage indicate the same, there is a statistically significant and economically meaningful relation between the net income (loss) of firms with low leverage and the natural log of maximum UI benefits. The same happens when regressing for larger companies only and when analyzing the period between 2000-2009.

After analyzing the overall association between unemployment subsidies and firms' profitability, the two main channels that are most likely to affect the main result in that relation

are explored in this paper. These are the relation between tax burden and firms' profitability, since tax burden is the main cost that the unemployment insurance system has on firms, and the relation between UI benefits and firms' labor productivity, given that labor productivity is one of the main benefits that the unemployment insurance system has on firms, as suggested by existing literature.

To begin with, the study of UI benefits costs is proceeded for companies because, as it was previously mentioned, the UI system was designed for companies to bear the expenses of these benefits, not the federal government. Furthermore, many economists have the opinion that the financing of this program is not as efficient as it was supposed to be since, in many states, the taxable wages bases are set too low and maximum tax rates imposed are not enough to allow for a full reflection of many companies' history of layoffs on the payroll tax rate they are charged with (Wandner, 2018). Therefore, the impact of UI benefits costs on companies' profitability is unclear, as the inefficiency of the method of its' financing may offset, at least part, of the firms' expenses. Thus, a thorough analysis is conducted for the two variables that compose UI benefits costs, and for the UI benefits costs itself. Then, the relation of each of these three variables with firms' net income (loss) is studied through panel data regression, by dividing the sample into two groups, in order to properly understand the effect of higher and lower payments. It is important to mention that the same set of controls and assumptions used in previous regressions is applied here.

Whilst for the group that presented less expenses with UI benefits, the results are statistically insignificant, for the group that reported a higher burden with UI benefits costs, the results indicate that there is a statistically significant relation between the natural log of taxable wage bases and net income (loss). Likewise, it can be concluded as well that there is an economically meaningful relation between the natural log of maximum UI benefits costs paid by firms and companies' net income (loss). Nonetheless, when it comes to the relation between

maximum state payroll tax rates and firms' profitability, the results are statistically insignificant for both data groups analyzed. To comprehend why the results are inconclusive for maximum state payroll tax rates, it is then analyzed the incidence of corporate taxation. Previous studies demonstrate that at least part of the burden with tax rates ultimately falls upon employees through a decrease of their salaries (Arulampalam, Devereux, and Maffini, 2008; Desai, Foley and Hines Jr., 2007). However, companies in industries where it is usually paid the minimum federal wage to workers or less, are, most likely, not able to compensate increases in payroll tax rates with the decrease of wages. Thus, more regressions to contemplate the relation between maximum payroll tax rates and these companies' profitability are run. As expected, the results show that there is an economically meaningful, and statistically significant relation between those two variables, in companies where salaries cannot easily be lowered.

Theoretical framework

In the past few decades, the impact of unemployment on companies and workers has been thoroughly discussed. It has already been established that when involuntarily fired, employees face great costs, therefore, in order to compensate for the unemployment risk they face, employees demand higher salaries and improved working conditions. These wage premiums, referred to as "compensating wage differentials", represent a significant cost that companies must bear in order to increase labor supply. As examples, Abowd and Ashenfelter (1981) empirical analysis supports the theory that estimated compensating differentials can range from less than 1 percent where workers experience little anticipated unemployment, to over 14 percent in industries that experience substantial anticipated unemployment and unemployment risk. Agrawal and Matsa (2013), estimate that in the absence of UI benefits, the cost of compensating wages for unemployment risk for BBB-rated firms can be of about 154 basis points, and as much as 301 basis points for BB-rated firms. Through this sequence of

facts, we may infer that since wage premiums directly decrease companies' operating profits by increasing the overall value of wages, they consequently lead to a lower profitability, measured as the net income.

Unemployment insurance can be a mechanism that offsets the impact of unemployment risk on wages and therefore on net income as well. This is because, in the presence of UI, the wage premium that employees require per unit of layoff risk is lower, therefore unemployment becomes less expensive. Topel (1984), finds that even if, for a typical worker, wages rise between 0.006% and 1% for each percentage point increase in unemployment, this wage differential disappears if UI completely replaces lost earnings while unemployed. Agrawal and Matsa (2013), when considering the presence of UI, estimate that for a BBB-rated firm the wage premium would only be of about 57 basis points and for a BB-rated company of about 112 basis points. These values are significantly lower than the ones previously mentioned, which do not account for UI benefits. The positive effect this can have on the net income may, nevertheless, be attenuated because companies are the ones who raise the funds for UI benefits, as it will be further explained in a following section.

Moreover, UI benefits can also have a negative impact on companies' profitability through the alteration in the incentives for income smoothing. It is well known that reported net profits of companies may be influenced by the choice of the accounting principles used for its measurement. According to Copeland (1968), one of the most common manipulating goals associated with corporate managers is the ability to report smooth income. Through a combination of field interviews and a survey instrument, Graham (2005) research indicated that CFOs believe earnings to be a key metric considered by outsiders. Volatile earnings are perceived as riskier than smooth earnings, thus companies prefer to report smooth income in order to appear more financially stable and consistent. The results obtained from the previously mentioned survey concluded that an astonishing 78% of the executives questioned would

abdicate economic value for smooth earnings. In Ng, Ranasinghe, Shi and Yang, 2019, empirical study however, it was determined that, once again, through a reduction of unemployment concerns, UI contributes to the decrease of the incentive to engage in income smoothing. This effect is stronger when employees face higher unemployment risk and for companies that have a great proportion of low-wage employees, for whom UI benefits would be particularly useful and necessary. Through this effect therefore, it can be concluded that UI benefits may also lead to more reports of lower (higher) net incomes (losses).

This same principle can be applied for the consumption of unemployed workers, since Gruber (1997) found solid evidence that UI has a considerable impact in terms of providing nontrivial consumption smoothing benefits to employees. In the mentioned study, it was estimated that without the existence of UI, the consumption of the unemployed workers would fall by 22%, over three times the average fall with the presence of this system. Presumably, companies can benefit in terms of profitability from this consumption smoothing, because of the impact that the unemployed workers' purchasing power may have on their net sales. If fired workers are able to have a higher consumption level due to the presence of UI, then it can be implied that this will lead to a smaller negative impact on the amount of net sales.

Practically all the theory analyzed in this section, namely the effect of UI benefits on wage premiums and consumption smoothing, indicates that the profitability of companies is positively impacted by the existence of UI benefits. However, the UI program can also contribute to a decrease of the practice of income smoothing, which implies that there could be an increase of the reporting of lower (higher) net incomes (losses). Furthermore, it is fundamental to add that the funds raised for UI benefits are financed by companies, through taxable wage bases and state payroll tax rates. The payroll tax rates depend on the unemployment history of each company, thus as the amount of layoffs of a company increases

so does the state payroll tax rate the employer is charged with. This means that UI benefits can also represent a cost companies have to bear.

Institutional background

The federal-state unemployment insurance system of the United States was established in 1935 with the purpose of providing financial support for eligible unemployed workers whilst securing macroeconomic stability by enhancing consumption and income smoothing effects. The system's basic functioning is common across all states since it is overseen by the US Department of Labor, however, as long as the Federal Law is being followed, each state has the autonomy to administrate its own UI program and define particular state requirements. These include eligibility requirements, the amount of benefits earned and the benefits' duration.

According to the general, nationwide eligibility criteria for unemployment insurance, only those who have involuntarily lost a job, are actively seeking work and have earned at least a certain amount of money during a base period before becoming unemployed, are eligible for UI benefits. Nevertheless, variations in state requirements lead to different applications of these general criteria across states, especially when it comes to the base period selection and treatment of part-time workers. The generosity and duration of UI benefits also varies across states. For example, certain states such as Connecticut, Illinois and New Hampshire have a uniform benefit duration, whilst others vary according to the unemployment rate such as Utah, that offers just 10 weeks of benefits when the rate is low, up to 26 when it is high. Regardless of this, in most states, benefits are assured for up to 26 weeks with approximately 50% of workers' previous wages being replaced. All states specify a maximum weekly benefit amount.

State requirements or conditions and changes in unemployment insurance benefits differ across states and over time due to a number of different factors. Examples of economic conditions that lead to these disparities are the level of local unemployment rates and its' evolution, the degree of industrial urbanization in each state, the average wage level, the gross

state product (GSP) and the overall cost of living. As to non-economic conditions, the most common are political factors such as reelection incentives and party preferences, but other factors such as natural disasters or criminal rates also justify these differences in UI benefits. Both these economic and non-economic factors have been observed in historical changes in UI benefits in US states. For example, between 2011 and 2016, Florida saw its state unemployment benefits drop year after year. This was derived by the improvement it witnessed in its local unemployment rate over this period of time, which led to a constant reduction in the maximum benefit duration the state could provide under the eligibility criteria for the Federal extended benefits. From a different perspective, California saw its maximum unemployment weekly benefits increase in 2002 by approximately 43%, at a time when year-end gubernatorial elections were taking place, with the alleged goal of bolstering political support for the governor's reelection (Agrawal & Matsa, 2013). One final example is the case of Arkansas in 2009, which increased its' UI benefits by approximately 38%, the first increase in 11 years. This increase was funded through the American Recovery and Reinvestment Act (ARRA) to support the state in times of recession but also favor the state's unemployment insurance program reform over the long term (Metzger, Huddleston and Blankenship, 2009).

In accordance with this regime, the UI system is mostly funded by states although the federal government is responsible for covering administrative costs and may provide financial support to states in the form of loans during times of need. In any case, the UI system is funded by taxes (state and federal ones) that employers pay on behalf of their employees. Thus, it is possible that changes in the generosity of unemployment insurance have a significant influence on the tax burden on companies and, consequently, on their profitability, a relation which we will examine further in this paper.

Data and empirical framework

Prior literature studies the association between unemployment insurance benefits and the profitability of companies under different scopes and perspectives. Nevertheless, it remains unclear as to whether there is a causal relationship between both, especially because of the complexity of this relation due to the two countervailing effects of UI benefits on firms' performance.

Raw data suggests that there is a slightly positive correlation between unemployment subsidies and firms' profitability, as shown by Figure 1. The graph plots the average net income per US state and year against the maximum unemployment insurance benefit in each state and year, over the same time period (1980-2019). This positive relation is consistent with the conclusions presented in certain literature, such as that from Wang and Zheng (2018), that suggest that the benefits of UI (higher labor output due to higher productivity and lower compensation premiums due to lower unemployment risk) offset the costs on firms. However, a positive correlation between these two variables does not necessarily imply causation between them since there are several other variables or factors that over time can also have a positive influence on a firm's profitability such as the price level or state laws. On top of that, the correlation considers untreated raw data, therefore, it may include outliers or observations that are not suitable for comparison. This said, this paper uses panel regression analysis to precisely study the connection between unemployment insurance benefits and firms' profitability at the firm-year level, based on data on UI benefit laws from the US states, macroeconomic conditions and firm balance sheet characteristics, all of which have their summary statistics in Table 1.

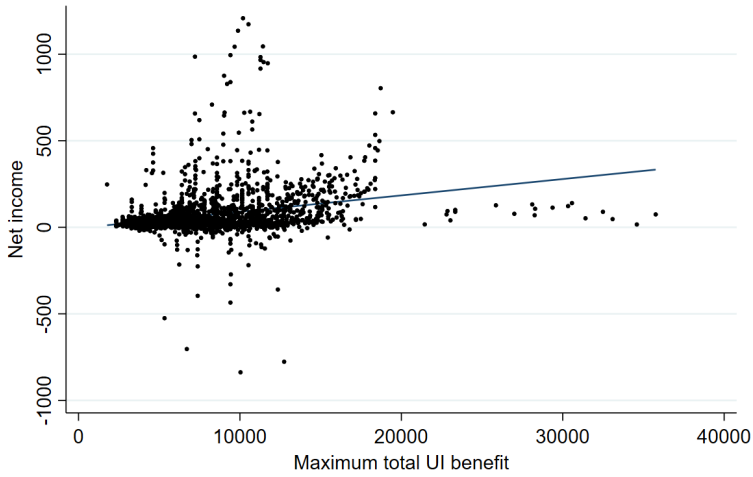

Figure 1. Cross correlation between the maximum total UI benefits and the average net income of all firms per US state between 1980 and 2019. The data of the unemployment insurance benefits are from annual reports of the US Department of Labor's "Significant Provisions of State UI Laws" and the data on firm level net income from Compustat. The regression line shown is weighted based on the number of state-year observations.

Table 1

Summary statistics.

The sample is composed of over 230,000 company-year observations from all the 50 states, from 1980 to 2019. The data of the unemployment insurance benefits are from annual reports of the US Department of Labor's "Significant Provisions of State UI Laws", the microeconomic data is from Compustat (these variables are winsorized at 1% tails), the gross domestic product (GDP) growth rates are from the US Bureau of Economic Analysis and the state unemployment rates (UR) are from the US Bureau of Labor Statistics. The sample includes all companies and there is no missing observation for every variable analyzed.

	Number of observations	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
Panel A: Unemployment Insurance Variable						
Log max total benefit	237,228	8.951	0.472	8.647	8.918	9.284
Panel B: Dependent Variables						
Net Income (Loss)	237,228	44.915	219.577	-2.272	1.190	15.284
Panel C: Control Variables						
Log Total Assets	111,058	4.832	2.199	3.290	4.686	6.291
Current Ratio	111,058	3.548	7.952	1.517	2.273	3.668
Total Debt/Total Assets	111,058	0.502	1.377	0.273	0.457	0.632
Unemployment Rate	237,228	6.060	1.946	4.7	5.7	7.2
GDP Growth	237,228	4.620	3.594	2.1	4.2	7.0

Data on state UI benefits is from the US Department of Labor's annual publications of "Significant provisions of state unemployment insurance laws" between 1980 and 2019. The state unemployment insurance benefits at grabs for an eligible claimant considered for analysis was computed by the product of the maximum weekly benefit amount and the maximum number of benefit weeks that can be received by all eligible claimants. This is naturally an approximation for this variable, since there are other determinants for this level, ranging from dependent's allowances to exceptional circumstances in certain states, such as high

unemployment, continuation of approved training, or workforce dislocations. The variable "log max total benefit" is the natural log of this product and it is the variable used for our analysis.

It is important to note that significant variation exists across states at a certain point in time and over time as well. For example, in 2015 the maximum total UI benefits in Florida was 3.9 thousand US dollars, whereas in the same year, Massachusetts had a maximum total UI benefits of over 30 thousand US dollars. This variation across states can be seen in Figure 2, where five different random states were selected, each one represented by a different line, to show how the unemployment benefits level differs from state to state for each given year. From a different perspective, Figure 3 depicts the graphical evolution over time of state UI benefits in general, through a histogram that shows how the average unemployment benefits levels vary over decades and over the whole time period, considering all 50 US states. We can conclude from the graphs by decades that, in general, the maximum total UI benefits have continuously increased over time throughout all states, with the last decade being the only exception, however, the modal and average percentage change was decreasing over decades. Additionally, the histogram for the whole time period shows that, overall, states typically increase their UI generosity by 25%-50% over a decade.

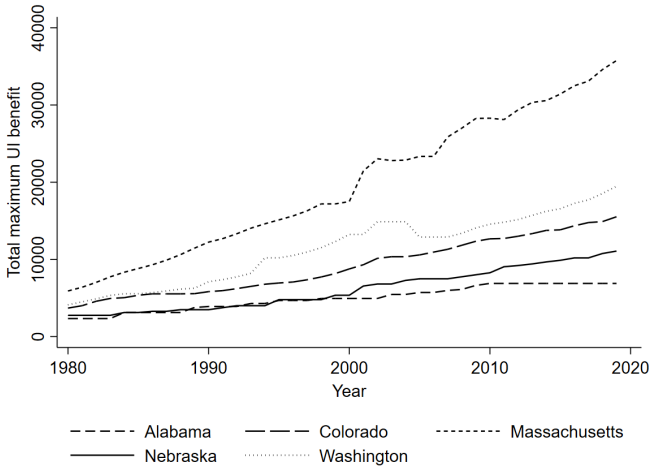

Figure 2. Evolution of the maximum total UI benefits by year between 1980 and 2019 for 5 random US states. The maximum total UI benefits data is the product of the maximum weekly benefits amount and the maximum subsidy duration, taken from annual reports of the US Department of Labor's "Significant Provisions of State UI Laws".

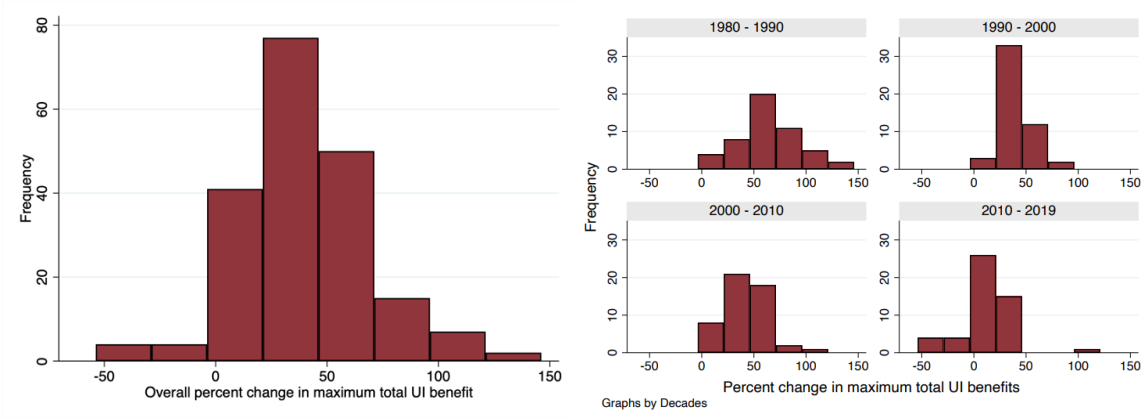

Figure 3. Distribution of changes in the maximum total UI benefits per decade between 1980 and 2019 of all 50 US states. The figure on the left depicts the overall decade percent change across the whole time period per state whereas the figures on the right show the distribution of changes in each of the decades. The maximum total UI benefits data is the product of the maximum weekly benefit amount and the maximum subsidy duration, taken from annual reports of the US Department of Labor's "Significant Provisions of State UI Laws".

Using the statistical software for data manipulation Stata, we combined the data of the states' unemployment insurance benefits with data for the net income of US firms, from Compustat, and a set of controls. The controls include the financial variables commonly included in profitability regressions (Nguyen and Nguyen, 2020), namely the natural logarithm of total assets as a measure of firm size, the current ratio as a measure of liquidity and the ratio of total debt to total assets as a measure of leverage. The data for all these variables was also taken from Compustat and was winsorized at 1% tails to exclude potential outliers. Local macroeconomic conditions are also accounted for in these controls through the inclusion of GDP growth rates, from the US Bureau of Economic Analysis, and state unemployment rates (UR), from the US Bureau of Labor Statistics, as variables. Ultimately, the total sample includes all firms, with the exception of firms from utilities and financials industries due to their highly different capital structure, with non-missing observations, resulting in more than 230,000 firm-year observations over the 1980-2019 period.

For our analysis, we regress net income, as our measure for firms' profitability, using the following regression:

$$Net\ Income\ (Loss)_{ijt} = \alpha_1 LN(Max\ Total\ UI\ Benefit)_{jt} + \beta X_{ijt} + \nu_i + \omega_t + \varphi_j + \varepsilon_{ijt}.$$

(1)

In this regression the net income of a firm *i* in state *j* at year *t* is modeled as a function of the natural log of the maximum total UI benefit in the same year, a set of controls as previously detailed, X_{ijt}, firm fixed effects, ν_i, year fixed effects, ω_t, and state fixed effects, φ_j. It is important to note that the maximum total UI benefits considered in the regression are timed at *t* and not *t*-1 since the data refers to January of each year, thus the effect on the net income happens in the same year, although months apart. Firm fixed effects are included to remove the effect that each firm's average investment has on the net income (loss) of firms, which might be affected by unobserved firm-specific variables, whereas year and state fixed effects aim to remove the source of variation caused by aggregate macroeconomic conditions and state-specific variables that affect all firms such as economic crises. Thus, these fixed effects ensure that the estimate for α_1 reflects, with a higher level of accuracy, actual changes in benefit generosity and profitability over time. Finally, according to Bertrand, Duflo and Mullainathan (2004), adjusting standard errors for clustering at the state level accounts for potential time-varying correlations in unobserved factors that affect different firms within the same state. Thus, this clustering method was used in all regressions.

Findings

The estimates obtained with the regression analysis conducted all led to the same result, which is that the impact of UI benefits in the profitability of companies is not statistically significant. Quoting Altman and Bland (1995), "absence of evidence is not evidence of absence", which means that the results presented in Table 2, should be carefully interpreted, not immediately seen as proof that a relation between the variables in question does not exist, but rather that more analyses should be done to reach a more certain conclusion. There can be many reasons as to why the regressions performed are not statistically significant, such as that the right model might not have been used to estimate this relation, the assumptions made may

not be the most adequate, the effect may be too small, or the variation in the sample simply too large. Nevertheless, insights on the regressions performed can be valuable to understand its eventual defects. To assess the effects of the controls applied, in each column an additional one is added. In Column 1, only fixed effects are accounted for, and the estimate obtained was that for each 100 log point increase in the maximum total amount of UI benefits, net income increases by 6.3 million US dollars. Similar findings were attained when added, in Column 2, state economic indicators (UR and GDP growth rate) to further control for macroeconomic conditions.

Table 2
Unemployment insurance benefits and companies' profitability.
This table comprises the results obtained from firm-panel regressions of net income (loss), on the natural log of the maximum total UI benefit under each states' UI system. In all regressions, controls for state, firm and year fixed effects were added. The last three regressions include state economic indicators (UR and GDP growth rate), with the last one including, moreover, firm financial controls (current ratio, natural logarithm of total assets and ratio of total debt to total assets). Where specified, industries in which a great percentage of employees is likely to be geographically dispersed is excluded. Firm financial controls are winsorized at 1% tails. Standard errors were adjusted for clustering at the state level. OLS corresponds to ordinary least squares.

	(1)	(2)	(3)	(4)
Panel A: Net Income				
Natural log max total benefit, t	6.260	8.543	14.512	13.462
Robust standard error	6.815	6.774	9.555	11.673
p-value	0.363	0.213	0.135	0.254
Number of observations	235,976	235,976	202,557	110,188
R2	0.627	0.627	0.620	0.656
Sample				
Excluded dispersed industries	No	No	Yes	Yes
Control variables				
State economic indicators	No	Yes	Yes	Yes
Firm financial controls	No	No	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estimation method	OLS	OLS	OLS	OLS

Following prior research (Agrawal and Matsa, 2013), in Columns 3 and 4 we exclude firms in wholesale, retail, and transport, since a great percentage of these industries' workforce is likely to be geographically dispersed. Employees are subjected to the UI regime imposed by

the state in which they work, and since we are only taking into consideration the UI law of the state in which each company is headquartered, this dispersion could reduce the value of our estimations. Excluding these companies almost doubles the value of the $\ln UI_t$ coefficient. In Column 4, we add firm financial controls, and the regression details that a 100 log point increase in UI benefits leads to an increase (decrease) of 13.5 million US dollars of the net income (loss), despite still not being statistically significant.

Industries and companies' differentiation

In order to better comprehend the statistically insignificance of the estimates of Table 2 and to understand if there could be any statistically significant result, in this subsection industries and companies are studied according to some defining dimensions related to the variables under scrutiny. Firstly, we start by evaluating how the relation between UI benefits and profitability differs between industries that have higher and lower layoffs and discharges levels. According to the existing theory, UI benefits can decrease the wage premium employees require per unit of layoff risk, which implies that the UI system is capable of offsetting the impact of unemployment risk on wages and consequently on profitability. However, in industries that present high layoff levels, the existence of UI benefits may not be enough to significantly decrease the wage premium that employees demand, as the probability of being fired is much more likely. Moreover, since employers are the ones that pay for UI benefits, even the greatest positive effect that UI can have on profitability, could be surpassed by the burden of the payments of said benefits. Thus, it is somewhat unclear what will be the results we are going to reach, because it can be equally possible that UI benefits are more than enough to significantly decrease wage premiums and, this way, overcome the negative impact of the respective payments.

According to the US Bureau of Labor Statistics, in 2019, the industries that presented the highest annual layoffs and discharges levels were professional and business services (5,045

thousand layoffs and discharges) and leisure and hospitality (3,570 thousand layoffs and discharges). On the other hand, the industries where it was reported in 2019 the lowest annual layoffs and discharges levels were real estate and rental and leasing (317 thousand layoffs and discharges), educational services (404 thousand layoffs and discharges) and information (464 thousand layoffs and discharges). It is relevant to notice that even though the industries of transportation, utilities, finance and insurance presented layoffs and discharges levels that could have been included in this analysis, they deliberately were not for the reasons already explained. Thus, two regressions are going to be run with the sample restricted to companies of those industries respectively. The results displayed in Table 3 (Column 1 and 2), are both statistically insignificant, with the p-values being extremely high (0.974 and 0.943), therefore, through the analysis of different layoffs and discharges levels, the null hypothesis, that there is no relation between the variables in question, cannot be rejected.

Then we examine what effects UI benefits can have in companies that only state profits in contrast to firms that solely report losses. As workers demand a wage premium to compensate for the unemployment risk they face, we expect that, since companies with net losses are more easily perceived as riskier, the compensating wage differentials are far greater in these firms. The effect of UI benefits in these companies is uncertain, it can either have a significant impact in terms of reducing wage premiums, decreasing losses, or it may not have a great effect on wages, leading to an increase of the losses due to the costs that UI benefits represent. Regarding companies with a positive net income, it is more likely that the existence of UI benefits leads to a decrease of compensating wage differentials which is more than capable of offsetting and even of surpassing the negative effect of the costs that UI benefits represent, as the companies are perceived as less risky.

When considering companies with losses, the results presented in Column 4 are statistically insignificant. However, when taking into account companies that only reported

profits, in Column 3, the results are statistically significant and indicate that there is indeed an economically meaningful relation between UI benefits and companies' profitability. More specifically, a 100 log point increase in the maximum total UI benefits leads to an increase of 41.09 million US dollars of the net income. This is in accordance with the theory of the decrease of the wage premium demanded by employees, but the magnitude of the increase is somewhat surprising, which leads us to conclude that UI benefits can have a positive impact in other variables other than wages.

Third, we investigate whether the level of firms' financial leverage influences the results on the relation between UI benefits and firms' profitability. Higher levels of financial leverage lead to more interest payments by firms, which subsequently decreases net income. Therefore, according to this logic, it would be expected that analyzing firms with low levels of financial leverage would give us more reliable results since interest payments would have a lower or null influence on the net income of firms. As such, we restrict our sample to firms with a higher leverage (above median total debt to total assets) and then to firms with a lower level of leverage (below median total debt to total assets) and run two separate regressions, whose results are reported in Table 3 (regressions 5 and 6 respectively). The results show that, when considering only firms with a low level of leverage, the relation between UI benefits and firm's profitability is in fact statistically significant and economically meaningful. In particular, that a 100 log point increase in the maximum total UI benefit leads to an increase in firms' profitability of approximately 34 million US dollars in net income.

Table 3
Impact of unemployment insurance benefits on firm's profitability by different dimensions.
This table comprises the results obtained from firm-panel regressions of net income, on the natural log of the maximum total UI benefit under each state's UI system and a set of controls as previously defined. For all regressions, these controls were included, controls for state, firm and year fixed effects were added and industries in which a great percentage of employees is likely to be geographically dispersed are excluded. Firm financial controls are winsorized at 1% tails. **, designates statistical significance at the 5% level. Standard errors were adjusted for clustering at the state level. OLS corresponds to ordinary least squares.

	High layoff and discharges levels (1)	Low layoff and discharges levels (2)	Net income profits (3)	Net income losses (4)	High leverage ratio (5)	Low leverage ratio (6)	Large firm size (7)	Small firm size (8)
Panel A: Net Income								
Natural log max total benefit, t	0.574	1.396	41.091**	2.429	19.896	34.094**	40.823**	-0.234
Robust standard error	17.546	19.438	17.497	4.838	17.631	15.265	19.160	0.761
p-value	0.974	0.943	0.023	0.618	0.265	0.03	0.038	0.760
Number of observations	19,867	15,964	66,761	41,424	53,992	54,244	54,798	54,415
R2	0.675	0.707	0.765	0.651	0.701	0.635	0.673	0.504
Sample								
Excluded dispersed industries	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables								
State economic indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm financial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS

Finally, this paper also explores if firm size, as measured by the natural logarithm of total assets, has a significant influence on the relation between unemployment subsidies and net income. In other words, if considering larger or smaller sized firms only, instead of both, leads to a different, more significant conclusion. In fact, results in Table 3 show a statistically significant and economically meaningful positive relation between UI benefits and net income when considering larger-sized firms, whereas for smaller-sized firms results are not significant and the estimate for α_1 is even negative. Larger firms typically present higher levels of profits since they are more established and mature firms with greater access to funding and more repeat business. As a result, the unemployment risk for workers in these firms is expected to be lower, enabling lower wage premiums and, consequently, higher profitability.

Additional studies

To further complement the previous analysis, we believe it would be empirically relevant to perform some additional studies. First, we want to comprehend how does the relation between UI benefits and companies' profitability develop over the four decades that have been under scrutiny. To that purpose, we performed four regressions, with each including firm-year observations of a specific singular decade, as it can be seen in Table 4. For the 1980s, 1990s and 2010s decades, the results are statistically insignificant, but for the decade that begins in

2000 and ends in 2009, the findings indicate that there is a statistically significant and economically meaningful relation between UI benefits and firms' profitability. Particularly, a 100 log point increase in the maximum UI benefits leads to an increase of companies' profitability of 35.3 million US dollars in net income.

The decade in question is characterized by three main occurrences, the 2001 Recession, an economic expansion between 2001 and 2007, and the Great Recession of 2008. Through prior regressions it became established that the relation between UI benefits and profitability tends to be a positive one. As such, initially we found plausible that the economic expansion observed in that period could have simply enhanced and strengthened the relation. However, this expansion is considered as one of the weakest ever since World War II (Aron-Dine, Stone and Kogan, 2008). Moreover, the 1990s decade was also characterized by a period of strong economic performance, but the results obtained for this set of years are still statistically insignificant. Therefore, the reason for the statistical significance of the results of Column 3 has to come from the two recessions of the decade. As already mentioned, one of the main goals of the UI system is to serve as a stabilizer of the economy, which is crucial in times of an economic downturn. In the recession of 2008, there had to be an overall significant increase of UI benefits (in a later part of this paper this will be more thoroughly discussed), which was done, for instance, through the Emergency Unemployment Compensation Act and the Federal-State Extended Benefits Program. Through simulations yielded, Vroman (2010), concluded that the regular UI benefits program had indeed a stabilizing effect, closing approximately one-tenth of the real GDP decrease caused by the Great Recession. Furthermore, Vroman (2010), concluded that the extended benefits had a fundamental stabilizing role as well. This leads us to conclude that this positive stabilizing effect, which affected the US economy as a whole, had to surpass the eventual negative impact of additional costs with UI benefits on companies' net income.

To further explore our framework and results, we also investigate whether the selection of the measure for profitability used has a significant influence on the results achieved. To do this, we perform two additional regressions (regressions 5 and 6 in Table 4) using EBIT and EBITDA respectively as dependent variables, instead of net income. All remaining variables and conditions are kept the same. Results reported in Table 4 show that both regressions are also not statistically significant, thus showing that a different choice for the measure of profitability would not change our conclusion and suggesting that the reason for the statistical insignificance in the relation between unemployment subsidies and firms' profitability has nothing to do with the selection of the dependent variable.

Table 4

Impact of unemployment insurance benefits on firm's profitability under additional specifications.
This table comprises the results obtained from firm-panel regressions of net income, on the natural log of the maximum total UI benefit under each state's UI system and a set of controls as previously defined. For all regressions, these controls were included, controls for state, firm and year fixed effects were added and industries in which a great percentage of employees is likely to be geographically dispersed are excluded. Firm financial controls are winsorized at 1% tails. ***, designates statistical significance at the 1% level. Standard errors were adjusted for clustering at the state level. OLS corresponds to ordinary least squares.

	Decade of 1980-1989 (1)	Decade of 1990-1999 (2)	Decade of 2000-2009 (3)	Decade of 2010-2019 (4)	EBIT as dependent variable (5)	EBITDA as dependent variable (6)	Adjusted for inflation (7)
Panel A: Net Income							
Natural log max total benefit, t	12.483	30.075	35.348***	-1.967	16.430	15.535	7.880
Robust standard error	10.648	26.396	10.693	7.761	20.051	24.762	4.930
p-value	0.247	0.260	0.002	0.801	0.417	0.533	0.116
Number of observations	25,203	34,056	28,320	21,253	110,156	109,911	110,188
R2	0.818	0.740	0.764	0.850	0.785	0.811	0.691
Sample							
Excluded dispersed industries	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables							
State economic indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm financial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS

To finish, we examine the influence that inflation may have on our results. A firm's net income is affected by changes in price levels, therefore it is possible that inflation may be distorting results. Thus, regression 7 considers inflation adjusted values for the net income variable, using the CPI index from 1980 to 2019 obtained from the US Bureau of Labor

Statistics. Results are still not statistically significant at the 10% level or less, as it can be seen in Table 4, meaning that no relation between unemployment benefits and net income can be concluded, however the p-value for this regression (0.116) is lower when compared against the original one without adjustment to inflation reported in Table 2, regression 4 (0.254).

The impact of UI benefits costs – Laura Faria Oliveira Fernandes

Introduction and theoretical framework

In the group part of this paper, we proceeded with the study of the relation between the maximum UI benefits an unemployed person can receive in each state and companies' profitability. Given that the main results previously obtained are statistically insignificant, this part of the paper explores what I consider to be one of the main channels in this relation, which is the impact of UI benefits costs on companies' profitability. The UI variable used before does not exactly reflect the actual costs companies have with payments of UI benefits, as for instance, in the Great Recession of 2008, the federal government also contributed to the raising of funds (Congressional Budget Office, 2012). Thus, in my individual part, I am going to precisely analyze the relation between companies' total costs with UI benefits and firms' profitability.

Behind the existence of unemployment insurance benefits in the United States there is a highly complex mechanism. As it was already briefly mentioned, UI is funded by both federal and state payroll taxes that fall upon employers. Vroom and Woodbury (2014), explain that The Federal Unemployment Tax Act (FUTA) charges on privately held companies, a payroll tax rate of 6% of the first 7 thousand US dollars of each covered worker's annual earnings. Under certain requirements, employers may be eligible for a tax credit of up to 5.4% of those 6%. The revenues obtained from FUTA are essentially used to pay for the expenses of administering the UI program, to cover costs related with the Extended Benefits program (which enables the

providence of up to 20 weeks of extra UI benefits), and to serve as loans for states that do not have enough UI benefits funds (Congressional Research Service, 2016).

Regarding state payroll tax rates, each state defines its own method to calculate them, as well as establishes a minimum and a maximum value which they can reach. This results in clear and marked differences among the UI programs of the states. The payroll tax rates are characterized by a fundamental component, titled "experience rate at the level of the employer", which means that the state payroll tax rates employers are charged with are linked to layoffs, increasing as the number of fired employees rises and vice versa. To implement experience rating two steps must be followed. The first one is that the UI benefits paid to each fired worker must be charged to the prior employer. The second step is to calculate a measure of layoff experience, through the employers' benefit charges, that can be mapped into a tax rate. (Vroom and Woodbury, 2014)

One important aspect to take into account, alongside with payroll tax rates, is the existence of payroll tax bases. The taxable wage base corresponds to the portion of an employee's annual salary that is subject to UI taxes, and each state sets a single taxable wage base to be applied, instead of defining a range. According to Vroom and Woodbury (2014), a federal minimum (but not a maximum) of 7 thousand US dollars is imposed for these taxable wage bases, thus, it is to be expected that they widely vary. For instance, in 2019, from statistics provided by the US Department of Labor, it can be observed that the taxable wage base is equal to the minimum of 7 thousand US dollars in 4 of the 50 states of the United States (Arizona, California, Florida and Tennessee). The taxable wage base was higher than 25 thousand US dollars in 14 states, with Hawaii and Washington having the highest ones, of 46.8 thousand US dollars and 49.8 thousand US dollars respectively. Finally, there were also 16 states in 2019 in which the wage base was of 10 thousand US dollars or less.

When first designed, the financing of UI benefits was supposed to be efficient by taxing more heavily employers that demonstrate higher layoff percentages and by being designed as a self-financing program. The intent with this last mentioned characteristic was for the raising of funds to be countercyclical ("forward funding benefits"), through the accumulation of UI benefits during periods of economic expansion, that would be saved for times of economic downturn (O'Leary and Wandner, 2018). Nonetheless, even if on paper the UI program appears to be functional, throughout the past few decades, many criticisms to this system have been made.

To begin with, the minimum taxable wage base (7 thousand US dollars) established by FUTA has not been updated since 1983, thus it has not been progressing over time and it is now deemed as incapable of generating the necessary funds. Moreover, Wandner (2018), reports that the tax rates applied by states are not high enough to distribute the necessary amount of UI without spending all the reserves during a recession, and that, in more stable times, contrary to what was supposed, states tend to choose to not increase payroll tax rates or even decide to lower them. Finally, because there are no federal requirements for the tax rate interval states define, some have set a maximum value for the taxes that does not fully allow the reflection of employer unemployment experience into state payroll tax rates that would enable to do just that (O'Leary and Wandner, 2018).

A period of time that confirms that the criticisms stated are reasonable is the one of the Great Recession of 2008 and following years. According to Vroman (2011), the recession was responsible for the doubling of the unemployment insurance rate between 2007 and 2009, and for the increase of average unemployment duration. Moreover, the number of weeks for which laid-off workers could receive UI benefits were extended and the amount of said benefits temporarily increased (Congressional Budget Office, 2012). Thus, the UI programs and their method of financing were severely affected by this crisis, because the raised funds that were

accumulated prior to the economic downturn were not enough to cover for what was needed, and because of the recession's depth and length.

As a consequence of the low funds reserved for UI benefits, other measures had to be taken. On June 30, 2008, the President signed the Emergency Unemployment Compensation Act of 2008, a program that offered additional weeks of UI benefits to laid-off employees and which was completely funded by the federal government (Congressional Budget Office, 2012). Furthermore, despite the fact that states increased either or both taxable wage bases and state payroll tax rates (as it will be demonstrated in the next session), this measure was not enough to raise the necessary funds, therefore, some states were forced to resort to loans, either from the US Treasury or in the private capital market (Vroman, 2011).

Ultimately, it can only be concluded that who may benefit from these failures of the UI program are the companies, as they lead to a lower than it was supposed to be burden of UI benefits payments. The next part will be dedicated to further investigating how taxable wage bases and state payroll tax rates shape the cost of UI benefits for firms, to then proceed to the study of how the expenses with UI impact companies' net income (loss).

Data and empirical framework

The variables that are now going to be analyzed are the ones that compose the UI benefits costs that companies have to pay, taxable wage bases and payroll tax rates, as well as the UI benefits expenses itself. The data for the taxable wage bases is stated on the annual reports of the US Department of Labor's "Significant Provisions of State UI Laws". However, there is no data set available that indicates firm-year observations of payroll tax rates, so as an approximate variable I will use the maximum possible state payroll tax rates capable of being applied in each state, which can also be found in the mentioned reports of the US Department of Labor's. Then, to obtain what companies have to pay in UI benefits per employee, I multiply the maximum state payroll tax rates by the established taxable wage bases. The time period that

is going to be studied ranges from 2003 to 2019, as previous reports do not include information for all the variables under analysis.

For comparison purposes, the gathered data is first divided into two groups, in states where companies have to pay less than 1.5 thousand US dollars of UI benefits per employee (Group 1) and states where companies have to pay more than or equal to 1.5 thousand US dollars of UI benefits per employee (Group 2). The sample contains in total 899 state-year observations, with Group 1 including 659 and Group 2 including 240. Even though companies in many states at some point had to pay (or still have to pay) less than 1.5 thousand US dollars per worker, Group 1 is not composed by any observation from the states of Hawaii, Iowa, Minnesota, North Dakota, Utah and Washington. On the other hand, Group 2 only includes data from 18 states.

To gain further knowledge about these variables' progression throughout the specified time period, three line plot graphs were designed. In order to do so, the average of the values of each state, per year, was done for the three variables. Each graph displays how a variable evolves over the years, distinguishing between observations from Group 1 and Group 2.

In figure 4, Graph 1 indicates that, whereas the average level of taxable wage bases of Group 1 remained rather constant between 2003 and 2019, in Group 2 a nearly consistent increase is observed over the years. This has to do with the fact that whilst some states decide on a fixed taxable wage base, others set a variable taxable wage base indexed to either the state's UI trust fund balance or to the average annual wages. It is worth to notice that from the states only included in Group 2 (the 6 states mentioned above), all of them in 2019 had what is titled as "flexible taxable wage bases" (US Department of Labor, 2019). Therefore, because taxable wage bases grow automatically with the growth of the variables they are indexed to, Group 2 presents greater taxable wage bases that increase over time, while most states from Group 1 did not implement significant changes to theirs. This corroborates Wandner (2018) explanations

that since minimum imposed taxable wage base is set too low, many states do not have the incentive to raise their taxable wage bases.

In its turn, Graph 2 reports that the studied Groups' average maximum state payroll tax levels follow more similar tendencies, and by 2011 they started to become rather similar to each other. It has already been mentioned that each employer tax rate is determined by the number of laid off employees of said firm. Going farther beyond, according to Guo (2019), the layoffs to which tax rates depend upon, typically occurred in the past 3 to 5 years. This theory is in accordance with the results demonstrated in the graph in question, since the two significant increases in average tax rates that occurred in both groups occurred in about 3 years after an economic downturn. The 2001 recession was followed in 2003/2004, by a sharp increase of the maximum state payroll tax rate of Group 2 and a less impactful one, but still significant, of the maximum tax rate of Group 1. The same can be said about the great increase of the average tax rate levels of Group 1 due to the Great Recession of 2008, even though it is noticeable an increase of the tax rates immediately in 2008, the rise of the maximum payroll tax rates is much more prominent after 2010.

Once more it can be concluded that the data studied is in accordance with what was stated by Wandner (2018), that in order to protect companies from exceptionally negative shocks, states implement somewhat low maximum tax rates. Furthermore, even if the payroll tax rates are temporarily increased due to an economic downturn, as soon as the US economy starts its' recovery process, it can be seen that the average maximum tax rates, either more gradually or more abruptly, promptly decrease.

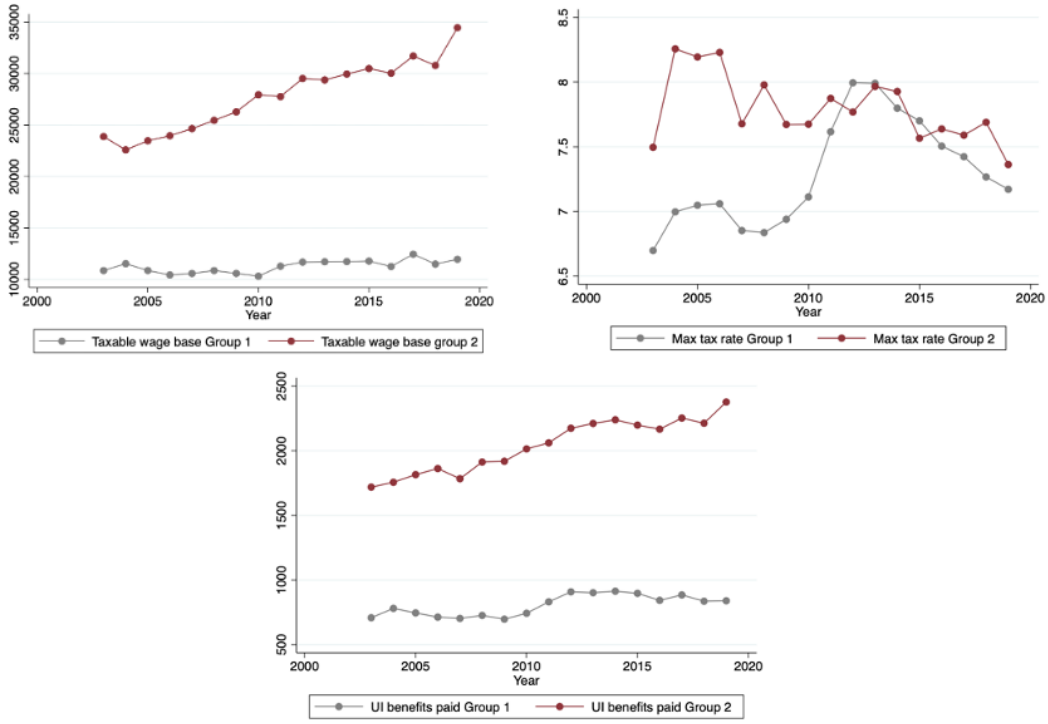

Figure 4. Comparison of the evolution of Group 1 and Group 2 taxable wage bases (Graph 1), maximum state payroll tax rates (Graph 2) and UI benefits paid by companies (Graph 3) from 2003 to 2019.

Straightforwardly, in Graph 3 it can be seen that there is a staggering difference between the average UI benefits paid by the different groups, with the amount Group 2 has to pay increasing somewhat stably over the years, whilst what Group 1 has to pay never goes above 1 thousand US dollars. This graph further demonstrates how the criticisms made to the USA UI system are more than legitimate, when given the chance to establish low UI benefits payments many states take advantage of that, which consequently may lead into the inability to provide the amount of funds necessary to go through another economic downturn. As there are states where companies could benefit more by having less expanses of UI benefits, the existing disparity can translate into an incentive for companies to move their locations to states with lower costs. In her research, Guo (2019) discovered that multi-establishment manufacturing firms respond to UI tax differences by tending to close plants located in states with higher relative tax costs (an effect more prominent during recessions). Given this, it is then expected

that the profitability of companies is much more negatively impacted by the costs of UI benefits in firms from Group 2 than from Group 1.

To better comprehend how these three variables in study impact firms' profitability, measured as the net income (loss), a panel data regression analysis is conducted for both of the groups defined, only now using firm-year observations. As I estimate net income regressions once more, with the natural log of taxable wages, maximum tax rates and the natural log of maximum UI benefits payable by the US companies as the independent variables instead, the same financial ratios, balance sheet and macroeconomic variables are used as controls (X_{ijt}). Firm (ν_i), year (ω_t) and state (φ_j) fixed effects are included for the same reasons stated in the group part of this paper.

$$Net\ Income\ (Loss)_{ijt} = \alpha_1 LN(Taxable\_Wages_{)jt} + \beta X_{ijt} + \nu_i + \omega_t + \varphi_j + \varepsilon_{ijt}. \quad (2)$$

$$Net\ Income\ (Loss)_{ijt} = \alpha_1 Max\_Tax\_Rates_{jt} + \beta X_{ijt} + \nu_i + \omega_t + \varphi_j + \varepsilon_{ijt}. \quad (3)$$

$$Net\ Income\ (Loss)_{ijt} = \alpha_1 LN(Max\ Payable\ UI)_{jt} + \beta X_{ijt} + \nu_i + \omega_t + \varphi_j + \varepsilon_{ijt.} \quad (4)$$

All independent variables are timed at *t* instead of *t*-1 as the respective data is from January, thus the effect on the profitability is supposed to occur in the same year. Overall, the total sample of Group 1 includes firms, i, from state *j*, that pay less than 1.5 thousand US dollars in UI benefits per employee, with non-missing observations resulting in over 63,000 firm-year observations over the 2003-2019 period. What changes in the total sample of Group 2 is that instead it includes firms, from state *j*, that pay more than 1.5 thousand US dollars in UI benefits per employee, resulting in over 12,000 firm-year observations. It is relevant to mention that none of the groups include utilities and financial companies because their capital structures are different from other firms. The estimated standard errors ε_{ijt}, are adjusted for clustering at the

state level to account for the reason stated in the group part. Summary statistics of the variables are displayed in Table 5.

Table 5

Summary statistics.

The sample is composed by over 77,300 company-year observations from all the 50 states, from 2003 to 2019. The data of the unemployment insurance benefits are from annual reports of the US Department of Labor's "Significant Provisions of State UI Laws", the microeconomic data is from Compustat (these variables are winsorized at 1% tails), the gross domestic product (GDP) growth rates are from the US Bureau of Economic Analysis, the state unemployment rates (UR) are from the US Bureau of Labor Statistics. The sample includes all companies and there is no missing observation for every variable analyzed.

	Number of observations	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
Panel A: Unemployment Insurance Variables						
Log taxable wages	77,378	9.274	0.470	8.854	9.105	9.547
Max tax rate	77,378	7.488	2.040	5.7	6.8	8.9
Log max UI paid	77,378	6.648	0.547	6.073	6.628	6.996
Panel B: Dependent Variables						
Net Income (Loss)	77,378	69.021	281.817	-7.128	1.570	30.346
Panel C: Control Variables						
Log Total Assets	40,293	5.783	2.133	4.266	5.722	7.251
Current Ratio	40,293	3.667	7.459	1.508	2.312	3.911
Total Debt/Total Assets	40,293	0.532	2.206	0.258	0.447	0.639
Unemployment Rate	77,378	6.114	2.130	4.6	5.5	7.3
GDP Growth	77,378	2.077	2.197	1.1	2.2	3.4

Findings

Unlike the results obtained from the study of the relation between UI benefits and companies' profitability, some of the regressions conducted for Group 2 led to statistically significant results. The estimates point to the existence of a negative relation between the natural log of taxable wage bases and companies' profitability: a 100 log point increase in the taxable wage bases leads to a decrease (increase) of about 60.6 million US dollars of net income (loss), with statistically significance at the 1% level (Column 3). This negative impact is intensified when we include financial controls, given that, in this case, a 100 log point increase of taxable wage bases leads to a decrease of profitability of approximately 86.5 million US dollars. Moreover, the results in Column 3 also indicate that there is an economically meaningful relation between the maximum natural log of UI benefits paid by companies, and companies' profitability. A 100 log point increase in the maximum of UI benefits paid leads to a decrease (increase) of the net income (loss) of 21.7 million US dollars, with statistically

significance at 5%. When adding financial controls, the estimate of α_1 decreases to -24.0 million US dollars.

Table 6
Companies' expenses with UI benefits and companies' profitability.
This table comprises the results obtained from firm-panel regressions of net income (loss), on the natural log of taxable wage bases, maximum tax rates and maximum UI benefits paid by companies, sequentially. All regressions include controls for state, firm and year fixed effects and state economic indicators (UR and GDP growth rate). Where specified, firm financial controls (current ratio, natural logarithm of total assets and ratio of total debt to total assets) were added. Furthermore, industries in which a great percentage of employees is likely to be geographically dispersed were excluded. Firm financial controls are winsorized at 1% tails. Standard errors were adjusted for clustering at the state level. **, *** designate statistically significance at the 5% and 1% level respectively. OLS corresponds to ordinary least squares.

	Group 1				Group 2		
	(1)		**(2)**		**(3)**		**(4)**
Panel A: Net Income							
Log taxable wages, t	-10.280		-5.875		-60.622***		-86.517**
Robust standard error	23.544		35.630		18.080		36.862
p-value	0.665		0.870		0.004		0.031
Number of observations	63,799		32,546		12,247		7,063
R2	0.792		0.814		0.830		0.858
Panel B: Net Income							
Max tax rate, t	0.387		-0.802		0.198		0.929
Robust standard error	1.263		1.903		1.217		1.440
p-value	0.761		0.675		0.873		0.527
Number of observations	63,799		32,546		12,247		7,063
R2	0.792		0.814		0.830		0.858
Panel C: Net Income							
Log max UI paid, t	0.266		-2.617		-21,723**		-24,033*
Robust standard error	10.657		15.297		8.365		12.423
p-value	0.826		0.865		0.019		0.070
Number of observations	63,799		32,546		12,247		7,063
R2	0.792		0.814		0.830		0.858
Excluded dispersed industries	Yes		Yes		Yes		Yes
Control variables							
State economic indicators	Yes		Yes		Yes		Yes
Firm financial controls	No		Yes		No		Yes
Firm fixed effects	Yes		Yes		Yes		Yes
State fixed effects	Yes		Yes		Yes		Yes
Year fixed effects	Yes		Yes		Yes		Yes
Estimation method	OLS		OLS		OLS		OLS

The findings reported in Table 6 can be said to be in accordance with what was reported in the plot line graphs, since they are evidence that companies' profitability can be significantly affected by expenses with UI benefits that surpass or are equal to 1.5 thousand US dollars per worker. Moreover, this difference clearly results from the significant discrepancy between the analyzed groups' taxable wage bases. It is likely that the eventual negative impact of the UI

payments in companies that have expenses lower than 1.5 US dollars per employee, are more easily offset by other effects. Pertaining the maximum state payroll tax rates, whose results were statistically insignificant in both groups, further studies will be needed in order to reach a more definite conclusion.

The incidence of state payroll taxes

One interesting topic to further explore, in order to better understand the statistically insignificance of the previously observed results for the state payroll taxes, is the incidence of corporate taxes. Through the prior extensive literature on the topic, it can be concluded that the incidence of the burden of taxes depends on a complex set of factors and behavioral reactions to tax. For example, Harberger (1962), the pioneer of works on this subject, developed a model where he showed that the incidence of the taxes depends on factors such as the elasticity of substitution between labor and capital in corporate and non-corporate sectors, as well as the elasticity of demand for the products of each sector. The conclusion the economist reached however, was that, under what he considered to be plausible assumptions, capital owners bear close to the full burden of taxes.

Even if there is a considerable number of effects to take into account when analyzing the incidence of corporate taxes, and even if some papers may point otherwise, many recent studies discovered that an increase in corporate tax rates leads to a decrease of wages. For instance, Arulampalam, Devereux, and Maffini (2008), using a database of over 55,000 companies, obtained results which indicate that approximately 50% of an exogenous increase in tax rates is passed on in lower wages. Desai, Foley and Hines Jr. (2007) estimated several regressions with various specifications and discovered that the percentage of the burden of corporate taxes that is borne by labor can range from 45% to 73%. This is crucial to consider in this paper because it might explain why the regressions estimated with the maximum tax rates as the independent variable led to statistically insignificant results. It can be the case that

state payroll tax rates do not impact companies' profitability because managers offset their impact with the decrease of workers' salaries. Thus, what it is going to be tested next is that in industries where usually it is paid the minimum wage or lower, it is expected that the same scenario cannot happen. As companies are already paying the supposedly lowest wages possible, they cannot be able to avoid the negative impact on profitability caused by state payroll taxes, at least through the decrease of wages.

In order to test this theory, panel regression analysis will be conducted. To obtain the intended data we resorted to US Bureau of Labor Statistics, as it presented the industries with the highest percentage of employees earning hourly salaries at or below the federal minimum salary. It is important to notice that employers are able to pay less than the minimum wage if, for example, workers earn enough tips to earn at least minimum wage. The industries with the highest percentage (9.5%) were by far leisure and hospitality, with approximately 3/5 of all workers in these industries being paid the minimum federal wage or less. The same set of controls and fixed effects applied to the previous regressions are going to be used in these ones as well. Furthermore, Compustat variables were winsorized at 1% tails and standard errors were adjuster for clustering at state-level. Overall, the total sample presents 1,593 firm-year observations, from 2003 to 2019, with no missing observations.

Moreover, I am going to compare these results with ones obtained from industries that report low percentages of employees paid hourly rates at or below the federal minimum wage. According to the US Bureau of Labor Statistics, the industries that have the lower percentages of workers paid the federal minimum wage or less are construction (0.3%) and manufacturing (0.4%). What only differs now from the regressions previously estimated is once again the industries studied. This leads to a total sample of almost 26,000 firm-year observations, from 2003 to 2019, with no missing values.

Table 7
Companies' state payroll tax rates expenses and companies' profitability.

This table comprises the results obtained from firm-panel regressions of net income (loss), on the maximum tax rates. All regressions include controls for state, firm and year fixed effects. Where specified, state economic indicators (UR and GDP growth rate) and firm financial controls (current ratio, natural logarithm of total assets and ratio of total debt to total assets) were added. Firm financial controls are winsorized at 1% tails. Standard errors were adjusted for clustering at the state level. *, designates statistically significance at the 10% level. OLS corresponds to ordinary least squares.

	(1)		(2)		(3)
Panel A: High percentage of minimum wage					
Max tax rate, t	-12.761*		-12.711*		-12.702*
Robust standard error	7.201		7.268		7.128
p-value	0.087		0.091		0.085
Number of observations	1,581		1,581		1,581
R2	0.741		0.741		0.743
Panel B: Low percentage of minimum wage					
Max tax rate, t	-1.809		-1.766		-1.560
Robust standard error	2.048		1.987		1.979
p-value	0.381		0.378		0.435
Number of observations	25,948		25,948		25,948
R2	0.825		0.825		0.826
Control variables					
State economic indicators	No		Yes		Yes
Firm financial controls	No		No		Yes
Firm fixed effects	Yes		Yes		Yes
State fixed effects	Yes		Yes		Yes
Year fixed effects	Yes		Yes		Yes
Estimation method	OLS		OLS		OLS

As expected, the estimates for industries with a high percentage of employees paid hourly rates at or below the minimum wage, reported in Table 7, are statistically significant at the 10% level and confirm that there is indeed a negative relation between maximum payroll tax rates levied on firms, to raise UI benefits funds, and firms' net income (loss). It is important to notice, however, that the number of observations used is very low, which might compromise the accuracy of the estimates obtained. In Column 1, where only the dependent and independent variables and fixed effects are considered, a 1 percentage point increase in the maximum state payroll tax rate is associated with a 12.8 million US dollars decrease of firms' profitability. When including UR and GDP growth rates as controls for macroeconomic conditions (Colum 2), the results are very similar, with the relation, therefore, still being economically meaningful. Finally, in Column 3 when adding financial controls to account for further firm characteristics, we obtain a coefficient estimate of -12.702, approximate to the previous two, and a slightly

smaller p-value. The statistical insignificance of the findings reported in Table 7 leads me to conclude that, when considering industries where workers are more likely to earn more than the federal minimum wage, the null hypothesis that there is no relation between maximum payroll tax rates and profitability cannot be rejected. Nevertheless, the research that is conducted in my individual part uses maximum payroll tax rates as an approximation for firms' payroll tax rates. Thus, future research where it is used a more accurate variable is recommended.

Conclusion

In conclusion, estimates show that overall, the UI benefits costs paid by companies can have a negative impact on companies' profitability in terms of net income (loss). However, among states, there is a high discrepancy in terms of the burden of UI benefits costs that companies have to bear. Moreover, it is relevant to add that, as the group work corroborated, the negative impact of these costs can nevertheless be offset by the positive effects that the UI benefits have on firms' profitability.

Group part

Conclusion

This paper examines the impact the unemployment insurance system has on a firm's financial performance, as measured by the level of profitability, and explores the main channels that affect this association. Our results suggest an inconclusive relation between unemployment insurance benefits and a firm's net income. However, when developing further analysis, we reach some conclusive results that show a significant positive relation between both variables for profitable companies, for firms with a low level of leverage and for larger-sized firms, which is in line with economic theory. Nevertheless, the overall insignificant results, prior to additional analysis, may be justified by the existence of multiple effects with opposing forces, two of which are examined in this paper. When studying the impact of the actual costs

companies have with UI benefits on profitability, results show that due to the significant taxable wage bases defined, for firms that have expenses with UI benefits higher than 1.5 thousand US dollars per employee, there is, as expected, a negative relation between both variables. Moreover, for companies where it is difficult to decrease workers' wages, results suggest that the payroll tax rates also have a negative impact on profitability. In contrast, when analyzing the role of labor productivity, our findings indicate a positive impact of unemployment insurance benefits on firms' labor productivity, even when exploring additional dimensions for higher level of reliability, which confirms our expectation that this variable has a key role on explaining the positive effect of UI changes on firms' performance.

In conclusion, this paper adds to a growing literature that analyzes the interaction between unemployment insurance and firms' performance and tax burden (including Wandner, 2018; Guo, 2019). Our paper reinforces the idea that labor market and industry characteristics are important features of analysis to draw more reliable and concrete conclusions. For future research we recommend the investigation of different channels in the relation between UI benefits and firms' profitability and the inclusion of additional variables, since certain omitted variables in our analysis exist and may affect the association between UI benefits and firms' performance or provide additional explanation for the findings.

Appendix

Table A1

This table lists the full regression outputs, including the coefficients on all control variables, obtained from the firm-panel regressions of net income (loss), on the natural log of the maximum total UI benefit under each states' UI system, as a complement to Table 2 of this paper.

	Coefficient		Robust standard error		P-value
Panel: Net Income					
Regression 1					
Natural log max total benefit, t	6.260		6.815		0.363
Regression 2					
Natural log max total benefit, t	8.543		6.774		0.213
Unemployment Rate	-0.753		0.985		0.448
GDP Growth	0.913***		0.281		0.002
Regression 3					
Natural log max total benefit, t	14.512		9.555		0.135
Unemployment Rate	-1.204		0.928		0.2
GDP Growth	0.830***		0.309		0.01
Regression 4					
Natural log max total benefit, t	13.462		11.673		0.254
Unemployment Rate	-0.223		0.905		0.806
GDP Growth	0.956**		0.398		0.020
Log Total Assets	24.992***		2.327		0
Current Ratio	-0.275		0.28		0.332
Total Debt/Total Assets	-4.547		6.418		0.482

Table A2.1

This table lists the regression outputs for the second regression performed for each of the three independent variables, for Group 1. The regressions include coefficients on all control variables, obtained from the firm-panel regressions of net income (loss), on the natural log of taxable wage bases, on maximum state payroll tax rates and on the natural log of the maximum UI benefits costs paid by companies. It serves as a complement to Table 6 of this paper.

	Coefficient		Robust standard error		P-value
Panel : Net Income					
Group 1					
Regression 2					
Log taxable wages, t	-5.875		35.630		0.870
Unemployment Rate	0.526		3.154		0.868
GDP Growth	2.759**		1.068		0.013
Log Total Assets	37.988***		6.401		0
Current Ratio	-0.622		0.744		0.408
Total Debt/Total Assets	-0.157		18.315		0.993
Regression 2					
Max tax rate, t	-0.802		1.903		0.675
Unemployment Rate	0.545		3.097		0.861
GDP Growth	2.764**		1.065		0.013
Log Total Assets	38.01***		6.419		0
Current Ratio	-0.625		0.741		0.404
Total Debt/Total Assets	-0.089		18.356		0.996
Regression 2					
Log max UI paid, t	-2.617		15.297		0.865
Unemployment Rate	0.546		3.149		0.863
GDP Growth	2.764**		1.065		0.013
Log Total Assets	37.999***		6.432		0
Current Ratio	-0.624		0.741		0.404
Total Debt/Total Assets	-0.122		18.374		0.995

Table A2.2

This table lists the regression outputs for the second regression performed for each of the three independent variables, for Group 2. The regressions include coefficients on all control variables, obtained from the firm-panel regressions of net income (loss), on the natural log of taxable wage bases, on maximum state payroll tax rates and on the natural log of the maximum UI benefits costs paid by companies. It serves as a complement to Table 6 of this paper.

	Coefficient		Robust standard error		P-value
Panel : Net Income					
Group 2					
Regression 2					
Log taxable wages, t	-86.517**		36.863		0.031
Unemployment Rate	2.437		2.059		0.253
GDP Growth	0.338		0.522		0.526
Log Total Assets	10.88**		3.880		0.012
Current Ratio	-0.123		0.398		0.762
Total Debt/Total Assets	-7.007**		3.320		0.050
Regression 2					
Max tax rate, t	0.929		1.440		0.527
Unemployment Rate	2.171		1.973		0.287
GDP Growth	0.595		0.561		0.303
Log Total Assets	11.533***		3.719		0.006
Current Ratio	-0.192		0.395		0.633
Total Debt/Total Assets	-5.965		3.48		0.105
Regression 2					
Log max UI paid, t	-24.033*		12.423		0.070
Unemployment Rate	1.659		2.173		0.456
GDP Growth	0.621		0.632		0.340
Log Total Assets	11.413***		3.728		0.007
Current Ratio	-0.188		0.405		0.650
Total Debt/Total Assets	-5.876		3.378		0.1

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