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THE IMPACT OF UNEMPLOYMENT INSURANCE ON JOB CREATION

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Abstract

Unemployment insurances are perceived as major benefits to support workers in their job findings. This thesis contributes to the pre-existent literature through researching the impact of the unemployment benefits on the companies' hirings and permanent layoffs, due to a lack of research on this matter. Using state and firm-specific variables, this study analyses the absolute and percentage impact on number of companies' employees. For two of the overall performed regression models, higher amounts of unemployment insurances seem to impact positively the number of companies' employees.

Keywords

Unemployment subsidies, unemployment insurance, total amount of UI, subsidies' maximum amount, subsidies' maximum duration, companies' number of employees, employment, unemployment, job creation, US, Great Recession, Covid-19, employee turnover rate.

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1. Introduction

Over the past years there have been periods in which governments and policymakers felt the need to increase unemployment benefits, being its duration or amount. Benefit extensions occurred more often during recessions as a business cycle stabilization tool. This stabilization aimed to protect workers from major income losses during recession periods as well as meeting consumption needs. However, there is a paradigm around the topic, because if these benefits are too generous, workers might get comfortable in being unemployed and could, consequently, cause the unemployment rate to rise and labor supply to not meet demand.

The existing literature on this subject contains papers addressing unemployment insurance and employment. Some studies found different conclusions for relations between states and firm specific variables and employment. Others found relations between unemployment subsidies and other employment variables. Though, none of them seemed to find a concrete answer to whether and how unemployment benefits affect number of companies' employees. This gap in the literature, created the perfect scenario for the development of a hypothesis which would put to test the above-mentioned effects.

This paper will argue that the unemployment insurances have a positive effect on job creation, as hirings. To study such effects, the chosen time frame ranges from 2006 to 2021. This time period covers the two most recent economic shocks: the Great Recession (2007-2009) and the Covid-19 Pandemic (2020-2021). Data was collected from the USA due to its size, different states' laws and the size of its stock market.

Data from companies and states was collected. As for firm-related variables, the number of employees, staff expenses, acquisitions, total assets, total liabilities, net income, stockholders'

equity and the IPO were taken from WRDS. Only firms with information on the number of employees and staff expenses were considered. Regarding each state, data on variables collected from the U.S. Labour Department were the unemployment rate, the maximum amount and the maximum duration (in weeks) of unemployment insurance that each state would provide to a regular citizen at any given year.

For the development of the model, number of employees was chosen as the base for the different dependent variables. While the other variables were chosen as the independent variables – variables one would expect to, in some way, impact the dependent variable.

The purpose of this study is to assess if the unemployment insurances have or not impact in the number of companies' employees, as employee hirings and permanent layoffs. Some ratios, such as the ROA, ROE, debt ratio, average expense per employee and a Boolean for acquisitions were calculated to better compare firms amongst each other.

A linear regression was created that had both variables related to the state and their unemployment subsidies policies, and variables that would reflect the reality of each firm. Three different variables were tested as to access which would be better to proceed with in further studies, the change in employees from year $t-1$ to year t as an absolute value, the change in employees from year $t-1$ to year t as a percentage, and the absolute number of employees. After performing the three different regressions and finding which of the dependent variable's variability was better explained through the above-mentioned independents variables, the final chosen dependent variable was the absolute number of employees. At this stage, only the firms' internal factors seem to be significant to explain the employee variation. Using this as the dependent variable, two new model specifications were constructed removing the total amount and then the changes in maximum amount and maximum duration for

unemployment subsidies. After acknowledging that the model would not be better with the removal of these variables, a new study was conducted as to focus on the two big crises of the century, the Great Recession and the Covid-19.

Regarding individual parts of the study, some regressions were performed, for samples extracted based on the 1st and 3rd quartiles for the least and most-levered companies, for companies with older or more recent IPO dates and for companies with lowest and highest levels of average expense per employee.

Although the majority of these models do not effectively predict the impact of unemployment subsidies on the dependent variable (which was the main objective of our study), they are relevant to estimate the variability of the number of companies' employees and the analysis was improved by including internal and firm-specific factors. It was expected that variables related to unemployment subsidies could explain more effectively the variability of the dependent variable, which was not the case in our study.

One of the obstacles to our analysis might be the sample of only publicly traded companies that is being considered for this study and it would be interesting to study a more heterogenous sample. Considering other explanatory variables such as specific employment-related variables could help better understand the variation of number of companies' employees. These variables could help explain the remaining variability of the previous regression models and consequently reduce the constant coefficient.

2. Literature Review

Despite being taken for granted, the first unemployment insurance programs in the United States were only established in the 1930s. They play an important role in providing short-term aid for jobless workers looking for new opportunities, and, in supporting consumer demand during economic downturns. Although this is true for workers, the sheer existence of unemployment insurance also has a great impact on businesses.

On this study's time frame, a rather significant event, known as the Great Recession, took place. This occurrence, begun in December 2007 all the way through to June 2009, going down in history as the most pressing economic downturn the US economy had suffered over the last three decades. The unemployment insurance system reacted by supplying benefit extensions and implementing new emergency benefits, allowing workers to claim the latter for longer time periods.

Following the Great Recession, there was a prolonged period of slow growth and weak labour markets up until another major event - the Covid-19 Pandemic. This crisis hit the world, resulting in profound changes in the economy and countries' policies regarding unemployment insurance.

Unemployment rate

A prevailing theory regarding unemployment argues that unemployment benefits apply an upwards pressure on the unemployment rate (François Chesnais, Grazia Ietto-Gillies, and Simonetti 2003). This conclusion is sustained by two central areas in labour economics: job-search theory and efficiency-wage theory. On one hand, the job-search theory argues that a rise in unemployment benefits leads to an increase in the time one spends unemployed, via a reduction in the incentive for unemployed workers to look for and obtain a job. On the other hand, the efficiency-wage theory explains that by reducing the cost of being unemployed,

workers will have the tendency to ask for higher wages, thus decreasing the demand for labour. Since the unemployment rate depends both on the duration of unemployment and its incidence, unemployment seems to rise with the level and the duration of benefits.

Unemployment insurance and duration

Despite the importance of the above-mentioned theory, empirical evidence seems to argue against it. A study (V.Spiezia, 2000) finds that several papers show that, in fact, the impact of benefits on unemployment duration is rather small (Lancaster and Nickell, 1980; Meyer, 1990). Therefore, there is a suggestion that these variables depend on a set of factors much wider than the ones usually considered in labour economics theories. To assess whether hiring subsidy programs lead to an increase in companies' hirings an article was found studying this impact on older workers being unemployed for less than six months. The results were not concise enough and proved an existent heterogeneity in the effects of hiring subsidies (Boockmann et al. 2012). One paper suggests that if there's an increased amount of unemployment subsidies, then probably it would cause higher overall unemployment (Holmlund, 1998) and so this might cause less companies' hirings. In other paper, the author implies, based on the results achieved, that unemployment insurance has a big effect on temporary layoff unemployment ("The Effect of Unemployment Insurance on Temporary Layoff Unemployment on JSTOR" 2022). However, for the present study it is more important to understand the relation between unemployment subsidies and permanent layoffs. As this author says further, the problem that arises when studying this matter is that one probably could not take the same assumptions for permanent layoffs.

Regarding the benefits for companies who hire new workers, the main findings were that wage subsidy programs stimulate the employment in subsidized firms (KANGASHARJU 2007). Most studies that estimate the effects of wage subsidy programs find positive effects on the

correlations between employment policies and subsidized hirings, although controls should be established for subsidized companies since there is a risk that firms use schemes as a permanent subsidy to their workforce ("The Effectiveness of Targeted Wage Subsidies for Hard-To-Place Workers" 2018).

Staff expenses

A study (Kang, Dong Ug, Gun Jea Yu, and Sang-Jik Lee, 2016) aims to see the effects of the level of employee benefits on employee productivity. The authors found that a higher level of staff expenses, i.e., employee's compensation, will lead to an increase in the level of the firm's productivity. Furthermore, a paper (Sheridan, John E., 1992) analyses how the organizational culture of a specific company affects its performance and employee retention. The research concludes that firms that have greater expenses with their employees will have lower human resources costs – lower turnover – and also, higher productivity. Further analysis of the literature on this topic will be carried out in chapter 5.3.

Return on Assets and Return on Equity

Concerning companies' financial performance measures, there are many theories implying a negative relationship between collective employee turnover and organizational performance, meaning that a rise in financial performance will lead to a decrease in employment turnover ratio i.e., increase in employment retention ratio. A study (Hancock, Julie I., David G. Allen, Frank A. Bosco, Karen R. McDaniel, and Charles A. Pierce, 2011) aims to clarify this relationship. The authors verify a significant negative relationship between the two variables, suggesting that the costs and human and social capital losses associated with employment turnover seem to outweigh the potential benefits of hiring better or less expensive workers and bringing new perspectives into the company. However, a paper (Lee, Shinwoo, 2017) observes that this negative relationship might not happen, depending on the type of turnover. To

conclude, the effects of the ROA and ROE – measures of financial performance - are ambiguous through the literature, making it hard to have an expectation for the behavior of these variables in this paper's model.

Debt

Regarding companies' leverage, a paper (X. Giroud and H. M. Mueller, 2015) shows that the firms that increased their leverage in the run-up to the Great Recession present a significantly larger decline in employment than firms that freed up debt capacity, i.e. low-leverage firms. This suggests that firms' balance sheets played a significant role in the propagation of shocks during this time period. However, another study (B. Van Doornik, D.Fazio, D. Schoenherr, J. Skrastins, 2022) investigates how an increase in unemployment insurance shifts labour supply from safer to riskier firms and reduces the compensating wage differentials that risky firms need to pay. Consequently, this argues that firms with higher debt levels will suffer an increase in value resulting from the decrease in the firms' labour costs. Further analysis of the literature on this topic will be carried out in chapter 5.1.

Acquisitions

Regarding acquisitions, a study (Lehto, Eero, and Petri Böckerman, 2008) intends to analyse the effects of this variable on employment. While existing literature has mostly studied the effects of acquisitions on productivity and wages, this paper contributes by studying the employment effects. The authors started by focusing solely on the manufacturing industry but then discovered that this would lead to wrong conclusions. Their most significant find was that almost all changes in ownership, being a merger or an acquisition, lead to an increase of the number of employees of the acquirer firm, but less than the two firms' employees together. Also, a paper (Conyon, Martin J., Sourafel Girma, Steve Thompson, and Peter W. Wright.,

2002) provides an analysis on how acquisitions affect firm employment. The study argues that mergers and acquisitions are followed by significant increase in the number of employees.

IPO

A paper (Borisov, Alexander, Andrew Ellul, and Merih Sevilir , 2012) studies the effects of going public on the growth of employees. The authors found that firms hire twice more employees for the following two years of their IPO. A cause for such conclusion is that when going public, companies experience a relaxation of their financial constraints, allowing for an improved access to equity and debt markets leading to more growth opportunities, such as increases in workforce numbers. Similarly, a study (Kenney, Martin, Donald Patton, and Jay R. Ritter, 2012) is concerned about post-IPO employment. The latter also finds more ground in the topic, and its authors conclude that after the IPO, organisations hire more than when private. These findings can allow for the conclusion that firms that had recent IPOs will have a higher level of employment compared to those that have been public for longer. Further analysis of the literature on this topic will be carried out in chapter 5.2.

Unemployment insurance during the Great Recession and Covid-19 Pandemic

In midst of economic downturns, like the Great Recession and Covid-19 Pandemic, governments and policy makers significantly increased the amount, duration, and suitability of unemployment benefits compared to regular UI. Establishing these programs provided an important foundation for stabilizing and propelling for recovery in a declining economy environment. In response to these agents, economists often warn about the supply side effects on the labour market. A study (Rothstein, 2011) explains how during the Great Recession, this increase in unemployment benefits lead to shocks in labour supply and demand. The author concluded that, UI extensions had significant effects on the probability that the eligible

unemployed would exit unemployment, concentrated among the long-term unemployed. This implies that UI benefit extensions raised the unemployment rate in early 2011.

An analysis (C. Pizzinelli and I. Shibata, 2022) observes that despite having tight labour markets, reflected in high vacancy-to-unemployment ratios and job leaves, employment recovery continues to be incomplete and below pre-pandemic levels. The authors found that there is a large number of workers not returning to work after the layoffs, suggesting that the income support programs during the pandemic allowed laborers to be picky, slowing job applications, acceptances of proposals, ultimately delaying employment recovery. In further support of this, a study (N. Gwyn, 2022) explains how the pandemic insurance programs, supposedly beneficial for the economy, ended up holding back employment growth.

By comparing aggregate employment in businesses across states opting to end these benefits early to those who have not, a paper (L. Pardue, 2021) analyses how hiring trends were affected as enhanced unemployment insurance benefits expired. States that ended enhanced UI provisions and started vaccination early, saw an increase in employment of adult workers 25 or older. In states where enhanced UI would not end for a few more months, there has been a simultaneous spike in hiring of 15–19-year-olds. These findings suggest that, while enhanced unemployment support during the pandemic have impacted the composition of the labour market, health concerns played a key role in driving adults' labour supply decisions rather than UI payments alone.

To conclude, reading through the literature, one can understand the importance in comparing the labour market's behaviour in reaction to both the Great Recession and Covid-19, two periods of great labour market shocks. Even though these two economic downturns produced similar shocks in the labour market – high unemployment rates, the two events do have

dissimilarities. A study (E. Jackson, 2022) observes how the economic recovery is being much softer in the Covid-19 period than it was during the Great Recession. This is because while Covid-19 job losses were caused by lockdowns and states closing activity which can be solved by opening activity as soon as possible, the factors that caused the Great Recession were more complex and resulted in longer-lasting job disruptions.

3. Data

3.1. Time Frame and Place

To study the effects of the regression variables on the hiring trends it was decided to choose a time frame which would cover at least two several economic shocks, thus allowing the assessment of the periods before and after the shocks. More detail on the above-mentioned model and variables will be given below.

The time period covered in this study starts at 2006 and ends in 2021, during which the Great Recession (2007-2009) and the Covid-19 Pandemic (2020-2021) were observed. In these kinds of periods, one can observe stronger repercussions than in normal downturns. Higher and long-term unemployment not only depends on how severe the recession is, but also on the flexibility at the micro-level and the ability to return to normal levels after the crisis. The study of this time period is aimed at capturing and analysing the major labour market shocks that happened during the two crises, and its after math.

For the matter of our study, data from the United States of America was chosen. Firstly, the USA is a very big country, with 50 different states, with 50 different laws, so it is interesting to make comparisons in a country with very different laws depending on the location. Also, it is of great importance to study a country which drastically suffered the two economic shocks. Since the Great recession started in the USA, the effects of the beginning, during and after math of this crisis can be studied in this area effectively. For Covid-19, even though it did not start in the USA, this crisis affected the whole world deeply, so it is important to study this time period in the USA. Unfortunately, this crisis is still going, even though it is showing signs of recovery, the long-term effects of this pandemic are still to be assessed, not leaving space for further analysis in this study.

Another factor that made it relevant to choose to analyse data from the United States, was the size of the stock market. Since data from listed companies is being studied, it is important to have a sample of relevant size. The USA stock market has a total market capitalization of $46,460,463.2 million, counting with more than 9,000 listed companies (Qian, Ritter, and Shao 2020). For the matter of studying the effects of several variables on the growth of employees in listed companies, it made sense to choose data from this country, as it had all the information needed. It is also important to mention that, for this study, only firms with information on the employees amount and staff expenses were considered.

3.2. Variables

For all publicly traded companies that are still active and for each state located in the U.S., two sets of variables were collected to create the model that was built with the goal of explaining and predicting the variability of a company's hires and permanent layoffs. Variables related to each company were collected from WRDS, whilst variables respective to each state were extracted from the U.S. Labour Department.

As for the variables related with each firm, the number of employees, staff expenses, acquisitions, total assets, total liabilities, net income, stockholders' equity and the IPO were taken from WRDS. From this data, some ratios as the ROA, ROE, debt ratio, average expense per employee and a Boolean for acquisitions were calculated to better compare firms amongst each other.

Regarding each state, the variables that were selected from the U.S. Labour Department were the unemployment rate, the maximum amount and the maximum duration in weeks, of unemployment insurance that each state would provide to a regular citizen at any given year from 2006 to 2021.

Variables for each firm

The amount of employees of each firm at any given year was collected as to analyse if it would vary with any particular pattern depending on the remaining variables. This variable alongside with the staff expenses, indicate how much a company spend in their employees, including incentive compensation, other benefit plans, payroll taxes, salaries and other expenses, was used to calculate the average expense per employee for each firm at any given year.

A company's acquisition in a certain year, indicates whether said company acquired another, or whether a part of it was acquired by another company, and the respective amount for that transaction. With the acquisition variable, a Boolean was created to indicate whether there were acquisitions or not for each company in said year. A value of one indicates that the company acquired another in said year, while a value of negative one, indicates the exact opposite – a dissolution occurred.

The total assets for each year indicate the value that each firm has in all combined assets at that year, while the net income indicates the profit a company generates by subtracting expenses to revenues. By dividing the net income by the total assets, the ROA was calculated for each company at any given year.

The total liabilities represent the amount that each company has in debt. As so, the debt ratio was calculated by dividing the total liabilities by the total assets and was provided a way to compare companies with different sizes. The stockholder's equity, represent the common equity, the preferred equity and nonredeemable noncontrolling interest for each company at any given year. To calculate the ROE, the net income was divided by the shareholder's equity.

The IPO for each firm was extracted to provide information on when each company went public, to get an idea of the firms' maturity. With this, a common pattern for companies with

an earlier IPO and with a more recent one will be researched, regarding their posture when in reference to employee hiring or layoffs.

Variables for each state

The unemployment rate was collected for each state and each year, as it represents the percentage of unemployment in the labour force.

As to analyse if there was an impact generated by the increase or decrease in the maximum amount and maximum duration from year $t-1$ to year t in any given state, two Boolean variables were created. For each variable, the value for each state was compared to the prior year and a value of -1 was associated to it if a decrease in said amount was observed. Following the same logic, an increase in the amount was associated to a value of 1, and zero represented the years where there was no change in the priorly mentioned variable. The total amount of unemployment insurance for each citizen was then calculated through multiplying the maximum amount per the maximum duration of weeks.

4. Empirical Approach

4.1. Research Question

The research question is "How changes in unemployment subsidies impact companies' hires and permanent layoffs?". For the present study it is crucial to analyse how differences in subsidies amounts and subsidies duration for each state and each year (as year and state being our fixed effects to smooth the occasional occurrences) affects the absolute number of companies' employees, as new hirings or permanent layoffs.

4.2. Regression Equation

To study and conclude about the research question stated above, the regression equation below was formulated.

$$\begin{aligned}\hat{Y}_{scy} = {} & \beta_0 + \beta_{\substack{total\\amount}} \times \text{total amount}_{sy} \\ & + \beta_{\substack{change\ maximum\\amount}} \times \text{change maximum amount}_{sy} \\ & + \beta_{\substack{change\ maximum\\duration}} \times \text{change maximum duration}_{sy} + \sum \beta_i X_i + \varepsilon\end{aligned}$$

Some β were explicitly included in the regression and other important variables were included in $\sum \beta_i X_i$ that contains the equation stated below.

$$\begin{aligned}\sum \beta_i X_i = {} & \beta_{\substack{unemployment\\rate}} \times unemployment\ rate + \beta_{\substack{staff\\expenses}} \times staff\ expenses \\ & + \beta_{ROA} \times ROA + \beta_{ROE} \times ROE + \beta_{\substack{debt\\ratio}} \times debt\ ratio \\ & + \beta_{\substack{average\ expense\\per\ employee}} \times average\ expense\ per\ employee \\ & + \beta_{acquisitions} \times acquisitions\end{aligned}$$

Dependent variable

In the regression equation, three different dependent variables will be studied as to comprehend which dependent variable is better explained through the regression. The first study considered the dependent variable $\hat{Y}_{scy}$[1] being the absolute change in number of employees in each firm, from year $t-1$ to year t. After that, the variation in the employee amount from $t-1$ to year t as a percentage, was considered for the dependent variable $\hat{Y}_{scy}$. Whilst the last dependent variable considered was the absolute value of employees in a firm for each respective year.

Independent variables

The crucial variables for the regression model are change in maximum subsidies amount, change in maximum subsidies duration and the total maximum subsidies amount. However, other independent variables were included in the regression equation that could also explain our hypothesis but are not so important in terms of results. Unemployment rate, staff expenses, ROA, ROE, debt ratio, average expense per employee and whether a company had acquisitions or not in that year (Boolean of acquisitions), are relevant variables to include in the model since although it is essential to study the effects of the main variables regarding unemployment subsidies in the dependent variable, the variable changes in companies' number of employees could also change due to other factors.

Control variables

The control variables are essential to include in the regression model to smooth occasional occurrences. So, control variables are included as fixed effects to study isolated changes and results for each state and year studied. It is important to observe the impact of unemployment

[1] With s, c and y standing for state, company and year, respectively.

subsidies in changes in companies' number of employees for each state and each year isolated and that's the main reason for using control variables in this model.

The control factors state and year had to be controlled in this regression model for several reasons. First, US states have different government rules, different geographical areas and population densities, different levels of GDP and so it is crucial to compare other variables' information separately for each state, since some results could be explained and justified inside a specific state but not generally for all states. It is expected that states with more GDP have more amounts and more duration of unemployment subsidies, for example.

Secondly, year was chosen as a control factor as well since in each year different events occur that could influence unemployment subsidies amount and duration, as changes in global economy, crisis and health events such as the Great Recession of 2008 and Covid-19 Pandemic being the most well-known of our times. For this reason, it is crucial to control the impact of explaining variables in the model during these periods of events. For example, it is expected an increase in unemployment subsidies amounts and duration during economic recessions, health crisis such as Covid-19 and also during periods of political instability and global wars.

4.3. Development of Hypothesis

Understanding the research question

The research question aims to study how the changes in maximum amount and maximum duration of unemployment subsidies, for each state and year, affect U.S. companies' number of employees. Companies can change their number of employees over time due to several reasons, but it could be because of companies' hirings, companies' permanent layoffs and also temporary layoffs or temporary (usually part-time) hirings. However, the last two were not being studied in this paper due to simplicity reasons. Also, it was chosen only maximum values

of subsidies amounts and duration as to facilitate the study. The focus was studying the impact of changes in unemployment subsidies maximum amount and maximum duration on the hirings or losses of companies' employees. The goal was to analyse if states with better or worse unemployment insurance policies cause companies to have more or less hirings or permanent layoffs. With this in mind, the hypothesis of this study is that companies incorporated in states with better unemployment policies have less hirings or more permanent layoffs, for each state and year in study. To prove this statement, a regression analysis will be performed to confirm or refute the main hypothesis.

Expected coefficients for total subsidies amount, change in maximum amount and change in maximum duration

It is expected a negative coefficient for the total maximum subsidies amount, for the change in maximum subsidies amount and duration and this is expected, since states with better unemployment policies will have higher values of unemployment insurance and this subsidy will be given to unemployment workers for a longer period. Having such better values of government subsidies to support unemployment workers, companies see themselves having to compete with these amounts of subsidies to retain workers and to get new employees, because if the unemployment subsidies' amount is higher than the wage that companies could offer to its employees, then workers would have more incentive to stay unemployed since they would get almost the same benefits without having to be actively employed in a company. And so, to avoid this constrain, companies would probably have to offer better wages to attract new employees and to retain the current ones. This extra effort would cause companies to have less available capital to invest in workforce, regarding salaries and training as well, as so they would probably hire less employees or even dismiss some of the current ones to increase available capital, decreasing the companies' number of employees.

Concluding about the other independent variables that affect our regression model, it is expected that their coefficients vary accordingly to support our main hypothesis.

Expected coefficient for unemployment rate

A negative coefficient for unemployment rate is expected, as it was assumed that companies hire less employees when the unemployment rate of the correspondent U.S. state is higher.

Expected coefficient for staff expenses

A positive coefficient is expected for the staff expense variable, since a company who was more employees is expected to spend more on their staff, such as wages and other benefits such as training and insurances. This relation between staff expenses and number of companies' employees is positive, although might not imply causality.

Expected coefficient for ROA and ROE

Contrarily, a positive coefficient is expected for both ROA and ROE assuming that when companies have more return on their assets and their stakeholders' equity, they have more resources to hire more employees.

Expected coefficient for debt ratio

The variable debt ratio can assume both positive and negative coefficients. A negative coefficient can be expected assuming that levered companies must pay its debts and so they have less available capital to invest in workforce as easily as unlevered companies. On the other hand, companies could contract debt to have more available capital to perform its investments and bigger companies could use their debt to grow and invest in human resources, for example. So, it is expected that debt can have both (positive and negative) impacts on companies' hires.

Expected coefficient for average expense per employee

A negative coefficient is expected for average expense per employee since companies with more expense per employee (regarding salaries and other expenses) probably have more costs in hiring new employees, so they prefer to not hire as often as other companies.

Expected coefficient for acquisitions

For acquisitions one can expect a positive coefficient, assuming that if companies acquire other firms, then they would also acquire other firms' employees and so they would increase their total workforce. However, there's another possible interpretation and it could also be expected a negative coefficient for acquisitions since when companies acquire other firms, they could also dismiss some actual employees due to lack of workforce needs.

Expected coefficient for IPO

It is expected a negative coefficient for IPO assuming that companies with a more recent IPO date probably hire less employees than older IPO companies, due to lack of stability in the market and so less willing to spend more on workforce. However, a company with a more recent IPO date could need more workforce in the beginning to support operations and expansion, thus they would probably hire more employees than older IPO firms that already have their workforce well established and probably only need to hire to replace an ex-employee and fill a work position.

To conclude, these expectations are not definite as others could have a different interpretation and so it is crucial to study the behaviour of these variables in the same environment and relating to each other, to infer more specifically about the impact of these variables in changes in number of companies' employees over time.

4.4. Summary and Descriptive Statistics

To have a better understanding on the distribution of the values of each variable, a descriptive analysis was conducted.

Summary statistics table

Variable	N	Mean	Standard Deviation	Minimum Value	Maximum Value
Unemployment Rate	6197	6.08	2.25	2.10	16.20
Total Amount of UI	6197	11631.03	4500.08	3300	57216
Staff Expense	6197	1058.61	3941.45	0	46707
ROA	6197	-0.0032	0.52	-30.88	1.22
ROE	5732	0.08918	3.17	-6994363	209.23
Debt Ratio	6191	0.810	0.5076	0.0018	21.05
Average Expense per Employee	6197	105.50	266.66	0	18254
Acquisitions	6197	0.1247	0.5679	-1	1
Δ in Maximum Amount	6197	0.3833	0.5304	-1	1
Δ in Maximum Duration	6197	-0.0190	0.2508	-1	1
IPO	6197	1995.29	13.78	1925	2022

Figure 1 - *Summary statistics table*

As noticed on the summary statistics table above, most variables have the same N, number of observations, except for the ROE. Regarding total amount, change in maximum amount and change in maximum duration, the average of these results is reasonable since it is expected that

amounts of unemployment subsidies are expected to increase more than to decrease (average for change in maximum amount is 0.38 being positive). However, for change in maximum duration, there is an average value of – 0.019 meaning that subsidies duration is expected to decrease more than to increase, result that was probably not expected generally. For total amount of subsidies, in absolute value, it is shown that there's a lot of variability in the observations since the minimum value is 3300 and maximum value is 57216 meaning that discrepancies among U.S. states and for all considered years are massive and an interesting and unexpected observation.

Regarding the other independent variables of the model, looking at unemployment rate, the average of this value in the model is also expected, since 6% is a reasonable value for this ratio, with a standard deviation of 2.25 which is also expected. The variable staff expenses has a considerable average value, but then the standard deviation is high, meaning that there are a lot of discrepancies among companies in the study, this being considered reasonable due to differences in companies' growth, net income and level (small, medium or big firm). The average for ROA is -0.0032 and for ROE is 0.089, being these and standard deviation values appropriate for the current study. Debt ratio has an average value of 0.81, varying for 0 to 21 as minimum and maximum values, respectively. The average expense per employee variable has an average value of 105.5, having high discrepancies in minimum value that is 0 and maximum value that is 18254. This high disparity in the latter is expected and could be explained by differences in employees' job positions and status within companies. The average value for acquisitions is 0.12, meaning that companies have more acquisitions rather than dissolutions, a positive value although close to zero and so is not so significant for our analysis. Concluding, IPO average value is 1995, being our range of years between 1925 and 2022.

Correlations between variables

	Unemployment Rate	Total Amount of UI	Staff Expense	ROA	ROE	Debt Ratio	Average Expense per Employee	Acquisitions	Δ in Maximum Amount	Δ in Maximum Duration	IPO
Unemployment Rate	1.0000										
Total Amount of UI	-0.0612	1.0000									
Staff Expenses	-0.0073	-0.0646	1.0000								
ROA	-0.0314	-0.0064	0.0194	1.0000							
ROE	-0.0104	-0.0167	-0.0068	-0.0109	1.0000						
Debt Ratio	0.0462	0.0404	0.0134	-0.8206	0.0130	1.0000					
Average Expense per Employee	-0.0026	0.0025	0.0219	-0.0364	-0.0032	-0.0164	1.0000				
Acquisitions	-0.0541	-0.0389	0.1492	0.0205	-0.0012	-0.0882	0.0360	1.0000			
Δ in Maximum Amount	-0.1468	0.4455	-0.0241	0.0262	-0.0233	-0.0175	0.0127	0.0026	1.0000		
Δ in Maximum Duration	-0.0115	0.1064	-0.0073	0.0028	0.0067	0.0016	0.0132	-0.0008	0.0412	1.0000	
IPO	-0.022	0.0578	-0.2157	-0.0942	0.0126	0.0873	0.0456	-0.0807	-0.0377	0.0193	1.0000

Figure 2 - *Correlations between variables*

As noticed on the correlations table above, the variables are not strongly correlated, since they do not reach a value above 0.5 or 0.7 in most cases. There are some exceptions, and some variables could be more correlated than others. However, having low correlated variables explaining our model is a result that it is good to achieve, avoiding multicollinearity issues between variables. The unemployment rate and change in subsidies maximum amount might be slightly more correlated with each other, but not significantly. Total subsidies amount is more correlated with change in subsidies maximum amount and change in subsidies max duration, as expected. The staff expenses variable is more correlated with acquisitions variable and IPO date of companies, although not so significant as well. However, the ROA and the debt ratio are strongly correlated, and this correlation is significative, with -0.82, with this being slightly expected as both are calculated with the use of the same variable, the total assets. The variables ROE, average expense per employee, acquisitions, change in maximum subsidies amount and change in maximum subsidies duration are not significantly correlated with any other specific variable of our regression model.

4.5. Regression with Different Dependent Variables

As to assess which dependent variable would explain more the variability of the number of companies' employees, different regression models were performed, to observe which scenario would lead to a more accurate result. The variables considered for this research were absolute changes in number of employees, changes in number of employees as percentage and absolute number of employees.

4.5.1. Absolute Changes in Number of Employees as Dependent Variable

Some analyses were calculated based on the regression and results achieved as stated below.

For this regression, using the absolute changes in the number of employees as dependent variable and a level of significance of $\alpha = 0.1$, the variables that are significant to the model

are the total amount, the staff expenses, the average expense per employee, the acquisitions and the IPO.

Absolute Change in Number of Employees		
	P-value	Coefficient
Unemployment Rate	(0.949)	58.94
Total Amount of UI	(0.072)	1.09
Staff Expenses	(0.000)	8.80
Return on Assets	(0.646)	1084.04
Return on Equity	(0.597)	110.36
Debt Ratio	(0.461)	1805.95
Average Expense per Employee	(0.041)	-5.03
Acquisitions	(0.002)	3886.20
Δ in Maximum Amount	(0.593)	964.08
Δ in Maximum Duration	(0.484)	-1946.34
IPO	(0.000)	-209.93
Constant	(0.000)	393824.10
Observations	5132	
R-squared	0.452	
Adjusted R-squared	0.444	

Figure 3- *Regression with change in number of employees as dependent variable*

Using a level of significance of $\alpha = 0.1$, the p-value of the total amount variable of 0.072 is lower to the chosen level of significance. As so, the null hypotheses is rejected and it can be concluded that the variable is significant to the model, and that $\beta_{total\ amount} \neq 0$. For each unit in the total amount variable, 1.09 units are expected to increase in the employees hirings, with all else being equal.

Observing the staff expenses variable with a p-value of zero and below any common level of significance, and consequently a $\beta_{\substack{staff \\ expenses}} \neq 0$, it can be concluded that this variable is

significant to the model. For this variable, an increase of a unit is expected to positively impact the employee hirings in 8.8 units, with all else being equal.

As for the average expense per employee, with a p-value of 0.041 lower than 0.1, it is affirmable that the variable is significant to the model and that $\beta_{\substack{average\ expense \\ per\ employee}} \neq 0$. This variable is expected to negatively impact the absolute change in employees, meaning increasing the permanent layoffs. An increase of a unit of the average expense per employee is expected to decrease the dependent variable in 5.03 units, *ceteris paribus*.

The last variable considered significant to our model, with a p-value of 0.002 below any common level of significance, is the acquisitions for each company in each year. With this, one can conclude that $\beta_{acquisitions} \neq 0$, and having acquisitions will consequently induce an increase of 3886.2 in the employee hirings, with all else being equal. Homogeneously, when a dissolution is observed, it is expected for the change in employees to decrease in the same amount.

As for the IPO, a zero p-value below any common level of significance is also observed, indicating that $\beta_{IPO} \neq 0$ and that the variable is significant to the model. A difference of a year in the date that a company went public, or for each more recent firms' IPO date, it is expected a decrease in the dependent variable in 209.93 units, with all else being equal.

4.5.2. Changes in Number of Employees in % as the Dependent Variable

Using the original regression, but having the dependent variable being the change in employees from year $t-1$ to year t as a percentage. It is observed that for this dependent variable, the same independent variables only explain 32.7% of the variability.

Using a level of significance of $\alpha = 0.1$, the variables that most seem to contribute in the explaining of the changes in number of employees as a percentage are the unemployment rate, the total amount and the staff expenses.

Change in Number of Employees as %

	P-value	Coefficient
Unemployment Rate	(0.054)	-940.8
Total Amount of UI	(0.001)	1.105
Staff Expenses	(0.000)	3.865
Return on Assets	(0.939)	-96.21
Return on Equity	(0.270)	123.1
Debt Ratio	(0.956)	-71.7
Average Expense per Employee	(0.111)	-2.092
Acquisitions	(0.383)	-585.9
Δ in Maximum Amount	(0.314)	-969.9
Δ in Maximum Duration	(0.224)	-1803.2
IPO	(0.823)	-6.54
Constant	(0.898)	7476
Observations	5132	
R-squared	0.327	
Adjusted R-squared	0.317	

***Figure 4** – Regression with % change of employees as dependent variable*

Regarding the variables that seem to contribute most to this model, the unemployment rate with a p-value of 0.054 below 0.1 has a negative impact on the percentage of employee change, with a $\beta_{\substack{unemployment \\ rate}} \neq 0$. With this being said, one can affirm that the unemployment rate is significant to the model and an increase of a unit in this value, is expected to have a decrease of 940.8 percentage points in the dependent variable, with all else being equal.

As for the total amount, with a p-value close to zero, it can be concluded that a $\beta_{\substack{total \\ amount}} \neq 0$. This variable is significant to the model and affects the employee amount positively, the

coefficient indicates that an increase of a unit will provoke an increase of 1.105 percentage points in the dependent variable, with all else being equal.

The staff expenses p-value is zero - lower than any common level of significance - as so it can be concluded that this variable is significant to the model and that $\beta_{\substack{staff \\ expenses}} \neq 0$. The positive coefficient for this variable indicates that for each unit it increases, the percentage of employees relative to the prior year will increase by 3.865 percentage points, with all else being equal.

4.5.3. Absolute Number of Employees as the Dependent Variable

Having the dependent variable as being the absolute number of companies' employees for a certain year t and performing a linear regression to study how changes in other factors influence this indicator, one can observe that the independent variables used in the regression model explain 78,3% of the variability of the dependent variable.

Regarding the variables that seem to contribute more to the explanation of the dependent variable, the variables staff expense, average expense per employee, acquisitions and IPO are the ones that better explain the absolute number of companies' employees for a certain year.

Absolute Number of Employees		
	P-value	Coefficient
Unemployment Rate	(0.744)	132.148
Total Amount of UI	(0.478)	0.187
Staff Expenses	(0.000)	10.035
Return on Assets	(0.917)	-110.055
Return on Equity	(0.254)	108.269
Debt Ratio	(0.635)	-517.147
Average Expense per Employee	(0.000)	-5.719
Acquisitions	(0.000)	2823.509
Δ in Maximum Amount	(0.836)	-164.888
Δ in Maximum Duration	(0.747)	-402.963
IPO	(0.000)	-144.905
Constant	(0.000)	289046.6
Observations	5726	
R-squared	0.783	
Adjusted R-squared	0.780	

Figure 5 – *Regression with absolute number of employees as dependent variable*

The variable staff expense has a null p-value, lower than any common level of significance and so being significant to the regression model. This variable has a positive impact on the absolute number of companies' employees. For each unit increased in staff expense, the dependent variable is expected to increase in 10.035 units, *ceteris paribus*.

The variable average expense per employee has a null p-value, lower than any common level of significance and so being significant to the regression model. This variable has a $\beta_{\substack{average\ expense \\ per\ employee}} = -5.719$, negatively affecting the dependent variable, absolute number of companies' employees. For each unit increased in the expense per employee, the absolute number of companies' employees decreases in 5.719 units, *ceteris paribus*.

The variable acquisitions has a null p-value, lower than any common level of significance and so being significant to the regression model. This variable has a $\beta_{acquisitions} \approx 2823.51$, affecting positively the dependent variable, absolute number of companies' employees. When companies acquire other companies in a certain year, the absolute number of companies' employees is expected to increase in 2823.51 units, *ceteris paribus*.

The variable IPO has a null p-value, lower than any common level of significance and so significant to the regression model. This variable has a $\beta_{IPO} \approx -144.9$, negatively affecting the dependent variable, absolute number of companies' employees. For each more recent year in IPO date, the absolute number of companies' employees is expected to decrease in 144.9 units, *ceteris paribus*.

For all the three different regressions using the three different dependent variables, the remaining variables, even though the p-value gotten through the Wald test indicates them not being significant to the model, they are not to be excluded from it as they are factors that are empirically proven to impact the employee hiring and as so are relevant to this study.

A reasonable relevance should be given to the constant as it has a considerably big value, as so this should always be considered when analysing each variable's impact in the company hirings and layoffs.

4.5.4. Conclusions

Comparing the three regressions performed above with three different dependent variables, one can conclude that to study and observe the implications of the explanatory variables in the number of companies' employees, the dependent variable absolute number of companies' employees is preferred instead of studying the changes (whether in absolute number or percentage). As so, the regression model with absolute number of companies' employees with

a R-squared higher than any of the other regressions, with a R-squared of 0.783, displays some interesting conclusions.

First, for the variable staff expense, for each unit increase, there is an increase of 10.035 new employee hirings within a certain company, meaning this that if a company spends more on all employees (because probably have more employees so more total spends on training and insurance as well) it has the tendency to hire more employees. This result is expected since companies who spend more on their employees usually spend more capital on new hirings, because they have more available capital to spend on human resources. However, this relation might not have causality because more staff expense might not lead to more hirings, although these variables are positively correlated.

For the variable average expense per employee, for each unit increased, there is a decrease of 5.719 units in companies' employees, as permanent layoffs. This result is expected since when companies spend more their employees (as more training or other benefits such as insurances), they have less available capital to spend on new employee hirings, also might having employee dismissals. On the other hand, when companies spend less capital on each employee, they are more willing to hire new employees because since they do not spend more on each current employee, they have more available capital to hire new ones.

Regarding acquisitions of a certain company, when companies acquire other firms in a certain year, the absolute number of companies' employees increase in 2823.509 units, as new hirings. This result is expected since when companies acquire others, there might be a merging of both companies' employees and so the total number of employees of the acquirer firm might increase and usually this might happen, although some dismissals might also happen for each firm individually.

For the IPO date variable, for each more recent year of firms' IPO, there is a decrease of 144.905 units, as employee dismissals or permanent layoffs. This result might be expected, on one hand, because recent IPO firms usually have less available capital to spend on human resources and so hire less employees, or older IPO firms hire more employees because they're more established in the market and have the capital and resources to do so. On the other hand, one could also expect an inverse result because recent IPO firms could have the need for human resources to develop their new activities in the beginning years and would probably hire more employees. In this study, this does not seem the case, since older IPO firms have the tendency to hire more employees than more recent IPO ones.

4.6. Removing Some Independent Variables

From the three regressions studied above, the one that displays more accurate results is the one that uses the absolute employee amount as a dependent variable. For that, for further studies that will be the regression used.

4.6.1. Regression Without Total Amount of Unemployment Subsidies

In order to isolate the effects of changes in maximum amount and maximum duration in the variability of the absolute number of companies' employees, the first regression was performed again, but without the total amount of unemployment insurance variable.

$$\hat{Y}_{sty} = \beta_0 + \beta_{\substack{change\ maximum \\ amount}} \times \text{change maximum amount}_{sy}$$

$$+ \beta_{\substack{change\ maximum \\ duration}} \times \text{change maximum duration}_{sy} + \sum \beta_i X_i + \varepsilon$$

When analysing this regression, the independent variables that seem to have an impact in the model are staff expenses, average expense per employee, acquisitions and the IPO variable, being these statistically significant in the regression model above.

Absolute Number of Employees		
	P-value	Coefficient
Unemployment Rate	(0.619)	195.706
Staff Expenses	(0.000)	10.035
Return on Assets	(0.919)	-107.976
Return on Equity	(0.255)	108.089
Debt Ratio	(0.641)	-508.019
Average Expense per Employee	(0.000)	-5.715
Acquisitions	(0.000)	2814.863
Δ in Maximum Amount	(0.984)	-15.698
Δ in Maximum Duration	(0.859)	-216.901
IPO	(0.000)	-144.998
Constant	(0.000)	298965.8
Observations	5726	
R-squared	0.783	
Adjusted R-squared	0.779	

Figure 6 *– Regression with absolute number of employees as dependent variable but without total amount of UI.*

Regarding staff expenses, this variable has a null p-value lower than any common level of significance. As so, it can be concluded that $\beta_{\substack{staff \\ expenses}} \neq 0$ meaning that an increase of a unit in this variable is expected to positively impact the absolute number of employees in 10.035 hirings, *ceteris paribus.*

The variable average expense per employee has a null p-value lower than any common level of significance, with a $\beta_{\substack{average\ expense \\ per\ employee}} \neq 0$ meaning that an increase of a unit in this variable is expected to decrease the absolute number of companies' employees in 5.715 units, as permanent layoffs, *ceteris paribus*.

The variable acquisitions has a null p-value lower than any common level of significance, with a $\beta_{acquisitions} \neq 0$ meaning than an increase of a unit in this variable is expected to increase the absolute number of companies' employees in 2814.863 units, as new hirings, *ceteris paribus*. This indicates that if a company acquires another, the company acquiring is expected to have an increase in the absolute number of employees of 2814.86, whilst the acquired company is expected to suffer a decrease in the same value, with all else being equal.

The variable IPO has a null p-value lower than any common level of significance, with a $\beta_{IPO} \neq 0$, meaning that an increase of a unit in this variable is expected to decrease the absolute number of companies' employees in 144.998 units, as permanent layoffs, *ceteris paribus*. This indicates that the more recent the company's IPO date, the less employees it will have and hire.

4.6.2. Regression Without Changes in Maximum Amount and Maximum Duration of UI

To study the effects of independent variables in the variability of the absolute number of companies' employees, a new regression was performed removing the variables changes in maximum UI amount and changes in maximum UI duration, isolating the effect of the total amount of UI.

$$\hat{Y}_{sty} = \beta_0 + \beta_{\substack{total \\ amount}} \times \text{total amount}_{sy} + \sum \beta_i X_i + \varepsilon$$

The regression model produced an R-squared of 0.783 meaning that the independent variables explain 78.3% of the variability of the dependent variable.

Regarding the variables that seem to contribute more to the explanation of the dependent variable, the variables staff expenses, average expense per employee, acquisitions and IPO better explain the absolute number of companies' employees for a certain year. Unemployment rate, total amount of UI, ROA, ROE and debt ratio do not seem to be significant to the model

and to influence the variability of the dependent variable, because these variables have a p-value greater than any common level of significance given.

Absolute Number of Employees		
	P-value	Coefficient
Unemployment Rate	(0.696)	155.843
Total Amount of UI	(0.531)	0.156
Staff Expenses	(0.000)	10.035
Return on Assets	(0.915)	-112.837
Return on Equity	(0.254)	108.292
Debt Ratio	(0.634)	-519.036
Average Expense per Employee	(0.000)	-5.718
Acquisitions	(0.000)	2822.242
IPO	(0.000)	-144.905
Constant	(0.000)	289209.8
Observations	5726	
R-squared	0.783	
Adjusted R-squared	0.779	

***Figure 7** – Regression with absolute number of employees as dependent variable but without the change in maximum amount of UI and change of maximum duration of UI.*

The variable staff expenses has a p-value equal to zero, being lower than any common level of significance. As so, the variable is statistically significant to explain the regression model and the dependent variable, with a $\beta_{staff\ expense} = 10.035$ indicating that an increase of a unit in the companies' staff expenses, is expected to lead to an increase of 10.035 units in the absolute number of companies' employees, *ceteris paribus*.

The variable average expense per employee has a p-value of zero lower than any common level of significance meaning that the variable is statistically significant to explain the regression model and the dependent variable, with a $\beta_{\substack{average\ expense \\ per\ employee}} = -5.72$ meaning that an increase

of a unit in the companies' expense per employee, in average, is expected to lead to a decrease of 5.72 employees, *ceteris paribus*.

The variable acquisitions has a p-value of zero and lower than any common level of significance, consequently this variable is statistically significant and helps explaining the regression model and the dependent variable. With a $\beta_{acquisitions} = 2822.24$, indicating that companies who acquire other firms in a certain year have an increase of almost three thousand employees, *ceteris paribus*.

In addition, the variable IPO has also a null p-value lower than any common level of significance meaning that the variable is statistically significant to explain the absolute number of companies' employees. This variable has a coefficient of $\beta_{IPO} = -144.91$ meaning that for each more recent companies' IPO date, there is an expected decrease of 144.91 employees in the companies, *ceteris paribus*.

4.6.3. Conclusions

Comparing the regressions without the variable total amount of UI and without changes in maximum amount and maximum duration, respectively, one can conclude that regarding the robustness of the model, R-squared for both regressions are almost the same and higher than 0.50 and so both regression models explain well the variability of the dependent variable, absolute number of companies' employees.

Concerning staff expense, for the regression without total amount of UI, an increase of a unit in staff expense is expected to increase the number of employees as 10.035 new hirings. When taking out the variables for changes in maximum amount and maximum duration, the model result is an increase of a unit in staff expense leads to the same conclusion. For this specific variable, when using the absolute amount of UI or the changes in amount and duration of UI

does not lead to a different conclusion. This result is expected since when companies have more staff expenses usually it means that they have more employees and so they might hire more employees, although this positive relation might imply causality.

Regarding the variable average expense per employee, for the regression without total amount of UI, an increase of a unit in average expense per employee leads to a decrease of 5.715 employees, as permanent layoffs. For the regression without changes in maximum amount and duration of UI, the same result is observed. For this specific variable, when using the absolute amount of UI or the changes in amount and duration of UI does not lead to a different conclusion. This result is expected since when companies spend more on each employee, being on benefits or insurances, there is less available capital to spend on new employees and the company hire less new workers. Contrarily, when companies spend less capital on each employee, often tend to hire more workers because might have more available capital to spend on human resources.

As for the variable acquisitions, for the regression without total amount of UI, an increase of a unit in acquisitions leads to an increase of 2814.863 units, i.e. hirings. For the regression without changes in maximum amount and duration of UI, the result is almost similar, with an increase of 2822.242 units, i.e. new employees. This result is expected since when companies acquire others, usually there is a merge of both companies' employees, and for a specific acquirer firm the number of employees usually increase within the company, although there are some total employee dismissals as well, when comparing the total number of employees for both companies individually, before the acquisition took place.

Regarding the variable IPO, for the regression without total amount of UI, an increase of a unit in the IPO date of a specific firm, leads to a decrease in 144.998 absolute number of companies'

employees, as dismissals or permanent layoffs. For the regression without changes in maximum amount and duration of UI, the result is equal. For this specific variable, when using the absolute amount of UI or the changes in amount and duration of UI does not lead to a different conclusion. This result is expected since it is understandable that firms with a more recent IPO date might have less available capital to spend on human resources therefore hire less employees, or firms with older IPO date hire more employees because they're more established in the market and have the capital and resources to do so. Concluding, firms with older IPO dates have the tendency to hire more employees than the ones with a more recent IPO date, going against the conclusions of recent literature papers.

4.7. Analysing Two Different Crisis

The more noticeable changes on the UI, duration and amount, occur when facing an economic crisis. As so, it is crucial to limit the sample as to analyse the two periods corresponding to the Great Recession, and to the Covid Pandemic.

4.7.1. Great Recession of 2008

The Great Recession of 2008 was a period of global economic instability and financial crisis that dictated the macroeconomic and political rules of financial systems for the following years. In this period (2008-2012), the recession was deep, job losses were truly significant in many U.S. states, and therefore the U.S. government implemented programs providing more weeks of unemployment benefits to help jobless workers and their families. The U.S. government also boosted weekly benefits amounts for jobless workers with dependent children and the majority of U.S. states expanded and improved the access to unemployment insurance benefits. The UI benefits were crucial for workers and their families during this recession, allowing them to live with dignified conditions despite the massive unemployment rate. These programs and initiatives made U.I. the most effective policy response to the Great Recession.

Taking this extraordinary period of 2008-2012 into consideration and since it was an extraordinary example of how changes in economy could dictate the amounts and durations of unemployment insurance benefits, it is crucial to study the impact of these changes in UI benefits and unemployment rate in companies' hires and permanent layoffs, as well as other financial indicators. Isolating only the observations from 2008 to 2012 and performing again a regression analysis under this sample, some conclusions were taken in the following paragraph.

Observing the R-squared of the regression model in figure 8, one can conclude that for this particular time frame, the model explains 76.9% of the variability of the dependent variable, similar to the observed value on the main regression using the full sample.

The variables that better explain the variability of the dependent variable on this regression model are staff expenses, the average expense per employee and the IPO with a p-value lower than any common level of significance, and the acquisitions when considering a level of significance of 0.10.

Absolute Number of employees		
	P-value	Coefficient
Unemployment Rate	(0.553)	-645.331
Total Amount of UI	(0.994)	0.0146
Staff Expenses	(0.000)	10.581
Return on Assets	(0.449)	-1112.836
Return on Equity	(0.531)	333.234
Debt Ratio	(0.441)	-1220.7
Average Expense per Employee	(0.000)	-20.934
Acquisitions	(0.053)	2145.444
Δ in Maximum Amount	(0.829)	-335.761
Δ in Maximum Duration	(0.786)	-1317.465
IPO	(0.000)	-199.885
Constant	(0.000)	409098.9
Observations	1669	
R-squared	0.769	
Adjusted R-squared	0.761	

Figure 8 *– Regression with absolute number of employees as dependent variable but only with the period of the Great Recession (2008-2012)*

As for the staff expenses variable, with a p-value of zero and lower than any common level of significance meaning that the variable is fully significant to the model. An increase of a unit of staff expenses is expected to have a positive impact of 10.58 units in the dependent variable, *ceteris paribus*.

Observing the average expense per employee, one can affirm that this variable is significant to the model as it has a p-value close to zero, rejecting the hypothesis $\beta_{\substack{average\ expense \\ per\ employee}} = 0$. The increase of a unit in this variable is expected to have a negative impact of 20.93 in the absolute number of employees, with all else being equal.

Using a level of significance of 0.1, the variable acquisitions will be considered significant to the model, with a p-value of 0.053. Companies that acquire other companies in a certain year

are expected to increase their employees in 2145.44 units in that same year, *ceteris paribus*. Whilst in the occurrence of a dissolution, it is for their employee amount to decrease in the same quantity.

Regarding the variable IPO, with a p-value close to zero and lower than any common level of significance, this variable is significant to explain some variability of the dependent variable in this model. For each more recent IPO date, one is expected to observe a decrease of the absolute number of employees in 199.885 units, *ceteris paribus*.

4.7.2. Covid-19 Pandemic

In 2019 coronavirus struck and the world stopped. Many companies shut down their business and consequently many employees were laid off. Facing a higher unemployment rate, the governments tend to implement new measures or better the existent ones, the Covid-19 pandemic was no exception. Facing this pandemic and uncertainty, the US increased the amounts and made them available for slightly longer periods of time.

Observing this particular sample, for this particular time frame, the employee hirings and layoffs behave in an expected way as in the regression first analysed. The model explains 83.7 % of the variability of the dependent variable, similar to the observed value on the main regression using the full sample.

The variables that seem to most be significant for this particular time frame are the staff expenses, the ROE and the acquisitions, all having a p-value below the level of significance of $\alpha = 0.1$. The remaining variables do not seem to be particularly relevant when analysing the Covid-19 period.

Absolute Number of Employees		
	P-value	Coefficient
Unemployment Rate	(0.968)	-35.073
Total Amount of UI	(0.854)	-0.0169
Staff Expenses	(0.000)	9.498
Return on Assets	(0.344)	4853.174
Return on Equity	(0.080)	438.704
Debt Ratio	(0.941)	239.457
Average Expense per Employee	(0.133)	-1.729
Acquisitions	(0.008)	2927.071
Δ in Maximum Amount	(0.624)	1016.538
Δ in Maximum Duration	(0.963)	-96.937
IPO	(0.423)	-35.047
Constant	(0.412)	72672.33
Observations	1292	
R-squared	0.837	
Adjusted R-squared	0.829	

Figure 9 *– Regression with absolute number of employees as dependent variable but only with the period of the Covid-19 pandemic (2020-2021)*

The staff expenses have a p-value of zero and lower than any common level of a significance, which indicates a $\beta_{\substack{staff \\ expenses}} \neq 0$ and that the variable is significant to the model. An increase of a unit is expected to lead to an increase of 9.50 units in the absolute number of employees a firm has, with all else being equal.

With a p-value of 0.080 associated to the ROE variable, the hypothesis of the variable not being significative to the model is rejected. It is expected for this variable to impact positively the dependent variable, with an increase of a unit leading to an increase of 438.70 in the dependent variable, with all else being equal.

The acquisitions variable p-value of 0.008 is lower than most levels of significance, being this variable considered significant to the construction of the model. The occurrence of acquisitions

in a company in certain year, is expected to lead to an increase of 2927.071 in the amount of employees, with all else being equal.

4.7.3. Conclusions

Regarding changes in regression models for specific periods of time, such as the Great Recession and Covid-19 Pandemic, some differences are perceived. First, the model seems to explain better the variability of the dependent variable for the Covid-19 pandemic period, since R-squared for this regression model is higher, and 83.7% of the variability of the absolute number of companies' employees is explained by this regression model, contrarily to the R-squared of 76.9% observed in the regression model for Great Recession.

Regarding the variable staff expenses, for the Great Recession model, an increase of a unit in staff expenses leads to an increase of almost 11 employees, as new hirings. One can observe that this result is also equal for the Covid-19 pandemic period, with an increase of almost 10 employees, as new hirings, for an increase of one unit in staff expenses variable. This result is expected since when companies have more expenses on their staff probably hire more employees, although this relation is positive but might not have causality.

Considering the variable average expense per employee, for the Great Recession model, an increase in one unit in average expense per employee leads to a decrease of approximately 21 employees, as new dismissals or permanent layoffs. It is expected a negative relation between this variable and the dependent variable since companies who spend more on each employee probably have less available capital to spend on new employee hirings. On the other hand, companies who spend less on each employee, on average, usually have more available capital to hire more new workers.

The variable ROE was significant to explain the variability of the dependent variable in Covid-19 pandemic period, although not significant in the Great Recession period, in our regression models. For the Covid-19 pandemic period, an increase of one unit in ROE, leads to an increase of approximately 439 employees, as new hirings. An increase in the ROE can be a consequence of an increase in the net income. This result is expected because if profits rise, it can be expected that having more available resources would lead to an increase in the invested capital in human resources, leading to employee hirings.

The variable IPO was significant to explain the variability of the dependent variable in Great Recession period, although not significant in the Covid-19 Pandemic period. In the Great Recession model, an increase of one unit in companies' IPO date is expected to decrease the dependent variable in approximately 200 employees. This result is expected since companies with more recent IPO dates would probably have less available capital to spend on new hirings and so hire less employees. On the other hand, companies with an older IPO date usually have more available capital to spend on human resources because are more established in the market, and so would probably hire more new workers.

For the variable acquisitions, in both Great Recession and Covid-19 pandemic, the regression models are significative. In Great Recession model, companies who acquire others in a certain year lead to an increase of approximately 2145 employees in the same year and within the same company. In the Covid-19 pandemic model, the occurrence of acquisitions in a company in a certain year lead to an increase of approximately 2927 employees within the same company, as new companies' hirings. For both regressions, results are almost similar, and this is expected since when companies acquire others, usually they merge their employees, having the acquirer company more employees than before the acquisition, although usually also having employee' dismissals due to the merge. However, in the acquirer company's point of view, the absolute

number of employees is expected to increase, due to the acquisition of some of the acquired company's employees.

5. How the Average Expense per Employee Impacts Companies' Hires?

For this chapter, the goal is to study the differences in the absolute number of employees between companies with high levels of expense per employee and ones that present lower expenses. Since the main goal of this paper is to observe and analyse the effects of unemployment insurance on firms' absolute number of employees, it is considered significant to look at how variables change for companies that invest more in their workers compared to those that do not. In doing so, one would bring value to the existing literature.

Questions such as whether firms that have higher expenses in their employees hire more, or invest in retaining and training workers should be considered. In the following paragraphs, an analysis of two different models will be done in hope to answer the above questions.

Theoretical Framework

In today's economy, it is greatly important that firms focus on not only finding the best employees, but also retain the ones that produce value to the company. At the same time, companies should also focus on how to compete with others. This is specially a challenge to small companies, since big companies are looking for talent and might steal the talented employees from them. C. Charaba (2022) observes how the key for small firms to compete with bigger ones, is the existence of benefits besides a high paycheck, that can increase the employee retention, which consequently decreases the employment turnover rate for said company.

To reinforce the importance of maintaining the employment retention rate high, the author recalls that losing employees represents high financial costs. In further support of this, Abbasi,

S. M., & Hollman, K. W. (2000), explain how increases in employment turnover often leads to major consequences for organizations. The authors observe that, when the smartest and most talented employees, i.e., the most mobile, leave a company, a brain drain might occur, negatively affecting innovation and causing major delays in the delivery of services and the introduction of new programs. A paper (Kim, J. Daniel, 2018) aims to study the effects of acquisitions on the absolute number of employees and hiring strategies. The author finds that despite the apparent benefits of hiring a whole team rather than individuals separately, it happens that some of these employees end up leaving the company, thus, the acquirer company suffers a decrease in the absolute number of employees instead of an increase.

Also, Cloutier, O., Felusiak, L., Hill, C., & Pemberton-Jones, E. J. (2015) mention that a high employment turnover increases costs like recruiting, training, overlapping of salaries and time for firms, estimating that hiring a new employee costs 200% more than maintaining current workers. It is also important to look at the effects that investing in employees has in their performance, and consequently in firm's performance. To conclude on this topic, Ahmad, S., Ahmad, M., & Asghar, R. A. (2014) mention how important it is for firms to invest in training and development to increase company performance, reinforcing that quality output is better produced by a trained worker.

After careful consideration of some of the literature that exists on this subject, it can be concluded that it is essential for a company to spend some of its money on staff expenses, the expected signal of the coefficients of the study that will be mentioned below, can now be inferred.

Expected Signal of Coefficients

For the matter of studying how differences in average expense per employee can affect the level of companies' hires, the sample will be split in two parts. Firstly, a regression will run only on the companies that are below the 25% percentile of our sample – Q1=58.94617, looking only at firms with 25% lowest average expense per employee. Then, a second regression will run on the companies that are above the 75% percentile of the same sample mentioned above – Q3=102.5745. The goal of this analysis is to see not only the effects of UI in the number of employees, but also, the main differences in hires between a company that saves on staff expenses and a company that has higher employee expenses.

Variable	N	Mean	SD	Q1	Q3
Average expense per employee	6197	105.4994	266.6574	58.94617	102.5745

Figure 16 - *Descriptive statistics for average expense per employee variable.*

In the following paragraphs, an expectation for the signal of the coefficients in this model will be done. Firstly, a company that has less expenses per employee is expected to hire more i.e., positive change number of employees, whereas a company that has higher expenses per employee is expected to have a lower growth in their employees' absolute number. Conversely, a company that has lower employee expenses would not look to maintain their employees, instead looking for the cheapest labour. Hence, when analysing the sample below Q1, one expects that the average expense per employee will have a positive impact on the absolute number of employees i.e., a positive coefficient. Consequently, one can expect that for the sample above Q3, the average expense per employee will have a negative impact on the dependent variable - a negative coefficient in the regression.

For the unemployment rate, one can predict that an increase in this variable will lead to a decrease in the absolute number of employees. For the total amount, one can expect a negative coefficient, because when the unemployed see themselves with more money without working, will be less likely to take a job offer. Though, one should expect that firms with higher expenses per employee do not observe a reduction in employment, as the higher staff investment will, most likely, compensate the amount of UI. The same can be expected for the change in maximum duration and change in maximum amount variables.

Also, for the staff expenses, one can expect a negative sign on the coefficient. If a company is having larger expenses with its employees, them being wages or other kind of expenses, it will be less likely to be hiring for more workers, it prefers to invest on its own staff. Though, this can change for lower average expenses per employee companies. These kinds of firms do not invest much on their workers, an increase in staff expenses might lead to a positive change in the absolute number of employees.

For the ROA and ROE variables, one can expect a positive coefficient because when companies show a higher value for said variables, they have more resources to hire more employees. The debt ratio is expected to display a positive coefficient, as firms might induce in more leverage to have more capital to consequently pay for more staff. The acquisitions variable is expected to have a positive coefficient, because if a firm acquires another is expected to have an increase in the absolute number of employees. If otherwise, a company is sold – bool_aqc= -1, one can expect to see a negative effect in the absolute number of employees, still considering the positive coefficient for this variable. Finally, for the IPO, it is expected a negative coefficient, considering that newer IPO companies are more tech focused and automatized, having a lower necessity to hire more employees.

Empirical Approach and Results

Regression when average expense per employee is in Q1

The regression in figure 17 was done by choosing values found in the first quartile, using average expense per employee to sample the data. Analysing the regression's coefficients, one notes an absolute number of things including a pattern which will be looked at. It is important to note that for the following analysis, a 10% significance level will be considered, and, when analysing the effect of one variable the others remain constant, *ceteris paribus.*

Absolute Number of Employees		
	P-value	Coefficient
Unemployment Rate	(0.672)	408.4
Total Amount of UI	(0.430)	-0.583
Staff Expense	(0.000)	19.46
Return on Assets	(0.000)	28800.4
Return on Equity	(0.698)	-168.7
Debt Ratio	(0.000)	25592.8
Average Expense per Employee	(0.000)	-1135.9
Acquisitions	(0.312)	1425.6
Δ in Maximum Amount	(0.875)	310.5
Δ in Maximum Duration	(0.285)	3646.7
IPO	(0.000)	-693.2
Constant	(0.000)	1421922.3
Observations	1277	
R-squared	0.845	
Adjusted R-squared	0.837	

Figure 17 – *Regression for companies with 25% less expense per employee.*

Firstly, the unemployment rate presents a positive coefficient, which does not make sense theoretically, since when the unemployment rate increases, one should observe a reduction in the absolute number of employees. However, one can observe the variable has a high p-value

(0.672), and thus is not considered statistically significant. A potential cause for the latter can be the fact that the unemployment rate is computed by dividing the absolute number of unemployed people by the total number of people in the labour force. The dependent variable, absolute number of employees, is included in the labour force, indicating that there may be a collinearity issue, meaning then that Reverse Causality bias might be occurring too. Consequently, this can mean that β1 and Y are associated to an extent, though in a way one would not expect. Instead of the unemployment rate causing a change in employees, the inverse is actually taking place: changes in employees cause changes in the unemployment rate.

The total amount variable has a negative coefficient, meaning an increase in the total amount of unemployment insurance will lead to a decrease in the absolute number of employees in companies that have lower average expense per employees. This makes sense, if the total amount of unemployment insurance increases, employees will be less likely to take job opportunities, they can get more money if unemployed. Though, this variable presents a p-value above the significance level, thus being statistically insignificant. Also, total staff expenses variable has a positive coefficient as well as a p-value equal to 0, leading to the conclusion that this variable is statistically significant and that an increase in total staff expenses will lead to a rise of 19.46 units in the absolute number of employees, *ceteris paribus*.

Likewise, the ROA has a positive coefficient, i.e., an increase in this variable will lead to an increase of 28800.4 units in the absolute number of employees, all else being equal. This variable has a p-value below any significance level, so it is considered statistically significant for this model, meaning that a firm, with low expenses per employee, but with a higher profitability from its assets, will have an increase on its absolute number of employees. The variable ROE has a negative coefficient but holds a p-value of 0.698 and so it is deemed irrelevant due to its statistical insignificance.

The debt-ratio variable displays a positive coefficient on the regression above and a null p-value below any significance level. Therefore, one can conclude that an increase in this ratio will lead to a positive change on the absolute number of employees – an increase of 25592.8 units on the dependent variable, *ceteris paribus*. This means that if firms with low average staff expenses increase their leverage, the absolute number of employees will also increase. Also, the average expense per employee has a negative coefficient, meaning that a rise in expenses per employee will lead to a decrease in value of the absolute number of employees by 1135.9 units, *ceteris paribus*. Due to its p-value with a value below any level of significance, this variable is considered statistically significant in this regression.

Furthermore, the acquisitions variable holds a positive coefficient, meaning a company with lower average expense per employee acquiring another will observe an increase in the absolute number of employees- as expected. If otherwise, a company is acquired, the Boolean will take the value –1 and so, the effect of the positive coefficient on the change of absolute number of employees will be negative. Though, since the p-value for acquisitions is above the significance level, one cannot observe the above-mentioned effects.

The change in maximum amount and maximum duration are also Boolean variables. The first one shows a positive coefficient, though with a high p-value (0.875) attached to it, thus meaning that this coefficient is statistically insignificant. At the same time, change in maximum duration also has a p-value above the significance level, and is too, considered irrelevant due to its statistical insignificance, even if it also holds a positive coefficient.

Finally, the IPO has a negative coefficient, meaning that the more recent the IPO year of a company is, the less employees it will hire, which goes according to both expectations and literature. The coefficient for this variable is equal to -693.20, which means that the more recent

the IPO year is, the employee amount of a firm is negatively affected in 693.20 units, all else equal. This variable has a p-value lower than any significance level and is therefore considered statistically significant for this analysis.

Moreover, the model has a R-squared of 0.845, which means that 84.5% of the variations in the change in employee's variable can be explained by the independent variables, whilst the remaining variation on the dependent variable remains unexplained. On top of this, having five statistically significant variables indicates that the model is a good indicator for interpreting the impact of the independent variables on the absolute number of collaborators employed by companies with low expenses per employee. Though, to analyse the effects of unemployment insurance, this model is not a good fit, as this variable is statistically insignificant. Finally, as the constant, $\beta 0$, is statistically significant, it should be taken in consideration when analysing the impact of each variable on the dependent variable.

Regression when average expense per employee is in Q3

The regression in figure 18 was done by choosing values found above the third quartile, using again the average expense per employee to sample the data. It is important to note that for the analysis done below, a 10% significance level will be considered, and, when studying the effect of one variable the others remain constant, *ceteris paribus*.

Absolute Number of Employees		
	P-value	Coefficient
Unemployment Rate	(0.228)	428.2
Total Amount of UI	(0.231)	0.275
Staff Expense	(0.000)	7.565
Return on Assets	(0.735)	-177.3
Return on Equity	(0.566)	24.23
Debt Ratio	(0.773)	-161.00
Average Expense per Employee	(0.000)	-2.399
Acquisitions	(0.000)	-2099.5
Δ in Maximum Amount	(0.168)	992.7
Δ in Maximum Duration	(0.815)	220.1
IPO	(0.000)	-74.28
Constant	(0.000)	142433.6
Observations	1537	
R-squared	0.955	
Adjusted R-squared	0.952	

Figure 18 – *Regression for companies with 25% more expense per employee.*

In this model, similarly to the previous one, the unemployment rate has a positive coefficient. The reasons for why that might be happening are explained above. Likewise, it shows a p-value above the significance level, thus being considered insignificant for the regression.

The total amount variable has a positive coefficient, meaning an increase in the total amount of unemployment insurance would lead to a greater absolute number of employees in companies that have high average expense per employees. Though, due to its high p-value, this variable is not statistically significant for the model. Total staff expenses show a positive coefficient as well as a p-value equal to 0, so one can conclude that this variable is statistically significant and that an increase in total staff expenses will lead to an increase of 7.565 units in the absolute number of employees, all else equal, for companies with higher average expenses per employee.

The ROA and ROE display negative and positive coefficients respectively. This could mean that an increase in the profitability of the company's assets will lead to a negative change in the absolute number of employees, and an increase in the profitability of equity will increase the dependent variable. Despite that, both variables present high p-values, thus being statistically insignificant. The debt-ratio variable has a negative coefficient in this regression, but it shows a p-value above the significance level therefore being deemed irrelevant due to its statistical insignificance. Also, and according to expectations, the average expense per employee has a negative coefficient, meaning that an increase in this variable will motivate a decrease of 2.399 units in the absolute number of employees, *ceteris paribus*. Since this variable has a p-value equal to 0.00, it is considered to be statistically significant. Furthermore, acquisitions hold a negative coefficient and a p-value below any significance level, thus considered statistically significant. This leads one to conclude that a firm that acquires another will suffer a decrease of 2099.5 units in the absolute number of employees, while a firm that is acquired will present an increase of the same value on the dependent variable, *ceteris paribus*.

Moreover, not statistically significant due to its high p-values, are the change in maximum amount and the change in maximum duration, presenting a positive coefficient. To conclude on the analysis of coefficients, the IPO has a negative effect on the absolute number of employees as well as a p-value below the significance level, leading to the conclusion, that the positive variation in the IPO year will have a negative effect of 74.28 units in the absolute number of employees, all else equal.

Understanding the analysis of the variables done above, one can notice that 4 of them are significant to explain this model. The constant is statistically significant, so its impact on the dependent variable should be considered together with the other variables. Overall, the

regression has a R-squared equal to 0.954, which means that 95.40% of the variations in the dependent variable can be explained by the independent variables.

Results and Conclusions

Analysing the two models, one can observe that the R-squared value for the last regression, (with companies that have higher staff expenses on their employees (R-squared of 0.954)), is higher than in the regression using a sample of companies with lower average expenses per employee (R-squared of 0.845). This means that the model filtering companies with higher expenses per employee, better explains the effects of the independent variables on the dependent variable, even having less statistically significant variables. Also, both regressions had a statistically significant constant, so its value should always be considered when analysing the model.

In both regressions, most coefficients' signals were according to both literature and expectations. The first model presented 5 variables that are statistically significant – variables that explain the dependent variable – these are staff expense, ROA, debt ratio, average expense per employee and IPO. The main conclusions taken from the study of this model were that if staff expense increases, then the absolute number of employees will also increase, where the same happens for debt ratio and ROA. Contrarily, for the average expense per employee and IPO variables, an increase will lead to a decrease on the value of the dependent variable.

For the second model, only four of the independent variables were statistically significant in staff expense, average expense per employee, acquisitions and IPO. More specifically, only staff expense presents a positive coefficient, thus indicating that an increase in this variable will lead to an increase in the absolute number of employees. The average expense per employee, acquisitions and IPO display negative coefficients, meaning that an increase in these variables

will lead to a smaller absolute number of workers for companies with high level of expense per employee.

All in all, one can conclude that an increase in the level of expense per employee will not lead to a rise in the absolute number of employees. Therefore, one may observe that companies might prefer to invest in their existing employees rather than hiring new ones. Moreover, the coefficient for average expense per employee is especially lower in the second model, meaning that an increase in this variable has a more negative effect on the absolute number of employees for organizations that have higher levels of employee expenses.

Although these models do aid in the answering of the initial question, none of the models helped in explaining the influence that unemployment insurance has on the dependent variable. The object of study is represented by the total amount, change in maximum duration and change in maximum amount variables, all of them being statistically insignificant in both regressions.

Finally, despite failing to explain the effects of UI on the dependent variable, this study still contributed to understanding the main differences between companies that invest more in their employees and those that do not, achieving more significant results in the model where companies present higher expenses per employee.

6. Conclusions of Previous Models

For the matter of studying the effects of unemployment insurance in the number of employees, some distinct approaches of the model were performed, only two of them having a R-squared lower than 0.5– not being able to explain most of the variance of the dependent variable. It is important to mention that for the analysis of all regressions a 10% significance level was used.

Firstly, three regressions were performed with different dependent variables. The first regression was done using the absolute change for the number of employees as the dependent variable. This model presented five statistically significant variables: total amount of unemployment insurance, staff expense, average expense per employee, acquisitions and IPO. Also, it had a R-squared equal to 0.452 meaning that 45.2% of the variation of the dependent variable can be explained by the independent variables. Though this value is not high, it does not mean that this model is worthless for the interpretation of the hypothesis, it actually shows a relation between the total amount of unemployment insurance and absolute change in the number of employees. Thus, even with a smaller significance, this model had a unique contribution to the analysis.

Afterwards, a regression using the percentage change in the absolute number of employees was performed. For this analysis only three statistically significant variables were found: unemployment rate, total amount of unemployment insurance and staff expenses. This model, presented an even lower R-squared (0.327), having a smaller explaining power than the previous model. With the percentage change number of employees as the dependent variable, 32.7% of the variance in the dependent variable can be explained by the independent variables. Still, as observed before, this fact does not mean that the model does not contribute to explain our hypothesis.

The third performed regression was done using the absolute number of employees as the dependent variable. It presented four statistically significant variables, staff expense, average expense per employee, acquisitions and IPO. Also, this model R-squared higher than in the previous regressions. Using the absolute number of employees as the dependent variable, 78.3% of the variability of the dependent variable can be explained by the remaining. Though, neither total amount of UI, change in maximum amount and change in maximum duration are significant in this model, leading to the conclusion that it is not a good estimate of the effects of unemployment insurance in the absolute number of employees. Regardless it is still a good estimate of the variations in the absolute number of employees through other variables.

The dependent variable chosen to proceed for further analysis was the absolute number of employees, as it had the greater variability explained by the regression model. Moreover, two more regressions were performed removing some of the independent variables and using absolute number of employees as the dependent variable. Firstly, a regression without the total amount variable was carried out, with the goal of isolating the effects of change in maximum amount and maximum duration of unemployment insurance. This model presented four statistically significant variables, them being staff expenses, average expense per employee, acquisitions and IPO. The R-squared is equal to 0.783 which means that 78.3% of the variation in the dependent variable, in this case absolute number of employees, is explained by the independent variables. Since the change in maximum amount and duration were not considered as statistically significant this model was not a good fit to explain the effect of unemployment insurance on the number of employees.

The second model performed on this topic was executed without the change in maximum duration and change in maximum amount of UI. Again, this was done to isolate the effect of total amount of unemployment insurance on the dependent variable. In this regression there are

also four statistically significant variables: staff expenses, average expense per employee, acquisitions and IPO. Also, 78.3% of the variation of the absolute number of employees is explained by the independent variables. Though, like most regressions in this paper, this model does not have present any variables related to unemployment insurance which are statistically significant, thus not being a good object to study the effects of the latter on number of employees. Still, it is a good model to estimate the variations of our dependent variable.

Furthermore, two more regressions were performed using only specific periods of time, Great Recession (2008-2012) and Covid-19 Pandemic (2020-2021). The first regression was carried out selecting a sample with the years of Great Recession, while the second, by selecting the two years of Covid-19 Pandemic, considering the data that was available. Firstly, the model using only Great Recession period presented four statistically significant variables, them being: staff expenses, average expense per employee, acquisitions and IPO. In addition, it has a R-squared equal to 0.769, which indicates that 76.9% of the variations in absolute number of employees during Great Recession times were explained by the independent variables. Again, this model accurately estimates some of the variations of the dependent variable, but it does not estimate the effects of unemployment insurance on the latter, thus not having a unique contribution for our main hypothesis.

Then, the regression performed using only the Covid-19 time period showed only three statistically significant variables: staff expenses, return on equity and acquisitions. For this model it was found that 83.7% of the variability in the dependent variable is explained by the input variables, which purports that this regression is a good estimate for variations on the number of employees during the Covid-19 Pandemic. Though, like many of the regressions performed, it is not a good estimate of the effects of unemployment insurance on the number of employees.

Regarding individual components of the study, further regressions were performed for each isolated considered condition. First, two regressions for 25% least-levered companies (less debt) and 25% most-levered companies (more debt), then two regressions for 25% companies with older IPO dates and 25% companies with newer IPO dates. Finally, two regressions for 25% companies with lowest levels of average expense per employee and 25% companies with highest levels of average expense per employee.

To investigate how debt influences the variability of companies' absolute number of employees, two sub-samples were built from the original sample, for 25% least-levered firms, with a debt ratio below 77.2%, and for 25% most-levered firms, with a debt ratio above 90.8%. This analysis was conducted to observe the differences on the impact of debt ratio on absolute number of companies' employees, among least and most-levered firms.

The regression model for 25% least-levered companies displayed seven variables considered statistically significant to explain the variability of the dependent variable: debt ratio, total amount of UI, staff expenses, ROA, average expense per employee, acquisitions and IPO, since they have a p-value lower than any common level of significance. This model has a R-squared equal to 0.877 meaning that 87.7% of the variation in the number of companies' employees is explained by the independent variables, being this model a good fit to explain changes in companies' number of employees, but not at predicting the effects of unemployment insurance on the dependent variable.

The regression model for 25% most-levered companies displays six variables considered statistically significant to explain the variability of the companies' number of employees: debt ratio, staff expenses, ROE, average expense per employee, acquisitions and IPO, since they have a p-value lower than any common level of significance. With a value of 0.752 in R-

squared, 75.2% of the variation of companies' number of employees is explained by the independent variables, being this regression model a good fit to explain changes in number of companies' employees, but not at predicting the effects of unemployment insurance on the dependent variable.

In reference to the IPO, when analysing the two extremes, two sub-samples were created using the quartiles one and third. One sample composed by companies with an IPO below or in 1988, and another with companies with an IPO on or after 2007. Observing companies with an older IPO, the variables that are the most significant to the explanation of the employee behaviour are the staff expenses, ROA, ROE, debt ratio, average expense per employee and acquisitions. For this sample, the model and its variables explain 78.8% of the variability of the absolute employee number. This implies that even though the model is efficient in predicting the dependent variable, the variables related to unemployment insurance do not seem to be as relevant as was thought in our previous hypothesis.

As for companies with an IPO on or after 2007, with an R-squared of 95.7%. It can be concluded that particularly for companies with a more recent IPO, the employee variation can be estimated with a greater accuracy. For these companies, the variables that are the most significative are the unemployment rate, total amount, staff expenses, ROA, debt ratio and the IPO. For this sample, not only internal factors are relevant to predict the employee variation. The total amount variable of unemployment insurance appears to slightly influence the amount of employees a firm has.

Moreover, two more regressions were done to study the differences in the absolute number of employees between companies with high levels of expense per employee and ones that present lower expenses. The first specification on this topic, done with the sample of low average

expense per employee companies, presented five statistically significant variables, them being, staff expense, return on assets, debt ratio, average expense per employee and IPO. Also, it had a R- squared equal to 0.845, meaning that 84.5% of the variation in the number of employees, in low average expense per employee firms, is explained by the independent variables. Like most specifications mentioned above, this one is a good fit to explain changes in the number of employees but is not at predicting the effect of unemployment insurance on changes in number of companies' employees.

The second performed regression on this topic, which was done using the sample with higher expense per employee companies, displayed four statistically significant variables, staff expense, average expense per employee, acquisitions and IPO. One can notice that this model's statistically significant variables follow the pattern of most regressions analysed before. Also, its R-squared is equal to 0.955, which insinuates that 95.5% of the variations of y – absolute number of employees – are explained by the input variables. This is a great value of significance, only leaving 4.5% of the variability unexplained. Then again, this regression is a good fit to explain variations in the number of employees through the other independent variables, but not through the ones related to unemployment insurance.

To conclude chapter 6, only two of the ten distinct model specifications showed some kind of relation between unemployment insurance variables and number of employees.

7. Final Conclusions

The purpose of this research paper was to examine the effects of unemployment subsidies on the job creation, as new hirings and permanent layoffs, for each state, within a specific company and year. Although our purpose was to analyse how number of companies' employees changed over time based on the effects of unemployment subsidies amounts and duration, our analysis was improved by including internal factors that could also explain the variability of the dependent variable. Therefore, variables related to each state were extracted from the U.S. Labour Department and variables related to each company were collected from WRDS.

Analysing the results collected, for the U.S. publicly traded companies – the sample considered for this study – and although the regressions models performed include state-specific and firm-specific variables, the ones that had a bigger impact on our models and to explain the variability of the absolute number of companies' employees were internal factors such as staff expense, average expense per employee, acquisitions and IPO date. As so, a new regression model was performed with these four firm-specific variables, as shown in the Appendix, even though that was not the aim of our study.

While it was expected that variables more related to unemployment subsidies such as total amount of UI, changes in maximum amount of UI and changes in maximum duration of UI could explain more effectively the variability of the dependent variable, the research conducted in this paper led to an ambiguity of results. It was not possible to conclude the impact of the unemployment subsidies effect on the job creation.

7.1. Limitations and Further Research

After a deep analysis, some suggestions are provided that could improve the explaining of the dependent variable. One of the obstacles to our analysis might be the sample that is being considered for this study. Only publicly traded companies are being included in this study, even though they only represent 1% of the total firms in the US. ("Changing Business Volatility" 2022). Therefore, it would be interesting to do the same study for a more heterogenous sample, with all different types of companies (with and without an IPO, with all dimensions and characteristics), to improve the analysis and provide better results.

Considering other explanatory variables that could also improve our analysis, such as level of job satisfaction, self-employment rate, companies' industry and economic growth, could help to better explain the variability of the dependent variable. These variables could improve the regression analysis and have an impact in whether a company hires or dismisses more or less employees. Also, specific variables related to unemployment subsidies or government employment benefits could also be interesting to include in the regression models, such as employees' wages, states' minimum wage, employment retention ratio, level of employment turnover, companies' tax benefits and wages subject to taxes, to better explain the relation between unemployment subsidies and changes in number of companies' employees. These variables could help explain the remaining variability of the previous regression models, that is lacking explanation, and consequently reduce the coefficient associated to the constant.

8. Appendix

In the regression analyses performed before all explanatory variables were considered, including significant and not significant variables, to explain the variability of the dependent variable. However, a new regression model was performed considering only variables that were significant to explain the variability of absolute number of companies' employees.

Absolute Number of Employees			
		P-value	Coefficient
Staff Expenses		(0.000)	10.19
Average Expense per Employee		(0.000)	-3.55
Acquisitions		(0.000)	3704.38
IPO		(0.000)	-101.44
Constant		(0.000)	382365.40
Observations	6197		
R-squared	0.782		
Adjusted R-squared	0.779		

Figure 19 – *Regression without variables that are not significant to the main model*

9. Bibliography

Cantor, Richard. 1990. "Effects of Leverage on Corporate Investment and Hiring Decisions." ResearchGate. unknown. February 1990. https://www.researchgate.net/publication/5050747_Effects_of_Leverage_on_Corporate_Investment_and_Hiring_Decisions.

"Changing Business Volatility." 2022. NBER. 2022. https://www.nber.org/digest/apr07/changing-business-volatility.

Hanka, Gordon. 1998. "Debt and the Terms of Employment" *Journal of Financial Economics* 48 (3): 245–82. https://doi.org/10.1016/s0304-405x(98)00012-9

Bae, Kee-Hong, Jun-Koo Kang, and Jin Wang. 2011. "Employee Treatment and Firm Leverage: A Test of the Stakeholder Theory of Capital Structure." *Journal of Financial Economics* 100 (1): 130–53. https://doi.org/10.1016/j.jfineco.2010.10.019.

Verwijmeren, Patrick, and Jeroen Derwall. 2010. "Employee Well-Being, Firm Leverage, and Bankruptcy Risk." *Journal of Banking & Finance* 34 (5): 956–64. https://doi.org/10.1016/j.jbankfin.2009.10.006.

Boubaker, Sabri, Lamia Chourou, Marwa Haddar, and Taher Hamza. 2019. "Does Employee Welfare Affect Corporate Debt Maturity?" *European Management Journal* 37 (5): 674–86. https://doi.org/10.1016/j.emj.2019.08.004.

Akyol, Ali C., and Patrick Verwijmeren. 2013. "Human Capital Costs, Firm Leverage, and Unemployment Rates." *Journal of Financial Intermediation* 22 (3): 464–81. https://doi.org/10.1016/j.jfi.2013.04.003.

Kale, Jayant R, Harley E Ryan, and Lingling Wang. 2007. "Debt as a Bonding Mechanism: Evidence from the Relations between Employee Productivity, Capital Structure,..." ResearchGate. unknown. October 2007.

https://www.researchgate.net/publication/228425452_Debt_as_a_Bonding_Mechanism_Evidence_from_the_Relations_Between_Employee_Productivity_Capital_Structure_and_Outside_Employment_Opportunities.

Joshi, Himanshu, and Prachi Bhatt. 2019. "Fair Employee Treatment and Financial Characteristics of Firms." *Theoretical Economics Letters* 09 (04): 929–46. https://doi.org/10.4236/tel.2019.94060.

Dr. Sachin Chavan, Dr. Snehal Sashte, and Miss.Trupti Balasaheb Gunjal. 2019. "A Study of Initial Public Offering & Its Comaprative Analysis." *Think India Journal* 22 (4): 9793–9801. https://thinkindiaquarterly.org/index.php/think-india/article/view/10587.

Qian, Yiming, Jay R. Ritter, and Xinjian Shao. 2020. "Initial Public Offerings Chinese Style." SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3682089.

Subrahmanyam, Avanidhar, and Sheridan Titman. 1999. "The Going-Public Decision and the Development of Financial Markets." The Journal of Finance 54 (3): 1045–82. https://doi.org/10.1111/0022-1082.00136.

RAJAN, RAGHURAM G. 2012. "Presidential Address: The Corporation in Finance." The Journal of Finance 67 (4): 1173–1217. https://doi.org/10.1111/j.1540-6261.2012.01745.x.

"Financial Conservatism Fosters Job Creation during Economic Crises." 2020. Applied Economics. 2020. https://www.tandfonline.com/doi/full/10.1080/00036846.2020.1751053.

Holmlund, Bertil. 1998. "Unemployment Insurance in Theory and Practice." *Scandinavian Journal of Economics* 100 (1): 113–41. https://doi.org/10.1111/1467-9442.00093.

"*The Effect of Unemployment Insurance on Temporary Layoff Unemployment on JSTOR*." 2022. Jstor.org. 2022. https://www.jstor.org/stable/1811316?seq=12#metadata_info_tab_contents.

Boockmann, Bernhard, Thomas Zwick, Andreas Ammermüller, and Michael Maier. 2012. "*Do hiring subsidies reduce unemployment among older workers? evidence from natural experiments*." *Journal of the European Economic Association* 10 (4): 735–64. https://doi.org/10.1111/j.1542-4774.2012.01070.x.

SPIEZIA, Vincenzo. 2000. "*The Effects of Benefits on Unemployment and Wages: A Comparison of Unemployment Compensation Systems.*" International Labour Review 139 (1): 73–90. https://ideas.repec.org/a/bla/intlab/v139y2000i1p73-90.html.

Mueller, Xavier;, Xavier Giroud, and Holger M Mueller. 2015. "*Firm Leverage and Unemployment during the Great Recession.*" Repec.org. April 2015. https://econpapers.repec.org/paper/nbrnberwo/21076.htm.

Doornik, Van. 2022. "*Unemployment Insurance as a Subsidy to Risky Firms.*" Working Papers. Princeton University. Economics Department. 2022. https://ideas.repec.org/p/pri/econom/2022-1.html.

Shibata, Ippei, and Carlo Pizzinelli. 2022. "*Has COVID-19 Induced Labor Market Mismatch? Evidence from the US and the UK.*" IMF Working Papers 2022 (005): 1. https://doi.org/10.5089/9781616359027.001.

"*Historic Unemployment Programs Provided Vital Support to Workers and the Economy during Pandemic, Offer Roadmap for Future Reform | Center on Budget and Policy Priorities.*" 2022. Center on Budget and Policy Priorities. March 24, 2022. https://www.cbpp.org/research/economy/historic-unemployment-programs-provided-vital-support-to-workers-and-the-economy.

"*Hiring Trends as Enhanced Unemployment Insurance Benefits Expire: Evidence from High-Frequency Small Business Data | Gusto*." 2021. Gusto. July 27, 2021. https://gusto.com/company-news/hiring-trends-as-enhanced-unemployment-insurance-benefits-expire-evidence-from-high-frequency-small-business-data.

Jackson, Elizabeth. 2022. "*How Do Unemployment Trends Compare during COVID-19 and the 2008 Recession?*" Sounddollar.com. Sound Dollar. August 26, 2022. https://www.sounddollar.com/unemployment-trends-comparison.

"*Total Market Value of the U.S. Stock Market.*" 2022. Siblis Research. October 7, 2022. https://siblisresearch.com/data/us-stock-market-value/.

Charaba, Chase. 2020. "*Employee Retention - the Real Cost of Losing an Employee.*" Peoplekeep.com. PeopleKeep. June 2, 2020. https://www.peoplekeep.com/blog/employee-retention-the-real-cost-of-losing-an-employee.

Cloutier, Omer, Laura Felusiak, Calvin Hill, Enda Jean, and Pe Mberton-Jones. 2015. "*The Importance of Developing Strategies for Employee Retention.*" http://www.m.www.na-businesspress.com/JLAE/Pemberton-JonesEJ_Web12_2_.pdf

Ahmad, Saqib, and Mushtaq Ahmad. 2014. "Impact of Training and Development on Employee Performance." https://core.ac.uk/download/pdf/234685253.pdf

Hollman, Kenneth W. 2020. “Turnover: The Real Bottom Line - Sami M. Abbasi, Kenneth W. Hollman, 2000.” Public Personnel Management. 2020. https://journals.sagepub.com/doi/abs/10.1177/009102600002900303

Kilponen, Juha, David Lodge, Rolf Strauch, and Juuso Vanhala. 2010. “Labour Markets during Recessions -Evidence on the Role of Wage Rigidity and Hysteresis.” https://www.banque-france.fr/sites/default/files/s2-6-vanhala_0.pdf

Kang, Dong Ug, Gun Jea Yu, and Sang-Jik Lee. 2016. “*Disentangling the Effects of the Employee Benefits on Employee Productivity*.” Journal of Applied Business Research (JABR) 32 (5): 1447. https://doi.org/10.19030/jabr.v32i5.9771.

Sheridan, John E. 1992. “Organizational Culture and Employee Retention.” *Academy of Management Journal* 35 (5): 1036–56. https://doi.org/10.5465/256539.

Hancock, Julie I., David G. Allen, Frank A. Bosco, Karen R. McDaniel, and Charles A. Pierce. 2011. “*Meta-Analytic Review of Employee Turnover as a Predictor of Firm Performance*.” Journal of Management 39 (3): 573–603. https://doi.org/10.1177/0149206311424943.

Lee, Shinwoo. 2017. “Employee Turnover and Organizational Performance in U.S. Federal Agencies.” *The American Review of Public Administration* 48 (6): 522–34. https://doi.org/10.1177/0275074017715322.

Lehto, Eero, and Petri Böckerman. 2008. “Analysing the Employment Effects of Mergers and Acquisitions.” *Journal of Economic Behavior & Organization* 68 (1): 112–24. https://doi.org/10.1016/j.jebo.2008.03.002.

Borisov, Alexander, Andrew Ellul, and Merih Sevilir. 2012. “IPOs and Employment.” *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2178101.

Kenney, Martin, Donald Patton, and Jay R. Ritter. 2012. “Post-IPO Employment and Revenue Growth for U.S. IPOs, June 1996-2010.” *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2063829.

Kim, J. Daniel. 2018. “Predictable Exodus: Startup Acquisitions and Employee Departures.” *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3252784.

KANGASHARJU, AKI. 2007. “Do Wage Subsidies Increase Employment in Subsidized Firms?” Economica 74 (293): 51–67. https://doi.org/10.1111/j.1468-0335.2006.00525.x.

“The Effectiveness of Targeted Wage Subsidies for Hard-To-Place Workers.” 2018. Applied Economics. 2018. https://www.tandfonline.com/doi/full/10.1080/00036840802600426?scroll=top&needAccess=true&role=tab.

François Chesnais, Grazia Ietto-Gillies, and Roberto Simonetti. 2003. *European Integration and Global Corporate Strategies*. Routledge. https://www.elibrary.imf.org/display/book/9781557754998/ch04.xml.

Rothstein, Jesse. 2011. “Unemployment Insurance and Job Search in the Great Recession,” October. https://doi.org/10.3386/w17534.

“Lending Relationships, Auditor Quality and Debt Costs | Emerald Insight.” 2012. Managerial Auditing Journal 27 (6): 550–72. https://doi.org/10.1108\/maj.