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Erik Devos, Shofiqur Rahman

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Labor Unemployment Insurance and Firm Cash Holdings

Erik Devos[#]
University of Texas at El Paso
Economics and Finance Department
College of Business Administration Rm. 247
El Paso, TX 79968-0543, USA
(915) 747-7770
hdevos@utep.edu

Shofiqur Rahman
New Mexico State University
Department of Finance
College of Business, Rm. 317
Las Cruces, NM 88003-8001, USA
(575) 646-1576
shofi@nmsu.edu

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ABSTRACT

This paper presents evidence that firms conserve cash to manage employees' perceptions of the risk of becoming unemployed. Employing a matched sample design and using state level changes in unemployment insurance (UI) benefits to proxy for unemployment risk, we test the hypothesis that cash holdings and unemployment risk are positively related. We find an economically and statistically significant association between decreases in cash holdings, following an increase in UI benefits (i.e., lower unemployment risk). Our findings are robust to alternative specifications and we find that the positive relation between cash holdings and unemployment risk is more pronounced for firms that are more labor intensive, have a high layoff propensity, have a higher fraction of low-wage workers, and are in industries with a higher fraction of UI recipients. Overall, our results are consistent with the idea that cash holdings are affected by not only shareholders but also other stakeholders: namely employees.

JEL classification: J01; G32; M54

Keywords: Unemployment risk; Stakeholders; Unemployment insurance benefits; Cash holdings; Employee welfare

[#] Corresponding author: email: hdevos@utep.edu, phone: (915) 747-7770. We thank Ben Chen (FMA discussant), Daniel Pastor, Tim Roth, Aaron Sun, Jim Upson, Eddie Wei, Emma Xu, and seminar participants at the 2016 FMA Meetings and the University of Texas at El Paso for comments. The authors retain responsibility for any remaining errors.

1. Introduction

U.S. firms hold substantial cash reserves. For example, in 2006, non-financial and non-utility Compustat firms reported aggregate cash holdings of $1.7 trillion, equaling 9.2% of their market value (Duchin, 2010). In addition, Bates, Kahle, and Stulz (2009) report that the average ratio of cash reserves to assets has increased dramatically since the 1980s. Given the economic importance of cash and the increase in cash levels of U.S. firms, it may not be surprising that a substantial literature stream has evolved linking cash levels to firm characteristics (e.g., Kim, Mauer, and Sherman, 1998; Opler, Pinkowitz, Stulz, and Williamson, 1999; Bates et al., 2008; Subramaniam, Tang, Yue, and Zhou, 2011), industry characteristics (e.g., Haushalter, Klasa, Maxwell, 2007; Qiu and Wan, 2015), and governance characteristics (e.g., Dittmar, Mahrt-Smith, and Servaes, 2003; Kalcheva and Lins, 2007; Faleye, 2004; Harford, Mansi, and Maxwell, 2008). Not only because cash levels are economically important, but also because high cash levels may be associated with agency problems as cash is easily accessible to management (e.g., Dittmar and Mahrt-Smith, 2007) which may lead to agency conflicts (e.g., Jensen, 1986; Pinkowitz, Stulz, and Williamson, 2006), a large part of the existing literature has focused on the relation between cash levels and shareholders. A much smaller literature investigates links between cash levels and other stakeholders. This is surprising because extant literature suggests that financial decisions may be influenced by other stakeholders as well (e.g., Titman, 1984; Cornell and Shapiro, 1987; Itzkowitz, 2013; Liu, Mauer, and Zhang, 2014; Ghaly, Dang, and Stathopoulos, 2015). Our paper adds to this line of enquiry by investigating the link between cash levels of U.S. firms and a different set of important stakeholders: employees.[1] The extant literature analyzing the role of employees on cash holdings focuses on unions and bargaining

[1] Note that we use the terms labor, workers, and employees interchangeably.

power (i.e., Klasa, Maxwell, and Ortiz-Molina, 2009; Schmalz, 2013; Ghaly et al., 2015). In our paper, we analyze a different channel through which employees may effect cash holdings and investigate whether cash holdings are related to labor unemployment risk (i.e., lower unemployment benefits or UI benefits from hereon). Our focus on unemployment risk in setting cash levels is motivated by existing literature that suggests that unemployment risk is important to employees and the firms they work for, even when the firm is not close to potential bankruptcy (e.g., Brown and Matsa, 2015). For example, Agrawal and Matsa (2013) find that, when a state (exogenously) increases unemployment insurance benefits (i.e., reducing expected labor risk), firms increase their debt levels. Other than their paper, there is a scarcity of empirical evidence relating unemployment risk to corporate policies.[2]

The labor economics literature posits that employees and the firms they work for care about unemployment risk because employees face substantial costs of unemployment in the form of personal and emotional distress. For example, unemployed workers often face significant reductions in consumption (Gruber, 1997), time costs such as long time delays before redeployment (Katz and Meyer, 1990), wage reductions after returning to work (Gibbons and Katz, 1991), and psychological and social costs (Liem and Liem, 1988; Winkelmann and Winkelmann, 1998; Kalil and Ziol-Guest, 2008). Since, in the presence of unemployment risk, workers demand higher compensating wage differentials, firms tend to choose conservative leverage policies (Agrawal and Matsa, 2013) or manage employee's perceptions of unemployment risk through earnings management (Dou et al., 2016). Supported by stakeholder theory that states that employees are sold a set of implicit and explicit claims including job security (Cornell and Shapiro, 1987), we argue that firms manage workers' perceptions of job

[2] Although there is evidence that suggests that labor unemployment risk is related to earnings management (Dou, Khan, and Zou (2016)).

security through maintaining substantial financial resources, such as cash. Not only will this increase in financial slack increase the feeling of job security of workers, it will also lower the costs to the firm of retaining employees. Specifically, firms with less conservative cash policies will likely appear to be less safe to employees and therefore workers, when exposed to high unemployment risk, will require firms to pay higher premiums in wages and benefits (i.e., wage differentials) as compensation for perceived job loss potential (Abowd and Ashenfelter, 1981; Topel, 1984). Second, there is evidence that firms that exhibit more unemployment risk are faced with higher search costs as potential employees shy away from the firm (Brown and Matsa, 2015). Therefore, we hypothesize that firms try to mitigate these two types of costs by conserving cash (i.e., have higher cash levels). Simply said, our main hypothesis implies that firms may change cash levels to manage the perceptions that employees may have of unemployment risk. To test this hypothesis, we employ a similar framework as Agrawal and Matsa (2013) and Dou et al. (2016). In our research design, we investigate the effects of exogenous shocks in employees' unemployment risk on firm cash levels. When the costs of unemployment (i.e., unemployment risk) decreases, firms should lower their cash levels. Because legally mandated increases in UI benefits decrease the monetary costs workers face when they are unemployed, state UI benefits are considered a good proxy for unemployment risk. Topel (1984) argues that higher UI benefits make layoffs less costly and reduce workers' demand for being compensated by their employers for facing unemployment risk. A variety of empirical papers show that UI compensation has economically meaningful effects on workers' behavior and on aggregate labor supply (e.g., Topel and Welch, 1980; Topel, 1984; Meyer, 1990; Meyer and Mok, 2007; Gormley, Liu, and Zhou, 2010).[3]

[3] Agrawal and Matsa (2013) find that measures of UI benefits are reflected in the aggregate realized value of UI

So, following Dou et al. (2016), we design a difference in differences (matched sample) approach to investigate the association between labor unemployment risk and cash holdings at the firm-year level. We construct a set of treatment firms, those headquartered in states that experience at least a 10% increase in the maximum total unemployment insurance (UI) benefits, and control firms, those headquartered in adjacent states without this increase in maximum total benefits in the event and pre-event year. In order to test our main hypothesis that cash holdings and UI benefits are negatively associated, we regress cash levels on UI benefits (i.e., our proxy for unemployment risk) along with a battery of control variables similar to those used in Opler et al. (1999) and Bates et al. (2009). Using cash to net assets ratio (*Cash*) as our primary proxy for cash holdings, we find that, consistent with our main hypothesis, firms have lower cash levels following an increase in UI benefits. Specifically, a 100 log point increase in the log of maximum total benefit (*UI_Benefit*) is associated with 22.6 percentage point decrease in cash holdings. Changes in *UI_Benefit* also have an economically significant impact on *Cash*. Using the mean net assets of $741.68 million for our sample firms and a movement of *UI_Benefit* from the 25th percentile to the 75th percentile, we find that the average firm reduces its cash level by $96.72 million.

We include firm fixed effects in all of our regression models to capture time-invariant and unobservable omitted variable effects. However, the time-varying effects from unobservable macro-economic conditions may cause our main findings to be spurious. We address this issue by performing a number of analyses, aimed to enhance our identification strategy and to check the robustness of our findings. First, we control for local macro-economic impact by including

benefits, paid by each state. They report an elasticity of 0.9 between maximum total benefit and actual compensation payments. They also find that aggregate compensation payout is correlated with both the maximum weekly benefit amounts and the maximum duration in weeks.

state GDP growth rates and state unemployment rates in all regression models. In addition, we investigate the effects of gubernatorial elections and intrastate sales. Second, we conduct a falsification test to trace out the timing of the relation between cash holdings and UI benefits, by including contemporaneous and forward values of *UI_Benefit*. Third, we estimate our baseline regressions after deleting firms active in industries where labor may be dispersed over multiple states. Fourth, we estimate our baseline regression with alternative measures of cash holdings and benefits, and with all available firm-years instead of only treatment and control firm-years. We also rule out two alternative explanations, related to the effects of cash flow and labor bargaining power, for our findings. In short, all of these analyses show strong support for our main hypothesis that changes in cash levels are associated with changes in UI benefits. Finally, a number of cross-sectional tests are employed to investigate the importance of perceived unemployment costs. We expect the change in cash levels following the change in UI benefits to be more pronounced for firms where workers' perceptions about unemployment risk are relatively important (e.g., firms that are more labor intensive, have a high layoff propensity, have a higher fraction of low-wage workers, and have a higher fraction of UI recipients in the industry). The findings of these cross-sectional tests are consistent with our expectations.

Overall, our results add to at least two streams of literature. First, our paper adds to the cash holdings literature, in that it provides new evidence that cash holdings are related to stakeholders other than investors, namely employees as cash holdings alter the perceptions of unemployment risk. Second, our paper adds to the labor economics literature by showing that unemployment risk is related not only to firms' capital structure decisions (Agrawal and Matsa, 2013) and accounting choices (Dou et al., 2016), but also to firms' cash holdings.

The remainder of our paper is structured as follows: Section 2 discusses related literature and develops our main hypothesis. Section 3 describes our data, variable definitions, and research design. In Section 4, we discuss our main empirical findings with identification analyses and robustness checks. Section 5 contains our cross sectional results and Section 6 concludes our paper.

2. Literature and hypothesis development

When workers become involuntary unemployed, they bear significant costs associated with their joblessness. These costs have been well identified and discussed in the labor economics literature. Examples of such costs are job search costs (Diamond, 1982; Mortensen, 1986; Mortensen and Pissarides, 1994), difficulty in finding new jobs (Gibbons and Katz, 1991; Farber, 2005), layoff discouragement costs (Jahoda, 1982), costly effects of frictional unemployment (Lazear, 2003), and information asymmetry costs associated with workers' productivity (Harris and Holmstrom, 1982). Regardless of the source of these costs, the (potential) costs of being unemployed impacts behavior of workers and the firms they work for. A number of theoretical and empirical papers suggest that workers require compensating payments in the form of higher wages and improved working conditions in order to mitigate perceived unemployment risk. These compensating payments are commonly called compensating wage differentials (e.g., Smith, 1776). Because firms cannot guarantee workers with insurance covering these nontrivial unemployment costs, a number of authors point out that firms must compensate workers ex ante to bear the risk of being unemployed (e.g., Abowd and Ashenfelter, 1981; Topel, 1984; Li, 1986; Hamermesh and Wolfe, 1990). Unemployment risk

and the related compensating wage differential, therefore, increases with the probability of joblessness, the degree of workers' risk aversion, the duration of being unemployed, and other direct and indirect costs incurred by unemployed workers during the job search. Abowd and Ashenfelter (1981) show that, in the presence of unemployment risk, compensating wage differentials account for 14% of total wages. Hamermesh and Wolfe (1990) find that unemployment risk accounts for 14% to 41% of the total intra-industry wage differentials. And Topel (1984) finds that a one percentage point increase in anticipated unemployment risk leads to a one percent increase in the wages. Hence, compensating wage differentials for unemployment risk are important. As shown by Agrawal and Matsa (2013), firms choose leverage levels to lower the risk of financial distress and costly layoffs, which implicitly reduces the wage differential that workers expect to offset unemployment risk. Importantly, employees do not necessarily have to be direct consumers of financial statements or have to have in-depth knowledge of finance or accounting in order for their perceptions to be shaped by reported cash holdings. As cash holdings are part of the public information set used by the media, analysts, ratings agencies, and other parties to generate forecasts and reports, and employees are consumers of these forecasts, reports, and news, reported cash holdings can shape employee perceptions of unemployment risk (similar to the argument of Dou et al. (2016), discussing the way employees may perceive reported earnings). The main empirical difficulty Agarwal and Matsa (2013) encounter is that it is difficult to identify the impact of employees' exposure to unemployment risk and they use changes in state unemployment insurance benefit laws and relate these to debt levels. We argue that cash levels may be related to unemployment risk in a similar manner and, because we face the same identification problem, we employ a very similar

approach (i.e., a matched sample analysis) as do Dou et al. (2016) in their study on unemployment risk and earnings management.

In the U.S., every state has its own unemployment insurance benefit laws. Unemployment insurance benefits provide temporary income to individuals who are involuntarily unemployed and are actively seeking jobs in order to help them maintain lost income and their standard of living. Although the basic structure of UI benefits is very similar across states, individual states retain the authority to set their own provisions regarding the maximum weekly benefits amount and/or the maximum amount of weeks that UI benefits can be claimed. UI benefits are calculated by a preset formula. Through weekly payments, with a limit to the maximum weekly amount, an unemployed individual can receive approximately half of their lost earnings (i.e., half of the realized earnings in four of the last five quarters) under the UI benefit system. UI benefits are funded by payroll taxes, paid by the employers. The insurance tax premium is based on the experience ratings or the unemployment history of a firm. For example, a firm with recent layoff history will pay higher payroll taxes. This higher premium could affect a firm's cash level through operating performance. We test this alternative hypothesis in section 4.2.6. State level changes in UI benefits could also be attributed to local macro-economic conditions. In order to mitigate the impact of these macro-economic factors, we not only use a difference in differences approach and construct treatment and control samples, a research design that may identify and eliminate the differences in local economic conditions between our subsamples, but also control for macro-economic factors in all the regression models that are described in section 4.2.1.

As mentioned in the introduction, our main hypothesis is that firms change cash levels in order to affect perceptions of their workers of unemployment risk and therefore, changes in unemployment risk are expected to be related to changes in cash levels.

3. Sample selection, variable measurement, and research design

3.1. Sample selection

We hand collect unemployment insurance benefit data from the US Department of Labor's "significant provisions of State UI Laws", from 1981 to 2010. We also collect firms' balance sheet and income statement data from the Compustat annual file for the period 1981 - 2010. Following Dou et al. (2016), we perform a matched sample analysis to investigate the association between labor unemployment risk and cash holdings, at the firm-year level. This treatment-and-control framework is designed in several steps. First, we construct a treatment sample of 98 state years that experience at least a 10% increase in the maximum total unemployment insurance benefits, relative to the previous year. These state years with large increases in UI benefits are considered event years. Second, we match each of these event years with adjacent state years without this large increase in maximum total benefits, resulting in a control sample of 219 state years.[4] More specifically, in the event year matching process, we apply three conditions- first, the event year has to experience a large increase in maximum total benefits (at least 10%); second, there is at least one bordering state that does not experience such an increase in maximum total benefits; third, there is no such increase in maximum total benefits in the year before the event year for both the states in treatment sample and the control sample.

[4] State-years in both the treatment and control sample are unequal because an event state-year can be matched with more than one adjacent state-year if multiple neighboring states do not experience a large increase in maximum total benefits.

Finally, we classify years as pre- or post-event in both samples based on the event year and identify firms in Compustat that are headquartered in these states. Company headquarters information for some firms is missing in Compustat. Because the unemployment risk measure for a firm is dependent on the state it is located, we only keep those firm-years for which we are able to get the unemployment risk variable (*UI_Benefit*), yielding a final sample of 29,056 firm-year observations. Since Compustat only reports a Company's current headquarters location as opposed to its historical location, measurement error could potentially introduce bias. However, Pirinsky and Wang (2006) find that only 118 firms out of a sample of 5,000 firms relocated their headquarters. We, therefore, expect that relocation related measurement error is likely to be insignificant.[5] Table 1 presents both the treatment sample (98 state-years) and the control sample (219 state-years), from 1982 to 2010. The Table shows that all sample years are represented and that the year 2001 has the highest number of states (10) experiencing a large increase in UI benefits.

3.2. Variable measurement

3.2.1. Measuring labor unemployment risk

Following Agrawal and Matsa (2013), we use unemployment insurance benefits (*UI_Benefit*) as our proxy for unemployment risk. It is measured as:

[5] However, Dou et al. (2016) report a substantially larger percentage of firms that change headquarters. To investigate whether this may be an issue for our study, we employ historical headquarters information that was parsed from 10-K forms, available on the SEC's EDGAR website. We thank Bill McDonald for sharing this data (note that his dataset spans the 1994-2010 period). We replicate our main regressions with this dataset and find no qualitative differences, suggesting that headquarters changes do not appear to be a significant problem for our study. These results are available upon request.

$$UI\_Benefit = Log(Maximum\ weekly\ benefit \times Maximum\ number\ of\ weeks) \quad (1)$$

The information on UI benefits is gathered from the US Department of Labor's "Significant Provisions of State UI Laws", from 1982 through 2010. These annual publications provide detailed descriptions of UI benefits for each state in the USA. According to the publication, eligible claimants receive a weekly benefit payment for a specified number of weeks. The level and duration of the UI benefit payments depends on workers' employment history during a base period. From each publication, we collect the maximum weekly benefit amount and the maximum duration a claimant is eligible to enjoy the benefit.

3.2.2. Measuring cash holdings

Based on Opler et al. (1999), the primary measure of cash holdings used in our paper is the ratio of cash and marketable securities (Compustat mnemonic: *CHE*) to total assets (mnemonic: *AT*) minus cash and marketable securities (*CHE*). We also use two alternative measures of cash holdings in the robustness section of our paper, in order to mitigate possible concerns that some firms may hold a large part of their assets in cash, creating extreme observations. Specifically, we use the ratio of cash to total assets and the log of the ratio of cash and marketable securities to total assets minus cash and marketable securities as alternative cash holding measures. Since debt is related to unemployment risk (Agrawal and Matsa, 2013), it may be possible that there is a mechanical effect on total assets. In order to address this concern, we also use a third alternative measure where debt is subtracted from total assets.

3.3. Research design

To test our hypotheses, we implement prior research design (e.g., Opler et al., 1999; Bates et al., 2009; Itzkowitz, 2013; Ghaly et al., 2015) and use the following base model to investigate the association between labor unemployment risk and cash holdings:

$$
\begin{aligned}
&Cash_{it} \\
&= \alpha_0 + \beta_1 UI\_Benefit_{i,t-1} + \beta_2 CF_{i,t} + \beta_3 NWC_{i,t} + \beta_4 CAPEX_{i,t} + \beta_5 LEV_{i,t} + \beta_6 ACQ_{i,t} \\
&+ \beta_7 MB_{i,t} + \beta_8 SIZE_{i,t} + \beta_9 RandD_{i,t} + \beta_{10} DIV_{i,t} + \beta_{11} IND\_CF\_VOL_{i,t} + \beta_{12} GDPgrowth_{i,t} \\
&+ \beta_{13} UNEMP_{i,t} + Firm\ dummy + Year\ dummy \\
&+ \varepsilon_{it} \qquad (2)
\end{aligned}
$$

where, the dependent variable (*Cash*) is the ratio of cash and marketable securities (*CHE*) to total assets (*AT*) minus cash and marketable securities (*CHE*). The subscripts *i* and *t* index firm and year, respectively. The regression model includes firm and year fixed effects with standard errors clustered by state (see Petersen, 2009).

Our main variable of interest is *UI_Benefit*, which proxies for labor unemployment risk. We argue that firms located in states with lower labor unemployment risk hold less cash and, therefore, expect the coefficient on the *UI_Benefit* variable to be negative. Consistent with prior studies (e.g., Opler et al., 1999; Bates et al., 2009), we estimate Eq. 2 including several control variables (i.e., firm characteristics and state economic factors) that are found to be related to our dependent variable (i.e., firms' cash holdings).[6] All else equal, firms with higher cash flow (*CF)* should accumulate more cash. Since net working capital (*NWC)* consists of assets that can

[6] Variables are defined in more detail in Appendix A.

substitute for cash, net working capital should negatively affect firms' cash holdings. Investment in capital expenditure, labeled (*CAPEX*) enhances a firms' debt capacity through collateral, resulting in a firm holding less cash. Leverage (labeled *LEV*) is expected to be negatively related to cash holdings when leverage imposes constraints, resulting in firms paying off debt using cash. Firms' acquisition activity (*ACQ*) is expected to be negatively associated with cash holdings since acquisition expenditures may represent cash outflows. Firms with higher market-to-book ratios (*MB*) should hold more cash because it is more costly for growth firms to be financially constrained. Firm size (*SIZE*) provides economies of scale in converting non-cash financial assets to cash. Like those with higher market-to-book ratios, firms with higher R&D expenses (*R&D*), are likely to hold more cash. Dividend paying firms (*DIV*) are less likely to be financially constrained and should hold less cash. Firms with greater cash flow risk (*IND_CF_VOL*) should save more cash for precautionary reasons. As in Agrawal and Matsa (2013) and Dou et al. (2016), we control for contemporaneous local macro-economic conditions. We include state GDP growth rates (*GDPgrowth*), based on data from the US Bureau of Economic Analysis and state unemployment rates (*UNEMP*), based on data from the Bureau of Labor Statistics in our regression models. Since changes in UI benefits occur at the state level, in all the regression models, we cluster standard errors by state in order to control for the time-varying correlation of unobserved factors and control for within-firm error term correlations. All the regression models also include firm fixed effects to capture time-invariant and unobservable firm fixed effects and year fixed effects to control for possible time trends.

3.4. Summary statistics

The descriptive statistics of our dependent-, benefits-, and control variables are presented in Table 2 for 29,056 firm-year observations. All control variables are winsorized at 1 percent and 99 percent. We use the ratio of cash to net assets as our main proxy for cash holdings. The average (median) firm in our sample holds 0.58 (0.11) in cash. We use the log of the maximum total benefits as the proxy for labor unemployment risk. The log maximum total benefit is calculated as the natural log of maximum weekly benefit amount multiplied by the maximum number of weeks. The maximum weekly benefit in our sample is $309 and a UI claimant is allowed to receive UI payments for as many as 26 weeks. The mean (median) of log max total benefit of our sample is $8,227 ($7,566). These numbers are fairly close to those of Dou et al. (2016). We use several firm characteristics as control variables. The average (median) firm in our sample has cash flow of -0.11 (0.05), net working capital of 0.05 (0.11), capital expenditure of 0.06 (0.04), a leverage ratio of 0.26 (0.18), and acquisition expenses of 0.02 (0.000).

The average (median) firm in our sample has a market-to-book ratio if 2.53 (1.51), size of 4.29 (4.18), and a ratio of R&D to sales of 0.52 (0.03). The mean (median) values for *DIV* and *IND_CF_VOL* are 0.25 (0.000) and 0.72 (0.18), respectively. In order to control for state level economic conditions that may correlate with UI benefits, we also control for state GDP growth rates and state level unemployment rates. The mean (median) for GDP growth rate is 5.85% (5.40%) and for unemployment rate it is 5.68% (5.30%).

4. Results and discussion

In this section, we test our main hypothesis that labor unemployment risk is positively associated with cash holdings (i.e., UI benefit is negatively associated with cash holdings). We estimate Eq. 2 in order to test this hypothesis.

4.1. Cash holdings around large increase in UI benefit changes

We start with a univariate analysis of the treatment and control samples. We analyze UI benefits and the macro-economic variables in both the event and pre-event year. Panel A of Table 3 shows the differences in means of both samples and the test of difference in differences (diff-in-diff) for state level variables. As the last column shows, only the UI benefits significantly differ in both the event and the pre-event year. The differences in UI benefits from the pre-event year to the event year are 0.16 (significant at the 1% level) for the treatment sample and 0.03 (insignificant at conventional levels) for the control sample. Since the treatment sample is constructed based on a 10% increase in UI benefits and the control sample is predicated on not having such an increase, the significant difference of the differences in UI benefit (0.13, significant at the 1% level) between the treatment sample and the control sample is consistent with our expectations

If the change in cash holdings between event and pre-event years in the treatment sample is the result of a change in macro-economic conditions, one would expect the diff-in-diff values for both the GDP growth rate and the unemployment rate to be statistically significant. The

differences in the changes in the GDP growth rate and the state unemployment rates are -0.35 and -0.03 and both are statistically insignificant. Specifically, the difference in the GDP growth rate in pre- and post-event years for the treatment (control) sample is -0.57 (-0.22) and is statistically insignificant. The difference in the state unemployment rate between the pre- and post-event years for the treatment (control) sample of 0.10 (0.13) is statistically insignificant, as well. Combined these findings suggest that macro-economic factors do not affect the change in the UI benefit, strengthening the idea that macro-economic factors are not a major concern in our empirical analyses.

Overall, the statistically insignificant change in both macro-economic variables (the last column of Table 3, Panel A), suggests that the local macro-economic factors are unlikely to explain observed effects in the treatment sample. This result is consistent with that of Dou et al. (2016). Panel B of Table 3 shows the univariate results (on a firm-year basis) for all the control variables used in our regression models. All the variables, except for cash flows, capital expenditures, market-to-book ratios, firm size, dividend, and industry cash flow volatility, are similar in event and pre-event years in both the treatment and control samples (last column). Specifically, for the treatment sample, the differences between the pre- and post-event years are -0.01 for net working capital, -0.00 for capital expenditure, and 0.11 for industry cash flow volatility. These are all statistically significant while the differences for the remaining variables are statistically insignificant. For the control sample, the differences between the pre- and post-event years are -0.01 for net working capital, -0.00 for capital expenditure, and 0.06 for industry cash flow volatility. These are statistically significant while the differences for the remaining variables are statistically insignificant.

We now estimate our baseline regression (Eq. 2) to test the association between cash holdings and UI benefits. To be precise, we regress firms' cash holdings in the current year on unemployment insurance benefits in the previous year along with a battery of firm level and macro-economic level control variables. The regression model includes firm fixed effects to capture time-invariant and unobservable firm fixed effects and year fixed effects to control for possible time trends. Table 4 presents the results of our baseline estimation. Model (1) reports our results without macro-economic control variables, whereas Model (2) includes them.[7]

In column 1, the coefficient on *UI_Benefit*, our variable of interest, is negative and statistically significant (-0.230, p = 0.001). We estimate this regression by controlling for a variety of firm characteristics, as mentioned above. In column 2, we introduce the state GDP growth rate and the state unemployment rate in our model in order to control for macro-economic impact firms may be exposed to. The coefficient on *UI_Benefit* is also negative and statistically significant (-0.226, p = 0.001). The coefficients on *CF* (0.508, p = 0.000), *MB* (0.025, p = 0.000), and *R&D* (0.113, p = 0.000) are positive and significant and the coefficients on *NWC* (-0.350, p = 0.000), *CAPEX* (-2.245, p = 0.000), *LEV* (-0.580, p = 0.000), and *ACQ* (-1.159, p = 0.000) are negative and significant. The findings in Table 4 suggest that firms hold less cash when labor is exposed to lower levels of unemployment risk (i.e., higher UI benefits). In addition, the effect of an increase in *UI_Benefit* is economically significant. For example, a 100 log point increase in the log of maximum total benefit (*UI_Benefit*) is associated with a 22.6 percentage point decrease in cash holdings. We also analyze the economic significance of our findings by multiplying the coefficient estimates for the *UI_Benefit* variable with the change in

[7] Note that from here onwards, we include macro-economic control variable in all of our analyses.

the level of log maximum total benefit, when moving from the 25th percentile to the 75th percentile (Table 2 shows an increase of 0.577 (= 9.229 - 8.652)). The economic effect of *UI_Benefit* on *Cash* can therefore be represented as a decrease in cash holdings of 13.04 percent. Using the mean net assets (*AT-CHE*) of $741.68 million for our sample firms (this number is not reported in any of our tables), this effect translates into a decrease of $96.72 million in cash holdings for an average firm-year. Overall, our findings are consistent with the hypothesis that cash holdings and UI benefits are negatively related.

We also employ a difference in differences estimation to further test our hypothesis. Table 5 presents the results of this analysis. *Treat* is an indicator variable equal to 1 for firm-years in the treatment sample, and zero otherwise. *Post* is an indicator variable equal to 1 for the year after an increase in unemployment benefits, and zero otherwise. The main variable of interest is the interaction term (*Treat* × *Post*). We estimate the effects on firms' cash holdings of the interaction term along with all the control variables used in our base regression (Equation (2)). We expect the coefficient of the interaction term to be negative and significant. A negative coefficient can be explained as firms in the treatment sample are more likely to have lower levels of cash holdings in the year after a 10% increase in UI benefits, when compared to their counterparts. The coefficient on our main variable of interest *Treat* × *Post* is negative and statistically significant, as expected.[8] Importantly, the key assumption underlying different-in-difference regressions is the parallel trend assumption, which states that the outcome for the treatment and control group follows the same time trend, in absence of treatment. To investigate, we design a placebo test and create a false post dummy variable, which is two years prior to the

[8] Because the fiscal year ending dates of the sample firms may not match the UI benefits changing years, we also perform this analysis using [-2, 2] and [-3, 3] windows, excluding year 0. In untabulated results, we find qualitatively similar results.

actual event years. We expect the coefficient on this DID estimator to be insignificant, to rule out the possibility of violation of the nonparallel trend assumption. In unreported results, we find that the coefficient on the interaction variable is not different from zero, suggesting that there exists a parallel trend and the observed difference in outcomes in our original DID setting is likely to be a treatment effect.

In summary, both Table 4 and Table 5 provide empirical support for our hypothesis that firms' reduce their cash holdings when UI benefits increase (i.e., a decrease in perceived unemployment risks).

4.2. Identification analyses and robustness checks

In the previous section, we reported a negative association between cash holdings and UI benefits. Although we use firm fixed effects in all the regressions to capture time-invariant and unobservable omitted variable effects, the time-varying effects may also cause our main findings to be spurious. For example, because of unobservable macro-economic conditions (e.g., limited investment opportunities or higher local unemployment risk) or political considerations, firms may hold less cash and state governments may increase UI benefits. In this section, we address these issues and discuss the results of several tests aimed to enhance our identification procedure and check the robustness of our findings.

4.2.1 Control for local macro-economic conditions and political considerations

Our research methodology is designed in a way that matches a treatment sample of firms in states with large increases in UI benefits with firms in neighboring states without such an increase in UI benefits. This sample construction method attenuates the effects of regional economic differences across firms. As we have discussed in section 4.1, the univariate analysis presented in Panel A of Table 3 shows that the changes in both macro-economic variables (i.e., GDP growth rate and state unemployment rate) are statistically insignificant, supporting the argument that the local macro-economic factors are unlikely to explain the observed effects in the treatment sample. In addition, we use these two control variables in our baseline regression model (Eq. 2) and in all other subsequent models. The results presented in Table 4 and 5 show that both the coefficients on these variables are statistically insignificant. Relatedly, since treatment state-years are adjacent state-years, we attempt to control for a possible state-adjacent state pair effect. This is because states in the same geographical region may experience the same economic trends. To mitigate the concern of omitted state-level economic conditions, we run our regressions using firms with a high fraction of sales from out-of-state customers as these firms' cash holdings are less sensitive to economic conditions in their headquarters states. We calculate interstate sales, measured at industry-state level as the percentage of the value of product shipments in the firm's three-digit NAICS that are sent to different US states. Interstate sales data are collected from 2007 Commodity Flow Survey. Then, we include those firms with at least 70%, 80%, or 90% of out of state sales in our main regression (Table 6). Given that the coefficient of interest remains negative and significant, it appears that "local" macro-economic conditions do not affect our results. Collectively, our evidence suggests that macro-economic conditions are unlikely to explain the observed reduction in cash holdings in treatment sample.

Political conditions can also affect firms' incentives to hold cash.[9] For example, firms may keep a low cash level in gubernatorial election years to show weakness in order to avoid public scrutiny, if the election involves economic debates that would adversely affect businesses. To investigate, we include a dummy labeled *Gubernatorial Election Year* in our main regression. This variable equals 1 if the state-year observation is a gubernatorial election year, and 0 otherwise. Table 7 shows that the coefficient on this variable is insignificant and that the coefficient on *UI_Benefit* remains negative and significant. Hence, these political conditions do not seem to affect our findings.

4.2.2. Falsification test

In our falsification test, we attempt to analyze the effects of timing on the relation between cash holdings and UI benefits. If the change in cash holdings is truly the response to an increase in UI benefits, one would observe the change in cash in relation to the change in UI benefit of the previous year- not in the same year and not in future years. To investigate, we introduce two additional variables in our baseline regression- one is $UI\_Benefit_t$ and another is $UI\_Benefit_{t+1}$. Note that both these variables represent future UI benefits. Table 8 presents the results of this falsification test. As column (1) shows, the coefficient on *UI_Benefit* is still negative and statistically significant (-0.208, p = 0.008), even after the inclusion of contemporaneous and forward values of UI benefits in our base line regression (Eq. 2). The coefficients on both these variables (i.e., current and future benefits) are statistically insignificant. This finding mitigates possible omitted variable bias issues in our regressions, and

[9] We thank the referee for suggesting this line of inquiry.

suggests that changes in cash holdings are the response of changes in UI benefits in the previous year, and are not related to those in the current or the coming year.

4.2.3 Geographically dispersed firms

Workers are geographically dispersed in some industries. Examples are employees who work in retail, wholesale, and transportation industries. A possible concern is that workers of companies in these industries work in a state that is not the same as the state of the headquarters of the firm they work for and, thus, are less likely to be affected by the unemployment risk of the headquarters state. To investigate whether this issue biases our inferences, we exclude industries with a dispersed workforce such as retail, wholesale, and transportation and re-estimate Eq. (2). Column (2) of Table 8 presents the results of this exercise. We find that the magnitude of the coefficient of interest (*UI_Benefit*) is slightly larger than the one reported in Table 4. To be precise, the coefficient is negative and statistically significant (-0.237, $p = 0.001$). This finding suggests that the association between cash holdings and UI benefits remains negative after excluding industries with a dispersed work force.

4.2.4 Alternative measures of cash holdings and all firm-years

Our results are robust to alternative measures of cash holdings. In the previous sections, our primary measure of cash holdings was the ratio of cash to net assets. We re-estimate Eq. (2) using two alternative measures of cash holdings to mitigate possible concerns that firms may hold most of their assets in cash, creating extreme observations. We use the ratio of cash to total

assets and the log of the ratio of cash and marketable securities to total assets minus cash and marketable securities. In addition, we use an alternative measure in which we adjust total assets, by excluding debt. Table 9 presents the results of re-estimating of our baseline regression (Eq. (2)). As shown in column (1), (2), and (3), the coefficients on *UI_Benefit* remain negative and statistically significant (-0.037, p = 0.000, -0.078, p =0.000, and -0.044, p = 0.000 respectively).

Our main findings are based on a matched sample analysis where we create a treatment sample and a control sample, depending on the large increase in UI benefits. Using similar data sets and without a matching treatment with control sample, Agrawal and Matsa (2013) estimate a pooled regression model, across all available firm-years. In this paper, we also estimate a pooled regression to check for the robustness of our main findings. As shown in column (4) of Table 9, the coefficient on *UI_Benefit* is still negative and statistically significant (-0.208, p = 0.000).

4.2.5. Alternative benefit measures

In the paper, so far, we have used a measure of UI benefits that is, similar to Agrawal and Matsa 2013), the log of the maximum weekly benefit times the maximum number of weeks. As a robustness test, we use (the logs of) the maximum duration and the maximum benefit, separately. The results of doing so are reported in Table 10. When we use the log of the maximum weekly benefit, we find a coefficient of -0.201, which is significant at the 1 percent level. Similarly, when we use the log of the maximum duration as our variable of interest, we obtain a negative significant coefficient. Overall, these results are consistent with our earlier findings.

4.2.6 Alternative explanation- cash flow effects

The main finding of our study is that cash holdings decrease with an increase in UI benefits. However, this finding may be subject to a spurious relation when considering UI premium costs of the sample firms. As unemployment insurance benefits are mostly financed by unemployment insurance taxes that are paid by eligible firms, an increase in UI benefits may increase firm's unemployment insurance premiums. In turn, these incremental costs could weaken the financial position of the firm and, therefore, reduce cash holdings. Specifically, one may observe a decrease in cash holdings around the same time as an increase in UI benefits. We regress firms' operating performance (i.e., profitability, measured by *ROA* and *industry adjusted ROA*) on UI benefits. To rule out the possibility of a spurious relationship, an increase in UI benefits should not lead to a reduction in profitability (i.e., the coefficient on the *UI_Benefit* variable is expected to be zero and insignificant).

We measure *ROA* by operating income before depreciation (mnemonic: *OIBDP*), scaled by total assets (*AT*) and *industry adjusted ROA* is calculated by subtracting the median industry ROA from the raw ROA, where industry is defined by two digit SIC code. The results of Models (1) and (2) in Table 11 show that none of the coefficients on the *UI_Benefit* variable are statistically significant. This finding rejects the notion that a negative association between cash holdings and UI benefits is driven by firms' cash flows.

4.2.7 Alternative explanation- bargaining power

A second alternative explanation for our findings is that the change in UI benefits affects corporate cash holdings through a labor union channel. For example, the work stoppage provision (WSP) permits strikers to collect unemployment benefits during a labor dispute, if their employer continues to operate at or near normal levels. In other words, the WSP provides strikers with insurance for a failed strike since it allows striking workers to receive benefits only if employers succeed in weathering the strike and continuing to produce at or near normal levels. To deal with such situations, employers may strategically lower their cash holding levels to gain better positions when negotiating with unions (Klasa et al 2009). Hence, the change in corporate cash holdings may reflect the changes in workers' bargaining environment rather than the changes in workers' unemployment risk.[10] To investigate this possibility, we perform the following analyses. First, in our main regressions, we include a variable that reflects the industry unionization rate, measured by the percentage of employees covered by labor unions.[11] A higher ratio proxies for more labor union power. In column (3) of Table 11, we show that doing so does not alter our main results, as the coefficient on the *UI_Benefit* variable remains negative and significant.[12] In column (4), we also interact a dummy (based on the median value of bargaining power) with our *UI_Benefit* variable. The coefficient on this interaction variable is insignificant, while our standalone *UI_Benefit* variable still has a negative significant coefficient. Overall, these tests do not seem to be supporting this alternative explanation.

5. Cross-sectional tests

[10] We thank the referee for suggesting this line of thinking.
[11] From http://unionstats.com.
[12] Note that in the third and fourth model of Table 11 we use cash holdings as dependent variable, whereas in the first two models ROA and adjusted ROA are used as dependent variables.

In this section, we employ different cross-sectional tests, considering the importance of perceived workers unemployment costs.[13] The main idea of our paper is that when workers face unemployment risk they require higher compensating wage differentials in the form of job security, better working conditions, or non-pecuniary benefits. Firms can manage perceptions of workers by taking on less debt (Agrawal and Matsa, 2013) or managing earnings (Dou et al., 2016). Our main argument is that a firm can also increase cash holdings to provide workers with a sense of safety. Because of the nature of the business or event to which a particular type of firm is exposed to, workers perceive varying levels of unemployment risk. We, therefore, expect that our main findings are more pronounced for firms or industries in which unemployment risk is potentially more severe.

5.1. Labor intensity

Labor intensive firms face greater labor costs from risky corporate policies because workers demand higher wage differentials, in response to increases in perceived unemployment risk. Managers of these firms, relying heavily on human capital will be more likely to manage the unemployment risk perception of their employees. We, therefore, expect the association between cash holdings and UI benefits to be more pronounced in more labor intensive firms. Labor intensity is measured as the total employees (mnemonic: *EMP*) divided by net assets (*AT-CHE*). Based on two-digit SIC code, above (below) median values are labeled as high (low) labor intensity. As shown in Table 12, *UI_Benefit* loads significantly negatively (-0.237, p = 0.012) for high labor intensity firms (Panel A) but the coefficient is statistically insignificant for

[13] We thank Agrawal and Matsa (2013) for providing us with some of the necessary data to conduct all these cross-sectional tests.

low labor intensity firms (Panel B).[14] Consistent with our prediction, this finding suggests that a decrease in cash holdings following an increase in UI benefits is more pronounced for high labor intensity firms.[15]

5.2. Layoff propensity

Firms in industries with substantial layoff history are likely to be perceived more risky, in terms of jobless potential. So, workers in these firms are likely to demand higher compensating wage differentials and managers of firms in these industries are more likely to manage perceptions of their workers when UI benefits are low. We, therefore, expect the association between cash holdings and UI benefits to be more pronounced in industries with a high layoff propensity. Layoff propensity is measured as the ratio of workers affected by extended mass layoffs to total industry employment. Based on three-digit NAICS code, firms in industries above (below) the median are labeled as high (low) layoff propensity firms. As shown in Table 12, *UI_Benefit* loads significantly negatively (-0.201, $p = 0.008$) for high layoff propensity firms (Panel A) but remains statistically insignificant for low layoff propensity firms (Panel B). This finding suggests that a decrease in cash holdings following an increase in UI benefits is more pronounced for firms with a high layoff propensity.

[14] In addition to comparing the coefficients on *UI_Benefit* in Panels A and B, in unreported tests, we also run regressions using an interaction variable to test whether the effects are more pronounced where expected. These regressions, although excluding firm fixed effects (because of econometric issues), do provide evidence consistent with there being significant differences in the coefficients on *UI_Benefit* between Panels A and B.

[15] We also bifurcate the sample in a high tech and non-high tech group. We define a firm as high tech firm if it belongs to any of the industries with first three digit SIC code of 283, 371, 372, 376, 357, 384, or 873. We find that the relation between cash holdings and UI benefits is more pronounced for non-high tech firms.

5.3. Proportion of low-wage workers

UI benefits are likely to be more important to low-wage workers. Hence, a firm with a higher proportion of low-wage workers is more likely to manage the perception of these workers through increasing cash holdings after a decrease in UI benefits. We, therefore, analyze firms in industries with a higher proportion of low-wage workers and hypothesize that the negative association between cash holdings and UI benefits is more pronounced for firms in these industries. The proportion of low-wage workers is calculated as the percentage of workers in the industry earnings less than $50,000 per year, based on the 2000 Census. Based on three-digit NAICS code, firms in industries above (below) the median are labeled as firms with more (fewer) low-wage workers. As shown in Table 12, the coefficient on the *UI_Benefit* variable is significant and negative (-0.263, p = 0.005) for more low-wage worker firms (Panel A) but statistically insignificant for fewer low-wage worker firms (Panel B). This, indeed, suggests that a decrease in cash holdings following an increase in UI benefit is more pronounced for firms in industries with more low-wage workers.

5.4. UI payment rate

We also analyze the impact of UI benefit, in industries with a higher number of UI recipients. Managers of firms in industries with more UI recipients are more likely to manage perceived risk by workers through cash holdings. Workers in these industries also face higher levels of unemployment risk, following decreases in UI benefits. We, therefore, hypothesize that the negative association between cash holdings and UI benefits is more pronounced in these industries. The UI payment rate is calculated as the fraction of workers in the industry that

received UI benefits, based on the March current population survey. Based on two-digit SIC codes, firms in industries where this fraction is above (below) the median value are labeled as firms with a high (low) UI payment rate. Table 12 shows that *UI_Benefit* loads significantly negative (-0.214, p = 0.003) for high UI payment rate firms (Panel A), but the coefficient is statistically insignificant for low UI payment rate firms (Panel B). Clearly, a decrease in cash holdings following an increase in UI benefit is more pronounced for high UI payment rate firms.

In all the cross-sectional tests in this part of the paper, we find expected results on the relation between cash holdings and UI benefits, depending on the importance of unemployment costs. Collectively, our findings support the main hypothesis that a decrease in cash holdings is associated with an increase in UI benefits.

6. Conclusion

The labor economics literature posits that employees care about unemployment risk because they face substantial costs of unemployment, in the form of personal and emotional distress. Firms care about this risk as well, as employees demand compensation wage differentials to offset this risk. Following extant literature, we posit that firms manage workers' perception through maintaining substantial financial resources, such as cash. Specifically, we hypothesize and test that firms may change cash levels to manage the perceptions that employees may have of unemployment risk. Using the ratio of cash to net assets to measure firms' cash holdings and unemployment insurance benefits as a proxy for unemployment risk, we provide empirical evidence that firms decrease cash levels in response to prior year increases in UI

benefits. The results in all of our regression models are consistent with this hypothesis and are both economically and statistically significant.

We enhance our identification and check the robustness of our findings by adding a falsification test and controlling for local macro-economic effects and political considerations, by investigating the effects of having a dispersed workforce, and by using alternative measures of benefits and cash holdings. We also analyze the association of cash holdings and UI benefits, depending on the importance of expected labor unemployment costs. To do so, we employ various cross-section tests labeling firms operating as labor intensive, having a high propensity to lay employees off, having a higher fraction of low-wage workers, and having a higher fraction of UI benefit recipients as those that are more likely to care about the relation between unemployment risk and cash holdings. We present evidence that is consistent with the idea that, for these firms, the relation between cash holdings and UI benefits is indeed more pronounced. In addition, we rule out alternative explanations that decreases in cash levels and increases in UI benefits are the result of cash flow effects or changes in union bargaining power. Overall, our findings support our main hypothesis that decreases in cash holdings are associated with increases in UI benefits.

Appendix A. Variable definitions

Variable	Definition
ACQ	Acquisitions is defined as acquisitions (*AQC*) divided by total assets (*AT*).
CAPEX	Capital expenditure (*CAPX*) scaled by total assets (*AT*).
Cash	Cash is the ratio of cash and marketable securities (CHE) to total assets (*AT*) minus cash and marketable securities.
CF	Cash flow is the earnings after interest, dividends, and tax but before depreciation (*OIBDP-XINT-TXT-DVC*), scaled by the book value of total assets (*AT*).
DIV	Dividend is a dummy variable set equal to one in years in which a firm pays common dividends (*DVC*), and zero otherwise.
GDPgrowth	GDP growth rate is the change in state GDP in year t and t-1. The data is from the US Bureau of Economic Analysis (BEA).
IND_CF_VOL	Industry cash flow volatility is the average of the firm cash flow standard deviation over each industry, defined by the two-digit SIC code. The standard deviation is calculated on firm-level cash flow to assets for the previous five years.
LEV	Leverage is the long-term debt (*DLTT*) plus debt in current liabilities (*DLC*), scaled by total assets (*AT*).
MB	The market-to-book value is defined as the book value of assets (*AT*) plus the market value of common equity (*PRCC_f* × *CSHO*) minus the book value of common equity (*CEQ*), scaled by the book value of assets (*AT*).
NWC	Net working capital is the working capital (*WCAP*) minus cash (*CHE*), scaled by total assets (*AT*).
R&D	Research and development is firm's research and development expenses (*XRD*), scaled by sales (*SALE*).
SIZE	Size is measured as the logarithm of the firm's book value of assets (*AT*).
UI_Benefit	UI Benefit is the log of maximum total benefits in year t-1 calculated as the product of the maximum weekly benefit amount and the maximum duration allowed in year t-1.
UNEMP	Unemployment rate for each state collected from the Bureau of Labor Statistics (BLS).

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Table 1

Event years followed by states with and without large increase in unemployment benefits

Event Years	Large increase (10%) in UI benefits	Adjacent states without large increase in UI benefits
1982	CA, CO, GA, MD, MI	AL,AZ,DC,DE,HI,NE,OH,PA,SC,WI
1983	IL	IA,IN,MO
1984	CT, DE, FL, NE, NY, OH	CO,GA,KY,MD,MI,PA,RI,SD,VT,WV
1985	AK, AR, MO, UT, WY	AZ,KS,LA,MT,NM,NV,OK,TN,TX,WA
1986	DC, DE, FL, IA, MN, RI	AL,CT,GA,IL,MA,ND,NE,PA,SD,VA,WI
1987	MD, MS	LA,WV
1988	FL, MI, NC, RI, TN	CT,GA,IN,KY,MA,MO,OH,VA,WI
1989	DC, MS	AR,LA,MD
1990	CA, KY, NY, WA, WI	AK,AZ,CT,HI,IA,ID,IL,MA,MN,MO,NJ,NV,OH,OR,PA,TN,VT
1991	FL, VA	AL,GA,NC,WV
1992	AK, DC, MA, MS, SD	AR,CT,IA,LA,MD,MN,MT,ND,NE,NH,NY,RI,VT,WA,WY
1993	AL	GA,TN
1994	WA, WY	AK,ID,MT,OR,UT
1995	NE	CO,IA,KS,MO
1996	AK, DE, MD	DC,NJ,PA,VA,WA,WV
1997	CT, TN	KY,MA,NC,NY,RI
1998	FL, LA, MO	AL,AR,GA,IA,IL,MS,OK,TX
1999	NE, NH, NY, TN	CO,CT,KS,KY,MA,ME,NC,NJ,PA,VA,WY
2000	MN	IA,ND,SD
2001	IL, IN, LA, MO, NC, NE, NY, PA, UT, VA	AR,CO,DC,DE,MI,MS,NJ,OH,OK,TN,TX,VT,WI,WV,WY
2002	CA, MA, WA	AK,AZ,HI,ID,NV,OR,RI
2003	AL, MD, MI, NH, VA, VT	DC,DE,FL,GA,ME,MS,NC,NY,PA,TN,WI
2004	KY, MT, NM	ID,IL,IN,MO,ND,OH,SD,TX,WV,WY
2005	AZ, DC	CO,MD,NV,UT,VA
2006	AR	MO,MS,OK,TN
2007	MA, TX	CT,LA,NY,RI
2008	HI, MD, MO, NH, NM, OK, WY	AZ,CA,CO,DC,DE,IA,ID,IL,KS,ME,MT,NE,PA,SD,TN,UT,VA,VT,WV
2009	AK, LA	AR,WA
2010	NM	AZ,CO,TX,UT

Table 2

Descriptive statistics

This table presents the descriptive statistics for the variables used in the regressions. All variables are defined in Appendix A.

Variable	N	Mean	Standard deviation	25th percentile	Median	75th percentile
Cash	29,056	0.576	1.441	0.029	0.113	0.413
UI_Benefit$_{t-1}$	29,056	8.924	0.423	8.652	8.931	9.229
CF	29,056	-0.112	0.534	-0.084	0.049	0.098
NWC	29,056	0.048	0.440	-0.035	0.105	0.253
CAPEX	29,056	0.059	0.061	0.020	0.041	0.076
LEV	29,056	0.257	0.339	0.034	0.180	0.348
ACQ	29,056	0.018	0.054	0.000	0.000	0.001
MB	29,056	2.529	3.224	1.085	1.514	2.525
SIZE	29,056	4.286	2.292	2.650	4.180	5.830
R&D	29,056	0.515	2.324	0.004	0.030	0.124
DIV	29,056	0.253	0.435	0.000	0.000	1.000
IND_CF_VOL	29,056	0.723	1.270	0.084	0.179	0.577
GDPgrowth	29,056	5.851	2.862	4.060	5.400	7.650
UNEMP	29,056	5.682	1.849	4.400	5.300	6.400

Table 3

Univariate analysis

This table presents differences in the means of variables in treatment state-years and control state-years. The treatment sample consists of states with a large increase (at least 10%) in unemployment insurance benefits. The control sample consists of states without large in increase in UI benefits. The event year is considered the year when the state experience at least 10% increase UI benefits. The pre-event year is the year before large increase in UI benefits. Panel A presents the state-year analysis covering state level variables and Panel B presents firm-year analysis covering control variables. All variables are defined in Appendix A. The mean differences between groups are based on *p*-values. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

Variables	Treatment state-years			Control state-years			Diff-in-Differences
	(1)	(2)	(1)-(2)	(3)	(4)	(3)-(4)	
	Event year mean	Pre-event year mean	Diff	Event year mean	Pre-event year mean	Diff	
Panel A: State-year univariate analysis							
UI_Benefit$_{t-1}$	8.832	8.676	0.156***	8.817	8.786	0.031	0.125***
GDPgrowth	5.803	6.374	-0.571	5.518	5.741	-0.223	-0.348
UNEMP	5.826	5.729	0.097	5.858	5.731	0.127	-0.031
Panel B: Firm-year univariate analysis							
CF	-0.127	-0.124	-0.003	-0.107	-0.103	-0.004	0.011*
NWC	0.046	0.060	-0.014*	0.038	0.051	-0.013**	-0.007
CAPEX	0.059	0.063	-0.004***	0.058	0.059	-0.002**	-0.003***
LEV	0.253	0.247	0.006	0.264	0.259	0.005	0.003
ACQ	0.016	0.016	0.000	0.019	0.019	0.000	0.000
MB	2.486	2.542	-0.056	2.560	2.516	0.045	-0.078**
SIZE	4.094	4.068	0.026	4.424	4.390	0.034	-0.031***
R&D	0.530	0.530	0.000	0.533	0.481	0.052	-0.008
DIV	0.218	0.230	-0.011	0.268	0.272	-0.004	-0.007**
IND_CF_VOL	0.629	0.521	0.107***	0.841	0.779	0.063***	0.049***

Table 4

The association between labor unemployment risk and cash holdings

This table presents the association between labor unemployment risk and firms' cash holdings. All variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at the state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Cash to net assets			
	(1)		(2)	
	Coeff.	*p*-value	Coeff.	*p*-value
$UI\_Benefit_{t-1}$	-0.230***	0.001	-0.226***	0.001
CF	0.508***	0.000	0.508***	0.000
NWC	-0.350***	0.000	-0.350***	0.000
CAPEX	-2.241***	0.000	-2.245***	0.000
LEV	-0.580***	0.000	-0.580***	0.000
ACQ	-1.159***	0.000	-1.159***	0.000
MB	0.025***	0.000	0.025***	0.000
SIZE	0.001	0.931	0.001	0.925
R&D	0.113***	0.000	0.113***	0.000
DIV	-0.004	0.788	-0.004	0.778
IND_CF_VOL	0.020	0.158	0.020	0.159
GDPgrowth			0.005	0.304
UNEMP			-0.001	0.873
Constant	2.772***	0.000	2.723***	0.000
Firm FE	Yes		Yes	
Year FE	Yes		Yes	
Adj. R^2	0.093		0.093	
Observations	29,056		29,056	

Table 5

Difference-in-differences regression

This table presents the difference-in-differences regression specification. *Treat* is an indicator variable equal to1for firm-years in the treatment sample, and zero otherwise. *Post* is an indicator variable equal to1 for the period after an increase in unemployment benefits, and zero otherwise. All other variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at the state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Cash to net assets	
	Coeff.	*p-value*
$Treat_{t-1} \times Post_{t-1}$	-0.028*	0.066
$Treat_{t-1}$	0.022	0.216
$Post_{t-1}$	0.000	0.973
CF	0.408***	0.000
NWC	-0.341***	0.000
CAPEX	-2.178***	0.000
LEV	-0.622***	0.000
ACQ	-1.166***	0.000
MB	0.029***	0.001
SIZE	0.013	0.403
R&D	-0.007	0.897
DIV	-0.017	0.282
IND_CF_VOL	0.021	0.151
GDPgrowth	0.007	0.171
UNEMP	-0.003	0.722
Constant	0.616***	0.000
Firm FE	Yes	
Year FE	Yes	
Adj. R^2	0.093	
Observations	29,056	

Table 6

Labor unemployment risk and cash holdings: by geography of sales

This table presents the association between labor unemployment risk and firms' cash holdings after controlling for interstate sales, measured at industry-state level as the percentage of the value of product shipments in the firm's three-digit NAICS that are sent to different US states. Interstate sales data are collected from 2007 Commodity Flow Survey. All variables are defined in Appendix A. The p-values are calculated based on standard errors clustered at the state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Cash to net assets					
	(1)		(2)		(3)	
	Interstate sales > 70%		Interstate sales > 80%		Interstate sales > 90%	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p-value*
UI_Benefit$_{t-1}$	-0.235***	0.004	-0.236***	0.004	-0.200*	0.071
CF	0.614***	0.000	0.614***	0.000	0.623***	0.000
NWC	-0.404***	0.000	-0.404***	0.000	-0.410***	0.001
CAPEX	-2.915***	0.000	-2.931***	0.000	-2.957***	0.000
LEV	-0.613***	0.000	-0.613***	0.000	-0.590***	0.000
ACQ	-1.117***	0.000	-1.118***	0.000	-1.075***	0.000
MB	0.018***	0.007	0.018***	0.007	0.017**	0.016
SIZE	-0.007	0.620	-0.007	0.612	-0.009	0.571
R&D	0.112***	0.000	0.112***	0.000	0.112***	0.000
DIV	0.002	0.898	0.003	0.892	0.008	0.698
IND_CF_VOL	0.025	0.131	0.025	0.132	0.028*	0.099
GDPgrowth	0.002	0.770	0.002	0.771	0.005	0.439
UNEMP	0.002	0.847	0.002	0.850	-0.002	0.861
Constant	3.028***	0.000	3.040***	0.000	2.769***	0.000
Firm FE	Yes		Yes		Yes	
Year FE	Yes		Yes		Yes	
Adj. R^2	0.100		0.101		0.100	
Observations	20,490		20,433		18,341	

Table 7

Labor unemployment risk and cash holdings: controlling for gubernatorial election years

This table presents the association between labor unemployment risk and firms' cash holdings after controlling for gubernatorial election years. State-wise gubernatorial election years are manually collected from Wikipedia sources and are verified with state level election resources, upon availability. *Gubernatorial Election Year* is a dummy variable equal to one if state-year observation is gubernatorial election year and zero otherwise. All other variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Cash to net assets	
	Coeff.	*p*-value
$UI\_Benefit_{t-1}$	-0.227***	0.001
Gubernatorial Election Year	-0.005	0.808
CF	0.508***	0.000
NWC	-0.353***	0.000
CAPEX	-2.232***	0.000
LEV	-0.585***	0.000
ACQ	-1.159***	0.000
MB	0.025***	0.000
SIZE	0.002	0.913
R&D	0.112***	0.000
DIV	-0.005	0.766
IND_CF_VOL	0.020	0.159
GDPgrowth	0.005	0.295
UNEMP	-0.001	0.903
Constant	2.731***	0.001
Firm FE	Yes	
Year FE	Yes	
Adj. R^2	0.093	
Observations	29,056	

Table 8

Falsification test and dispersed workforce

This table presents the association between labor unemployment risk and firms' cash holdings, controlling for omitted variables and excluding dispersed industries such as retail, wholesale, and transportation. All variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at the state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Cash to net assets			
	(1)		(2)	
	Falsification		Excluding dispersed workforce	
	Coeff.	*p*-value	Coeff.	*p*-value
$UI\_Benefit_{t-1}$	-0.208***	0.008	-0.237***	0.001
$UI\_Benefit_{t}$	-0.045	0.498		
$UI\_Benefit_{t+1}$	0.013	0.856		
CF	0.408***	0.000	0.528***	0.000
NWC	-0.343***	0.000	-0.366***	0.000
CAPEX	-2.184***	0.000	-2.364***	0.000
LEV	-0.623***	0.000	-0.611***	0.000
ACQ	-1.167***	0.000	-1.226***	0.000
MB	0.028***	0.001	0.026***	0.000
SIZE	0.014	0.381	0.003	0.859
R&D	0.007	0.884	0.111***	0.000
DIV	-0.016	0.311	-0.005	0.766
IND_CF_VOL	0.021	0.144	0.024	0.116
GDPgrowth	0.006	0.203	0.005	0.324
UNEMP	0.000	0.962	-0.001	0.916
Constant	2.847***	0.006	0.621***	0.005
Firm FE	Yes		Yes	
Year FE	Yes		Yes	
Adj. R^2	0.094		0.096	
Observations	29,056		25,489	

Table 9

Labor unemployment risk and cash holdings: alternative measures of cash holdings and all state-years

This table presents the association between labor unemployment risk and firms' cash holdings using alternative proxies for cash holdings and all state-years sample. All variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at the state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Alternative measures of cash holdings							
	(1)		(2)		(3)		(4)	
	Cash/assets		Log (cash/net assets)		Cash/(assets-leverage)		All state-years	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
UI_Benefit$_{t-1}$	-0.037***	0.000	-0.078***	0.000	-0.044***	0.000	-0.208***	0.000
CF	0.057***	0.000	0.142***	0.000	0.048***	0.000	0.472***	0.000
NWC	-0.085***	0.000	-0.150***	0.000	-0.060***	0.000	-0.428***	0.000
CAPEX	-0.343***	0.000	-0.739***	0.000	-0.371***	0.000	-2.560***	0.000
LEV	-0.175***	0.000	-0.282***	0.000	-0.163***	0.000	-0.686***	0.000
ACQ	-0.256***	0.000	-0.468***	0.000	-0.269***	0.000	-1.277***	0.000
MB	0.007***	0.000	0.012***	0.000	0.004***	0.000	0.023***	0.000
SIZE	0.001	0.628	0.002	0.761	0.010***	0.002	0.004	0.749
R&D	0.010***	0.000	0.028***	0.000	0.010***	0.000	0.095***	0.000
DIV	-0.001	0.778	-0.001	0.853	-0.013***	0.009	0.014	0.293
IND_CF_VOL	0.003	0.179	0.007	0.164	0.004	0.227	0.000	0.953
GDPgrowth	0.000	0.790	0.001	0.610	-0.001	0.503	0.003	0.282
UNEMP	-0.002	0.247	-0.003	0.180	-0.002	0.208	-0.005	0.454
Constant	0.585***	0.000	1.084***	0.000	0.658***	0.000	2.849***	0.000
Firm FE	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Adj. R^2	0.137		0.125		0.121		0.085	
Observations	29,056		29,056		29,056		74,414	

Table 10

Labor unemployment risk and cash holdings: alternative measure of labor unemployment risk

This table presents the association between labor unemployment risk and firms' cash holdings using alternative measures of unemployment risks (i.e., maximum weekly benefit (*LMWB*) and maximum duration (*LMD*)). All other variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Cash to net assets			
	(1)		(2)	
	LMWB		*LMD*	
	Coeff.	*p*-value	Coeff.	*p*-value
$UI\_Benefit_{t-1}$	-0.201***	0.005	-0.408***	0.000
CF	0.507***	0.000	0.508***	0.000
NWC	-0.352***	0.000	-0.351***	0.000
CAPEX	-2.229***	0.000	-2.227***	0.000
LEV	-0.585***	0.000	-0.585***	0.000
ACQ	-1.158***	0.000	-1.160***	0.000
MB	0.025***	0.000	0.025***	0.000
SIZE	0.001	0.921	0.001	0.929
R&D	0.112***	0.000	0.112***	0.000
DIV	-0.005	0.764	-0.005	0.744
IND_CF_VOL	0.020	0.160	0.019	0.166
GDPgrowth	0.005	0.282	0.004	0.373
UNEMP	0.001	0.935	-0.007	0.311
Constant	1.811***	0.000	1.972***	0.000
Firm FE	Yes		Yes	
Year FE	Yes		Yes	
Adj. R^2	0.093		0.093	
Observations	29,056		29,056	

Table 11

Alternative explanations: cash flow effects and labor bargaining power

This table presents the effect of labor unemployment risk on firms' operating performance and the association between labor unemployment risk and firms' cash holdings, considering labor bargaining power. *ROA* is the operating income before depreciation (*OIBDP*) scaled by total assets (*AT*). Industry adjusted ROA is calculated by subtracting the median industry ROA from the raw ROA where industry is defined as two digit SIC code. *LBP* represents industry unionization rates, measured as the percentage of employees covered by labor unions. The higher this ratio, the higher the bargaining power. In column (3), we use bargaining power as the control variable and, in column (4), we use the magnitude of bargaining power as an interaction term, defined as high and low where high (low) bargaining power is the ratio above (below) sample median. All other variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at the state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

	Alternative explanation							
	Operating Performance				Labor Bargaining Power			
	(1)		(2)		(3)		(4)	
	ROA		*Adjusted* ROA		LBP as Control		LBP as Interaction	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
$UI\_Benefit_{t-1} \times LBP$							0.115	0.128
$UI\_Benefit_{t-1}$	-0.058	0.788	-0.054	0.805	-0.209***	0.005	-0.251***	0.001
LBP					-0.004*	0.063	-0.966	0.150
CF	0.892***	0.001	0.883***	0.001	0.560***	0.000	0.560***	0.000
NWC	-0.154	0.653	-0.150	0.662	-0.378***	0.000	-0.379***	0.000
CAPEX	2.486	0.512	2.492	0.510	-2.423***	0.000	-2.418***	0.000
LEV	-1.267*	0.066	-1.264*	0.067	-0.586***	0.000	-0.586***	0.000
ACQ	0.104	0.538	0.097	0.565	-1.077***	0.000	-1.074***	0.000
MB	-0.182	0.124	-0.182	0.124	0.025***	0.001	0.025***	0.001
SIZE	0.030	0.438	0.033	0.399	-0.005	0.727	-0.006	0.667
R&D	-0.026	0.495	-0.026	0.494	0.115***	0.000	0.115***	0.000
DIV	-0.010	0.804	-0.010	0.798	0.004	0.812	0.009	0.612
IND_CF_VOL	0.012	0.650	0.022	0.401	0.019	0.188	0.023	0.136
GDPgrowth	0.021	0.353	0.021	0.359	0.005	0.323	0.005	0.295
UNEMP	0.026	0.113	0.027	0.102	0.001	0.863	0.001	0.855
Constant	0.602	0.796	0.462	0.845	2.618***	0.000	3.176***	0.000
Firm FE	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Adj. R^2	0.018		0.018		0.0981		0.0991	
Observations	28,080		28,080		25,901		25,901	

Table 12

Cross-sectional tests: importance of workers' perceived unemployment costs

This table presents the association between labor unemployment risk and cash holdings by the importance of workers' perceived unemployment costs. Labor intensity is measured as total employees (*EMP*) divided by net assets (*AT-CHE*). Layoff propensity the ratio of workers affected by extended mass layoffs to total industry employment. Low-wage workers are the proportion of workers earnings less than $50,000 per year. UI payment rate is the proportion of workers collecting unemployment benefit based in two digit SIC code. Above (below) median (labor intensity, layoff propensity, low-wage workers, and UI payment rate) is called industries with higher (lower) perceived unemployment costs. All other variables are defined in Appendix A. The *p*-values are calculated based on standard errors clustered at the state level. *, **, and *** represent two-tail significance levels of 10 percent, 5 percent, and 1 percent, respectively.

Panel A: Industries with higher perceived unemployment costs

	(1) High labor intensity		(2) High layoff propensity		(3) More low-wage workers		(4) High UI payment rate	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
$UI\_Benefit_{t-1}$	-0.237**	0.012	-0.201***	0.008	-0.263***	0.005	-0.214***	0.003
CF	0.750***	0.000	0.364***	0.000	0.361***	0.000	0.335***	0.000
NWC	-0.407***	0.000	-0.342***	0.000	-0.370***	0.000	-0.241***	0.001
CAPEX	-2.397***	0.000	-1.819***	0.000	-1.657***	0.000	-1.886***	0.000
LEV	-0.523***	0.000	-0.492***	0.000	-0.566***	0.000	-0.437***	0.000
ACQ	-1.359***	0.000	-0.844***	0.000	-1.160***	0.000	-1.176***	0.000
MB	0.004	0.691	0.027***	0.000	0.026***	0.004	0.037***	0.000
SIZE	0.175***	0.000	-0.001	0.951	0.008	0.693	0.013	0.332
R&D	0.135***	0.000	0.122***	0.000	0.144***	0.000	0.100***	0.000
DIV	-0.054*	0.058	-0.004	0.820	-0.011	0.545	0.011	0.561
IND_CF_VOL	0.059**	0.030	0.011	0.341	0.009	0.465	0.018*	0.073
GDPgrowth	0.006	0.470	0.004	0.363	0.006	0.212	0.007	0.157
UNEMP	0.004	0.754	-0.005	0.440	-0.008	0.477	0.006	0.463
Constant	2.584***	0.002	2.394***	0.001	2.955***	0.001	2.343***	0.000
Firm FE	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Adj. R^2	0.169		0.094		0.108		0.081	
Observations	14,858		18,369		16,683		15,848	

Table 12 (Continued.)

Panel B: Industries with lower perceived unemployment costs

	(1) Low labor intensity		(2) Low layoff propensity		(3) Fewer low-wage workers		(4) Low UI payment rate	
	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value
$UI\_Benefit_{t-1}$	-0.082	0.123	-0.250	0.187	-0.167	0.322	-0.199	0.184
CF	0.167***	0.000	0.625***	0.000	0.665***	0.000	0.673***	0.000
NWC	-0.296***	0.000	-0.346**	0.013	-0.317**	0.021	-0.452***	0.003
CAPEX	-1.091***	0.000	-2.849***	0.000	-3.161***	0.000	-2.634***	0.000
LEV	-0.374***	0.000	-0.689***	0.000	-0.600***	0.000	-0.722***	0.000
ACQ	-0.714***	0.000	-1.779***	0.000	-1.195***	0.000	-1.166***	0.000
MB	0.011***	0.009	0.023**	0.028	0.025***	0.004	0.013	0.261
SIZE	0.020	0.279	0.014	0.681	-0.012	0.571	-0.012	0.626
R&D	0.041***	0.000	0.110***	0.000	0.103***	0.000	0.118***	0.000
DIV	0.020	0.369	0.001	0.962	0.005	0.842	-0.017	0.527
IND_CF_VOL	0.007	0.565	0.034	0.169	0.035	0.111	0.012	0.594
GDPgrowth	-0.002	0.420	0.005	0.480	0.003	0.710	0.001	0.847
UNEMP	-0.007	0.425	0.015	0.417	0.008	0.464	-0.010	0.512
Constant	1.186**	0.015	2.903*	0.095	2.571*	0.058	3.064**	0.016
Firm FE	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Adj. R^2	0.042		0.107		0.098		0.110	
Observations	14,198		10,687		12,373		13,208	

Highlights:

- Firms conserve cash to manage employees' perceptions of the risk of becoming unemployed.
- There exists an economically and statistically significant association between decreases in cash holdings, following an increase in UI benefits (i.e., lower unemployment risk).
- The positive relation between cash holdings and unemployment risk is more pronounced for firms that are more labor intensive, have a high layoff propensity, have a higher fraction of low-wage workers, and are in industries with a higher fraction of UI recipients.
- Our results are consistent with the idea that cash holdings are affected by not only shareholders but also other stakeholders: namely employees.