Collective bargaining power and corporate cash policy☆

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ARTICLE INFO

ABSTRACT

This paper provides novel evidence on the role of labor unions in firms' corporate cash policy. Examining the unionization rates of firms across 29 countries for the period 2004–2015, we show that firms respond to an increase in unionization rate by decreasing their corporate cash holdings. The reported effect is symmetric, in that firms respond to increases (decreases) in unionization rate by decreasing (increasing) their cash buffers. These results are consistent with the bargaining hypothesis, namely, that firms strategically decrease their cash level to counter the rise in employees' bargaining power due to increased unionization. Additionally, we find that the negative effect of unionization on cash holdings is more pronounced in labor-intensive, large, high-growth, high profitability, and low labor productive firms. The countries' quality of institutions intensifies the documented relationship, what is in line with the cost economies theory. Moreover, we exploit shocks to the economies and show that increase in the unionization following a banking crisis influence negatively firm's cash levels. These findings are robust to different unionization variable constructions, alternative dependent variable definitions, controlling for potentially correlated time-variant firm characteristics, saturation of a dense set of fixed effects, and endogeneity concerns.

1. Introduction

Recent studies suggest that firms with a large amount of cash on their balance sheet are better placed to weather an unexpected downturn. Ramelli and Wagner (2020) and Fahlenbrach et al. (2020) find that the fall in stock prices following the COVID-19 outbreak was less significant for less leveraged firms and those with higher cash ratios. Furthermore, Joseph et al. (2020) show that firms with high cash levels performed significantly better during the 2008 Global Financial Crisis (GFC). However, higher cash levels mean higher costs for the firm. Moreover, a firms' cash levels may determine the management's bargaining power in negotiations with labor unions. According to the transaction cost economics (TCE) theory (Williamson, 1979), management should adjust the level of cash to optimize its bargaining position with the unions. In other words, the costs of cash levels are the transaction costs of the contract with the labor union, and it determines the contractual commitment of the parties to some extent.

Labor unions have long been a subject of controversy in the economics literature. In their seminal paper, Freeman and Medoff (1984) present two contrary views on labor unions that could prompt firms to adopt contradictory financial strategies. According to them, unions have a positive side in that they negotiate with employers for better terms and wages for employees. However, these gains are most likely to be at the cost of firms' profit, which will decrease from increased staff costs. Managements may therefore decide to adopt cash policies for their companies that would give them a better bargaining position in wage negotiation with labor unions. The idea is quite simple: the bargaining power of unions would be lower when the firm has low cash reserves (Klasa et al., 2009).

The negative side of unions is that they act as a cartel and use their bargaining power to raise the wages of employees beyond competitive levels. Furthermore, the wages in unionized firms are becoming more rigid, raising the operating risks of firms (Chen et al., 2011). Cavanaugh (1998) argues that unionized workers

acquire property rights over jobs. Thus, they can appropriate a portion of the quasi-rents generated from their employer's relationship specific investments in the firm's assets. Consequently, Cavanaugh (1998) also reports that as union density increases, firms exhibit lower profitability, investment, and employee growth. Additionally, these detrimental effects increase as the degree of asset specificity becomes larger because the assets become more non-redeployable to another user or use, thereby increasing the captured quasi-rents. Managements can respond to their increased risks by adopting more financial flexibility, or, in other words, maintaining higher cash levels. Moreover, by maintaining higher cash levels, managements make more credible their implied promises to employees (Gao et al., 2013).

These two contrasting views on labor unions represent the different effects of unions on firms' strategic financial policy choice. Freeman and Medoff (1984) argue that the positive impact of labor unions outweigh the negative consequences. Bryson (2014) shows that unions continue to generate a wage premium and reduce despite declining bargaining power. He points out that for the United States (US) and the United Kingdom (UK) a union membership wage premium vary between 10% to 15%, while for five European countries the union wage premium is zero or not significantly different from zero. This effect is mainly due to the fact that unions are also able to determine wage outcome in the non union sectors by collectively bargained rates. Bryson (2014) argue that although the wage premium has declined in developed countries in recent years, it remains sizable and statistically significant for most groups of employees. Thus, the study document that companies strived to improve their bargaining position in recent years.

Klasa et al. (2009) examined the industry data on unionization, to find strong support for the bargaining hypothesis. They suggest that the US firms facing persistent demands from powerful unions hold lower cash reserves to improve their bargaining position and protect their profits from such demands. However, Schmalz (2015) proposes that the causal effect of unionization on cash and debt levels is heterogeneous across US firms. He finds large (small) financially constrained US firms reducing (increasing) their cash levels but increasing (reducing) their leverage. Thus, the empirical evidence that firms strategically hold less cash in unionized firms to improve their bargain position remains ambiguous.

This paper re-examines the effect of labor unions on firms' cash holdings using unique data and a new conceptual framework that more accurately predicts the relation between unionization and cash holdings. Our framework is based on studies such as Klasa et al. (2009) that indicate that firm managements use cash holding policies to improve their bargaining power when negotiating with unionized workers. In contrast to studies in the literature, we use firm-level labor union data of a large sample of firms across 29 countries for the period from 2004 to 2015. From the firm-level financial position and unionization data, we document that the average firm responds to increases in unionization rate by decreasing its corporate cash holdings. This is consistent with the bargaining hypothesis, according to which companies strategically decrease their cash holdings to counter the rise in employees' bargaining power due to increased unionization. The reported effect is symmetric in that firms respond to an increase (decrease) in unionization rate by decreasing (increasing) their cash buffers. Moreover, we investigate whether the effects of unionization on cash holdings are heterogeneous across firms. We find that unionization has a very strong negative effect on the cash ratios of labor-intensive, large, high-growth, profitable, and low labor productive firms. Furthermore, we find that a better quality of countries' institutions intensifies the documented relationship. We argue that the results using the subsample analyses based on countries' quality of institutions provides additional evidence to the TCE theory. This is because our results show that changes in the firms' and govern-

ment's institutional environment affect the bargaining position of the contracting parties. These results support the arguments of Williamson (2000), who states that transactions are more difficult to conduct in countries with low quality institutions.

Next, we conduct an event study using the treatment effect estimation to isolate the endogeneity concerns. We employ the systematic banking crisis that results in increased firm unionization and investigate its impact on cash levels using a difference-in-differences (DID) strategy. We find that during a systematic banking crisis, the cash level of firms' declines more relative to the control group countries. Hence, the results of the event study support our hypothesis that the increased unionization results in lower cash levels. Moreover, the results provide further evidence to the TCE theory as the existing literature shows that labor unions strengthen because of a financial crisis (Kim and Kim, 2003). Furthermore, crisis periods are associated with high uncertainty which further increases transaction costs. Thus, in crisis periods, firms try to improve their bargain power with the unions by further lowering their cash levels. However, this strategy is risky as recent research shows that firms with higher cash levels are able to improve their competitive position during the recovery phase (Joseph et al., 2020).

To gain a higher degree of certainty that our interpretation of the firm-level results is correct, we address causality and endogeneity concerns, and consequently, exclude other explanations for the identified empirical patterns. Regarding the issue of causality, we use a dynamic model analysis and a placebo test. If our results are accidental or are driven by factors that are unaccounted for, a placebo test will falsify our findings. We re-estimate firm-level models based on random assignments of labor changes to firms. We find that neither of our conclusions is falsified by this test as statistically significant coefficients lie outside the bootstrap confidence intervals. Consequently, the results of the placebo test are consistent with the view that the changes in labor union and cash levels have a causal relationship.

We contribute to the literature in three ways. First, we expand the TCE theory by showing that the firm's management attempts to appropriate their position by increasing their bargaining position using cash. Williamson (1994) elaborates that TCE applies to contracting problems related directly, or indirectly, to a wide range of areas including labor organization, corporate governance, and finance. In the law and finance literature, the transaction costs perspective has been applied to explain theoretical decisions regarding contracts with labor unions. Williamson (1979) classifies the transaction as idiosyncratic; however, as far as we know, it has never been used in empirical work.

Second, we build on and complement Klasa et al. (2009) by confirming that unionized firms hold less cash. However, we extend Klasa et al. (2009) by using a cross-country sample of firm-level unionization data. Specifically, our variable covers the changes in employees' unionization as well as number of employees under collective bargaining agreements. Klasa et al. (2009) argue that firms strive to improve their bargaining position in negotiations with labor unions because labor costs generally account for a large part of a firm's total costs. Thus, our measure better captures the relationship between a firm and its labor unions because an increase in wages affects both the employees in a union as well as those under a collective bargaining agreement. Moreover, the effect of unionization on cash levels depends on the firm characteristics. Furthermore, unionization affects the cash levels of companies through collective bargaining. This is stronger in labor-intensive, large, high-growth, and low labor productive firms because the labor unions of these companies have more power; this also explains the different labor union effects on cash.

Third, a cross-country sample allows us to analyze how the countries' institutions affect the association between unionization

and corporate cash holdings. To the best our knowledge, this is the first study to show that unionization of workers affects the firm's cash holding polices, and that this effect is stronger in countries with high institutional quality. We believe that the bargaining power of unions and employees in countries with low institutional quality is weak, and that therefore companies in such countries do not need to improve their bargaining position against organized labor. In other words, companies ignore the unions in such countries, as can be seen in the literature.

The remainder of the paper is organized as follows. Section 2 summarizes the related literature and develops our hypothesis. Section 3 discusses our sample and empirical design. Section 4 presents the results of the main tests as well as a battery of sensitivity tests. The results of additional analyses are presented in Section 5. Finally, Section 6 concludes the paper.

2. Related literature

Our work contributes to the growing body of the literature investigating the relationship between labor market institutions and corporate liquidity management, particularly firms' cash policy which is the key to firms' financial flexibility. High corporate liquidity levels might prompt workers to raise their wage demands. Therefore, managements tend to improve their bargaining position with workers through active liquidity management. Consequently, the transactions with labor union have idiosyncratic quality.

2.1. Transaction cost economics and labor contract

According to Williamson (2010), TCE's main concept is to align transactions within the governance of a firm or externalized to the governance of market. Further, Williamson (1985) recognizes the specificity of the labor market and its idiosyncrasy associated with unionization. In his opinion, unions may help provide governance by providing an established means of representing workers' interests. Therefore, the management will be more likely to tolerate, or even encourage, union representation (see also Klein et al. (1978)). He argues that not all forms of union activity will be mutually beneficial as unions may still seek to benefit workers at the expense of the employer, and the management can be expected to oppose such efforts.

While the theoretical literature recognizes the importance of the TCE perspective for the labor market (Vogel, 1983; Cartier, 1994), empirical research on the topic remains scarce. Masters and Miles (2002) apply the TCE perspective to explain firms' increasing reliance on external labor arrangements. They provide evidence that the TCE perspective helps explain, to large extent, external labor use, while variables found to be important in the past only have an indirect effect on the decision. Tan and Mahoney (2006) employ the TCE perspective to explain and predict multinational firms' reliance on expatriates to provide managerial services in foreign subsidiaries. They find that transaction cost minimization played an important role in influencing the international staffing decision of Japanese multinational firms in the US. Tan and Mahoney (2006) also find that multinational firms strongly rely on expatriates; they argue that multinational firms that seek to develop localization strategies should try to reduce the contractual costs of host country nationals. In similar vein, Pérez and Pla-Barber (2005) analyze Spanish multinational companies' decision on whether to recruit expatriates or local managers in their companies' subsidiaries. They document that the TCE perspective explains firm's reliance on expatriates to manage foreign subsidiaries.

Meanwhile, Argyres and Liebeskind (1999) argue that unionized labor uses it bargaining power to restrict some forms of employment, particularly outsourcing. They present an example of General Motors's (GM) workers who were able to use their bargaining power to change the terms and condition of their basic contracts. As a result, GM was constrained in its ability to modify its labor agreements due to the union's bargaining power. Moreover, Argyres and Liebeskind (1999) present further examples on the truck and airline industries in the US. For example, in the airline industry, union bargaining power prevented a firm from carrying out organizational changes. In turn, this meant higher costs for the firm.

In our opinion, a unionized firm has an incentive to lower the bargaining power of the union. Doing so allows the firm to carry out necessary changes and suppress workers' demands. Thus, we expect that firms' try to influence their bargaining power with the labor union by adjusting their cash levels. This hypothesis is in line with Argyres and Liebeskind (1999), who argue that the greater the firm's relative bargaining power, the greater its ability to negotiate and curb contractual restrictions. Moreover, they state that TCE's primary concern is to identify the potential for changes in bargaining power and adjusting governance mechanisms to offset them.

2.2. Labor and corporate liquidity management

According to the bargaining argument, union power generally increases through financial leverage since managers try to improve their bargaining power over employees by reducing the firms' financial slack. Bronars and Deere (1991) present a positive correlation between leverage and unionization level as a proxy for labor bargaining power. This correlation was confirmed by Matsa (2010), who found that strong labor rights caused firms to choose high leverage at the cost of free cash flow to strengthen their bargaining position. Also, Lin et al. (2018) show that German firms subject to employee board representation mandate maintain higher leverage than similar firms not subject to the mandate.

In contrast, Simintzi et al. (2015), using international data, show that reforms that increase employment protection are associated with a significant reduction in leverage. They argue that an increase in employment protection raises the restructuring as well as fixed costs of a firm that has to pay independently of performance, that is, its operating leverage. Thus, firms react to an increase in employment protection by reducing their financial leverage. Chen et al. (2011) show that the constraints labor unions impose on firm operations affect the firms' equity costs, which are significantly higher in more unionized industries. Thus, empirical studies on the effect of unionization on capital structure, especially firm leverage, do not present uniform results.

Studies in the literature suggest that the dividend policy of a firm signals private information on the firm's prospects (Benartzi et al., 1997). Managers are required to choose their firm's dividend policy and are incentivized to convey their projected earnings to investors. However, the managers are constrained in that this signal could pass on to the union, who would then bargain for higher wages. Using descriptive analysis, DeAngelo and DeAngelo (1991) find that highly unionized firms cut their dividends when they face severe financial difficulties to send a credible signal to labor unions and win some concessions from them. However, through empirical analyses, DeAngelo and DeAngelo (1991) and Matsa (2006) show that collective bargaining only moderately reduces dividend payouts. Chino (2016) finds the effect of unionization on payouts across firms depending on the firms' profitability. He shows that the effect is negative for low-profitability firms but positive for high-profitability ones. This finding documents that the effect of unionization is not heterogeneous across firms.

This is similar to the findings of Ghaly et al. (2015), who show a positive relation between employee-friendly practices and cash holdings. Their arguments are based on the stakeholder theory prediction that firms are incentivized to make their implied promises

to employees credible by maintaining high cash levels. They use an index to measure employee well-being, and find the employee welfare index (EWI) effect on cash holdings to be positive and significant only for human-capital-intensive firms and high-tech industries. Moreover, they find that the EWI explains the choice of cash holdings only in highly competitive and high-labor-mobility industries. These results confirm that unionization does not have a uniform effect on liquidity management, which could vary by the firms' characteristics. Thus, we hypothesize that the effect of unionization on cash is not homogeneous and strongly depends on the firms' characteristics.

2.3. Labor and corporate cash

Several studies have examined the effects of labor unions on corporate cash holdings. Klasa et al. (2009) find that unionized industries in the US hold relatively lower cash levels. They argue that US firms hold less cash to gain a better bargaining position in negotiations with labor unions and shelter their corporate income from union demand (bargaining-power effect). In support of this argument, they show that unionized firms holding higher cash levels face a higher probability of labor strikes. Schmalz (2015) investigated how unionization affected the policies of US firms, to obtain results consistent with the bargaining-view predictions. He shows that the average US firm facing a unionization election reduces its cash-to-asset ratio and increases its leverage.

In contrast, Cui et al. (2018) show that labor-intensive firms in China significantly increased their cash holdings after China passed its Labor Contract Law (LC Law). This law significantly raised the employment protection in China, but Cui et al. (2018) point out that it does not allow collective bargaining. They found that as the law increased the labor costs of companies, the companies increased their cash holdings. Thus, they propose that we need to consider the institutional framework to better understand the employment protection implication for firms. Karpuz et al. (2020) examine the data of 20 OECD countries from 1985 to 2007, to obtain similar results. They show that when the employment protection law (EPL) of a country becomes stricter, firms in the country increase their cash holdings significantly. They feel that strong EPLs make the firing and hiring of employees more difficult and less timely. This implies higher operating leverage and distress risk level for firms due to greater fixed wage claims. Therefore, Karpuz et al. (2020) hypothesize that stringent EPLs result in greater precautionary demand for cash to counter the increased operational risk of firms ('labor adjustment cost effect').

One explanation for these results is that improved labor laws do not necessarily lead to increased bargaining power for employees. Rajan and Zingales (2004) show that influential and powerful groups such as unionized workers, who they call incumbents, hinder change at the cost of outsiders. According to them, incumbents are well organized and therefore more efficient than dispersed groups, who have no focused agenda. They argue that because unionized workers are powerful, companies may have to adjust their cash levels and gain a better bargaining position to deal with them. In contrast, changes in employee laws do not threaten the bargaining position of firm management teams, who are probably better organized than dispersed employees. Therefore, even significant changes in employee laws do not necessarily increase their bargaining position because their ability to use it against the company is limited.

Overall, existing studies present mixed evidence on how labor unions affect firms' capital structure and corporate cash. One explanation for the different results is that the majority of studies employ only country-level data. Moreover, the studies proxy the labor union effect using data on industry unionization or the implementation of labor reforms.

The novelty of this study is that we use cross-country corporate-level unionization data of both developed and developing countries. We also analyze the effect of unionization on cash holdings to find the company characteristics and institutional setting. We therefore feel that the results of this study can generally fill the gap in the existing literature.

3. Empirical model and data

3.1. Methodology

To study how labor unions affect the cash holdings of corporates, we use our empirical models and apply the conservative method of running pooled (panel) ordinary least squares (OLS) regression in the paper. Our basic model takes the form

$$Cash_{i,j,t} = \alpha_i + \beta_1 Union_{i,j,t-1} + \beta_2 X_{i,j,t-1} + \beta_3 Y_{j,t-1} + \gamma_i$$
$$+ \eta_{k \times t} + \varepsilon_{i,j,t} \tag{1}$$

where individual firms are denoted by subscript i, countries by j, industries by k, and years by t. $Cash_{i,j,t}$ is one of the two dependent variables used in regressions reflecting corporate cash holding. As our main dependent variable of cash ($Cash_1$), we use the sum of cash and cash equivalents divided over total assets minus cash and equivalents. As a robustness check, we also employ the ratio of cash over total assets minus cash ($Cash_2$).

The main variable of interest is the one-period lagged firm-level unionization indicator, $Union_{i,j,t}$. It measures the changes in bargaining power of unionized workers in a firm. This indicator is scaled from −1 to 1, where 1 indicates an increase in the percentage of employees registered with independent trade unions or covered by collective bargaining agreements, and −1 indicates a decrease in percentage of employees registered with independent trade unions or covered by collective bargaining agreements. Additionally, 0 indicates no changes in union bargaining power in the company. In a complementary study, we employ two additional binary variables to examine how a company's unionization rates affect its cash holdings. To examine the (a) symmetric labor union effects on cash holdings, we replace the $Union_{i,j,t}$ variable in Eq. (1) with $Union_{up}$, which takes the value of 1 when the percentage of employees registered with independent trade unions or covered by collective bargaining agreements increases, and zero otherwise. Thus, this variable captures only the increase in unionization. Conversely, we replace the $Union_{i,j,t}$ variable in Eq. (1) with $Union_{down}$ which takes the value of 1 when the percentage of employees registered with independent trade unions or covered by collective bargaining agreements decreases, and zero otherwise. This variable captures only the decrease in unionization.

In contrast to existing studies, we calculate our variables using firm-level data. Empirical studies in the literature use industry unionization rates as proxy for labor bargaining power. More importantly, our variable shows the changes in employees' unionization as well as number of employees covered by collective bargaining agreements. Hence, our measure is more precise and broader than the traditional measure. We believe that our measure better captures the potential effect of labor unions on cash since it covers all the employees in a firm covered by collective bargaining agreements.

The vector of covariates $X_{i,j,t}$ is the one-period lagged set of firm characteristics determining the cash holdings of companies. In our regression analysis, we consider the standard firm-level set of explanatory variables for corporate cash, as identified in the literature [see Opler et al. (1999), Bates et al. (2009), Gao et al. (2013)]: size (defined as the logarithm of total assets) is a control variable for degree of diversification and thus the risk of default; market value to book value (MBV; this is the ratio of equity market value to book

value), capital expenditures (CAPEX is defined as capital expenditure over total assets), and sales growth (defined as the change in sales from previous year) are indicators of investment and growth opportunities; leverage (defined as total debt over total assets) and tangible assets (defined as net property, plant, and equipment over total assets) are proxies for amount of access to external funds and the collateral that a firm can pledge; research and development expenses (R&D is defined as R&D over sales) is a proxy for information asymmetries; cash flow (defined as operating cash flows scaled by total assets), net working capital (NWC is defined as the net working capital over total assets), and profitability (ROA is the ratio of net income before preferred dividends over total assets) are proxies for the possibility to generate internal funds; and dividend (a dummy variable that take the value of 1 for dividend-paying firms, and zero otherwise) is a proxy for the availability of internal funds.

The vector of covariates $Y_{j,t}$ represents the one-period lagged variables that control for country-level differences. We employ the GDP and GDP per capita (GDPpc) to control for the differences in macroeconomic conditions and income across countries. We control for institution quality (Institutions), a composite index of corruption, law and order, and bureaucratic institutions. We also control for the investment profile (Investment) to capture the differences in enforcement of law and investor protection across countries. We proxy the investment environment using the composite risk of the expropriation or contract viability index, payment delays, and profit repatriation. Each component in both indices is scored on a scale from 0 (very high risk) to 4 (very low risk). Table A2 provides a detailed definition of the variables used and the data sources.

Moreover, we include firm effects (γ_i) to control for the firm-level unobservable characteristics affecting the firms' cash holdings and industry × year fixed effects ($\eta_{k \times t}$) in our estimations, because some time-varying industry characteristics-such as investment opportunities-might affect the cash holdings of firms.

3.2. Data

Our sample consists of the firm-level unionization data of 939 companies in 29 countries for the period from 2004 to 2015, which we obtain from ASSET4. We drop the observations of firms with negative balances of total assets, net sales, and cash. The sample shows an increasing trend in number of observations, from 54 in 2004 to 663 2015. The largest three countries in terms of number of observations are the US (2363 firm-years), Canada (381 firm-years), and South Africa (167 firm-years). In contrast, the smallest three countries are Indonesia (14 firm-years), Belgium (19 firm-years), and Greece (26 firm-years). The sample distribution by country is shown in Appendix Table A1.

Table A1 presents the average firm-level unionization and corporate cash holdings by country. Our sample includes both developed and developing countries and hence shows large variations in unionization and cash holding levels. Turkey and China show the highest unionization level, while Belgium and Canada show the lowest. Belgium is one of the countries with lowest cash levels; the US and Israel have the lowest levels.

We match the unionization data and firm-level financial data from Worldscope. We exclude the firm-year observations of regulated industries. Our final sample is an unbalanced panel of 4952 firm-year observations. We employ country-level control variables, and use GDP and GDP per capita from the WDI World Bank; the indices for institutional and investment quality are constructed using the International Country Risk Guide (ICRG).

In Table 1 reports the mean, median, 25th and 75th percentiles, and standard deviation of the main variables used in the analysis. The average ratio of $Cash_1$ for the sample is 16.92%, while

Table 1
Summary statistics.

Variable	Mean	Std. dev.	P25	Median	P75
$Cash_1$	16.92	22.09	4.28	9.43	19.23
$Cash_2$	9.15	10.20	2.18	5.78	11.99
Unionization	−0.04	0.72	−1.00	0.00	0.00
$Unionization_{up}$	0.24	0.43	0.00	0.00	0.00
$Unionization_{down}$	0.28	0.45	0.00	0.00	1.00
Size	15.93	1.36	14.96	15.85	16.83
MBV	2.95	2.75	1.32	2.11	3.44
Leverage	26.33	16.88	14.77	24.91	36.35
Tangibility	34.99	22.68	15.46	31.76	51.22
NWC	13.21	16.20	1.60	9.94	22.18
Cash Flow	17.39	12.49	8.22	14.23	25.43
CAPEX	6.29	5.13	2.64	4.80	8.47
R&D	0.02	0.03	0.00	0.00	0.01
Dividend	0.76	0.43	1.00	1.00	1.00
Sales	7.58	19.06	−2.54	5.85	15.84
ROA	6.90	7.29	3.50	6.63	10.55
GDP	29.09	1.37	28.05	29.27	30.37
GDPpc	10.50	0.71	10.60	10.78	10.85
Institutions	12.23	2.49	12.58	13.00	13.50
Investment	10.89	1.83	10.50	11.75	12.00

The table provides the summary statistics of regression variables for the full sample of 4952 firm-year observations from 939 companies in 29 countries for the years 2004–2015. The variable definitions are in appendix in Table A1.

that of $Cash_2$ for the firms in the sample is 9.15%. The firm- and country-level standard deviations are 22% and 10%, respectively, suggesting a remarkable variation in cash reserves across firms. The mean for unionization is slightly negative, indicating a decline in unionization level across firms during the 2004–2015 period. The remaining firm- and country-level control variables exhibit substantial variation due to the cross-sectional differences across firms and countries.

4. Results

4.1. Collective bargaining and corporate cash holdings

Table 2 shows our baseline regression results. The dependent variable in columns (1)–(3) is $Cash_1$, while that in columns (4)–(6) is $Cash_2$. The variable of interest in columns (1) and (3) is $Union$, which encodes the changes in firms' unionization. The coefficient of the variable is negative and statistically significant at the 1% level in both specifications. Similarly, the coefficient of the binary variable $Union_{up}$ is negative and statistically significant and the coefficient of $Union_{down}$ is positive and statistically significant for the firms' cash levels. Our results thus show that the firms' cash policy responds negatively to unionization; this is consistent with the bargaining-power hypothesis. The unionization effect on cash levels is symmetric. Companies decrease (increase) their cash levels in response to an increase (decrease) in unionization rate.

The coefficient of firm-level control variables such as firm size, leverage, and CAPEX is negative and statistically significant and that of variables net working capital and cash flows is positive and statistically significant in all specifications. Overall, the results for firm-level variables are as in Opler et al. (1999), Bates et al. (2009), Gao et al. (2013).

The literature shows several ways to proxy for the unionization of firms or industries. We therefore analyze the sensitivity of our results to the choice of the unionization variable. We present the results using the alternative measures of unionization in Table 3. In all of the following specifications, the firm-level and macroeconomic control variables influence the dependent variable in the directions shown in Table 2. Moreover, these variables do not change their statistical significance, with the coefficients being highly stable in magnitude. To keep the following tables concise, we

Table 2
Collective bargaining and corporate cash holdings.

	(1)	(2)	(3)	(4)	(5)	(6)
Unionization	−0.429***			−0.365***		
	(2.96)			(2.85)		
Unionization$_{up}$		−0.629**			−0.839***	
		(2.41)			(3.53)	
Unionization$_{down}$			0.829***			0.411*
			(3.06)			(1.72)
Size	−5.967***	−5.967***	−5.973***	−3.746***	−3.739***	−3.752***
	(4.63)	(4.63)	(4.64)	(4.69)	(4.69)	(4.71)
MBV	0.069	0.071	0.066	0.089	0.091	0.087
	(0.53)	(0.54)	(0.51)	(1.00)	(1.02)	(0.98)
Leverage	−0.063*	−0.063*	−0.063*	−0.055**	−0.055**	−0.055**
	(1.68)	(1.68)	(1.68)	(2.33)	(2.34)	(2.33)
PPE	−0.052	−0.052	−0.051	−0.015	−0.016	−0.015
	(1.24)	(1.25)	(1.23)	(0.51)	(0.52)	(0.51)
NWC	0.394***	0.393***	0.394***	0.108***	0.108***	0.108***
	(8.25)	(8.24)	(8.25)	(3.21)	(3.21)	(3.20)
Cash Flow	0.200***	0.199***	0.200***	0.082**	0.082**	0.082**
	(3.68)	(3.68)	(3.69)	(2.02)	(2.02)	(2.03)
CAPEX	−0.510***	−0.511***	−0.511***	−0.232***	−0.231***	−0.234***
	(8.08)	(8.10)	(8.08)	(4.68)	(4.67)	(4.70)
R&D	−61.173	−61.001	−61.160	127.164***	127.048***	127.410***
	(0.97)	(0.97)	(0.97)	(4.72)	(4.71)	(4.73)
Dividend	−1.376*	−1.356*	−1.380*	−0.708	−0.712	−0.685
	(1.73)	(1.70)	(1.74)	(0.94)	(0.95)	(0.91)
Sales	−0.003	−0.003	−0.003	−0.010	−0.010	−0.010
	(0.22)	(0.22)	(0.21)	(0.96)	(0.97)	(0.95)
ROA	−0.021	−0.020	−0.021	−0.023	−0.023	−0.022
	(0.41)	(0.41)	(0.41)	(0.63)	(0.64)	(0.61)
GDP	−15.676	−15.903	−15.724	37.447**	37.528**	37.119**
	(0.72)	(0.73)	(0.72)	(2.30)	(2.31)	(2.27)
GDPpc	20.843	21.038	20.935	−35.436**	−35.561**	−35.089**
	(0.96)	(0.97)	(0.96)	(2.15)	(2.16)	(2.12)
Quality of Institutions	0.649	0.667	0.623	0.518	0.546	0.501
	(1.04)	(1.07)	(0.99)	(1.14)	(1.21)	(1.10)
Investment Profile	−0.766***	−0.769***	−0.762***	−0.332	−0.337	−0.330
	(2.90)	(2.91)	(2.88)	(1.60)	(1.63)	(1.58)
Adjusted R^2	0.846	0.846	0.846	0.643	0.643	0.642
Observations	4,952	4,952	4,952	4,500	4,500	4,500

The table reports the effects of collective bargaining on corporate cash holdings. The coefficient estimates are obtained using an OLS regression model. The dependent variable in columns (1)–(3) and (4)–(6) are Cash$_1$ and Cash$_2$, respectively The variables of interest are one-period lagged Unionization, Unionization$_{up}$, and Unionization$_{down}$. Variable definitions are in appendix Table A1. All the regressions include firm and industry × year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered by firm. t-Statistics are in parentheses. ***, **, * Denotes significance at the 1%, 5% and 10% level, respectively.

Table 3
Collective bargaining and corporate cash holdings – alternative construction of unionization.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Change in unionization ratio						
Unionization	−3.590**			−4.468**		
	(2.19)			(2.58)		
Unionization$_{up}$		−.187**			−3.820**	
		(2.18)			(2.07)	
Unionization$_{down}$			4.630			8.156**
			(1.45)			(2.17)
Adjusted R^2	0.846	0.846	0.846	0.643	0.642	0.643
Observations	4,952	4,952	4,952	4,500	4,500	4,500
Panel B: Unionization shock						
Unionization	−0.493***			−0.635***		
	(2.84)			(3.63)		
Unionization$_{up}$		−0.449**			−0.837***	
		(1.96)			(3.59)	
Unionization$_{down}$			0.881***			0.808**
			(2.72)			(2.57)
Adjusted R^2	0.846	0.899	0.846	0.643	0.643	0.643
Observations	4,952	4,952	4,952	4,500	4,500	4,500

The table reports the effects of collective bargaining on corporate cash holdings. The coefficient estimates are obtained using an OLS regression model. The dependent variable in columns (1)–(3) and (4)–(6) are Cash$_1$ and Cash$_2$, respectively. The variables of interest are Unionization, Unionization$_{up}$, and Unionization$_{down}$. The variable in Panel A is calculated on the actual change in unionization rate from the previous year. The variable of interest in Panel B focuses only on the major changes in unionization rate. All the regressions include one-period lagged firm-level variables and macroeconomic control variables, as specified in Table 2, and include the firm and industry × year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered by firm. t-Statistics are in parentheses. ***, ** Denotes significance at the 1% and 5% level, respectively.

present only the estimation results for the unionization variables[1].

In Panel A, for the main dependent variable *Unionization*, we use the actual change in firms' unionization. As in previous studies, we use the two variables $Union_{up}$ and $Union_{down}$ to control for the increase and decrease in firms' unionization ratios, respectively. $Union_{up}$ focuses only on the positive changes, while $Union_{down}$ focuses only on the negative changes. The results in Panel A confirm our previous findings of a positive relation between firm unionization and cash levels. The coefficient of unionization ratio shown in columns (1) and (4) is negative and statistically significant at the 5% level. The variables representing changes (positive/negative) are also in line with our previous results. The coefficient of the variable of interest shown in columns (2) and (5) is negative and significantly related to the cash level, whereas that shown in columns (3) and (6) is positive and significant only in the second specification. These results are also economically important; from column (1), ceteris paribus, firms will reduce their cash levels by up to 0.21% (3.59/16.92) if the unionization ratio of the firm increases by 1%.

In Panel B, as previously, we use the binary variable *Unionization* to measure the unionization in a firm. It takes the value of 1 when the change in unionization in a firm is greater than the median change in unionization across all sample firms in year t, and zero otherwise. The binary variables $Union_{up}$ and $Union_{down}$ take the value of 1 when the increase or decrease in unionization is greater than the median, respectively, and zero otherwise. In line with our previous findings, the coefficients of the variables *Unionization* and $Union_{up}$ are negative and statistically significant at least at the 5% level. Conversely, the coefficient of the variable $Union_{down}$ is positive and statistically related to the firm cash levels. Thus, these results confirm our findings that firms adapt their cash policies as the unionization level changes within the firm.

4.2. Effects of transaction costs on collective bargaining

Next, we analyze the causal effects of unionization in subsamples of firms. Following Schmalz (2015), we assume that some mechanism may be more important than others in subsets of firms. To investigate the effects of transaction costs on collective bargaining, we split our sample by firm-level characteristics and the countries' institutional framework. Dividing the sample allows us to investigate whether the transaction cost determines the bargaining effect between management and labor unions. We use median values to divide the sample. The results are shown in Table 4. The dependent variable in columns (1)–(3) is $Cash_1$, while that in columns (2)–(4) is $Cash_2$.

Panel A shows the results where we use labor intensity, measured by dividing the firms' labor costs by sales, to divide the full sample. The coefficient in columns (1) and (2) is negative and significant at the 1% level for high labor-intensive firms. In columns (3) and (4), the magnitudes are similarly large for low labor-intensive firms, but none of the estimates is statistically significant. Our findings contrast the results of Cui et al. (2018), who compare the changes in cash holdings of high labor-intensive and low labor-intensive firms before and after enactment of the LC Law. They find that high labor intensity leads to a relative increase in cash holdings after introduction of the LC Law. In their opinion, improvement in law does not provide a collective bargaining mechanism, to explain the different results.

In most countries, employer organizations better represent medium and large firms than small firms. Indeed, in some countries such as Japan, labor unions have no representation at all in small

Table 4
Heterogeneous effects of collective bargaining on corporate cash holdings.

	(1)	(2)	(3)	(4)
Panel A: High vs. low labor intensity				
Unionization	−0.835**	−0.948***	−0.132	−0.417
	(2.07)	(3.31)	(0.46)	(1.60)
Adjusted R^2	0.77	0.66	0.83	0.59
Observations	1,005	967	982	972
Panel B: Large vs. small firms				
Unionization	−0.453***	−0.517***	−0.283	−0.018
	(2.94)	(3.49)	(1.02)	(0.08)
Adjusted R^2	0.82	0.54	0.85	0.67
Observations	2,455	2,309	2,428	2,119
Panel C: High vs. low growth firms				
Unionization	−1.088***	−0.545***	−0.097	−0.217
	(4.70)	(2.92)	(0.49)	(1.29)
Adjusted R^2	0.85	0.68	0.86	0.62
Observations	2,366	2,145	2,343	2,101
Panel D: High vs. low profitability				
Unionization	−0.759***	−0.643***	−0.204	−0.197
	(2.96)	(2.97)	(1.30)	(1.19)
Adjusted R^2	0.86	0.69	0.89	0.61
Observations	2,304	2,068	2,322	2,103
Panel E: High vs. low labor productivity				
Unionization	−0.214	−0.081	−0.648***	−0.461**
	(1.15)	(0.42)	(2.71)	(2.38)
Adjusted R^2	0.87	0.66	0.85	0.66
Observations	2,298	2,119	2,294	2,034
Panel F: Better vs. poor quality of institutions				
Unionization	−0.625***	−0.625***	−0.032	−0.127
	(3.06)	(3.24)	(0.15)	(0.68)
Adjusted R^2	0.85	0.67	0.86	0.66
Observations	2,928	2,497	1,908	1,858

The table reports the effects of collective bargaining on corporate cash holdings. The coefficient estimates are obtained using an OLS regression model. The dependent variable in columns (1) and (3) is $Cash_1$, and in columns (2) and (4) is $Cash_2$. The variable of interest is one-period lagged Unionization in the panels. Variable definitions are in appendix Table A1. All the regressions include one-period lagged firm-level variables and macroeconomic control variables, as specified in Table 2, and include the firm and industry × year fixed effects. t-Statistics are in parentheses. ***, ** Denotes significance at the 1% and 5% level, respectively.

companies. Moreover, employer organizations tend to represent medium and large firms in terms of employees (OECD, 1997). Thus, we assume that the collective bargaining of labor unions is stronger in larger firms. In other words, labor unions have stronger effect on the cash levels of larger firms than smaller ones. Panel B shows the results when assets are used as a measure of firm size to divide our sample. In the subsample of large firms presented in columns (1) and (2), the coefficient of unionization is negative and statistically significant at the 1% level. However, in the subsample of small firms shown in columns (3) and (4) also the coefficient of unionization is negative, but statistically insignificant. In our opinion, these results confirm that stronger the unionization, the stronger is its effect on cash levels.

Schmalz (2015) documents that unionization raises the cash ratios of financially unconstrained firms. However, he shows that financially constrained firms reduce their cash but increase their leverage. We may therefore assume that unionization has a weak effect on cash in firms that do not perform well. Panel C presents the results where Tobin's q is used as a measure of firms' growth potential to divide the sample. The coefficient of unionization is negative for all specifications, and is statistically significant for the subsample of firms whose growth potential is presented in columns (1) and (2). Similar results are obtained when return on equity is used as a measure of firms' profitability and the sample is divided into

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[1] All the results can be obtained from the authors upon request.

two subsamples. Panel D shows negative results for unionization in all specifications again. However, the coefficient is statistically significant for the subsample of firms with higher profitability presented in columns (1) and (2). Thus, we find further evidence that unionization has different effects across firms depending on their performance.

The benefits of unionization can be assumed to be large, particularly for workers who can be easily replaced in the absence of unionization. In contrast, the benefit of unionization should be small for workers who cannot be easily replaced even in the absence of unionization. We test our assumptions using labor productivity, measured by sales per employee, and divide the sample into two subsamples. The results in Panel E are as expected. The coefficient of unionization is negative in all specifications, but is statistically significant for the subsample of firms with lower productivity presented in columns (1) and (2). Thus, the results document that unionization has different effects across workers and consequently, across firms.

The TCE theory predicts that labor unions are stronger in countries with strong legal law (institutions) as transactions are easier to take place. Moreover, we may assume that workers' rights are better protected in countries with higher quality institutions, including their right to bargaining power to improve working conditions. Williamson (2000) argues that getting the institutional environment right is logically prior to getting the transactions right. Hence, based on the TCE theory, labor unions should have more power in countries with higher institutional quality, where the effect on cash levels should be stronger. Panel F shows the results where we divide the sample using the index for institutional quality of the country. The coefficient of unionization is negative in all specifications. However, as expected, the results are stronger for countries with higher institutional quality. The coefficients in columns (1) and (2) are significant at the 1% level, and statistically insignificant in columns (3) and (4). The results support the TCE theory. This indicates that labor unions are stronger in countries with better institutional quality, which in turn influences the bargaining effect.

Overall, our results support the idea that transaction costs determine the bargaining effect, assuming a negative relationship between the cash-to-assets ratio and increased firm unionization. In line with the TCE theory, we find that the bargaining effect varies across firms and countries. Those differences are the result of changes in the symmetry of the relationship between the management and the labor union, and the effect of the institutional framework. These, in turn, impact transaction costs. Our findings supplement Schmalz (2015) who reports different unionization effects for financially constrained and unconstrained firms. He assumes that financially constrained firms cannot freely adjust their financial policies. Our results support this view, but also show that other firm-level characteristics may determine the response of firms to unionization. Moreover, we show that the countries' institutional quality plays an important role and explains the causal effect of firms' response to unionization. The results are in line with Williamson (2000), who argues that the institutional framework has an important effect on the transaction costs.

4.3. Event study

To further identify the causal relation between unionization and firms cash level, we conduct an event study using a DID strategy. As an exogenous shock to unionization, we explore the systematic banking crisis in a country during the GFC. Kim and Kim (2003) show that the South Korean financial crisis of 1997 had a positive effect on the labor unions. They document that the crisis reversed the declining trend of unionization of workers. Moreover, they show that the movement toward industrial unionization increased dramatically after the crisis, and was accompanied by increasing

Table 5
Banking crisis, labor unions, and cash holdings.

	1	2
Unionization	−0.224	−0.367**
	(1.04)	(2.39)
Unionization × Crisis	−1.845**	−1.327**
	(2.29)	(2.08)
Crisis	−1.027	−0.792
	(0.80)	(0.81)
Adjusted R^2	0.847	0.644
Observations	4,952	4,500

This table reports the effects of collective bargaining on corporate cash holdings during a systematic banking crisis. The coefficient estimates are obtained using an OLS regression model. The dependent variables in columns (1) and (2) are Cash$_1$ and Cash$_2$, respectively. The variable Unionization takes the value of $1(-1)$ when the percentage of unionized employees increases (decreases), and zero otherwise. The variable Crisis takes the value of one if a country experiences a systematic banking crisis, and zero otherwise. All the regressions include one-period lagged firm-level variables and macroeconomic control variables, as specified in Table 2, and include the firm and industry × year fixed effects. t-Statistics are in parentheses. **Denotes significance at the 5% level.

strike activity. Consequently, the response of the Korean employees to the crisis was unionization, which was then consolidated and was able better to protect labor interest. Moreover, Akdogu et al. (2019) document that unions were more open to restructuring in the form of mergers during the global financial crisis of 2008. document that unions were more open to restructuring in the form of mergers during the GFC. These results are in contrast to previous studies showing that normally, unionized firms resist takeovers more (Tian and Wang, 2020); however, in dire times, the unions resist less as it may affect the firms' survival (Akdogu et al., 2019).

Consequently, a financial crisis has two contrasting effects on the labor market. First, in most cases, a financial crisis results in increased unemployment and widened income inequalities. In contrast, the existing evidence shows that a crisis increases the reliance on trade unionism to defend the employees' interest in periods of uncertainty. Moreover, trade unions are more open to restructuration when firms' survival is at risk. Thus, firms may have a further incentive to use low cash levels to bargain in negations with the unions.

Following the literature, we employ the systematic banking crisis in a country during the GFC as a shock to firm's unionization level, and examine how corporate cash holdings change before and after such a shock across countries are and are not affected directly by the crisis. We employ a DID strategy by introducing an interaction term of the variables Crisis and Unionization to examine how a change in firms' unionization determine their corporate cash holdings. Crisis takes the value of one if a country underwent a systematic banking crisis during the GFC, and zero otherwise. We use the study of Laeven and Valencia (2013) to identify countries with systematic banking crisis and the duration of the crisis.

Table 5 reports the regression results in columns (1) and (2) where the dependent variables are Cash$_1$ and Cash$_2$, respectively. The results show that the increase in unionization negatively influences the firms' cash holding as the coefficient of unionization is negative and statistically significant in column (2). As expected, we find that a financial crisis is negatively related with a firm's cash holding. However, the coefficient for crisis is insignificant in both specifications. In contrast, we find that the interaction term between unionization and crisis is negatively and significantly related to firms' cash holding, at least at the 5% level. Hence, the results indicate that increased unionization during a systemic banking crisis is negatively related to corporate cash holding. Consequently, the results of the event study support the bargaining hypothesis, namely, that firms decrease their cash levels to counter

Table 6
Collective bargaining and corporate cash holdings – dynamic model.

	(1)	(2)
Unionization$_{y-2}$	−0.237	−0.356
	(0.93)	(1.59)
Unionization$_{y-1}$	−0.101	−0.118
	(0.36)	(0.44)
Unionization$_{y0}$	−0.222	−0.166
	(0.72)	(0.65)
Unionization$_{y+1}$	−0.846***	−0.799***
	(2.88)	(3.02)
Unionization$_{y+2}$	−0.494**	−0.361*
	(2.09)	(1.68)
Adjusted R^2	0.86	0.66
Observations	2,999	2,559

The table reports the effects of collective bargaining on corporate cash holdings in a dynamic model. The coefficient estimates are obtained using an OLS regression model. The dependent variable in column (1) and (2) are Cash$_1$ and Cash$_2$, respectively. The variable of interest is Unionization for each firm and time period $t = -2$ to $t + 2$. Variable definitions are in appendix Table A1. All the regressions include one-period lagged firm-level variables and macroeconomic control variables, as specified in Table 2, and include the firm and industry × year fixed effects. t-Statistics are in parentheses. ***, **, * Denotes significance at the 1%, 5% and 10% level, respectively.

the rise in employees' bargaining power due to increased unionization.

5. Robustness tests

Here, we address two main concerns that may potentially hamper the interpretation of our results and invalidate the conclusions. These concerns are related to the causality and selection problems. We further test the validity of our results after augmenting the sample and using alternative variables.

5.1. Causality concerns

Our results till now suggest that that the management responds to unionization by decreasing the firms' cash levels to obtain a better bargaining position. The results in Table 2 strongly supports this notion. However, this should not be interpreted as the causal effect of unionization. One endogeneity concern is the reverse-causality argument. Employees with low cash levels may be more likely to seek unionization to protect their job. In other words, unionization is the employees' response to their own low cash levels.

We address the endogeneity problem by analyzing the relationship between cash levels and changes in unionization during a five-year period. Columns (1) and (2) in Table 4 give the results when the dependent variables are $Cash_1$ and $Cash_2$, respectively. In case of reverse causality, low levels of cash would not be the unionized firm's response to unionization. Thus, low cash levels lead to unionization in firms and the unionization effect.

The coefficients of the variable controlling for changes in firms' unionization one or two years in advance are negative and statistically insignificant. Likewise, the coefficient of contemporaneous changes in a firm's unionization is negative and insignificantly related to the changes in its cash level. Thus, we find no evidence that unionization is the effect of low cash in firms.

Conversely, the coefficients of one-year and two-year lagged changes in unionization are negative and statistically significant. The coefficients of one-period lagged changes in unionization are the largest, and statistically significant at the 1% level. Hence, as the results suggest, companies adjust their cash levels in the year following the change in unionization rate. Thus, we can interpret our results as a causal relationship, but this is not a precise test for the direction of the relationship.

Table 7
Placebo test.

	1	2	3	4	5	6
Unionization	−0.065	−0.047	−0.047	−0.132	−0.119	−0.109
	(0.34)	(0.27)	(0.27)	(1.00)	(0.92)	(0.84)
Adjusted R^2	0.823	0.846	0.846	0.619	0.641	0.642
Observations	4,952	4,952	4,952	4,500	4,500	4,500

The table reports the estimates from the placebo test. The coefficient estimates are obtained using an OLS regression model. The dependent variables in columns (1)–(3) and (4)–(6) are Cash$_1$ and Cash$_2$, respectively. The variable Unionization, representing changes in unionization, is assigned randomly in the regressions. All the regressions include one-period lagged firm-level variables and macroeconomic control variables, as specified in Table 2, and include the firm and industry × year fixed effects. t-Statistics are in parentheses.

In Table 6, we present the effects of unionization controlling for time. This does not directly prove that the management responds directly to unionization. To address this causality concern, we perform a placebo test as a robustness check. It may be possible that our results are driven by unobserved or unaccounted factors, and not by the changes in unionization. To exclude this accidental character of our findings, we randomly assigned the changes of unionization to firms in our sample.

In Table 7, we provide the results of the placebo test. We find that the coefficient of unionization is now insignificant in all specifications. Therefore, the results of the placebo test support our initial claim that the presence of labor unions affects the level of firm cash holdings.

5.2. Propensity score matching

Next, there may be a potential selection bias in our study since a firm's level of unionization is unlikely to be exogenous, and may rather be related to observable characteristics such as firm size, profitability, or leverage. Accordingly, following Rosenbaum and Rubin (1983), we use propensity score matching (PSM) to reduce selection bias. Such matching allows a comparison of outcomes to be performed using treatment and control groups which are as similar as possible. We classify firms as treated (control) group when they have an above (below) median unionization ratio. We compare the treatment and control groups of the PSM samples based on the firm level control variables.

Panel A of Table 8A confirms the rationality of using the matching approach when comparing these two groups of firms. The first four columns present the means and t-statistics of differences across the treatment and control groups before PSM. We find that firms with a lower ratio of unionization are on average smaller and have a higher market to book value. This can be explained by higher sales and profitability. Indeed, the financial ratios are all substantially different among the two groups prior to matching. In the columns denoted "after matching," we present the results after the matching process. We find no statistically significant differences across any of the firm characteristics between the treated and control groups. In summary, the matching process has removed any meaningful differences along firm characteristics from the two groups of firms, and in process, ensured that our results are not sample biased.

Panel B of Table 8A presents the results of the estimation using matched samples. In columns (1)–(3) and (4)–(6), the dependent variables are Cash1 and Cash2, respectively. Moreover, we cluster robust standard errors in columns (1)–(4) at firm level, in columns (2)–(5) at country level, and in columns (3)–(6) at country-industry level. In line with the results in Table 2, we find that the variable of interest, Unionization, is negative and significant at least at the 1% level. Thus, the results show that firms respond to unionization by adjusting their cash holding and the findings are not biased by the sampling procedure (Table 8B).

Table 8A
Propensity score matching results.

	Before matching				After matching			
	Treated	Control	Differences	t-Stat	Treated	Control	Differences	t-Stat
Size	16.419	15.440	0.979***	27.16	16.300	16.278	0.022	0.35
MBV	2.552	3.339	−0.787***	10.18	2.636	2.850	−0.214	1.56
Leverage	27.475	25.179	2.296***	4.80	27.268	26.823	0.445	0.55
Tangibility	40.828	29.153	11.675***	18.75	39.910	41.726	−1.817	1.64
NWC	8.775	17.651	−8.876***	20.05	9.475	9.064	0.411	0.60
Cash Flow	16.802	17.971	−1.169***	3.30	17.049	17.100	−0.051	0.09
CAPEX	6.717	5.854	0.863***	5.94	6.693	7.004	−0.310	1.17
R&D	0.010	0.022	−0.012***	13.54	0.010	0.009	0.001	0.51
Dividend	0.855	0.658	0.197***	16.57	0.848	0.874	−0.026	1.37
Sales	6.000	9.166	−3.167***	5.86	6.099	5.615	0.484	0.55
ROA	6.534	7.255	−0.721***	3.48	6.635	6.742	−0.107	0.32

The treatment (control) group consists of firms with a unionization ratio above (below) the median in a country. The table presents pairwise comparisons of the variables in which the matching is performed both before and after the matching using one-to-one PSM algorithm based on a firm's level control variables.

Table 8B
Propensity score matching results.

	1	2	3	4	5	6
Unionization	−0.344**	−0.344**	−0.344**	−0.452***	−0.452**	−0.452***
	(2.19)	(2.05)	(2.04)	(3.04)	(2.56)	(2.61)
Size	−4.714***	−4.714***	−4.714***	−2.901***	−2.901***	−2.901***
	(4.70)	(6.42)	(5.69)	(3.34)	(3.94)	(3.09)
MBV	−0.086	−0.086	−0.086	−0.120	−0.120**	−0.120*
	(0.78)	(0.79)	(0.71)	(1.50)	(2.18)	(1.72)
Leverage	−0.040	−0.040	−0.040	−0.053**	−0.053**	−0.053*
	(1.48)	(1.49)	(1.40)	(2.06)	(2.18)	(1.77)
Tangibility	−0.042	−0.042	−0.042	−0.010	−0.010	−0.010
	(1.20)	(1.34)	(1.13)	(0.31)	(0.64)	(0.35)
NWC	0.274***	0.274***	0.274***	0.110***	0.110***	0.110***
	(5.71)	(6.54)	(4.93)	(3.27)	(3.24)	(2.80)
Cash Flow	0.145***	0.145***	0.145***	0.080*	0.080***	0.080*
	(3.05)	(3.40)	(2.65)	(1.77)	(2.86)	(1.90)
CAPEX	−0.356***	−0.356***	−0.356***	−0.153***	−0.153**	−0.153**
	(4.40)	(4.86)	(4.13)	(2.70)	(2.26)	(2.33)
R&D	22.363	22.363	22.363	29.302	29.302	29.302
	(0.71)	(0.67)	(0.55)	(0.98)	(0.85)	(0.78)
Dividend	−1.590***	−1.590**	−1.590***	−2.478***	−2.478***	−2.478***
	(2.73)	(2.19)	(2.78)	(3.67)	(3.79)	(4.06)
Sales	0.004	0.004	0.004	−0.013	−0.013	−0.013
	(0.36)	(0.34)	(0.31)	(1.10)	(0.80)	(0.87)
ROA	−0.019	−0.019	−0.019	0.029	0.029	0.029
	(0.47)	(0.51)	(0.50)	(0.75)	(0.93)	(0.69)
GDP	−18.027	−18.027	−18.027	27.351	27.351	27.351
	(0.88)	(0.84)	(0.77)	(1.60)	(1.06)	(1.32)
GDPpc	19.184	19.184	19.184	−24.550	−24.550	−24.550
	(0.94)	(0.88)	(0.81)	(1.44)	(0.93)	(1.16)
Quality of Institutions	0.325	0.325	0.325	0.014	0.014	0.014
	(0.57)	(0.58)	(0.47)	(0.03)	(0.02)	(0.02)
Investment Profile	−0.543**	−0.543**	−0.543**	−0.488**	−0.488*	−0.488*
	(2.17)	(2.20)	(2.12)	(2.13)	(1.90)	(1.72)
Adjusted R^2	0.751	0.753	0.751	0.590	0.590	0.590
Observations	3,032	3,032	3,032	2,755	2,755	2,755

The table presents the results of the OLS regression where the dependent variable in columns (1)–(3) is $Cash_1$, and in columns (4)–(6) is $Cash_2$. The variables of interest are one-period lagged Unionization and definitions of all variables are in appendix Table A1. All regressions include firm and industry-year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered by firm in columns (1) and (4), country in columns (2) and (5), and country-industry in columns (3) and (6). t-Statistics are in parentheses. ***, **, * Denotes significance at the 1%, 5% and 10% level, respectively.

5.3. Sensitivity analyses

Lastly, we further check the robustness of our main results through a wide array of sensitivity analyses. Table 9 presents our robustness check results, where the dependent variables in column (1) and (2) of Panels A, B, and C are $Cash_1$ and $Cash_2$, respectively.

First, to confirm the consistency of the results, we remove the US and Canadian firms from our sample since they account for almost 50% of observations in the sample and could therefore bias the results from over representation. After excluding the US and Canadian firms, we have 471 firms from over 27 countries in the sample. The results reported in Panel A are highly consistent with our main results shown in columns (1) and (4) of Table 2.

Second, we divide the countries in the sample into two groups based on membership in the OECD. We assume that OECD member countries are on average more developed than non-OECD member countries. Using the two samples, we again compute the basic regressions separately. The results suggest that unionization affects the cash levels of firms more strongly in industrial than developing countries than in developing countries. Our results are in line with TCE theory as transactions are easier to close in industrial countries.

Table 9
Robustness tests.

	1	2
Panel A: Canada and USA excluded from sample		
Unionization	−0.391**	−0.551***
	(2.06)	(3.39)
Adjusted R^2	0.804	0.58
Observations	2,207	2,195
Panel B: OECD countries excluded from sample		
Unionization	−0.575***	−0.480***
	(3.34)	(3.03)
Adjusted R^2	0.85	0.66
Observations	4,033	3,584
Panel C: Country × year fixed effects		
Unionization	−0.401***	−0.344***
	(2.71)	(2.63)
Adjusted R^2	0.85	0.65
Observations	4,933	4,485
Panel D: Alternative dependent variables		
Unionization	−0.501***	−0.554***
	(2.82)	(3.55)
Adjusted R^2	0.83	0.67
Observations	4,952	4,500

The table reports the effects of collective bargaining on corporate cash holdings. The coefficient estimates are obtained using an OLS regression model. The dependent variable in column (1) is $Cash_1$, and that in column (2) is $Cash_2$ in all the panels. The variable of interest is one-period lagged Unionization in all panels. All the regressions include one-period lagged firm-level variables and macroeconomic control variables, as specified in Table 2, and include the firm and industry × year fixed effects. Variable definitions are in appendix Table A1. *t*-Statistics are in parentheses. ***, ** Denotes significance at the 1%, and 5% level, respectively.

Hence, the bargaining position of unions in those countries is more likely to be stronger, which in turn affects firm's behavior.

Third, we use the country × year fixed effects rather than macroeconomic control variables. This allows us to control for the omitted time-variant country characteristics such as corporate governance reforms that determine the cash levels. From the results shown in Panel C, the coefficient of unionization is negative and statistically significant at the 1% level. These results suggest that firms change their cash levels in response to changes in unionization, and not in response to other macroeconomic or institutional changes in the country.

Fourth, we employ alternative cash level measures as the dependent variables in our regression. In Panel D column (1), the dependent variable is cash divided by sales. In column (2), the dependent variable is cash and its equivalents divided by sales. The use of alternative dependent variables does not alter our results; in both columns, the coefficient for unionization remains negative and statistically significant at the 1% level. We employ additional alternative measures for firms' cash levels, including year-to-year cash growth, but our results remain unchanged.

We do not present additional results for the sake of brevity, but all the results can be obtained from the authors on request. Our robustness test results obtained using different methodology, data, and variables confirm the previous finding on the link between cash levels and firm unionization.

6. Conclusions

This paper provides novel evidence on the causes and causality of firms' cash levels and changes in unionization. Specifically, we examine the financial choices of firms in response to increased unionization using firm-level data of a large number of firms around the globe. We find that the average firm responds to increased unionization by decreasing their cash holdings. The reported effect is symmetric; firms respond to an increase (decrease) in unionization rate by decreasing (increasing) their cash buffers. The results are consistent with the bargaining hypothesis that firms strategically decrease their cash levels to counter the increased bargaining power of employees due to increased unionization.

The effect of labor unions on cash levels is heterogeneous across firms. We find that the results are stronger for large, more profitable, and high-growth firm. These results reflect the power of unions and their bargaining agreements with firms. Specifically, the effect is more pronounced in firms that try to gain a bargaining advantage over unions in labor-intensive and low labor productive firms. These firms have larger labor union representation and more employees covered under bargaining agreements than other firms.

We finally show that better institutional quality of countries strengthens the relationship between labor unions and cash holdings of firms. We assume that better institutional quality allows unions to extract benefits from firms more easily. In our opinion, the results confirm the validity of the TCE theory as it is easier to close a contract in countries with better institutional quality. Consequently, in those countries, the management will try to improve its bargaining position by having lower cash levels.

The results of causality and endogeneity checks are consistent with the view that there is a causal, and not accidental, link between the firms' unionization and its cash holding. We conduct an event study using a DID strategy to address the problems of potential endogeneity. We use the systematic banking crisis as a shock that increases unionization and find that it resulted in a decline in corporate cash holdings. These results provide evidence on a causal relation between unionization and corporate cash holding.

Furthermore, we conduct a placebo test and the random assigned change in firm's unionization remains insignificant. Our results are robust to the different unionization variable constructions, alternative dependent variable definitions, controlling for potentially correlated time-variant firm characteristics, saturation of a dense set of fixed effects, and endogeneity concerns.

The results of this study are important from the policy perspective because firms with lower cash and higher leverage are more prone to financial distress during a crisis period. Our research confirms a strong negative union coverage effect on firm cash levels. While Bronars and Deere (1991), Matsa (2010) document that firms increase their leverage before wage negotiations with employees to improve their bargaining position, Hirsch (1991) show that union coverage exhibits a strong negative relationship between company earnings and market value. Consequently, unionized firms may be more prone to bankruptcy during a crisis period. However, this question is out of the scope of this study, and we leave it for a future research.

Author statement

Muhammad Farooq Ahmad: Conceptualization, Methodology, Formal analysis, Writing – Review & Editing

Oskar Kowalewski: Methodology, Writing- Original draft preparation; Writing – Review & Editing

Appendix A

Table A1
Sample.

Country	Obs.	Firms	Unionization		Cash ratio
			Avg	Stdev	
Australia	80	19	0.43	0.21	8.02
Austria	27	6	0.75	0.27	8.95
Belgium	19	5	0.78	0.15	5.90
Brazil	162	34	0.75	0.37	13.94
Canada	381	72	0.37	0.27	7.65
Chile	65	16	0.54	0.20	9.29
China	57	13	0.62	0.48	17.61
Finland	43	10	0.74	0.17	12.53
France	154	31	0.71	0.23	9.61
Germany	130	26	0.67	0.21	10.10
Greece	26	5	0.65	0.26	10.48
India	68	17	0.41	0.34	14.01
Indonesia	14	5	0.96	0.04	14.67
Israel	28	7	0.16	0.32	13.27
Italy	65	12	0.50	0.34	8.70
Japan	105	19	0.54	0.28	13.39
Mexico	93	21	0.55	0.13	11.46
Netherlands	66	19	0.46	0.28	9.94
Norway	33	6	0.77	0.12	10.01
Russia	66	14	0.58	0.33	7.74
Singapore	30	8	0.30	0.17	8.80
South Africa	167	43	0.64	0.24	8.26
South Korea	132	29	0.56	0.29	11.60
Spain	100	19	0.73	0.24	10.81
Sweden	119	19	0.70	0.18	9.99
Switzerland	108	19	0.55	0.19	14.87
Turkey	37	10	0.39	0.32	20.25
United Kingdom	214	39	0.48	0.26	9.82
United States	2363	396	0.17	0.22	14.21
Total	4952	939			

The table shows the number of firms and observation in a given country in the sample, and the average of unionization and corporate cash holding levels for the years 2003 to 2015.

Table A2
Variable definitions.

Variable	Definition	Source
Unionization	An index that takes the value of 1 (-1) when the percentage of employees represented by independent trade union organizations or covered by collective bargaining agreements increases (decreases), and 0 otherwise.	ASSET4
Unionization$_{up}$	A dummy variable that takes the value of 1 when the percentage of employees represented by independent trade union organizations or covered by collective bargaining agreements increases, and 0 otherwise.	ASSET4
Unionization$_{down}$	A dummy variable that takes the value of 1 when the percentage of employees represented by independent trade union organizations or covered by collective bargaining agreements decreases, and 0 otherwise.	ASSET4
Cash$_1$	It is a ratio of which is calculated as cash and cash equivalents divided by total assets net off cash and cash equivalents.	Worldscope
Cash$_2$	It is a ratio of which is calculated as cash divided by total assets net off cash.	Worldscope
Size	It is calculated by taking natural logarithm of total assets in millions of USD.	Worldscope

Table A2 (Continued)

Variable	Definition	Source
MBV	Market book value (MBV) is calculated as market value of equity divided by book value of equity.	Worldscope
Leverage	Leverage is calculated as total debt divided by total assets.	Worldscope
Tangibility	Tangibility is calculated as Property, Plan and Equipment divided by total assets.	Worldscope
NWC	Net Working Capital (NWC) is calculated as working capital divided by total assets. The working capital is estimated by the formula (Current Assets – Current Liabilities – Cash).	Worldscope
Cash Flow	Cash flow is calculated as cash flow from operation divided by net sales.	Worldscope
CAPEX	Capital expenditure (CAPEX) is calculated as capital expenditure divided by total assets.	Worldscope
R&D	Research and development expenditures (R&D) is calculated as research and development expenses and divided by net sales.	Worldscope
Dividend	Dividend is an indicator variable which is equal to 1 if the firm is paying dividend and 0 otherwise.	Worldscope
ΔSale	ΔSale is the percentage change in sale from previous year.	Worldscope
ROA	Return on Assets (ROA) is calculated as net income before preferred dividends divided by total assets.	Worldscope
GDP	The natural logarithm of Gross Domestic Product (GDP) for each country.	World Bank
GDPpc	The natural logarithm of Gross Domestic Product per capita for each country.	World Bank
Quality of Institutions	Time-varying index measuring the institutional quality of a country, which is calculated by summing the three following components: (1) corruption; (2) law and order; and (3) bureaucratic quality.	ICRG
Investment Profile	Time-varying index measuring the government's attitude toward investment. The investment profile is determined by summing the three following components: (1) risk of expropriation or contract viability; (2) payment delays; and (3) repatriation of profits. Each component is scored on a scale from 0 (very high risk) to 4 (very low risk).	ICRG

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