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Employment Protection Laws and Corporate Cash Holdings*

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Abstract

We study how employment protection laws (EPLs) affect corporate cash-holding decision. By exploiting within-country changes in EPLs across 20 OECD countries as a source of variation in labor adjustment costs, we show that following an increase in the stringency of EPLs, firms' cash holdings increase significantly. This relationship is stronger for firms with high labor turnover, no multinational presence, or financial constraints, indicating that labor adjustment cost raising distress risk is the mechanism in play. Cash buffers created by firms faced with stricter EPLs help them mitigate the underinvestment problem in subsequent episodes of industry-wide distress. Consistent with this precautionary motive, the market's valuation of excess cash is positively associated with the EPL strictness. We further demonstrate that the response of cash policy to changes in EPLs is distinct from that of debt policy or investment policy. Our evidence highlights the role of interaction between labor-market and financial frictions in determining the level and the value of corporate cash.

Keywords: employment protection, labor adjustment cost, cash holdings, value of cash
JEL classification: G31, G32, G38, K31

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1. Introduction

A large body of research evaluates how the legal framework related to labor markets impacts employment contracts and the relationship between workers and their employing firms. In particular, prior studies document that labor laws have important implications for firms' innovation (Acharya et al., 2013, 2014), cost of debt (Alimov, 2015a), capital structure (Simintzi et al., 2015), and takeover activities (Alimov, 2015b; Dessaint et al., 2017). In this article, we extend the literature by examining the impact of employment protection laws (EPLs henceforth) on corporate cash holdings. Specifically, we aim to answer the following questions. How does the stringency of employment protection laws alter firms' cash-holding incentives? Which economic mechanisms underlie this relationship? Does firms' cash response to changes in EPLs have any implications for their subsequent investment outcomes and value creation?

Our empirical investigation of these questions is motivated by two important sources of interest. First, while corporate cash holdings across the world have received much of attention, few studies to date have exploited the lens of legal systems to study firms' cash policy. Much of the prior literature mainly focuses on examining various firm-level determinants of corporate cash (Opler et al., 1999; Foley et al., 2007; Harford et al., 2008; Bates et al., 2009; Gao et al., 2013). Although some recent studies have investigated how firms' cash policy is affected by legal or institutional factors—such as the litigation risk (Arena and Julio, 2015; Nguyen et al., 2018), unionization of employees (Klasa et al., 2009; Schmalz, 2016), and unemployment benefits (Devos and Rahman, 2018)—the effect of EPLs on corporate cash holdings has received less attention. Given that liquidity management is of the first-order importance to many companies around the world (Campello et al., 2011), an analysis of corporate cash holdings in conjunction with EPLs is an important gap to fill in the literature. Second, theoretical predictions about the effect of EPLs on firms' cash-holding behavior are a priori

ambiguous. Since any regulatory change has a potential to affect corporate decisions and in turn overall economic performance, it is important for policy makers to evaluate ex ante such an impact. Therefore, our empirical assessment can assist policy makers to make more informed decisions on EPLs that take into account both labor markets and firms' potential reaction to labor reforms.

To examine how firms' cash holdings respond to changes in EPL, we develop two competing hypotheses drawing on the literature that evaluates the effects on corporate decisions of labor market institutions, such as EPLs, dismissal laws, and unionization. On the one hand, strong EPLs are likely to make the firing and hiring more difficult and less timely, increasing firms' labor adjustment costs (Autor et al., 2006; Millan et al., 2013; Berglund and Furaker, 2016). A higher labor adjustment cost implies a greater burden of fixed wage claims for a firm to service even in an unfavorable state, and in turn brings about a higher level of operating leverage and the distress risk (Alimov, 2015a). Therefore, we hypothesize that firms facing stringent EPLs should have greater precautionary demand for cash in an attempt to counteract the distress risk associated with labor adjustment cost.[1] We call this effect "labor adjustment cost effect."

On the other hand, one might argue that an increase in the stringency of EPLs could leave workers with greater bargaining power.[2] The increased bargaining power for a firm's employees can then lead to the firm' strategic use of financial policies. For example, prior research documents that firms with unionized workers are more likely to increase their leverage ratio (Bronars and Deere, 1991; Matsa, 2010) and reduce cash holdings (Klasa et al., 2009; Schmalz, 2016) in order to improve their bargaining power over unionized workers. Intuitively, if the firm has a low leverage ratio and a large cash cushion, it will be more difficult for the firm to refuse the labor union's demand for a wage increase.

[1] See, among others, Almeida et al. (2011) for a similar argument. Their theoretical model predicts that firms increase cash holdings and saving propensities in an attempt to reduce the impact of financial frictions in the future.

[2] While Saint-Paul's (2002) model highlights that greater worker bargaining power leads to stricter EPLs, it is less clear whether the stricter EPLs can imply greater worker bargaining power.

This line of reasoning then yields an alternative prediction that stringent EPLs might encourage firms to lower their cash reserves ("bargaining power effect").

To study how the stringency of EPLs affects corporate cash holdings, we use the index developed by the Organisation for Economic Cooperation and Development (OECD) for its member countries.[3] We exploit within-country changes in EPLs in the difference-in-differences (DID) framework to remove the time-invariant country effects (for example, culture) that may drive cross-country heterogeneities in both labor laws and corporate cash holdings. By examining firms' response to intertemporal variation in EPLs across 20 OECD countries from 1985 to 2007, we find strong support to our labor adjustment cost hypothesis.[4] Our research is the first to provide comprehensive evidence on how and why firms' cash-holding decision responds to changes in EPLs around the world and how that decision impacts the subsequent outcomes in firms' investments and the market's reaction.

Our baseline DID results show that when employment protection becomes stricter in a country, firms in that country increase cash holdings significantly. The effect of EPLs on firms' cash holdings we document is economically large. For example, our estimates indicate that, had UK's labor protection (a mean EPL index score of 0.7) become, counterfactually, as strong as that of Norway (a mean score of 2.7), a UK firm's cash to asset ratio on average would have been four percentage points higher than what we observe in the data. This magnitude translates to a 25% increase from the mean cash ratio in our sample. We perform a battery of additional checks to ensure the robustness of our baseline DID results (see Section 3 for details).

[3] While the OECD's summary EPL index is our baseline measure of the stringency of a country's EPLs, we show that our results are robust to using the OECD's sub-indicators or alternative measures developed by Allard (2005) and Simintzi et al. (2015), respectively (see Online Appendix, Tables OA2 and OA3).

[4] The OECD's EPL index is available from 1985 to 2013. We stop in 2007 to avoid potential confounding factors that the global financial crisis might create for both labor markets and corporate cash holdings (see e.g., Simintzi et al., 2015; Dessaint et al., 2017). In unreported results, we find that our results are robust to using the extended sample period of 1985–2013.

We then extend our analysis in several ways to provide further empirical support. First, we inspect the economic mechanisms underlying the effect of EPLs on corporate cash holdings by examining cross-sectional differences in this relationship. Our results show that the positive relationship of corporate cash holdings and the EPL index becomes stronger among (i) firms in the industries with high labor turnover rates, (ii) firms without multinational operations, and (iii) firms deemed to have a greater degree of financial constraints or a higher cash flow volatility. These results support the view that firms' concerns about labor adjustment cost—which raises operating leverage and distress risk—is the channel through which the stringency of EPLs can affect corporate cash holdings.

Second, we examine how EPLs affect firms' propensities to save cash out of internal and external sources of funds. Prior literature shows that when precautionary demand for cash grows, firms increase not only cash balance but also propensity to save (Almeida et al., 2004; McLean, 2011). Consistent with this prediction, we find that a greater stringency in EPLs gives rise to a stronger incentive for firms to save cash from cash flows and equity and debt issuances.[5] Our results suggest that firms strive to secure precautionary cash buffers in anticipation of an increase in distress risk associated with operating leverage.

Third, we provide evidence indicating that cash buffers saved by firms in the face of increased rigidity in EPLs allow these firms to navigate industry downturns better. We estimate an investment equation augmented with lagged cash, the EPL index, an industry-wide distress measure (Opler and Titman, 1994), and the interaction terms of these variables. Our analysis reveals that an increase in the EPL strictness makes the positive relationship between lagged cash and capital investment

[5] Given the evidence that stricter EPLs lead to a higher cost of debt capital (Alimov, 2015a), the positive impact of EPLs on firms' tendency to save from debt-issue proceeds we find might appear counterintuitive. However, it should be noted that a firm's saving behavior observed is *conditional on* the success of its attempt to raise capital.

stronger. More importantly, the incremental effect of EPLs on the positive investment-cash relationship is even more pronounced for firms that experience industry-wide distress in the subsequent period. These results suggest that the positive relationship between corporate cash and the EPL stringency—the baseline result we document—indeed reflects firms' attempt to alleviate the risk of adverse shocks that may come to the fore. With a lower flexibility in adjusting their workforce, firms become even more vulnerable to an adverse shock. Cash buffers, which can help firms mitigate the underinvestment problem (Denis and Sibilkov, 2009), therefore play an important role in creating value for the firms faced with strict EPLs.

Fourth, by investigating the market's valuation of firm's excess cash, we provide evidence further corroborating the value-creation role of cash. Given that a greater stringency in EPLs can lead to increases in the distress risk and the cost of external financing (Alimov, 2015a), we expect cash buffers—which provide firms with financial flexibility—to be more valuable to firms faced with strict EPLs.[6] Consistent with this prediction, our results show that the market value of excess cash increases when EPLs become more stringent. These results, reassuringly, highlight that firms' optimal decision-making in line with the market's expectation underlies the positive association between corporate cash holdings and variation in EPLs.

Finally, we ensure that the response of firms' cash policy to variation in EPLs is not the flipside of the response of debt policy previously documented (see Simintzi et al. (2015) and Serfling (2016) for international and U.S. studies, respectively). The value-relevance of cash and the increased saving propensity shown in our aforementioned results already indicate that changes in cash holdings following labor reforms are an outcome of firms' optimal response, rather than a reflection of changes

[6] In a similar vein, Gamba and Triantis's (2008) theoretical model demonstrates that the value of financial flexibility is greater when real flexibility (the reversibility of investment in capital in their model) is lower.

in debt policy. We provide further support by showing heterogenous responses between the constrained and the unconstrained firms, consistent with the extant theories that incorporate both cash and debt policies into the dynamic model of the firm (Acharya et al., 2007; Bolton et al., 2011) (Section 5.4 discusses the theoretical predictions of these models in detail). In a similar vein, we also show that our results hold in a framework that takes into account firms' cash, debt, and investment policies all together.

Our work contributes to a growing body of literature investigating the relationship between labor market institutions and various corporate policies, such as investment activities (Acharya et al., 2013, 2014; Alimov, 2015b; Dessaint et al., 2017; Subramanian and Megginson, 2018), governance (Atanassov and Kim, 2009), and financing (Klasa et al., 2009; Matsa, 2010; Agrawal and Matsa, 2013; Simintzi et al., 2015; Schmalz, 2016; Serfling, 2016; Devos and Rahman, 2018; Ahmad et al., 2017). Our research fills a void in this literature by examining how within-country changes in the stringency of EPLs affect the level and the value of cash holdings through the labor adjustment cost channel.[7] Given the difficulty of predicting the impacts of labor market policies on various economic agents, our empirical investigation provides useful insights on policy implications for the corporate sector.[8]

In addition, our study adds to a large body of literature concerned with corporate financial policy and cash policy in particular (e.g., Opler et al., 1999; Foley et al., 2007; Harford et al., 2008; Bates et al., 2009) by showing that legal protection for employment is an important factor that firms take into account in determining the optimal level of precautionary cash buffers. Our results suggest that cash

[7] In contemporaneous studies related to ours, Cui et al. (2018) and Beuselinck et al. (2018) examine the impacts of labor reforms in China and the U.S., respectively, on firms' cash holdings. Their results lend further support to our findings.

[8] A volume of research has investigated the impacts of labor market institutions—such as minimum wages, labor union, and EPLs—on economic performance. See, among others, Bentolila and Bertola (1990), Bertola (1990), Lazear (1990), Blanchard and Portugal (2001), Besley and Burgess (2004), Autor et al. (2006), Autor et al. (2007), Lafontaine and Sivadasan (2009), and Griffith and Macartney (2014), Nickell and Layard (1999) provide a survey of earlier studies.

buffers built by firms in the face of stricter EPLs allow them to maintain capital investment during subsequent episodes of industry-wide distress, thereby creating value to these firms. This is in line with Ghaly et al.'s (2017) finding that firms with greater reliance on *skilled* labor benefit more from cash holdings. Their study and ours, although based on different settings, complement each other in documenting the important role of labor adjustment costs played in corporate liquidity management.[9]

The rest of the paper proceeds as follows. Section 2 describes the empirical model and the data. Section 3 reports the results of our baseline and robustness tests. Section 4 is about cross-sectional heterogeneities. Section 5 provides additional evidence and Section 6 concludes.

2. Empirical model and data

2.1. Empirical model

To study how the legal protection for employment affects corporate cash holdings, we use the DID approach that exploits within-country variation in EPLs across 20 countries. Using the firm-level panel data, we estimate the following equation:

$$Cash_{i,k,t} = \gamma EPL_{k,t-1} + \Phi X_{i,k,t} + \Psi Z_{k,t} + f_i + g_{j\times t} + \varepsilon_{i,k,t}, \quad (1)$$

where we denote individual firms by subscript *i*, countries by *k*, industries by *j*, and year by *t*. $EPL_{k,t-1}$ is the measure of the stringency of EPLs (Section 2.2 provides more details on the EPL measure). We control for various firm-, industry-, and country-level characteristics that may affect corporate cash holdings. The vector of covariates $X_{i,k,t}$ includes firm-level determinants of cash that have been widely discussed in prior literature (Opler et al., 1999; Bates et al., 2009). Following these studies,

[9] Ghaly et al.'s focus (2017) is mainly on analyzing the *cross-firm* variation in labor adjustment costs attributable to industry characteristics (firms' reliance on skilled labor) in the U.S., whereas ours is on investigating the *within-firm* variation attributable to regulatory shocks (changes in EPLs) that are staggered across different countries.

we include firm size (natural logarithm of the beginning-of-year book assets), Q (market to book), leverage ratio (debt to assets), property, plant, and equipment (PPE), net working capital (NWC), cash flow, capital expenditures (CAPEX), research and development (R&D) expenses to sales, and a binary indicator for the dividend-paying firms (PPE, NWC, cash flow and CAPEX are normalized by the beginning-of-year assets). To account for the country-level economic conditions and investor protection, we include GDP growth, GDP per capita, and the creditor rights index (Djankov, McLiesh and Shleifer, 2007) in the vector $Z_{k,t}$. Moreover, we include industry-times-year fixed effects $g_{j\times t}$, because some time-varying industry characteristics—such as investment opportunities—might affect firms' cash holdings.[10] Since EPLs change within each country, standard errors are corrected for clustering of observations at the country level (Bertrand and Mullainathan, 2013).

The DID framework allows us to examine the relationship between the within-country variation in the EPL strictness and the within-firm variation in cash holdings. To wit, suppose that country A underwent an increase in EPL in 2000, while country B had no such change, and that cash holdings of a firm in country A and a firm in country B are measured from 1999 through 2001. One can then measure changes in cash holdings over time and compare the difference in such changes between the two firms. Since firm-specific intercepts f_i in Equation (1) remove the time-invariant firm- and country-specific unobservable heterogeneities in corporate cash policy, our estimate of the coefficient γ captures the differences in changes in cash holdings between the firms with and without changes in the EPL strictness. It is worth noting that unlike a passage of a law (a binary change from 0 to 1), changes in the stringency of EPLs—which is measured by the OECD's index we describe below—occur with varying treatment intensities.

[10] The industry classification is based on Fama-French 12 industries. Using Fama-French 49 or SIC two-digit industries is less suitable for our international sample, because doing so leaves very few observations for some industry-years. Our results are nonetheless robust to using these alternative industry definitions.

2.2. Data and sample construction

We measure the stringency of EPLs by using the EPL index developed by the OECD. Since Lazear (1990), the EPL index has been widely used in the literature as the measure of job security for workers in a country. Each year, the OECD publishes EPL indices for each member country by surveying various legislations concerning the length of the notice period, amount of severance payment provisions, and the administrative requirements for employing firms to lay off their employees. For each of these categories, the OECD computes a score and combines these scores to construct sub-indicators and summary indices. The values of the indices range from zero to six, and a higher score represents stricter employee protection. Our baseline measure of the stringency of employment protection is the summary index based on the average of the sub-indicators for regular contracts (EPR) and temporary contracts (EPT), both of which begin in 1985.

While we refer to this summary index as the EPL index throughout our paper, as mentioned earlier (see footnote 3), we ensure that our results are robust to using various alternative measures. These additional tests, reported in the Online Appendix, are performed by: (i) using the OECD's sub-indicators for regular workers and temporary workers separately, as well as using the one for collective dismissals (EPC), which is only available from 1998 and onwards; (ii) using the measure developed by Allard (2005) that encompasses more comprehensive aspects of EPLs; and (iii) using the one developed by Simintzi et al. (2015) that only considers major labor reforms.[11]

Our sample consists of companies in 20 OECD countries from 1985 to 2007 for which the

[11] Although we do not have strong priors about which aspect of EPL matters more for firms and their cash policy, the results reported in the Online Appendix, Table OA2, show that each sub-indicator has a significant impact on corporate cash holdings, suggesting that firms take into account various dimensions of EPLs. These results reassure us the validity of the summary EPL index as our baseline measure.

OECD's EPL index data are available for at least 19 years.[12] Similar to Simintzi et al. (2015), we stop in 2007 to avoid undesirable changes in both labor markets and corporate cash-holding behavior that the global financial crisis might have caused. We collect data on firm-level financial information from the Worldscope. By applying the data filters common in the literature (e.g., Bates et al., 2009; Almeida et al., 2004), we exclude firm-years that are in regulated industries (SIC 6000–6999, 4900–4999, and 9000–9999), have the book value of total assets smaller than $10 million in 2007 dollar, have the book value of cash holdings greater than that of total assets, or have missing values for the main variables used in Equation (1). The country-level variables are from various sources. GDP growth and GDP per capita are from the International Monetary Fund (IMF) database and the creditor rights index is from Djankov et al. (2007). To perform robustness checks, we also obtain the country-level union density rates and governments' spending on labor markets, respectively, from the OECD database and the political orientation of governments from the World Bank Database of Political Institutions. Appendix provides variable definitions in detail.

2.3. Summary statistics

Figure 1 plots, for each country, the evolution of the EPL index scores. It reveals substantial variation not just across countries but also within each country: the stringency of EPLs has overall increased for five countries (Australia, France, Ireland, New Zealand, and UK), whereas it has overall declined for 13 countries (Austria, Belgium, Denmark, Finland, Germany, Greece, Italy, Japan, Netherlands, Norway, Portugal, Spain, and Sweden). No such change has occurred in Canada and Switzerland during our sample period. It is worth noting that changes in the EPL strictness are dispersed over our

[12] The countries in our sample are basically the founding members of the OECD although four countries are excluded. Iceland, Luxemburg, and Turkey are excluded due to the index data availability. We exclude U.S., because our sample would otherwise consist primarily of the observations with no time-variation in EPLs (that is, the number of U.S. firms is similar to that of firms used in our sample and the index score for the U.S. does not change throughout the sample period).

sample period. These staggered changes across countries make a desirable property for our DID experiment.

[Insert Figure 1]

Table 1, Panel A, reports the summary statistics for the variables used in our study. The firm-level variables, where appropriate, are scaled by the beginning-of-year assets and are further winsorized at 1% in both tails. These statistics are consistent with those reported by prior studies (see, for example, Khurana et al., 2006; Mclean and Zhao, 2018).

[Insert Table 1]

Panel B presents the country-level statistics for the EPL index (Columns 1–3), the country-level median cash holdings (Columns 4), and the univariate comparisons (Columns 5–9). The country means and variances of the EPL index confirm, among others, what Figure 1 has suggested: the stringency of EPLs differs not just across countries but also within country for the majority of countries in our sample. In addition, to gain some insights before conducting our formal DID tests, we check the univariate relationship between the EPL strictness and cash holdings. For each country, we divide firm-year observations into low and high EPL regimes based on the country-specific means of EPL index (Columns 5 and 6); we then perform the Wilcoxon rank-sum test for differences in the median cash-to-asset ratios between the high and low EPL regimes (Columns 7–9). To account for firm heterogeneity in cash policy, we calculate the firm-level *demeaned* cash-to-asset ratios and obtain the country medians of the demeaned ratios. The results show that for 13 out of 18 countries (note that Canada and Switzerland are excluded), the median cash-to-asset ratios are higher in the high EPL regime; for eight of them, these differences are statistically significant at the 1% level. Although there are five cases in which the median cash-to-asset ratios are rather lower in the high EPL regime, the differences are significant in only three cases. These comparisons, albeit preliminary, suggest that

when a country's EPLs become more stringent, firms in that country tend to hold more cash.

3 The effect of EPLs on corporate cash holdings

3.1. Baseline difference-in-differences estimation results

We begin our discussion with a graphical illustration of our key result. Figure 2 plots the evolution of the firm-level excess cash over the seven-year period (i.e., the $[t-3, t+3]$ window) around a change in EPLs. The excess cash is net of firm-specific effects, country's economic conditions, and the time-varying industry conditions.[13] We then compute the means of excess cash for the groups of firms that have experienced an increase (marked with "+" signs), a decrease (marked with "–" signs), and no change (marked with squares), respectively, in the EPL strictness at year t. These excess cash holdings are expected to float around zero, which is by definition the "normal" level of any excess quantity.

The graphs show that after an increase (decrease) in the EPL index in year t, firms' excess cash rises (falls) in year $t+1$, whereas it remains flat for those with no change in the EPL index. Although excess cash holdings prior to the treatment are different between the three groups of firms, this difference, as Roberts and Whited (2013) note, does not mean the violation of the parallel-trends assumption. Importantly, there is a *break* in the trend of excess cash for the treatment groups after the onset of the treatment. We also note that, in the case of an increase in the EPL index, excess cash holdings temporarily fall in year $t-2$ and return to the previous level in year $t-1$. While the former movement is unlikely related to EPLs, the latter one—the return to the normal level in year $t-1$—may reflect firms' precautionary reaction to an *anticipated* increase in the EPL strictness (the anticipation is not impossible as political debates often precede a labor reform). In contrast, when the

[13] The residuals—excess cash—are estimated from Equation (1) that controls for all variables, except $EPL_{i,k,t-1}$.

stringency of EPLs drops in year t, excess cash holdings do not decrease until year $t+1$. Given that firms need time to accumulate cash buffers, the observed asymmetry in firms' reactions seems consistent with rational decision-making (Section 3.2 provides the test results for pre-treatment trends).

[Insert Figure 2]

Table 2 reports the results of our baseline regression. Column 1 presents the regression that includes the common firm-level determinants of cash holdings well-established in prior literature (Opler et al., 1999; Bates et al., 2009), while our focus is on the one in Column 2 that is augmented with country-level control variables. As described in Equation (1), our regression includes firm fixed effects f_i and industry-times-year fixed effects $g_{j\times t}$. The results show that firms' cash policy responds positively to the increased stringency of EPLs, consistent with the labor adjustment cost hypothesis. This effect is statistically significant and economically large: in Column 2, we see that in response to a one standard deviation increase in the EPL index, firms increase their cash holdings by 184 basis points, an increase of 19% (12%) relative to the sample median (mean). The coefficients on other variables, such as firm size, Q, leverage, PPE, NWC, cash flow, CAPEX, and R&D, are similar to those reported by previous studies.

[Insert Table 2]

It has been well-established in the finance literature that holding excess cash involves various economic benefits (for example, the ease of financing future growth opportunities and the support for product market competition) and costs (the opportunity costs of holding low-return assets and the agency costs of free cash flows). From this tradeoff-theory point of view, our results indicate that a greater stringency in EPLs makes the marginal benefits of holding an additional dollar of cash exceed the marginal costs of doing so. As discussed above, the increased difficulty of firing employees—in

terms of the costs, time, and procedures required—creates additional economic costs to firms in adjusting their labor. Because these increased labor adjustment costs leave firms with a greater burden of operating leverage going forward, firms increase precautionary cash holdings as an attempt to weather distress risks that may come to the fore.

While our DID approach mitigates the concern that unobservable heterogeneities across countries and firms might drive differences in our outcome variable, we ensure the robustness of our findings in the subsections that follow. Our additional robustness results using the propensity score-matched samples are reported in the Online Appendix (Table OA1).

3.2. Pre-treatment trends

In this subsection, we further alleviate a potential concern that an upward (downward) trend in corporate cash holdings might have existed prior to an increase (decrease) in the strictness of a country's EPLs. While the evolution of cash holdings described in Figure 1 indicates that a pre-treatment trend is unlikely a cause for concern, we explicitly evaluate this possibility in a regression framework by employing Bertrand and Mullainathan's (2003) approach.

Specifically, we replace $EPL_{i,k,t-1}$ in Equation (1) with two sets of four dummy variables: $incr\_before^{-1}$ is a binary indicator that equals one if a firm is observed one year prior to an increase in the EPL index (that is, the firm is observed in year $t-1$ and experiences an increase in EPL in year t); $incr\_before^{0}$ equals one if a firm is observed in the year in which such an increase takes place; $incr\_after^{1}$ equals one if a firm has experienced an increase last year; and $incr\_after^{2+}$ equals one if a firm has experienced an increase in EPL at least two years ago. A set of four dummy variables $decr\_before^{-1}$, $decr\_before^{0}$, $decr\_after^{1}$, and $decr\_after^{2+}$ are likewise defined for a decrease in the EPL index. Unlike the passage of the business combination law studied in Bertrand and Mullainathan (2003), changes in EPLs can occur more than once for a country and, in this

case, the effect of a change can be confounded by subsequent changes. We avoid this problem by excluding the countries that underwent multiple changes in EPLs during our sample period (see, for example, Serfling (2016) for a similar approach used for the U.S. state-level test).

[Insert Table 3]

Table 3 reports our estimation results. The dummy variable $incr\_before^{-1}$ ($decr\_before^{-1}$) allows us to assess whether a relatively higher (lower) level of cash already exists even before an increase (decrease) in EPL takes place. Finding a positive (negative) and significant coefficient on $incr\_before^{-1}$ ($decr\_before^{-1}$) would be problematic, because it could be an indication of a trend in cash holdings prior to a change in EPLs. The results show that the coefficients on $incr\_before^{-1}$ and $incr\_before^{0}$ are either insignificant or negative, whereas the coefficients on $incr\_after^{1}$ and $incr\_after^{2+}$ are positive and significant. Similarly, the coefficients on $decr\_before^{-1}$ and $decr\_before^{0}$ are insignificant and smaller in magnitude than those on $decr\_after^{1}$ and $decr\_after^{2+}$.

These results indicate that the positive relationship between the EPL index and cash holdings we find is unlikely driven by some unknown pre-treatment trends or reverse causation; any effect of a change in EPLs on corporate cash holdings comes into play only after such a regulatory event takes place. This lends further support to the causal interpretation of our baseline results.

3.3. Other country-level characteristics

In this subsection, we address a remaining concern that the political economy of labor markets, which is likely to affect a country's EPLs, might also be correlated with individual firms' performance and decisions. As Botero et al. (2004) argue, a left-wing government is more likely to support pro-labor

legislations than is a right-wing one. Similarly, a burden of labor-market support—such as unemployment benefits, public employment services, or training—may lead to stricter EPLs (Besley and Burgess, 2004). The unionization rate (the fraction of unionized workers) in a country may also have an impact on both EPLs and cash policy of firms in that country.[14] As these country characteristics are not necessarily time-invariant, they might not be properly accounted for in our regression model that includes firm fixed effects and industry-times-year fixed effects. We therefore augment Equation (1) with the discussed variables to assess whether our inferences are affected.

[Insert Table 4]

Table 4 reports the results. In Columns 1–3, we add the unionization rate, labor-market spending, and the political orientation one by one, cumulatively, to Equation (1). A negative, albeit insignificant, coefficient on the unionization rate appears to be consistent with the bargaining-power hypothesis discussed in the literature (Klasa et al., 2009; Matsa, 2010). Neither the governments' labor-market spending or the political orientation has a significant impact on corporate cash holdings. To the extent that left-wing governments have a tendency to promote stricter EPLs, the mildly positive relationship between corporate cash holdings and the indicator of leftist government seems generally consistent with our main finding. Across all specifications, we find that the effect of EPL remains unaffected.

4. Cross-sectional heterogeneities

In this section, we evaluate the economic channels through which a change in the EPL strictness impacts corporate cash holdings. To examine whether labor adjustment cost and the distress risk associated with it, as we hypothesize, are the economic mechanisms underlying our results, we conduct

[14] If the unionization of workers encourages firms' strategic use of financial policy (Bronars and Deere, 1991; Klasa et al., 2009; Matsa, 2010), corporate cash holdings could be negatively correlated with a country's union density.

various cross-sectional tests based on labor turnover rates, multinational presence, financial constraints, and cash flow uncertainty.

4.1. Labor turnover and multinational presence

To assess whether the labor adjustment cost is an economic mechanism in play, we exploit two aspects of firms, namely, how frequently a firm replaces its employees (labor turnover) and the extent to which a firm's operations take place in foreign countries (multinational presence). If an increase in the stringency of EPLs serves as a regulatory shock to labor adjustment costs, the effect of the shock is likely stronger among the firms for which restrictions on labor adjustment are more detrimental. For the reasons related to technologies, operating environments, and the market structure, firms in certain industries benefit from—and thus require—flexible adjustment of their workforce; these industries in turn have relatively high labor turnover rates (Abowd and Vilhuber, 2011; Davis and Haltiwanger, 2014). As firms in these industries have a greater incentive to ameliorate the increased risks associated with the rigidity in labor adjustment, their precautionary demand for cash becomes even stronger than does that of other firms in response to an increase in the EPL strictness. Therefore, the positive effect of the EPL strictness on corporate cash holdings we find is expected to be more pronounced for firms in the industries with high labor turnover rates.

To conduct our test, we construct a measure of the industry-level labor turnover rates using the U.S. Census Bureau's Quarterly Workforce Indicator (QWI) data.[15] Like in other studies (Alimov, 2015a), the assumption behind using the U.S. industry-level data is that the same industries share commonality in terms of technologies and business characteristics. As the QWI coverage has become

[15] The QWI job data has much larger coverage than the previous ones (for example, Bureau of Labor Statistics data). The QWI data is based on the micro-level data collected for the Longitudinal Employer-Household Dynamics (LEHD) program at the U.S. Census Bureau. QWI began with the surveys as early as 1993 by 18 participating states covering about 30% of jobs and, by 2001, the number of participating states has increased to 47 covering more than 90% of jobs in private sectors (Abowd and Vilhuber, 2011). We thank John Haltiwanger for pointing out to us the advantages of the QWI data.

substantially comprehensive—covering 70% of jobs in the U.S.—from 1998 onwards, we use the data for the 1998–2007 period to obtain hires (*HirA*), separations (*Sep*), beginning-of-period employment (*Emp*) and end-of-period employment (*EmpEnd*). Following Abowd and Vilhuber (2011), we calculate the labor turnover rate for each industry as $LaborTurnOver = \frac{HirA+Sep}{0.5(Emp+EmpEnd)}$. As the QWI data use North American Industry Classification System (NAICS) as the industry classification, we compute the industry mean rates for each four-digit NAICS and map them to their three-digit SIC equivalents. One of the advantages of using the QWI data is that it provides a more comprehensive coverage than does Davis et al.'s (1996) measure used in previous studies (Alimov, 2015a). Because of its "fuller capture of short duration jobs," as noted by Davis and Haltiwanger (2014, p.6, footnote 6), the QWI data yields the U.S. national mean turnover rate almost twice higher than that from the JOLTS data.[16] Moreover, while Davis et al.'s (1996) measure covers only 20 manufacturing industries based on two-digit SIC (SIC between 2000 and 3999), the QWI data can provide the turnover rate measure for over 200 industries based on four-digit NAICS (over 60 industries based on three-digit NAICS).

[Insert Table 5]

Column 1 in Table 5 reports the result of our cross-sectional test based on the labor turnover rates. We include the interaction of the EPL index and the labor turnover measure $LaborTurnOver$, in addition to all other covariates in Equation (1). Since our regression includes firm fixed effects, the coefficient on the labor turnover measure itself cannot be estimated. It is worth noting that the focus of our test is on evaluating whether the effect of EPLs on cash holdings we document is varying across firms with different labor turnover rates. We indeed find that the interaction term is positive and significant, consistent with our intuition discussed. As EPLs are more binding for the firms whose

[16] The national mean turnover rate is 0.45 and is very close to that reported by Davis and Haltiwanger (2014).

businesses require flexible adjustment of workforce, these firms have a greater precautionary demand for cash buffers to alleviate risks associated with the lost benefits of flexibility.

In a similar vein, we investigate whether firms' multinational presence influences the impact of EPL on cash holdings we find.[17] Since multinational firms' subsidiaries operating in foreign countries are likely subject to labor laws of the countries in which the subsidiaries are domiciled, these firms' cash policy is likely less sensitive to changes in EPLs in their home countries. Therefore, we posit that the multinational firms' cash response to changes in the EPL stringency should be relatively weak. Following prior literature (e.g., Foley et al., 2007; Gungoraydinoglu et al., 2017), we define a firm as "multinational" if the firm reports foreign operating income or foreign income tax in the past five consecutive years.[18] Our result is reported in Column 2 of Table 5. Consistent with our prediction, it shows that the coefficient on the interaction of the EPL index and the *Multinational* dummy is negative and significant. The result suggests that the effect of EPLs is stronger for domestic firms given that they hire employees mostly in their home countries and thus are more directly affected by a regulatory event that increases labor adjustment costs.

4.2. Financial constraints and cash flow volatility

In this subsection we examine whether financial constraints play a role in the relationship between the EPLs and firm's cash holdings. If stricter EPLs leave firms with a larger burden of fixed wage claims going forward, high operating leverage becomes an even bigger concern for firms that are financially constrained. Similarly, we posit that firms with volatile cash flows are more vulnerable to the risks associated with operating leverage.

[17] We thank an anonymous referee for this suggestion.

[18] Our results hold when we use alternative periods (e.g., past three years) to define the *Multinational* dummy.

To test these hypotheses, we use various a priori proxies of firms' financial constraints and the firm-level cash flow volatility. Firm size and firm age are among the most widely-used proxies of financial constraints in the literature. The two variables arguably suffer less from endogeneity issues, and are shown to be closely related to firms' ability to access capital markets (Hadlock and Pierce, 2010; Farre-Mensa and Ljungqvist, 2016). As additional measures of financial constraints, we also employ Whited and Wu (2006) index, Size-and-Age index (Hadlock and Pierce, 2010), and Kaplan-Zingales index (Kaplan and Zingales, 1997; Lamont et al., 2001). As our results are qualitatively the same across these alternatives, we report, for brevity, the results based on firm size, firm age, and Whited-Wu index. To compute the firm-level volatility of cash flow to assets, we require for each firm at least five data points between 1985 and 2007.

Using these measures, we prepare three sets of financial-constraint subsamples and that of cash-flow-volatility subsamples. The constrained (unconstrained) group based on firm size consists of the firm-year observations whose book asset size belongs to the bottom (top) 30 percentile in each corresponding year. The same procedure applies to the Whited-Wu index subsamples in the inverse way (i.e., the top 30 percentile of the index comprises the constrained group). The constrained (unconstrained) group based on firm age consists of firms that have appeared in the Worldscope database for less (more) than 15 years (see, for example, Brown et al. (2009) for a similar approach). Finally, the high (low) cash-flow-volatility group is defined as the firms whose cash flow volatility falls in the top (bottom) 30 percentile. We then estimate Equation (1) for these four pairs of subsamples.

[Insert Table 6]

The results reported in Table 6 show that the positive effect of EPLs on cash holdings is more pronounced among small firms, young firms, firms with high Whited-Wu index, and those with high cash flow volatility, consistent with our hypotheses. These results thus lend support to the idea that a

greater stringency in EPLs leads to the distress risk associated with operating leverage that is particularly damaging to the constrained firms. Interestingly, the same regulatory shock does not seem to disturb the unconstrained firms. These results are indicative of heterogeneities between constrained and unconstrained firms in their focus of financial policy that have been discussed in prior literature (Acharya et al., 2007; Bolton et al., 2011). In Section 5.4, we conduct an analysis to gain further insights on this issue in conjunction with EPLs.

5. Further tests

In this section we extend our analysis in several ways to provide further corroborating evidence. We show that the stringency of EPLs also encourages firms to save more cash from internal and external sources of financing. Moreover, increased precautionary cash holdings indeed help firms to weather subsequent adverse shocks (industry-wide distress) by allowing these firms to maintain their capital investment. The market's valuation of excess cash agrees with such a positive role played. Finally, we show that the response of firms' cash policy to EPLs is not the flipside of that of firms' debt policy or investment policy.

5.1. EPLs and propensities to save cash

In this subsection, we examine how EPLs affect firms' propensities to save cash from the internal and external sources of funds. Our motivation for this investigation is twofold. Prior literature documents that firms' precautionary demand for cash leads to increases in not only cash holdings, but also propensities to save cash (Almeida et al., 2004; McLean, 2011). Given the risk associated with labor adjustment costs, we thus expect firms' saving propensities to increase with the EPL strictness. Further, an investigation of the marginal propensities to save cash from different sources of funds has an advantage over that of cash balance, because one might argue that firms' cash balance per se could

be affected by other corporate policies, particularly debt policy. Such a concern is mitigated as we evaluate how the EPL strictness impacts sensitivities of cash savings to the sources of funds (as afore-mentioned, we conduct a formal analysis to further mitigate this concern in Section 5.4).

As the first step, we estimate the regression similar to the one used in McLean (2011) and McLean and Zhao (2018), augmented with the EPL index and its interactions with cash flow, equity issuance, and debt issuance, respectively:

$$\begin{aligned}\Delta Cash_{i,k,t} = {} & \gamma_1 EPL_{k,t-1} + \gamma_2 CashFlow_{i,k,t} + \gamma_3 EquityIssue_{i,k,t} + \gamma_4 DebtIssue_{i,k,t} \\ & + \gamma_5\left(EPL_{k,t-1} \times CashFlow_{i,k,t}\right) + \gamma_6\left(EPL_{k,t-1} \times EquityIssue_{i,k,t}\right) \\ & + \gamma_7\left(EPL_{k,t-1} \times DebtIssue_{i,k,t}\right) + \Phi X_{i,k,t} + \Psi Z_{k,t} + f_i + g_{j\times t} + \varepsilon_{i,k,t},\end{aligned} \tag{2}$$

where $\Delta Cash_{i,k,t}$ is the one-year change in cash divided by the beginning-of-year assets. Firms' cash flows, equity issuance, and debt issuance are also scaled by the beginning-of-year assets. We include firm size and Q in $X_{i,k,t}$ and the same set of country-level controls in $Z_{k,t}$ as before. Since any unused portion of internal or external funds would flow into a firm's end-of-year cash balance, the three sources of funds included in Equation (2) should not be viewed as the factors driving a firm's cash policy in a *deep* sense. The coefficients on these variables, as discussed in McLean (2011), can be best interpreted as firms' propensities to save out of cash flows and proceeds from equity and debt issuances (see Almeida et al. (2004) for a similar argument). Our focus is placed on the coefficients on the three interaction terms $\gamma_{n\in\{5,6,7\}}$, which capture the impact of EPLs on these propensities.

[Insert Table 7]

Panel A of Table 7 reports our estimation results. The coefficients on cash flow, equity and debt issuances are, on average, positive and statistically significant. For the mean EPL index score of 2, the sensitivities of cash saving to cash flow, equity issuance and debt issuance, respectively, are 15,

35 and 5 cents.[19] Consistent with McLean's (2011) findings, firms tend to save a greater fraction of equity issue proceeds than that of cash flows or debt issue proceeds. More importantly, the interaction terms show that an increase in the EPL strictness has a positive and significant impact on these saving propensities. In response to a labor reform raising the EPL index score by one unit, firms increase their propensities to save cash from each additional dollar raised by 3 to 4 cents. Within the empirical distribution of the EPL index (from 0.6 to 4.1) in our sample, the increments in these saving propensities can be as large as 11 to 14 cents.

Next, we further investigate how firms' cash savings are sourced from operating, financing, and investing activities, respectively. By tracking changes in each of the three types of sources and uses of funds, the analysis allows us to obtain a more complete picture as to how firms allocate their resources around a change in the EPL strictness. Following Brisker et al. (2013), we use the following flow-of-funds identity condition:

$$\Delta Cash_t \equiv CFO_t + CFF_t - CFI_t,$$

where CFO_t, CFF_t, and CFI_t, respectively, refer to cash flows from operating, financing, and investing activities, respectively. These variables are all taken from the statement of cash flows and scaled by lagged total assets. A positive sign on *CFO* and *CFF* indicates net fund inflows from these activities, contributing to cash balance, whereas a positive sign on *CFI* means net fund outflows due to investing activities. For each type, we calculate five-year means before and after a change in the EPL index.

The results reported in Panel B of Table 7 show that when the stringency of EPL rises, *CFO* and *CFF* increase and *CFI* does not change. This suggests that firms' cash savings are sourced largely

[19] For example, the propensity to save out of cash flow at the mean EPL is calculated as $0.063 + 2 \times 0.044 = 0.15$.

from *CFO* (internal funds) and *CFF* (net issuances), consistent with our inferences drawn on the saving-propensity regression results. Moreover, the fact that *CFI* remains unchanged indicates that investment cut is not a main driving force for the increases in firms' cash holdings in response to stricter EPLs (in Section 5.4, we conduct a formal analysis to confirm this).

The results for the case of decreases in the EPL strictness are also consistent with our prediction. Firms spend more on their operating activities (e.g., increase in working capital) and financing activities (e.g., increase in payout), resulting in decreases in *CFO* and *CFF*. Cash outflows due to investing activities (*CFI*) decline following a decrease in the EPL index. This result again suggests that the effect of EPL on firms' cash holdings is independent from its effect, if any, on firms' investment policy. Had firms' cash policy been driven by their investment policy, a reduction in investing activities in response to a decrease in the EPL strictness would have resulted in an increase in cash holdings; this in turn would only attenuate the relationship between EPL and cash we document.

Overall, the results of our investigations yield a consistent conclusion: when EPLs become more stringent, firms strive to build up cash buffers from various sources of funds. This evidence of *increased* saving propensities buttresses the idea that a greater stringency in EPLs incentivizes firms to create financial flexibility that can ameliorate the risk associated with a rise in labor adjustment costs.

5.2. EPLs, cash holdings, and capital investment in the subsequent industry downturns

As a next step, we investigate whether cash buffers saved by a firm lead to a better real outcome for the firm under a stricter EPL environment. This is an important question to examine, because firms' precautionary motive for cash holdings is closely related to, among others, their investment opportunities; that is, cash holdings help firms to undertake their investment projects in *any* future states, including an adverse one. To evaluate this investment-smoothing role of cash holdings in conjunction with EPLs, we estimate the investment equation augmented with, among others, the EPL strictness,

lagged cash, an industry-wide distress measure, and the interaction terms of these variables:

$$
\begin{aligned}
CAPEX_{i,k,t} = {} & \gamma_1 EPL_{k,t-1} + \gamma_2 Cash_{i,k,t-1} + \gamma_3 InduDown_{m,t} \\
& + \gamma_4 \left(EPL_{k,t-1} \times Cash_{i,k,t-1} \times InduDown_{m,t}\right) \\
& + \gamma_5 \left(EPL_{k,t-1} \times Cash_{i,k,t-1}\right) + \gamma_6 \left(EPL_{k,t-1} \times InduDown_{m,t}\right) \\
& + \gamma_7 \left(Cash_{i,k,t-1} \times InduDown_{m,t}\right) + \Phi X_{i,k,t} + \Psi Z_{k,t} + f_i + g_{j\times t} + \varepsilon_{i,k,t},
\end{aligned} \tag{3}
$$

where $InduDown_{m,t}$ is our industry-wide distress measure and $Cash_{i,k,t-1}$ is lagged cash holdings.[20] Following Opler and Titman (1994), we define, for each three-digit SIC, an industry-wide downturn as a period when the industry's median sales growth is negative and its median stock return is lower than minus 20% (our industry definition for fixed effects $g_{j\times t}$ is Fama-French 12 industry as before). Our main variable of interest in this test is the three-way interaction of the EPL strictness, lagged excess cash, and the industry downturn measure.

Table 8 reports our investment regression results. In Columns 1 and 3, the variable $EPL_{k,t-1}$ is the same time-varying index score used in our baseline tests. In Columns 2 and 4, it is a dummy variable that equals one if there has been an increase in the EPL strictness in year $t-1$ and zero if there has been a decrease in that year. We first check, as a benchmark, whether a positive relationship between capital investment and lagged cash becomes stronger in a more rigid EPL environment. The interaction of the EPL strictness and lagged cash in Columns 1 and 2 captures this *unconditional* effect of EPLs on the investment-cash relationship (these regressions do not include the industry downturn measure nor its interactions with other variables). The results suggest that a positive effect of lagged cash on capital investment is more pronounced for firms under stricter EPLs although this incremental effect is marginally significant (Column 2) or insignificant (Column 1). It is worth noting that the direct effect of EPLs on capital investment is likely weak as firms become more cautious

[20] Our results hold when lagged excess cash is used in place of lagged cash.

about both capital investment and hiring. On the one hand, given the irreversibility inherent in capital investment (Pindyck, 1991; Abel and Eberly, 1996), an increase in firms' firing costs—a factor that raises firms' operating leverage—can discourage their capital investment (Bai et al., 2019). On the other hand, increased firing costs can incentivize firms to shift its operation towards a less labor-intensive one (Blanchard, 1997; Autor et al., 2007).[21] Therefore, a greater stringency in EPLs does not warrant an unequivocal increase or decrease in firms' capital investment.

[Insert Table 8]

We are primarily interested in assessing the effect of EPLs on the relationship between capital investment and lagged cash, *conditional on* a subsequent episode of an adverse shock. The results in Columns 3 and 4 show that the coefficient on the three-way interaction of EPL, lagged cash, and the industry downturn measure is positive and significant. The incremental effect of the EPL strictness on the positive investment-cash relationship becomes stronger for firms experiencing industry-wide distress in subsequent periods. These results highlight that what underlies the positive response of corporate cash to the EPL strictness that our baseline DID tests have uncovered is, as expected, firms' precautionary motive. With increased labor adjustment costs following a rise in the EPL strictness, firms become more vulnerable to adverse shocks that may be realized in the future. But cash buffers created by these firms help them to ameliorate the underinvestment problem (see Denis and Sibilkov (2009) for a similar argument) and thus seem to play a role in creating value to the firms faced with stringent EPLs.

5.3. EPLs and the value of excess cash

[21] In a similar vein, Cingano et al. (2014) document that a rise in firing costs due to stricter EPLs leads to an increase in the capital-to-labor ratio for firms with sufficient liquidity resources. Belot et al. (2007) argue that employment protection gives incentives for workers to invest in firm-specific capital, raising firms' productivity. This in turn allows firms to increase investment rates and results in a positive relationship between the EPL strictness and firms' capital intensity.

To provide evidence further corroborating the value-creation role played by cash, we evaluate how EPLs affect the market's valuation of excess cash holdings. It is well-documented in prior research that the value of excess cash holdings is larger for firms with limited access to external capital markets, because cash holdings allow these firms to undertake growth opportunities without relying on costly external financing (Pinkowitz et al., 2006; Faulkender and Wang, 2006). Given that a greater stringency in EPLs can lead to increases in the distress risk and the cost of external financing (Alimov, 2015a), cash buffers are likely to become more valuable to firms facing strict EPLs. In a similar vein, Gamba and Triantis's (2008) theoretical model demonstrates that financial flexibility becomes more valuable to the firm whose production technology is less flexible—the one with a low reversibility of capital. Moreover, our evidence in the previous subsection likewise points to a positive role played by cash holdings in navigating subsequent industry downturns.

Our regression model follows the one developed by, among others, Pinkowitz et al. (2006) and Fresard and Salva (2010) on the basis of Fama and French's (1998) approach:

$$\begin{aligned} MV_{i,k,t} = {} & \beta_1 EPL_{k,t-1} + \beta_2 XCash_{i,k,t} + \beta_3 \left(EPL_{k,t-1} \times XCash_{i,k,t}\right) \\ & + \phi_1 E_{i,k,t} + \phi_2 \Delta E_{i,k,t}^{[t-2,t]} + \phi_3 \Delta E_{i,k,t}^{[t,t+2]} + \phi_4 RD_{i,k,t} + \phi_5 \Delta RD_{i,k,t}^{[t-2,t]} + \phi_6 \Delta RD_{i,k,t}^{[t,t+2]} \\ & + \phi_7 I_{i,k,t} + \phi_8 \Delta I_{i,k,t}^{[t-2,t]} + \phi_9 \Delta I_{i,k,t}^{[t,t+2]} + \phi_{10} D_{i,k,t} + \phi_{11} \Delta D_{i,k,t}^{[t-2,t]} + \phi_{12} \Delta D_{i,k,t}^{[t,t+2]} \\ & + \phi_{13} \Delta NA_{i,k,t}^{[t-2,t]} + \phi_{14} \Delta NA_{i,k,t}^{[t,t+2]} + \phi_{15} \Delta MV_{i,k,t}^{[t,t+2]} + \Psi Z_{k,t} + a_k + b_t + \varepsilon_{i,k,t}, \end{aligned} \tag{4}$$

where $XCash_{i,k,t}$ is excess cash estimated from Equation (1) using the instrumental variable method.[22] E is earnings before extraordinary items plus interest expenses, RD is R&D expenses, I is

[22] Since excess cash equals actual level of cash minus its predicted level, a potential concern here is that the dependent variable market to book in Equation (4) is also used in predicting the level of cash. To address this issue, we follow Dittmar and Mahrt-Smith (2007) and Fresard and Salva (2010) to use the instrument variable approach in estimating the level of cash. Specifically, the market to book ratio included in Equation (1) is instrumented with two-year lagged sales growth, and otherwise the same equation is estimated for each country to predict the level of cash (again, EPL is not included in this estimation).

interest expenses, D is dividends, and NA is net assets (total assets minus cash). Following Fama and French (1998) and Pinkowitz et al. (2006), we include two-year changes in these variables. $\Delta x_{i,k,t}^{[t-2,t]}$ and $\Delta x_{i,k,t}^{[t,t+2]}$, respectively, indicate a change in variable $x_{i,k,t}$ from year $t-2$ to t and that from year t to $t+2$. The vector $Z_{k,t}$ includes the country-level time-varying control variables. Country fixed effects a_k and year fixed effects b_t are included and all variables are normalized by year t total assets.

[Insert Table 9]

Table 9 reports the results of estimating the value of excess cash. Following Fresard and Salva (2010), we experiment with two types of samples: the sample used in Columns 1, 2, and 4 only includes firms with positive excess cash, whereas in Columns 3 and 5 we set negative excess cash to zero and include all available observations. Columns 2 and 3 report the results with the baseline country-level control variables, while Columns 4 and 5 present those with additional country characteristics introduced in Section 3 (Column 1 is a benchmark result without EPL and its interaction with excess cash). Consistent with our intuition discussed above, we find that the coefficient on the interaction of the EPL strictness and excess cash is positive and significant across all specifications. These results indicate that the shadow price of an additional dollar of cash increases with the EPL strictness. Intuitively, investors place a higher premium on excess cash for the firms facing a greater stringency in EPLs, because increased labor adjustment costs can make these firms more prone to financial distress going forward. This evidence further corroborates our baseline DID results in that firms' optimal decision-making in parallel with the market's expectation drives the positive association between corporate cash holdings and within-country variation in EPLs.

5.4. Is cash policy explained away by debt policy or investment policy?

In this subsection, we conduct an analysis to ensure that the response of firms' cash policy to variation

in EPLs is not the flipside of the response of debt policy. Simintzi et al. (2015) and Serfling (2016), respectively, use country-level changes in EPLs and the U.S. state-level adoption of Wrongful Discharge Laws, and document that firms' leverage ratio responds negatively to a regulatory shock raising firing costs. In a hypothetical frictionless market, cash in hand today would be perfectly substituted for by debt capacity and thus become merely negative debt. From this conventional view of cash, one might raise a concern that corporate cash holdings are largely determined by firms' debt policy. Although our results in the previous subsections concerning the propensities to save and the value of cash already indicate that changes in corporate cash following labor reforms are the outcome of firms' optimal decision-making, we conduct formal tests to further mitigate this concern.

We draw on the extant theories that incorporate both cash and debt policies into the dynamic model of the firm (Acharya et al., 2007; Bolton et al., 2011). According to these theories, when an additional dollar of cash is available, the financially constrained firms prefer accumulating cash over paying down debt, whereas the unconstrained ones are largely indifferent between the two alternatives. The unconstrained firms have no problem to issue new debt in the future, and thus are indifferent between holding cash (negative debt) and paying down debt (creating debt capacity). The constrained firms, however, find it optimal to accumulate cash while leaving their leverage ratios relatively high today, because paying down debt today does not warrant new debt issuance in the future.

This theoretical framework allows us to assess whether the positive association between the EPL strictness and corporate cash holdings is the result of firms' intended response or merely the reflection of changes in firms' debt policy. If the latter is true, we would observe an unambiguously positive (negative) effect of EPLs on corporate cash (debt) policy for both the constrained and unconstrained groups of firms. The discussed theories, however, predict that a positive (negative) effect of EPLs on cash (debt) should be concentrated among the constrained (unconstrained) firms.

To test this prediction, we follow Saretto and Tookes (2013) and Subrahmanyam et al. (2017) to

estimate leverage and cash regressions jointly in the 2SLS system. To identify the system of equations, industry mean leverage and industry mean cash, respectively, are included in the leverage and cash models. We report our second-stage regression results in Table 10, Panels A–C (the corresponding first-stage regressions are provided in the Online Appendix). As before, we use firm size, firm age, and Whited-Wu index as our sorting variables to classify firms into the constrained and unconstrained groups. We find strong support to our predictions. The effect of EPLs on leverage is not different from zero for the constrained firms, whereas it is negative and significant for the unconstrained firms. In contrast, the positive effect of EPLs on cash is more pronounced for the constrained firms (this is also consistent with the results reported in Section 4, Table 6). For the constrained firms, cash in hand today does not seem substituted for by debt capacity. These results, collectively, suggest that both cash policy and debt policy are an important part of firms' decision-making in responding to a regulatory event that changes labor adjustment costs.

[Insert Table 10]

Moreover, to further ensure the robustness of our findings, we check whether our results hold when we take into account firms' investment policy, as well as cash and debt policies, into a joint estimation system. We apply a procedure similar to the one described above, and report the results in Panels D–F of Table 10. Our conclusion drawn on these results remains the same.

6. Conclusions

In this paper, we investigate how the stringency of employment protection laws (EPLs) affect corporate cash policy, cash saving propensities, and the value-creation role of cash holdings. Theory suggests that a greater stringency in EPLs increases labor adjustment costs and in turn leaves firms with a larger burden of operating leverage going forward. Therefore, firms' precautionary demand

for cash, as a means of creating financial flexibility, increases with the EPL strictness. Using inter-temporal variation in the stringency of EPLs across 20 OECD countries, we find strong empirical support to this key prediction. Our series of tests uncover a robust positive relationship between the EPL strictness and corporate cash holdings. Consistent with the labor adjustment cost hypothesis, this positive effect of EPLs on cash is stronger among firms with high labor turnover, no multinational presence, or financial constraints.

Moreover, following an increase in the stringency of EPLs, firms raise the propensities to save cash from both internal and external sources of funds. Cash buffers created by firms in the face of stricter EPLs help these firms to support their capital investment in subsequent episodes of industry-wide distress. The market's valuation of firms' cash buffers is also greater when they experience an increase in the EPL strictness. These results together lend strong support to the idea that firms' precautionary motive underlies the positive association between corporate cash and the EPL strictness. Firms across the world seem to use their cash policy as a means of optimally responding to increased labor adjustment costs in an attempt to mitigate the distress risk.

Overall, our study highlights that the stringency of EPLs is an important factor that firms take into account in determining the optimal level of precautionary cash buffers. It sheds new light on the interaction between financial market frictions and labor market frictions that influences corporate cash behaviors and the value of cash holdings.

Appendix. Variable definitions

Firm-level variables (Worldscope item names in the parentheses where applicable):	
Cash	Cash and short term investments (WC02005)/total assets$_{i,t-1}$ (WC02999).
Size	Natural logarithm of total assets in 2007 US dollars.
Q	[Total assets (WC02999) – book value of equity (WC03501) + market value of equity (WC08001)]/total assets$_{i,t-1}$ (WC02999).
Leverage	Total debt (WC03255)/total assets$_{i,t-1}$ (WC02999).
PPE	Net property plant and equipment (WC02501)/total assets$_{i,t-1}$ (WC02999).
NWC	[Net working capital (WC03151) – cash (WC02005)]/total assets$_{i,t-1}$ (WC02999).
Cash flow	[Net income before extraordinary items and preferred dividends (WC01551) + depreciation and amortization (WC01151)]/total assets$_{i,t-1}$ (WC02999).
CAPEX	Capital expenditures (WC04601)/total assets$_{i,t-1}$ (WC02999)
R&D to sales	Research and development (WC01201)/net sales (WC01001). Missing observations are set to zero.
Dividend payer	A dummy indicator that equals one if firms pay dividends.
Equity Issue	Net proceed from sale and issue of common and preferred stocks (WC04251)/total assets$_{i,t-1}$ (WC02999).
Debt Issue	Long-term debt issue (WC04401)/total assets$_{i,t-1}$ (WC02999).
InduDown	Industry-wide distress measure (Opler and Titman, 1994), defined as a period when the industry's median sales growth is negative and its median stock return is lower than minus 20%. Industry definition is three-digit SIC.
Multinational	A dummy variable that equals one if a firm reports foreign operating income (WC07126) or foreign income tax (WC18187) in the past five consecutive years.
Country-level variables:	
EPL	Employment protection legislation index ranging from 0 to 6 [Source: OECD].
GDP growth	Annual GDP growth [Source: International Monetary Fund (IMF)].
GDP per capita (in $2007)	Annual GDP per capita [Source: IMF].
Creditor rights	Protection for creditor rights ranging from 0 to 4 [Source: Djankov, McLiesh and Shleifer (2007)]
Unionization rate	The number of trade union members divided by that of total wage and salary earners [Source: OECD].
Labor spending	Government spending on labor as a fraction of GDP [Source: OECD].
Political orientation	An indicator variable that takes one, two, and three, respectively, if the political orientation of a government is of right-wing, center, and left-wing, respectively [Source: World Bank].

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Figure 1

Evolution of EPL by Country.

This figure plots the evolution of the EPL index scores by country over the period 1985–2007.

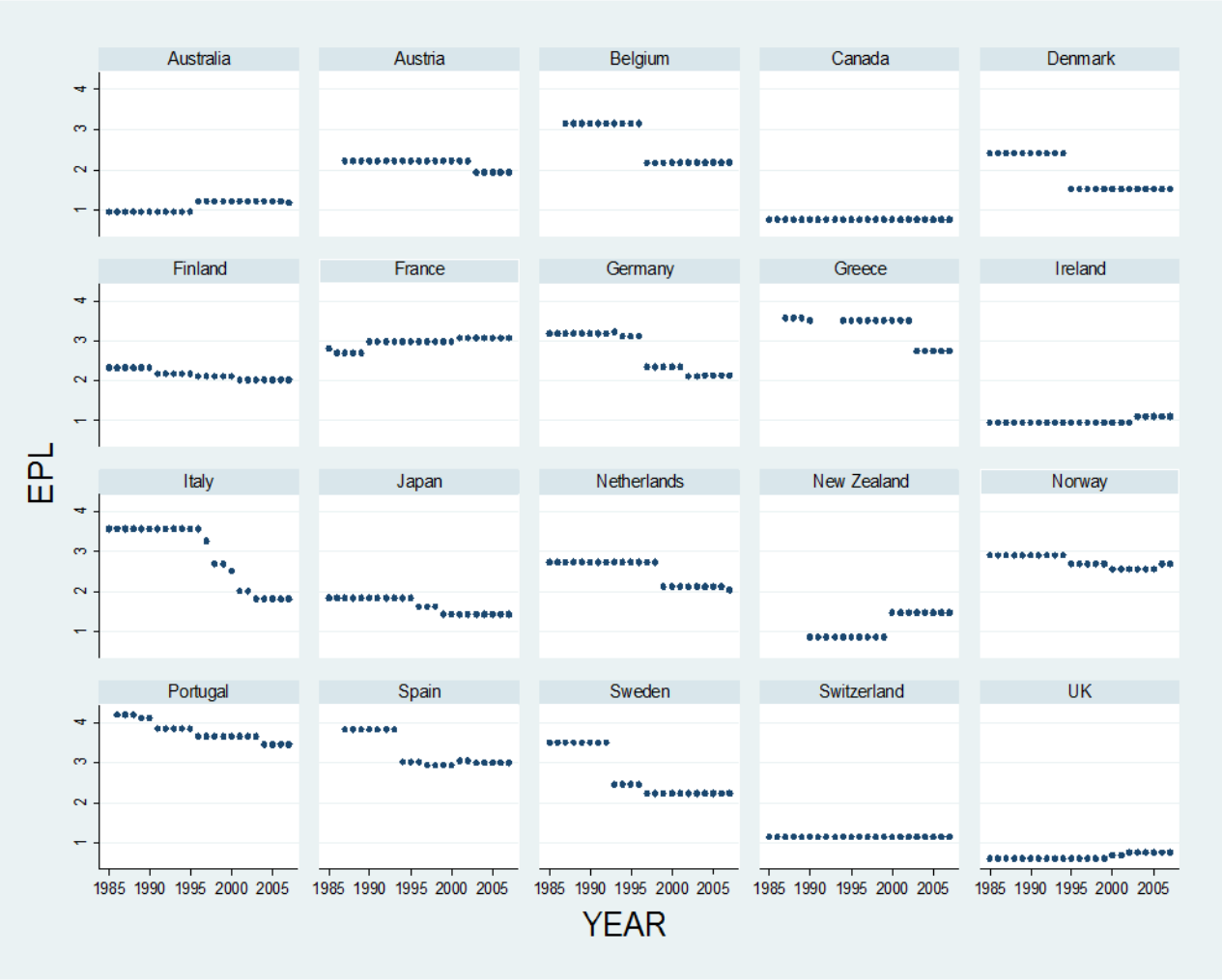

Figure 2

Evolution of the Firm-Level Excess Cash around Changes in EPLs.

This figure plots the evolution of the firm-level excess cash over the seven-year period around a change in the EPL index in year *t*. The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. The excess cash is net of firm-specific effects, country's economic conditions, and the time-varying industry conditions. See Section 3 for the estimation of the residuals in more detail.

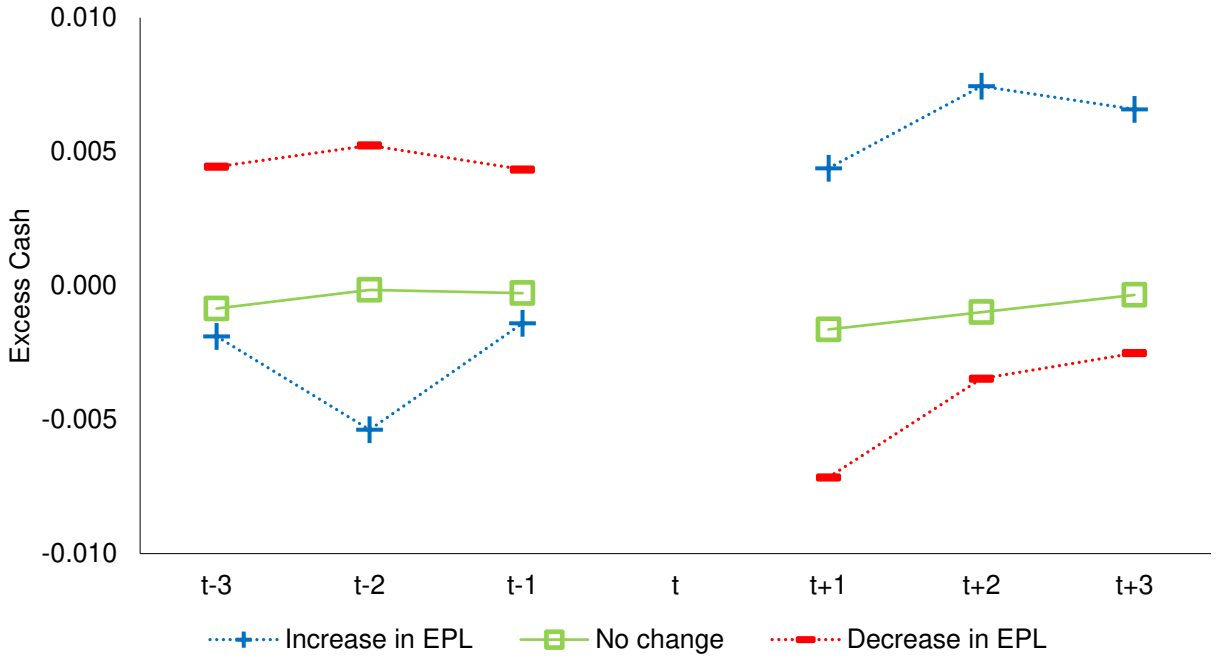

Table 1

Summary statistics.

Panel A reports descriptive statistics for the whole sample. Panel B reports, for each country, the descriptive statistics of the EPL index (Columns 1–3), the medians of cash to asset ratios (Column 4), the number of observations and the medians of firm-level demeaned cash to asset ratios for the low and high EPL regimes (Columns 5–8), and the Wilcoxon rank-sum test results for differences in these medians between the two EPL regimes (Column 9). For each country, the high EPL regime is defined as the years for which the EPL index scores are greater than the country mean score (this split is unavailable for Canada and Switzerland, for which the EPL index does not vary). The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. All variables, except *Size*, *Q*, *R&D to sales*, *Dividend payer*, and the country-level variables, are scaled by the beginning-of-year assets. The variables are winsorized at 1% in both tails. In Column 9 in Panel B, ***, **, and * indicate the statistical significance for the median difference at the 1%, 5%, and 10% levels, respectively.

Panel A: Firm and country characteristics

	Mean (1)	Median (2)	SD (3)	N (4)
Firm-level variables:				
$Cash$	0.160	0.096	0.196	74,260
$\Delta Cash$	0.021	0.001	0.130	74,260
$Size$ (ln Assets, in \$2007, million)	12.70	12.59	1.84	74,260
Q (market to book)	1.94	1.38	1.79	74,260
$Leverage$	0.256	0.222	0.218	74,260
PPE (net property plant and equipment)	0.389	0.314	0.678	74,260
NWC (net working capital, net of cash)	0.034	0.025	0.192	74,260
$Cash\ flow$	0.080	0.084	0.124	74,260
$CAPEX$	0.078	0.049	0.099	74,260
$R\&D\ to\ sales$	0.021	0.000	0.073	74,260
$Dividend\ payer$	0.725	1.000	0.447	74,260
$Equity\ issue$	0.056	0.000	0.190	74,260
$Debt\ issue$	0.063	0.008	0.129	74,260
Country-level variables:				
$GDP\ growth$	2.460	2.530	1.589	74,260
$GDP\ per\ capita$ (in \$2007)	29,584	28,274	8,782	74,260
$Creditor\ rights$	2.41	2.00	1.27	74,260
$Unionization\ rate$	29.89	28.01	15.57	74,260
$Labor\ spending$	1.64	1.20	1.18	65,744
$Political\ orientation$	1.83	1.00	0.97	63,818

(*continued*)

(**Table 1** continued)

Panel B: Country-by-country statistics for the EPL index and cash

	EPL index score			Cash to assets	Low and high EPL regimes by country: Number of observations		Medians of firm-level demeaned cash to assets		
Country	N (1)	Mean (2)	SD (3)	Median (4)	Low EPL regime (5)	High EPL regime (6)	Low EPL regime (7)	High EPL regime (8)	Difference (8) – (7) (9)
Australia	5,065	1.149	0.087	0.070	581	4,327	-0.012	-0.007	0.005
Austria	462	2.108	0.135	0.099	169	286	-0.008	-0.007	0.001
Belgium	637	2.361	0.384	0.072	515	105	-0.009	-0.006	0.002
Canada	8,168	0.750	0.000	0.049	n/a	n/a	n/a	n/a	n/a
Denmark	1,512	1.795	0.423	0.120	1,016	415	-0.020	0.006	0.026***
Finland	1,314	2.100	0.093	0.083	543	691	-0.018	-0.008	0.011***
France	5,954	2.992	0.086	0.107	2,928	2,624	-0.008	-0.012	-0.003***
Germany	3,639	2.383	0.382	0.076	2,931	641	-0.009	-0.002	0.007***
Greece	428	2.936	0.342	0.058	314	107	-0.003	0.000	0.003
Ireland	871	0.978	0.079	0.110	551	230	-0.014	-0.018	-0.004
Italy	2,245	2.715	0.775	0.097	1,064	977	-0.020	-0.016	0.004***
Japan	15,378	1.498	0.143	0.142	12,317	2,618	-0.011	0.013	0.024***
Netherlands	2,276	2.441	0.309	0.065	1,065	1,054	-0.013	-0.006	0.007***
New Zealand	603	1.221	0.300	0.021	246	357	-0.010	-0.002	0.008***
Norway	1,350	2.711	0.131	0.142	968	299	-0.015	-0.014	0.002
Portugal	493	3.688	0.164	0.035	102	376	0.000	-0.007	-0.007***
Spain	905	3.185	0.363	0.060	684	161	-0.007	-0.014	-0.007
Sweden	1,974	2.492	0.447	0.102	1,656	208	-0.014	-0.006	0.008***
Switzerland	1,926	1.140	0.000	0.122	n/a	n/a	n/a	n/a	n/a
UK	19,060	0.655	0.068	0.076	9,552	7,923	-0.009	-0.013	-0.004***

Table 2

Baseline difference-in-differences estimation results.

This table reports the estimation results of Equation (1). The dependent variable is cash to assets. The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. All variables, except *Size*, *Q*, *R&D to sales*, *Dividend payer*, and the country-level variables, are scaled by the beginning-of-year assets. The variables are winsorized at 1% in both tails. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

$Dependent\ var: Cash$	(1)	(2)
$\boldsymbol{EPL}$	**0.033*** **	**0.021*** **
	[0.012]	[0.006]
$Size$	-0.035***	-0.038***
	[0.004]	[0.003]
Q	0.041***	0.041***
	[0.003]	[0.003]
$Leverage$	-0.046*	-0.053**
	[0.025]	[0.022]
PPE	0.001	0.001
	[0.002]	[0.002]
NWC	-0.194***	-0.190***
	[0.017]	[0.014]
$Cash\ flow$	0.098***	0.097***
	[0.019]	[0.019]
$CAPEX$	-0.064***	-0.060***
	[0.018]	[0.017]
$R\&D\ to\ sales$	0.091***	0.092***
	[0.026]	[0.026]
$Dividend\ payer$	0.012***	0.012***
	[0.003]	[0.003]
$GDP\ growth$		0.002
		[0.001]
$GDP\ per\ capita$		0.077***
		[0.007]
$Creditor\ rights$		0.005
		[0.011]
N	74,260	74,260
Adjusted R^2	0.293	0.297
Firm FE	Yes	Yes
Industry*Year FE	Yes	Yes

Table 3

Pre-treatment trends.

This table reports the dynamic effects of changes in EPLs on cash to assets. Two sets of four dummy indicators are prepared: $incr\_before^{-1}$ is a dummy that equals one if a firm is observed one year prior to an increase in the EPL strictness; $incr\_before^{0}$ is a dummy that equals one if a firm is observed in the year in which such an increase takes place; $incr\_after^{1}$ is a dummy that equals one if a firm experienced the increase last year; and $incr\_after^{2+}$ is a dummy that equals one if a firm experienced the increase at least two years ago. In the same way, a set of four dummy variables are defined for the case of a decrease in the EPL strictness. Regressions include the firm- and country-level controls (unreported). The data are obtained from the Worldscope for nonregulated industrial firms in the countries that underwent a single increase (Ireland and New Zealand) or a single decrease (Austria and Demark) in the EPL strictness between 1985 and 2007 that satisfy the data filters described in Section 2. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

$Dependent\ var: Cash$	(1)	(2)
$incr\_before^{-1}$	-0.008**	-0.006
	[0.002]	[0.004]
$incr\_before^{0}$	-0.005	-0.002
	[0.019]	[0.020]
$\boldsymbol{incr\_after^{1}}$	**0.025*** **	**0.028*** **
	[0.004]	[0.004]
$\boldsymbol{incr\_after^{2+}}$	**0.038*** **	**0.041*** **
	[0.006]	[0.004]
$decr\_before^{-1}$	-0.017*	-0.014
	[0.007]	[0.008]
$decr\_before^{0}$	-0.017	-0.014
	[0.015]	[0.011]
$\boldsymbol{decr\_after^{1}}$	**-0.028*** **	**-0.026***
	[0.004]	[0.008]
$\boldsymbol{decr\_after^{2+}}$	**-0.051*** *	**-0.047***
	[0.016]	[0.019]
N	3,448	3,448
Adjusted R^2	0.299	0.265
Firm-level controls	Yes	Yes
Country-level controls	Yes	Yes
Firm FE	Yes	Yes
Industry*Year FE	Yes	
Year FE		Yes

Table 4

Other country-level characteristics.

This table reports the estimation results of Equation (1) augmented with additional country-level characteristics. The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. All variables, except *Size*, *Q*, *R&D to sales*, *Dividend payer*, and the country-level variables, are scaled by the beginning-of-year assets. The variables are winsorized at 1% in both tails. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

$Dependent\ var$: $Cash$	(1)	(2)	(3)
$\boldsymbol{EPL}$	**0.020*** **	**0.025** **	**0.023** **
	[0.007]	[0.010]	[0.009]
$Size$	-0.038***	-0.037***	-0.036***
	[0.003]	[0.003]	[0.003]
Q	0.041***	0.042***	0.042***
	[0.003]	[0.003]	[0.003]
$Leverage$	-0.053**	-0.046**	-0.047**
	[0.022]	[0.021]	[0.021]
PPE	0.001	-0.007	-0.007
	[0.002]	[0.008]	[0.008]
NWC	-0.190***	-0.183***	-0.185***
	[0.014]	[0.014]	[0.014]
$Cash\ flow$	0.097***	0.107***	0.106***
	[0.019]	[0.023]	[0.023]
$CAPEX$	-0.059***	-0.053**	-0.054**
	[0.016]	[0.019]	[0.019]
$R\&D\ to\ sales$	0.091***	0.076**	0.073**
	[0.026]	[0.031]	[0.031]
$Dividend\ payer$	0.012***	0.013***	0.014***
	[0.003]	[0.003]	[0.003]
$GDP\ growth$	0.002	0.000	0.000
	[0.001]	[0.001]	[0.001]
$GDP\ per\ capita$	0.075***	0.068***	0.067***
	[0.007]	[0.008]	[0.007]
$Creditor\ rights$	0.004	0.000	0.001
	[0.012]	[0.010]	[0.009]
$Unionization\ rate$	-0.001	-0.000	-0.000
	[0.001]	[0.001]	[0.001]
$Labor\ spending$		-0.005	-0.003
		[0.006]	[0.006]
$Political\ orientation$			0.002
			[0.002]
N	74,260	65,744	63,818
Adjusted R^2	0.297	0.291	0.292
Firm FE	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes

Table 5

Effect of labor turnover and multinational presence.

This table reports the estimation results of Equation (1) augmented with interaction terms $EPL \times LaborTurnOver$ (Column 1) and $EPL \times Multinational$ (Column 2). Labor turnover rates ($LaborTurnOver$) are calculated using the Quarterly Workforce Indicators (QWI) data from the U.S. Census Bureau as described in Section 4. In Column 2, a firm is defined as multinational if the firm reports foreign operating income or foreign income tax in the past five consecutive years. Regressions include the firm- and country-level controls (unreported). The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

$Dependent\ var$: $Cash$	(1)	(2)
EPL	0.016**	0.022***
	[0.007]	[0.007]
$(\boldsymbol{EPL \times LaborTurnOver})$	**0.027***	
	[0.016]	
$(\boldsymbol{EPL \times Multinational})$		**-0.008*** **
		[0.001]
N	70,187	74,260
Adjusted R^2	0.297	0.297
Firm-level controls	Yes	Yes
Country-level controls	Yes	Yes
Firm FE	Yes	Yes
Industry*Year FE	Yes	Yes

Table 6

Effect of financial constraints and cash flow volatility.

This table reports the estimation results of Equation (1) for the subsamples formed based on firm size, firm age, Whited-Wu index, and the firm-level cash flow volatility as indicated in the column headers. The subgroup labeled as Small (Large) consists of firm-year observations whose book asset size belongs to the bottom (top) 30 percentile in each corresponding year; the subgroup Young (Mature) consists of firms that have appeared in the Worldscope database for less (more) than 15 years; the subgroup High (Low) Whited-Wu Index consists of firm-year observations whose score belongs to the top (bottom) 30 percentiles in each corresponding year; and the subgroup High (Low) Cash Flow Volatility consists of firm-year observations whose cash flow volatility belongs to the top (bottom) 30 percentiles in each corresponding year. Regressions include the firm- and country-level controls (unreported). The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Firm Size		Firm Age		Whited-Wu Index		Cash Flow Volatility	
	Small	Large	Young	Mature	High	Low	High	Low
Dependent var: *Cash*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EPL	**0.039*** **	**0.012**	**0.021*** **	**0.013**	**0.020** **	**0.009**	**0.026** **	**0.017**
	[0.008]	[0.008]	[0.007]	[0.009]	[0.008]	[0.008]	[0.010]	[0.012]
N	22,289	22,274	44,595	29,665	18,474	18,558	19,973	20,008
Adjusted R^2	0.313	0.267	0.309	0.275	0.279	0.284	0.330	0.324
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7

EPLs and propensities to save cash.

Panel A reports the estimation results of Equation (2), where the dependent variable is the one-year change in cash to assets (cash saving regressions). Panel B reports the comparisons of cash flows from operating (*CFO*), financing (*CFF*), and investing (*CFI*) activities five years before and after a change in the EPL index score. The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. All variables, except *Size*, *Q*, and the country-level variables, are scaled by the beginning-of-year assets. The variables are winsorized at 1% in both tails. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Cash saving regressions

Dependent var: $\Delta Cash$	(1)	(2)
EPL	0.000	-0.005
	[0.003]	[0.004]
$Cash\ flow$	0.063***	0.062**
	[0.021]	[0.026]
$Equuity\ issue$	0.284***	0.278***
	[0.025]	[0.037]
$Debt\ issue$	-0.031	-0.020
	[0.024]	[0.025]
$(\boldsymbol{EPL \times Cash\ flow})$	**0.044****	**0.043****
	[0.018]	[0.019]
$(\boldsymbol{EPL \times Equity\ issue})$	**0.034****	**0.036***
	[0.015]	[0.019]
$(\boldsymbol{EPL \times Debt\ issue})$	**0.039*****	**0.029****
	[0.013]	[0.012]
$Size$	-0.009**	-0.007*
	[0.003]	[0.004]
Q	0.017***	0.017***
	[0.001]	[0.001]
$GDP\ growth$	-0.001	-0.002***
	[0.001]	[0.000]
$GDP\ per\ capita$	0.037***	0.032***
	[0.005]	[0.005]
$Creditor\ rights$	0.000	-0.005*
	[0.003]	[0.003]
$Unionization\ rate$		-0.001***
		[0.000]
$Labor\ spending$		0.001
		[0.002]
$Political\ orientation$		0.001
		[0.001]
N	74,260	63,818
Adjusted R^2	0.333	0.327
Firm FE	Yes	Yes
Industry*Year FE	Yes	Yes

(*continued*)

(**Table 7** continued)

Panel B: Changes in net cash flows from operating, financing, and investing activities			
	(1)	(2)	(3)
	Before a Change in the EPL Index Five-year mean [Five-year median]	After a Change in the EPL Index Five-year mean [Five-year median]	*p*-value for mean diff. [median diff.]
Increase in EPL			
CFO	0.089 [0.076]	0.094 [0.087]	0.001 [0.000]
CFF	0.051 [-0.011]	0.075 [-0.005]	0.000 [0.000]
CFI	0.122 [0.055]	0.123 [0.060]	0.898 [0.000]
Decrease in EPL			
CFO	0.102 [0.092]	0.073 [0.064]	0.000 [0.000]
CFF	0.080 [-0.004]	0.024 [-0.014]	0.000 [0.000]
CFI	0.132 [0.069]	0.074 [0.044]	0.000 [0.000]

Table 8

EPLs, cash, and capital investment in the subsequent industry downturns.

This table reports the estimation results of Equation (3). The dependent variable is CAPEX to lagged assets. $InduDown$ is the industry-wide distress measure (Opler and Titman, 1994), defined as a period in which each three-digit SIC industry's median sales growth is negative and its median stock return is lower than minus 20%. The industry definition used for $InduDown$ is three-digit SIC industry, whereas the definition used for industry*year fixed effects is Fama-French 12 industry as before. $Cash$ is lagged cash holdings. In Columns 1 and 3, $EPL_{i,k,t-1}$ is the EPL index score; in Columns 2 and 4, it is a dummy variable that takes one if there is an increase in the index score in year $t-1$ and zero if there is a decrease in that year. The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. The variables are winsorized at 1% in both tails. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

$Dependent\ var: CAPEX$	(1)	(2)	(3)	(4)
EPL	0.003	-0.004	0.003	-0.003
	[0.005]	[0.006]	[0.005]	[0.007]
$Cash$	0.040***	0.040***	0.039***	0.038***
	[0.011]	[0.008]	[0.011]	[0.008]
$InduDown$			-0.007***	-0.003
			[0.002]	[0.013]
$(\boldsymbol{EPL \times Cash \times InduDown})$			**0.026*** **	**0.049** **
			[0.009]	**[0.022]**
$(EPL \times Cash)$	0.006	0.042*	0.005	0.041*
	[0.006]	[0.023]	[0.006]	[0.022]
$(EPL \times InduDown)$			0.001	-0.015
			[0.001]	[0.013]
$(Cash \times InduDown)$			0.004	0.017
			[0.004]	[0.022]
Q	0.010***	0.009***	0.010***	0.009***
	[0.001]	[0.002]	[0.001]	[0.002]
$Leverage$	0.090***	0.127***	0.090***	0.128***
	[0.010]	[0.023]	[0.010]	[0.023]
$Cash\ flow$	0.077***	0.037	0.076***	0.039
	[0.009]	[0.032]	[0.009]	[0.032]
$Size$	-0.015***	-0.011*	-0.015***	-0.011*
	[0.001]	[0.006]	[0.001]	[0.006]
$GDP\ growth$	0.000	0.005***	0.000	0.005***
	[0.001]	[0.000]	[0.001]	[0.000]
$GDP\ per\ capita$	-0.007	0.106***	-0.007	0.105***
	[0.006]	[0.012]	[0.007]	[0.012]
$Creditor\ rights$	-0.013**	-0.011**	-0.013**	-0.011**
	[0.005]	[0.004]	[0.005]	[0.005]
N	62,443	5,356	62,443	5,356
Adjusted R^2	0.198	0.242	0.199	0.242
Firm FE	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes

Table 9

EPLs and the value of excess cash.

This table reports the estimation results of Equation (4). The dependent variable is market to book ratio. $XCash$ is excess cash estimated from Equation (1) using the instrumental variable method as described in Section 5. In Columns 1, 2, and 4, the sample consists of the firms with positive excess cash; in Columns 3 and 5, excess cash is set to zero for the observations with negative values and all available observations are included. E is earnings before extraordinary items plus interest expenses, RD is R&D expenses, I is interest expenses, D is dividends, and NA is net assets (total assets minus cash). These variables are scaled by the beginning-of-year assets. $\Delta x_{i,k,t}^{[t-2,t]}$ and $\Delta x_{i,k,t}^{[t,t+2]}$, respectively, indicate a change in variable $x_{i,k,t}$ from $t-2$ to t and that from t to $t+2$. The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. The variables are winsorized at 1% in both tails. Standard errors robust to clustering by country are reported in the brackets. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

$Dependent\ var$: $MV_{i,k,t}$	Firms with $XCash > 0$ (1)	Firms with $XCash > 0$ (2)	$XCash = 0$ if negative (3)	Firms with $XCash > 0$ (4)	$XCash = 0$ if negative (5)
$XCash_{i,k,t}$	0.740***	0.465***	0.529***	0.460***	0.530***
	[0.025]	[0.082]	[0.098]	[0.085]	[0.104]
$EPL_{k,t-1}$		-0.141**	-0.042	-0.135	-0.016
		[0.058]	[0.056]	[0.080]	[0.080]
$(\boldsymbol{XCash \times EPL})$		**0.290*** **	**0.222** **	**0.322*** **	**0.240** **
		[0.074]	[0.113]	[0.075]	[0.115]
$E_{i,k,t}$	-1.463***	-1.461***	-1.808***	-1.338**	-1.692***
	[0.128]	[0.448]	[0.346]	[0.477]	[0.366]
$\Delta E_{i,k,t}^{[t-2,t]}$	0.358***	0.368***	0.422***	0.337**	0.394***
	[0.075]	[0.125]	[0.110]	[0.123]	[0.102]
$\Delta E_{i,k,t}^{[t,t+2]}$	-0.304***	-0.318	-0.288**	-0.245	-0.220
	[0.087]	[0.222]	[0.119]	[0.239]	[0.128]
$RD_{i,k,t}$	4.165***	3.964***	4.195***	3.092***	3.455***
	[0.382]	[1.131]	[1.114]	[0.892]	[0.948]
$\Delta RD_{i,k,t}^{[t-2,t]}$	2.841***	3.009***	2.003***	2.674***	1.805***
	[0.533]	[0.822]	[0.283]	[0.782]	[0.277]
$\Delta RD_{i,k,t}^{[t,t+2]}$	3.887***	3.797**	3.185***	2.823**	2.598***
	[0.513]	[1.473]	[0.873]	[1.237]	[0.734]
$I_{i,k,t}$	-0.034	0.459	3.844*	-0.138	3.298
	[0.936]	[1.691]	[1.982]	[1.710]	[2.017]
$\Delta I_{i,k,t}^{[t-2,t]}$	-1.964***	-1.617*	-2.591***	-1.398	-2.245**
	[0.710]	[0.853]	[0.698]	[1.135]	[0.853]
$\Delta I_{i,k,t}^{[t,t+2]}$	-2.482***	-2.479*	-1.210	-2.492**	-1.242
	[0.690]	[1.428]	[1.013]	[0.973]	[0.814]
$D_{i,k,t}$	12.667***	12.449***	12.158***	11.709***	11.584***
	[0.845]	[2.381]	[2.368]	[2.419]	[2.398]
$\Delta D_{i,k,t}^{[t-2,t]}$	0.069	0.549	0.152	0.470	-0.364
	[0.676]	[0.859]	[1.256]	[0.830]	[1.076]
$\Delta D_{i,k,t}^{[t,t+2]}$	4.837***	4.628***	3.695**	4.015***	3.117**
	[0.525]	[1.428]	[1.589]	[1.244]	[1.348]

(*continued*)

(**Table 9** continued)

	(1)	(2)	(3)	(4)	(5)
$\Delta NA_{i,k,t}^{[t-2,t]}$	0.296***	0.285***	0.240***	0.254**	0.221***
	[0.033]	[0.081]	[0.055]	[0.102]	[0.065]
$\Delta NA_{i,k,t}^{[t,t+2]}$	0.326***	0.307***	0.257***	0.253***	0.214***
	[0.026]	[0.081]	[0.078]	[0.076]	[0.066]
$\Delta MV_{i,k,t}^{[t,t+2]}$	-0.098***	-0.092*	-0.075	-0.069	-0.054
	[0.014]	[0.045]	[0.048]	[0.041]	[0.040]
$GDP\ growth_{k,t}$		0.071***	0.064***	0.059***	0.061***
		[0.021]	[0.020]	[0.011]	[0.012]
$GDP\ per\ capita_{k,t}$		-0.295	-0.146	-0.300*	-0.080
		[0.174]	[0.138]	[0.166]	[0.145]
$Creditor\ rights_{k,t}$		0.417***	0.315***	0.307***	0.263***
		[0.076]	[0.070]	[0.057]	[0.058]
$Unionization\ rate_{k,t}$				-0.015**	-0.006
				[0.006]	[0.007]
$Labor\ spending_{k,t}$				-0.063**	-0.038
				[0.029]	[0.027]
$Political\ orientation_{k,t}$				0.053***	0.017
				[0.016]	[0.016]
N	29,503	29,496	68,255	25,456	59,547
Adjusted R^2	0.422	0.438	0.375	0.469	0.386
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Table 10

Debt, cash, and investment policies.

Panels A–C report the results of the 2SLS system of leverage (Columns 1 and 2) and cash (Columns 3 and 4) equations. Panels D–F report the results of the 3SLS system of leverage (Columns 1 and 2), cash (Columns 3 and 4) and investment (Columns 5 and 6) equations. The financial-constraint subsamples are formed based on firm size, firm age, and Whited-Wu index, respectively, as indicated in the panel headings. Section 4 describes the sample classification methods in more details. To identify the 2SLS system, industry mean leverage ratio and industry mean cash to assets, respectively, are included. To identify the 3SLS system, industry mean leverage ratio, industry mean cash to assets, and industry mean CAPEX to assets respectively, are included. See the Online Appendix for the corresponding first-stage results. The data are obtained from the Worldscope for nonregulated industrial firms in 20 OECD countries from 1985 to 2007 that satisfy the data filters described in Section 2. All variables, except *Size*, *Q*, *R&D to sales*, *Dividend payer*, and the country-level variables, are scaled by the beginning-of-year assets. The variables are winsorized at 1% in both tails. ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Debt and cash regressions using the firm size subsamples

Dependent var:	Leverage		Cash	
	Small	large	Small	Large
	(1)	(2)	(3)	(4)
EPL	**0.009**	**-0.023****	**0.041*****	**0.007**
	[0.018]	[0.011]	[0.009]	[0.008]
Cash	-0.108	0.781***		
	[0.375]	[0.237]		
Industry leverage	0.014	0.045		
	[0.034]	[0.038]		
Leverage			-0.776***	-0.371***
			[0.142]	[0.100]
Industry cash			0.04	-0.141***
			[0.077]	[0.045]
Size	0.012	0.044***	-0.051***	-0.011**
	[0.032]	[0.008]	[0.006]	[0.005]
Q	0.017	0.019**	0.053***	0.038***
	[0.015]	[0.008]	[0.003]	[0.005]
PPE	0.089***	0.389***	0.024**	0.036
	[0.024]	[0.033]	[0.009]	[0.041]
NWC	-0.238***	-0.069	-0.356***	-0.274***
	[0.070]	[0.057]	[0.040]	[0.035]
Cash flow	-0.010	-0.449***	0.091***	0.085**
	[0.041]	[0.054]	[0.019]	[0.031]
CAPEX	0.229***	0.113***	0.161***	0.065**
	[0.036]	[0.033]	[0.031]	[0.028]
R&D to sales	-0.065	-0.195	0.028	0.155*
	[0.063]	[0.123]	[0.039]	[0.088]
Dividend payer	-0.027***	-0.031***	0.000	-0.006
	[0.009]	[0.004]	[0.007]	[0.005]
GDP growth	0.001	-0.003*	-0.001	0.001
	[0.002]	[0.002]	[0.002]	[0.001]
GDP per capita	0.060	0.057*	0.124***	0.113***
	[0.050]	[0.028]	[0.039]	[0.020]
Creditor rights	0.002	0.041***	-0.013	0.017*
	[0.014]	[0.010]	[0.009]	[0.009]
N	22,165	22,165	22,165	22,165
Adjusted R^2	0.182	0.337	0.309	0.269
Firm FE	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes

(*continued*)

(**Table 10** continued)

Panel B: Debt and cash regressions using the firm age subsamples

Dependent var:	Leverage		Cash	
	Young	Mature	Young	Mature
	(1)	(2)	(3)	(4)
EPL	**-0.012**	**-0.027****	**0.016****	**0.003**
	[0.011]	[0.013]	[0.007]	[0.009]
Cash	0.216*	0.783***		
	[0.117]	[0.155]		
Industry leverage	0.002	0.120***		
	[0.037]	[0.035]		
Leverage			-0.567***	-0.699***
			[0.121]	[0.105]
Industry cash			-0.029	-0.078
			[0.057]	[0.068]
N	44,353	29,503	44,353	29,503
Adjusted R^2	0.172	0.260	0.310	0.281
Firm-level controls	Yes	Yes	Yes	Yes
Country-level controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes

Panel C: Debt and cash regressions using the Whited-Wu index subsamples

Dependent var:	Leverage		Cash	
	Constrained	Unconstrained	Constrained	Unconstrained
	(1)	(2)	(3)	(4)
EPL	**-0.011**	**-0.028****	**0.016****	**0.005**
	[0.015]	[0.011]	[0.008]	[0.007]
Cash	-0.539***	0.781**		
	[0.137]	[0.290]		
Industry leverage	0.006	0.508***		
	[0.059]	[0.045]		
Leverage			-0.552***	-0.254***
			[0.027]	[0.044]
Industry cash			0.018	-0.060
			[0.054]	[0.045]
N	18,365	18,390	18,365	18,390
Adjusted R^2	0.212	0.272	0.277	0.282
Firm-level controls	Yes	Yes	Yes	Yes
Country-level controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes

(*continued*)

(**Table 10** continued)

Panel D: Debt, cash, and investment regressions using the firm size subsamples

Dependent var:	Leverage		Cash		CAPEX	
	Small (1)	large (2)	Small (3)	Large (4)	Small (5)	Large (6)
EPL	**0.019**	**-0.023****	**0.044*****	**0.005**	**0.005**	**0.007**
	[0.016]	**[0.010]**	**[0.010]**	**[0.008]**	**[0.007]**	**[0.005]**
Cash	-0.333	0.714***			-0.138***	-0.232***
	[0.270]	[0.221]			[0.046]	[0.038]
Industry leverage	-0.021	0.066				
	[0.037]	[0.053]				
Leverage			-0.834***	-0.380***	0.215***	0.226***
			[0.135]	[0.103]	[0.049]	[0.013]
Industry cash			0.057	-0.173***		
			[0.068]	[0.043]		
CAPEX	-0.235	0.552	-0.549	0.938**		
	[0.401]	[0.536]	[0.526]	[0.388]		
Industry CAPEX					0.315***	0.163***
					[0.045]	[0.029]
Size	-0.006	0.048***	-0.057***	0.001	-0.016***	-0.015***
	[0.027]	[0.011]	[0.008]	[0.008]	[0.004]	[0.002]
Q	0.031**	0.016	0.063***	0.030***	0.009***	0.002**
	[0.014]	[0.009]	[0.007]	[0.004]	[0.002]	[0.001]
PPE	0.105***	0.400***	0.031***	0.045		
	[0.026]	[0.033]	[0.008]	[0.042]		
NWC	-0.284***	-0.082	-0.375***	-0.276***		
	[0.052]	[0.054]	[0.044]	[0.037]		
Cash flow	0.029	-0.487***	0.120***	-0.008	0.064***	0.179***
	[0.040]	[0.073]	[0.026]	[0.050]	[0.010]	[0.016]
R&D to sales	-0.045	-0.181	0.026	0.157*		
	[0.054]	[0.125]	[0.038]	[0.086]		
Dividend payer	-0.019**	-0.030***	0.001	-0.006		
	[0.008]	[0.004]	[0.007]	[0.005]		
GDP growth	0.001	-0.002	0.000	0.002	0.000	0.001**
	[0.002]	[0.001]	[0.002]	[0.001]	[0.001]	[0.000]
GDP per capita	0.087*	0.064**	0.139***	0.119***	0.003	-0.014***
	[0.046]	[0.024]	[0.044]	[0.021]	[0.015]	[0.004]
Creditor rights	-0.007	0.044***	-0.022**	0.021*	-0.013**	-0.007*
	[0.018]	[0.010]	[0.010]	[0.011]	[0.006]	[0.004]
N	22,165	22,165	22,165	22,165	22,165	22,165
Adjusted R^2	0.17	0.336	0.311	0.27	0.201	0.32
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes

(*continued*)

(**Table 10** continued)

Panel E: Debt, cash, and investment regressions using the firm age subsamples

Dependent var:	Leverage		Cash		CAPEX	
	Young (1)	Mature (2)	Young (3)	Mature (4)	Young (5)	Mature (6)
EPL	**-0.008**	**-0.025***	**0.016****	**0.005**	**0.005**	**0.009**
	[0.011]	**[0.013]**	**[0.007]**	**[0.008]**	**[0.009]**	**[0.006]**
Cash	0.047	0.654**			0.021	-0.153**
	[0.190]	[0.250]			[0.111]	[0.060]
Industry leverage	0.011	0.155**				
	[0.047]	[0.061]				
Leverage			-0.663***	-0.676***	0.247**	0.188***
			[0.123]	[0.099]	[0.096]	[0.049]
Industry cash			-0.042	-0.068		
			[0.057]	[0.065]		
CAPEX	0.34	0.983	0.037	-0.097		
	[0.348]	[0.680]	[0.511]	[0.511]		
Industry CAPEX					0.164**	0.212***
					[0.075]	[0.028]
N	44,353	29,503	44,353	29,503	44,353	29,503
Adjusted R^2	0.142	0.253	0.308	0.281	0.193	0.243
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel F: Debt, cash, and investment regressions using the Whited-Wu index subsamples

Dependent var:	Leverage		Cash		CAPEX	
	Constrained (1)	Unconstr. (2)	Constrained (3)	Unconstr. (4)	Constrained (5)	Unconstr. (6)
EPL	**-0.013**	**-0.027*****	**0.014***	**0.005**	**0.007**	**0.006**
	[0.015]	**[0.010]**	**[0.008]**	**[0.007]**	**[0.005]**	**[0.004]**
Cash	-0.486**	0.792*			0.026***	-0.095
	[0.190]	[0.438]			[0.009]	[0.056]
Industry leverage	0.010	0.568***				
	[0.065]	[0.057]				
Leverage			-0.519***	-0.266***	0.215***	0.294***
			[0.039]	[0.043]	[0.015]	[0.022]
Industry cash			-0.02	-0.06		
			[0.057]	[0.039]		
CAPEX	0.170	1.360**	0.665*	-0.067		
	[0.422]	[0.528]	[0.321]	[0.288]		
Industry CAPEX					0.149***	0.203***
					[0.031]	[0.029]
N	18,310	18,305	18,310	18,305	18,310	18,305
Adjusted R^2	0.209	0.248	0.278	0.282	0.241	0.299
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes