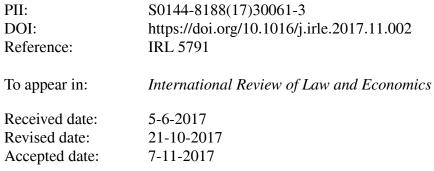# Accepted Manuscript

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# Bankruptcy and the difficulty of firing

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Highlights

- Layoffs may be an *ex ante* mechanism to avoid bankruptcy.
- An important amount of firing restrictions leads to more bankruptcies.
- The employer's legal obligation to notify a third party prior the dismissal of one employee encourages the use of bankruptcy.
- Labor codes that apply priority rules in case of reemployment tend to increase the number of bankruptcies.

**Abstract**   Firms may use layoffs as an *ex ante* mechanism to avoid filing for bankruptcy. However, the national labor law may impose some restrictions that delay or hamper the firing decision of the employer. This study proposes a different legal pathway for policymakers whose goal is to reduce the use of bankruptcy without acting on the design of the bankruptcy law. Using a sample of 33 countries from 2007 to 2015, we show that the total amount of firing restrictions leads to more bankruptcies. The employer's legal obligation to notify a third party prior the dismissal of one employee tends to increase the number of bankruptcies. It is very likely that the employer's rescue strategy endures an intense *ex post* monitoring of the employment contracts and/or a strong legal opposition to the layoff decision from such third party. In addition, labor codes that apply priority rules in case of reemployment can increase the use of bankruptcy.

**Keywords** Bankruptcy, Layoff, Labor
**JEL Classification** G33 G38 J63 K31

## 1. Introduction

One of the most important legal provision of the new French labor law adopted on August 9 2016 is the possibility of employees' dismissal on the basis of firm's economic performance. Thus, a French company faced with a decline in sales can more easily dismiss some of its employees in order to protect its own existence. Such reform made the subject of a long debate in the French society in which numerous labor unions have tried to oppose to its adoption. The main argument of French policymakers was that the new labor reform will increase the competitiveness of French companies on the European market. Nevertheless, heavier regulations of labor markets are associated with lower labor force participation and higher level of unemployment among the young population (Botero et al., 2004). Similar negative effects of such laws was also confirmed by Djankov and Ramalho (2008). Emerging economies with rigid employment laws seem to be characterized by developed grey economies and higher unemployment.

A pro-worker legal orientation of the labor law has not only social benefits by diminishing the likelihood of employee's layoff, but also financial costs. For instance, such rigid labor codes affect the input decisions of firms. According to Lafontaine and Sivadasan (2009), labor regulations that hinder firms to adjust the labor input as a response to the fluctuations of the demand can impede the growth of firms. However, such regulations increase workers' employment tenure by protecting them against job loss when firms experience negative shocks. Not surprisingly, pro-worker governments will always encourage the adoption of amendments that strengthen the bargaining power of employees. Besley and Burgess (2004) analyzed the consequences of such pro-worker political orientation in the case of India. Their study confirms that pro-worker labor market regulations diminished the level of investment, employment and productivity of the manufacturing sector. According to Klapper et al. (2006), labor regulations that protect more the employees can impede the growth of new firms. Higher costs of compliance with labor regulations may inhibit firms' entry.

As opposed to pro-worker laws, less rigid labor regulations tend to harm less the national economy. Di Tella and MacCulloch (2005) examined the main consequences of such laws in 21 countries from 1984 to 1990. After controlling for time and country fixed effects, their study shows that a higher degree of flexibility of firms to adjust labor to economic realities significantly

increases the employment rate and the labor force participation rate. Hence, a certain support in favor of less rigid labor laws seems to be justified by the labor literature. However, adopting a labor law that diminishes the difficulty of firing does not affect only the economic environment but also the amount of work of bankruptcy institutions.

In this paper, we want to examine another financial perspective that may shed light on the ongoing debate between rigid labor laws and flexible labor laws. Consequently, our research assesses how legal restrictions of firing and the amount of such restrictions influence the national number of bankruptcies. Rational agents should try to prevent firm's default and to use different economic strategies in order to favor the firm's survival. If such strategy is based on layoffs, a higher difficulty of firing should increase the pressure put on bankruptcy courts by increasing the number of bankruptcies.

In order to analyze such financial consequences of firing regulations, we constructed a sample of 33 countries from 2007 to 2015. Moreover, this study uses 4 firing restrictions provided by the World Bank such as: (1) the employer's obligation to notify a third party, e.g. a government agency, in case of the dismissal of one redundant worker, (2) the employer's obligation to consult a third party prior a collective dismissal, (3) the approval of a third party that is required for a collective dismissal and (4) the employer's obligation to apply priority rules in case of reemployment. Our estimations confirm that the presence of restrictions (1) and (4) encourages the use of bankruptcy. Furthermore, an important amount of firing restrictions also increases the use of bankruptcy in the economy. The way the layoff process is regulated by the law seems to directly affect the number of bankruptcy procedures opened in court. The estimations confirm that rigid labor laws that protect employees against firing are associated with a higher bankruptcy usage in the economy.

Although some studies treated the determinants of firms' exit rate such as Flynn (1991), Doi (2000) or Disney et al. (2003), firm's bankruptcy and firm's exit do not stand on a common ground. First, the firm will not automatically exit the market when the bankruptcy petition is approved by the court. Bankruptcy procedures are lengthy. According to Blazy et al. (2013), the average duration of a voluntary liquidation procedure in England is 35 months. In Netherlands, creditors have to wait on average 2 years to fully liquidate the debtor's assets (Couwenberg and de Jong, 2008). Second, the bankrupt firm will definitively exit the market when the judge will impose its removal from the national register. The deregistration dictated by the court is equivalent to the legal

3

exit of the firm. However, a bankruptcy procedure does not always lead to such outcome. A firm can settle the creditors' claims soon after the court approved the bankruptcy petition by partially liquidating its assets. Some national bankruptcy procedures are also designed to help the debtor regain her financial health such as the Chapter 11 of the U.S. bankruptcy system or the *Redressement judiciaire* procedure of the French bankruptcy system. Stef (2017) identified 90 countries that have such reorganization procedures that may allow the survival of the debtor under the guidance of a reorganization plan voted by claimants and approved by the court.

Our research is of primary interest for public authorities confronted with a large number of bankruptcies. One legal alternative to diminish the national use of bankruptcy was suggested by Claessens and Klapper (2005). Legal systems are able to reduce the number of bankruptcies if they have a higher judicial efficiency and grant creditors an important amount of legal rights. Such alternative would be feasible for a country with efficient institutions. However, it may be difficult for a country to raise the judicial efficiency in the short term. Some legal systems are not used to provide a higher protection to creditors such as national systems of French legal origin (Djankov et al., 2007). This study aims to propose a different legal pathway for policymakers whose goal is to reduce the use of bankruptcy without acting on the design of the bankruptcy law. As the study shows, countries with labor codes that hamper the employer's layoff decision are more prone to have a higher number of bankruptcies. By reducing the legal restrictions that slow down the layoff process, policymakers can diminish the use of bankruptcy in the economy.

The study is organized as follows. Section 2 presents the main determinants of corporate bankruptcy filing rates identified in the literature and the relationship between labor codes and insolvency risk. In section 3, we present our sample of 33 countries and describe the variables used to assess the impact of the firing regulations on the number of bankruptcies. Section 4 presents our econometric methodology and the results of our estimations. Section 5 presents our robustness checks. The last section concludes.

## 2. What drives the use of bankruptcy?
### 2.1 Determinants of corporate bankruptcy filing rates

The fall and the rise of corporate bankruptcy filings are subject to different legal and economic factors. Adopting a new bankruptcy reform may be intended to modernize the national

bankruptcy system in order to better serve the interest of claimants and debtors. Boyes and Faith (1986) showed that the implementation of the 1978 Bankruptcy Reform Act of United States increased on average the number of bankruptcies per month by 16.6% in the first two years after the adoption of the new law. However, a bankruptcy reform does not always lead to an increase of bankruptcies soon after its adoption. In 1986, a new insolvency act was adopted by the United Kingdom. As argued by Liu and Wilson (2002), the new law aimed to facilitate the reorganization of distressed companies and protect creditors from different malpractice. A reduction of the number of bankruptcies was recorded in the first three years following its adoption. In that period, more than 1100 companies were on average discouraged to file for bankruptcy (Liu and Wilson, 2002). In 1997, Belgium adopted a new bankruptcy law whose main purpose was to encourage the debtor's reorganization. According to Dewaelheyns and Van Hulle (2008), the Belgium reform managed to diminish the use of bankruptcy by small companies in the manufacturing and trade industries.

The variance of bankruptcy filings is also sensitive to currency fluctuations. Jacobsen and Kloster (2005) analyzed the impact of such macroeconomic factors on the number of Norwegian bankruptcies during 1991 and 2004. Their study shows that the appreciation of the local currency and the high growth of wages lead to an increase of the number of bankruptcies in 2002. Nevertheless, when the local currency started to depreciate and the wages to record a moderate growth in 2003, the number of bankruptcies started to decline. Another determinant of bankruptcy use is the net interest payments. Cuthbertson and Hudson (1996) showed that an increase of net interest rate had a short-run positive impact on the number of British compulsory liquidations. In the long-run, firms can adapt more easily to high interest rates allowing them to avoid bankruptcy. Fiscal policy also seems to play a role in the variance of bankruptcies. Buehler et al. (2012) examined the determinants of bankruptcies in Switzerland. Bankruptcy rates are lower in Swiss regions where corporate taxes and unemployment rates are lower and local authorities finance high public investment projects. In addition, central municipalities of agglomerations tend to be characterized by lower bankruptcy rates. Furthermore, a drop in the regional property prices can increase the regional level of forced insolvencies in New Zealand (Fabling and Grimes, 2005). Hence, the creditors' incentives to force a debtor to file for bankruptcy may increase when the loan repayment risk is higher, i.e. the collateral value decreased.

Undoubtedly, the number of bankruptcies is directly influenced by the content of the bankruptcy law. The rights granted to claimants provide a certain degree of protection that may encourage or discourage the use of bankruptcy. Claessens and Klapper (2005) examined how creditor's legal rights and the judicial efficiency of public institutions affect the bankruptcy filings of 35 countries from 1990 to 1999. Bankruptcy systems that do not impose an automatic stay on debtor's assets have less bankruptcies. Moreover, bankruptcy filings increase if a judgment during a reorganization procedure is rendered in less than 90 days. A greater judicial efficiency encourages the bankruptcy use but a bankruptcy system of high judicial efficiency that provides a higher degree of protection to creditors is associated with less bankruptcies. Stef (2017) extended their research by assessing the use of the liquidation procedure (31 countries) and the use of the reorganization procedure (23 countries) from 2005 to 2012. National bankruptcy laws that approve more easily the debtor's reorganization favor more filings of reorganization whereas bankruptcy voting rules with higher thresholds hamper the use of reorganization. A legal interference in terms of use also exists between the two bankruptcy procedures. The interference supposes that the approval mechanism of reorganization has an impact on the use of liquidation. The most significant legal provision that confirms the legal interference is the cram-down right of the court, i.e. judge's legal rights to overcome the creditors' rejection and to impose the reorganization procedure. Such legal provision decreases the national use of the liquidation procedure.

### 2.2 Layoffs and bankruptcy

Firms that want to prevent filing for bankruptcy will engage in different *ex ante* strategies such as finding cheaper suppliers, renegotiating credit contracts, expanding on other markets, diminishing production costs, improving labor productivity, abandon unprofitable projects etc. Layoffs are also an *ex ante* mechanism that can prevent bankruptcy or at least delay the bankruptcy filing. When the expected costs of defending against a worker's unlawful termination lawsuit are higher, firms tend to replace firings policy, i.e. situation where few employees are displaced, with layoff policy characterized by a large number of displacements (Oyer and Schaefer, 2000). According to Pfann (2006), a firm may have strong incentives to delay the firing decision when the firing costs are higher. Hence, the firm's insolvency risk may increase when firings are delayed. Nevertheless, employees' interest are not protected only by the law but also by the unions. The

unionization process seeks to raise the wages and to protect the employment of the current employees. However, Freeman and Kleiner (1999) confirm that unions have on average a rational behavior that does not drive firms out of business. Although unions are able to increase workers' compensations and slow down the economic growth of union firms, they are fully aware of the social necessity of the firm's survival. In addition, the influence of unions on the insolvency risk mainly depends on the size of the unions. Large size unions favor firm's termination whereas low and medium size unions are associated with a lower likelihood of firm's insolvency (Freeman and Kleiner, 1999).

The main dilemma of the employment protection is to diminish the layoff likelihood of individuals without harming the existence of the firm (Gautié, 2004). Such goal may be achieved by adopting fiscal instruments that can empower firms to use more rationally the firing policy. Blanchard and Tirole (2003) propose the taxation of layoff and the severance pay as instruments that can reduce the social cost of firings. The use of a tax on layoff should improve the layoff decision making process of firms. As noticed by Gautié (2004), such tax may also increase the financial burden of insolvent firms that are trying to recover their financial health. Nevertheless, a layoff tax paid by bankrupt firms can hinder the settlement procedure of debt if such tax is higher than the bankruptcy costs of the legal procedure.

In addition to the protection provided by the labor code, employees also benefit from certain rights granted in case the firm files for bankruptcy. The protection granted by the bankruptcy law to employees is mainly represented by a high position in the absolute priority rule that defines the payment order of the creditors' claims. For instance, employees are paid first before the secured claimants, the state and the other unsecured creditors in France. Seror (2003) sustains that employees should be protected in such scenario for two main reasons. First, the employees have only one income source that is the bankrupt debtor. Unlike the debtor's suppliers that may bear the loss of a certain unpaid claim, employees have limited diversified income sources. Second, the debtor will need employees if the firm is allowed to operate as a going concern under a reorganization procedure. The fully replacement of employees during such procedure may be costly. Hence, a bankrupt debtor may have an interest to keep his employees.

In this study, we will focus on a new legal determinant of the bankruptcy use that is related to the national labor law. This legal determinant deals with the legal difficulty of firing. If the labor code imposes numerous obligations on the employer prior a layoff decision, it may be possible that

7

his strategy of saving the firm through firings will not be so successful. Hence, countries that slow down the layoff process through the legal system should have a higher degree of bankruptcy use. Nevertheless, Claessens and Klapper (2005) also analyzed how the protection degree of employees granted by the labor law determines the bankruptcy use. National laws that provide a higher degree of job security and better conditions of employment are associated with a lower number of bankruptcies. Such restrictive labor laws deter the entry of new firms therefore diminishing the bankruptcy use. Compared to their study, our analysis is focused solely on the difficulty of an employer to fire his employees and not on the job security or employment conditions. From our perspective, less severe regulations applied on the layoff process can be used as an *ex ante* mechanism to sustain the debtor's survival on the market. Hence, bankruptcy procedures should be more used in legal environments that have a more strict layoff process.

### 3. Data and variables

Our sample contains data about the use of bankruptcy in 33 countries from 2007 to 2015. We measure the annual use of bankruptcy through the number of bankruptcy filings (*Bankruptcy*). The data was gathered directly from bankruptcy institutions and national institutes of statistics. Appendix B details the data sources per country. In order to assess the difficulty of firing, we use 4 legal provisions provided by the World Bank. Hence, *R1* is a dummy variable equal to 1 if the employer must notify a third party such as a public institution to terminate the employment contract of one redundant worker and 0 otherwise. *R2* equals 1 if the employer of the firm must notify or consult a third party prior a collective dismissal and 0 otherwise. *R3* identifies countries where the employer requires the approval from a third party to initiate a collective dismissal. *R4* identifies labor laws that apply priority rules in case of reemployment. Furthermore, we constructed an aggregate index that captures the amount of firing restrictions. *FRI* is the sum between *R1*, *R2*, *R3* and *R4*.

We use these legal provisions for three main reasons. First, the aspects allow to measure the amount of restrictions that an employer faces prior a dismissal decision. The presence of such restrictions in the national labor law delays the employer's firing strategy of saving his distressed firm. Second, the 4 variables are time-variant variables. 8 out of the 33 countries of our sample modified their legal restrictions of layoff. Compared to Claessens and Klapper (2005), this

8

time-variance of our variables will allow to integrate fixed effects in our econometric estimations. Third, the data is driven from the *Doing Business Project* of the World Bank which is based on certain assumptions about the worker and the employer. Thus, the worker is assumed to be a 42-year-old nonexecutive male employee that has been working for the firm for 20 years belonging to the national majority religion and race. The employer is a limited liability domestic firm from the manufacturing sector. However, the four legal provisions that we use are independent of the assumptions made for the worker and employer.[1]

The following table presents the descriptive statistics of our variables. A higher degree of bankruptcy use is encountered mainly in France, Germany, United Kingdom (U.K.) and United States (U.S.), all having an annual average value of *Bankruptcy* superior to 20 000 opened bankruptcy procedures. Not surprisingly, France records the highest average number of bankruptcies in our sample. 59 613 bankruptcy procedures are on average opened every year in France, a country whose legal system is recognized for its debtor-friendliness orientation. Conversely, United Kingdom with its creditor-friendly bankruptcy environment has on average nearly 3 times fewer bankruptcies than France. Moreover, Eastern European countries have on average a low number of bankruptcies, e.g. Bulgaria, Estonia, Latvia, Lithuania, Slovakia or Poland. Such countries have very young bankruptcy systems compared to the Western European countries. As suggested by Blazy and Stef (2016), Eastern European bankruptcy users may have a poor knowledge about the bankruptcy procedures which may lead to fewer bankruptcies. On the same note, bankruptcy procedures are also rarely used in South America, e.g. Chile, Brazil, and in Southern Asia, e.g. Korea, Singapore.

{Table 1}

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[1] According to the answers provided by the World Bank. Nonetheless, the *Worker Adjustment and Retraining Notification Act* (WARN) of United States that was adopted in 1989 requires employers to notify their employees and the appropriate unit of local government in case of a plant closing and/or a mass layoff. However, such law is very restrictive. First, WARN can be enforced only by firms having at least 100 full-time employees or at least 100 employees that work at least a combined 4 000 hours per week. According to the U.S. Census Bureau, such firms represented on average only 1.77% of the total number of firms in 2012. Second, the notification in case of a mass layoff requires a layoff of more than 500 employees or of 50-499 employees if they represent at least 33% of the total active force. Third, the notification in case of a plant closing is mandatory if the employment loss counts at least 50 employees. Being aware of this legal peculiarity, we confirm that we obtain similar results if we consider the value of *R2* equal to 1 in the case of U.S. or if we exclude the U.S. from our sample.

Table 1 also shows the average values of the firing restriction variables. In 13 countries of our sample, the employer is obliged by the law to notify a third party prior the layoff of one employee (*R1*). In half of the sample, the labor law obliges the employer to consult a public institution if he intends to engage in a collective dismissal (*R2*). However, the employer cannot dismiss more employees without the approval of a third party in 18 countries (*R3*). Priority rules in case of reemployment of former employees must be applied in about 32% of the labor laws (*R4*). The most restrictive firing environments are in Finland and Portugal for which *FRI* is equal to 4. However, 10 countries have no legal restrictions on the layoff process, i.e. *FRI* equals 0. Hence, it is much harder to layoff an individual in Portugal than in U.K. and U.S.. These preliminary statistics confirm that the firing regulations are not homogenous. In the following section, we will estimate the influence of such regulations on the bankruptcy use.

## 4. Estimations

We will assess the propensity to file for bankruptcy using the logarithm of *Bankruptcy*. One main econometric issue in estimating the determinants of the bankruptcy use is that the bankruptcy procedure can be the result of a converted bankruptcy procedure. For instance, failing to comply with the payment schedule of the reorganization plan can determine the judge to convert the reorganization procedure into a liquidation procedure. In certain countries such as France and Belgium, the bankruptcy law allows companies that initially filed for liquidation to be rescued through a reorganization procedure if such procedure is viable from an economic point of view. In addition, a firm that filed for bankruptcy for reasons of payment default can provoke their main suppliers or partners to go bankrupt if their survival is entirely dependent on the payments made by the bankrupt debtor. In the light of these arguments, we will introduce the 1-year lagged value of *Bankruptcy* in the following econometric model:

$$Log(Bankruptcy)_{i,t} = \alpha_i + \beta_t + Firing_{i,t-1} + Log(Bankruptcy)_{i,t-1} + Z_{i,t-1} + \mu_{i,t} \qquad (1)$$

where *i* is the index of countries ranging from 1 to 33, *t* is the year index ranging from 2007 to 2015, $\alpha_i$ is the unobserved country effect, $\beta_t$ is the unobserved time effect, $Firing_{i,t-1}$ is a variable lagged by one year with $Firing \in \{ FRI, R1, R2, R3, R4 \}$, $Z_{i,t-1}$ is a set of control variables lagged by

1 year and $\mu_{i,t}$ is the error term. We measure the difficulty of firing using the lagged values of the time-variant aggregate index *FRI* and the legal aspects counted by *R1*, *R2*, *R3* and *R4*. Such lagged values are justified by the fact that a layoff decision aimed to prevent bankruptcy filing requires a certain time period in order to produce its effects. If the layoff is used as an *ex ante* mechanism of bankruptcy prevention, the firing decision will not be generally taken one day before submitting the bankruptcy petition.

In addition, we use a similar set of control variables as Claessens and Klapper (2005). Our estimations control for the judicial efficiency of public institutions (*Rule of Law*), for the amount of rights granted to claimants by the collateral and bankruptcy laws (*LRI*), for the economic development of the country (Logarithm of the gross domestic product per capita (*GDP per capita*)), for the national economy's recession (*Growth Rate* of the national GDP) and the financial cost of debt (long term interest rate measured as a 10-year benchmark government bond yields (*LTIR*)). We use *GDP per capita* as a control variable given that large national economies should be associated with more bankruptcies compared to middle and low-income countries. Moreover, we expect that high cost of debt financing (*LTIR*) encourages firms to trigger a bankruptcy procedure whereas countries with growing economies (*Growth Rate*) should have less bankruptcies. Claessens and Klapper (2005) argued that bankruptcy systems with high judicial efficiency that grant more rights to creditors are associated with less use of bankruptcy. Hence, we introduced the interaction term between *Rule of Law* and *LRI* (*Rule of Law $_{t-1}$ \* LRI $_{t-1}$*). Appendix A provides a detailed description of our variables.

{Table 2}

Table 2 presents the results of our estimations. In the first column, the 1-year lagged variable *FRI* has no significant impact on *Bankruptcy*. In the second column of table 2, we introduced all the firing restrictions but none of them has a significant coefficient with the exception of *R1*. In addition, lagged *R1* has also a positive and significant coefficient in the third column of table 2. If the employer has to notify a third party to terminate the employment contract of one employee, such third party can delay the layoff decision by requesting additional documents that should prove that the layoff background complies with all the national labor law regulations. Moreover, the notification can be followed by a monitoring activity from regional or national

department of labor rights that can be entitled by the law to check all the current employment contracts. According to Hogan (2001), labor unions monitor how the contract clauses are respected by the employer and they provide valuable information to the workers about their legal rights settled by the contract. Such *ex post* pressure on the employer's activity may affect his financial strategy of saving the firm.

The signs of the estimated coefficients of our control variables follow a logic path although some of them are not statistically significant such as the coefficients of *GDP per capita* and *LTIR*. Contrary to the study of Claessens and Klapper (2005), national systems with efficient public institutions that grant creditors an important amount of legal rights have no significant influence on the use of bankruptcy. In table 2, the interaction term between *Rule of Law* and *LRI* has a non significant coefficient. One possible explanation for this result is the use of country fixed-effects that were not employed by Claessens and Klapper (2005) due to the fact that their legal variables were time-invariant variables. Furthermore, the bankruptcy use increases in countries that underwent an increase of the number of bankruptcies in the previous year (*Log(Bankruptcy)$_{t-1}$*). Nevertheless, economy's growth helps companies survive longer (*Growth Rate $_{t-1}$*).

We test the robustness of our results using the 2-years lagged values of our firing restriction variables. We apply the same econometric approach and we use the same control variables. Table 3 presents the results of our estimations. We can notice that the layoff restrictions have a stronger explanation power when they are lagged by 2-years. In column (1), the amount of firing regulations existing in the labor law 2 years prior the bankruptcy filing (*FRI $_{t-2}$*) has a positive and significant impact on *Bankruptcy*. The total amount of firing restrictions 2-years prior the bankruptcy filing process seems to favor more bankruptcies. If such process is subject to multiple legal restrictions, the employer's strategy of saving the firm through layoff may not be so successful. Hence, firm's bankruptcy will be a very probable outcome. In column (2), *R1$_{t-2}$*, *R2$_{t-2}$* and *R4$_{t-2}$* have a significant influence on *Bankruptcy*. However, only the coefficients of *R1$_{t-2}$* and *R4$_{t-2}$* kept their significance in regressions of columns (3) and (6) where they are separately treated. The presence of a legal obligation to notify a third party in case of firing one employee (*R1$_{t-2}$*) in the previous 2 years significantly encourages the use of bankruptcy in the economy. Surprisingly, the existence of a legal provision that imposed the application of priority rules for reemployments 2 years before (*R4$_{t-2}$*) is a significant growth source of bankruptcy. The application of priority rules supposes that individuals that had worked for a given employer have a reemployment priority over the other

12

candidates if the working position is again available. If the employer is obliged by the law to rehire an individual that was previously fired due to his low degree of efficiency and/or competence, such reemployment may lead to the employer's bankruptcy *ceteris paribus*. By restraining the hiring decision, the law may diminish the success likelihood of the employer's economic strategy in the long-term. In the following section, we propose different robustness checks of our results.

{Table 3}

## 5. Robustness tests

We check the robustness of our results by three different approaches. First, we assess how the value changes of the firing restrictions index (*FRI)* impact the number of bankruptcies. Second, we examine if the influence of the amount of firing restrictions on the bankruptcy use depends on the legal orientation of the bankruptcy regime either pro-reorganization regime or pro-liquidation regime. Third, we test the robustness of such influence by considering legal reforms aimed to strengthen the employee's protection in case of the employer's bankruptcy.

### *5.1. Changes in the firing restrictions and bankruptcy use*

One possibility to check the robustness of our results is to consider the approach developed by Acharya et al. (2011). Using a sample of 38 countries, their study analyzes how the changes in the amount of rights granted to creditors influence the propensity of firms to diversify acquisitions across industries. A decrease of the creditors' rights favors more mergers of same-industry firms. Following their approach, we constructed a variable *ΔFRI* that is a dummy variable equal to 1 after the year of change from a period of severe firing restrictions, and 0 otherwise, and that it equals 0 after the year of change from a period of weaker firing restrictions, and 1 otherwise, and that it equals 0 for countries that suffered no change in the firing restrictions index (*FRI*). *ΔFRI* will allow to estimate how the weakening of firing restrictions impacts the use of bankruptcies. In our sample, 2 countries have tightened the firing restrictions, i.e. Australia in 2011 and Italy in 2013, whereas 6 countries have removed some firing restrictions, i.e. Estonia in 2011, Latvia in 2013, Finland and

13

Poland in 2015, Ireland in 2014, Slovenia in 2014 and 2015.[2]  Hence, $\varDelta FRI$ will allow to exploit 9 changes of 8 countries in the amount of firing restrictions.

Table 4 presents the estimations of our panel model in which we use the same control variables as in equation (1). Fixed-effects and time effects are also included in the regressions. In the first column of table 4, changes in the firing restrictions have no significant impact on the number of bankruptcies. However, $\varDelta FRI_{t-1}$ lagged by one year (column (2)) and $\varDelta FRI_{t-2}$ lagged by 2-years (column (3)) diminish significantly the bankruptcy use. Our approach of considering that firing regulations require a certain period of time in order to influence the rescue strategy of insolvent firms seems to be econometrically justified. In addition, weakening the firing regulations decreases the national number of bankruptcies one year and two years after the legal change has occurred. Those estimations confirm our initial results. Switching from rigid labor laws to flexible labor laws matters for the bankruptcy environment.

{Table 4}

*5.2. Firing restrictions and bankruptcy regime*

Some bankruptcy systems approve more easily a reorganization procedure than other national bankruptcy systems (Stef, 2017). Pro-reorganization bankruptcy regimes tend to favor the use of reorganization. Such procedure is intended to protect employment by granting the survival of the debtor (employer) under the terms of a reorganization plan. The plan defines certain economic and/or technical measures aimed to restore the financial health of the firm (Stef, 2015). Conversely, a pro-liquidation bankruptcy regime encourages the use of the liquidation procedure in which the debtor's assets are sold to satisfy the creditors' claims. Employers confronted with financial problems may take into account such legal orientation in their decision to prevent the firm's insolvency. In the presence of a pro-reorganization regime, the employer's incentives to engage in strategies that prevent financial losses should be lower than in a pro-liquidation environment *ceteris paribus*. Hence, the impact of the firing restrictions on the use of bankruptcy may depend on the orientation of the bankruptcy regime.

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[2]  In the article of Acharya et al. (2011), changes in the creditors' rights occurred only in 6 out of 38 countries. In our research, changes in *FRI* occurred in 8 out of the 33 countries.

We identify such orientation using the study of Stef (2017) that assesses the reorganization approval process of 90 countries. Such process has three main legal components as follows: (1) the voting rules used to establish the creditors' approval of the reorganization plan, (2) the voting right of the secured creditors and (3) the cram-down right of the court. Voting rules with lower voting thresholds and the lack of the secured creditors' voting right should facilitate the approval of the reorganization procedure given that it has to be accepted by a smaller coalition of creditors. In addition, the cram-down provision grants the court the right to impose the reorganization procedure independently of the claimants' decision. In the light of those aspects, we considered a pro-reorganization regime a bankruptcy regime for which at least 2 of the following legal provisions were valid: (i) bankruptcy voting rules have lower voting thresholds[3], (ii) secured creditors have no voting rights as secured creditors and (iii) the judge or the court has a cram-down right. Otherwise, we treated the bankruptcy system as a pro-liquidation system.

Table 5 presents the estimations of regression (1) for the subsample of pro-reorganization regimes (columns (1) and (2)) and for the subsample of pro-liquidation regimes (columns (3) and (4)). The first subsample is composed of 12 countries whereas the second subsample of 21 countries.[4] We can notice that the amount of firing restrictions tend to increase the number of bankruptcies in a pro-reorganization environment. The coefficients of 1-year and 2 years lagged values of *FRI* are positive and significant at 1% level in the first two columns of table 5. Such restrictions seem to significantly hamper the employer's rescue strategy through layoffs leading to the firm's bankruptcy. Surprisingly, employers (debtors) will engage different actions such as layoffs to avoid bankruptcy even in an environment that favors the firm's survival in case of bankruptcy. But why should firms have strong incentives to avoid filing for bankruptcy in such a legal regime?[5] First, a reorganization procedure has certain costs such as the administrative costs, e.g. lawyers' costs, trustees' fees, appraisal costs, etc., and indirect costs, e.g. foregone investment opportunities, lost sales due to bankruptcy, etc. (White, 1989). According to Blazy et al. (2013), the bankruptcy costs of reorganization represent on average 2.7% of the total due claims in France and 8% in England. In U.S., the bankruptcy costs of a reorganization procedure (Chapter 11) represent

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[3] Bankruptcy voting rules can have two voting thresholds (Stef, 2017). Hence, the reorganization plan must be accepted by a majority in number of creditors (first threshold) that must hold a certain value of the total debt (second threshold). We identified the voting rules with lower thresholds as the rules for which the first threshold is equal to 0 and the second threshold is equal to 50%.

[4] The subsample of pro-reorganization regimes includes the following countries: Brazil, Denmark, Finland, France, Germany, Italy, Japan, South Korea, Netherlands, Slovakia, Spain and United Kingdom.

[5] The loyalty toward the firm and the personal motivations also are other arguments that increase such incentives.

on average 16.9% of the total value of firm's assets (Bris et al., 2006). Consequently, employers will want to avoid such costs that are usually paid from the firm's assets. Second, engaging in preventing measures can be associated with a *bona fide* debtor (employer). Such positive signal can more easily convince the claimants and/or the judge to accept the reorganization of the firm. Furthermore, the amount of firing restrictions 2 years prior the bankruptcy filing ($FRI_{t-2}$) significantly increases the number of bankruptcies in a pro-liquidation regime (table 5, column (4)). Overall, the estimations are consistent with the previous results. In addition, it seems that the influence of the amount of firing restrictions on the bankruptcy use is not affected by the orientation of the bankruptcy system.

{Table 5}

### 5.3. Employee-friendly reforms and bankruptcies

After the triggering of bankruptcy, the employees become creditors having a certain right on the firm's assets. Thus, they are entitled to the payment of their claims whose amounts are mainly given by wages and certain penalties. The bankruptcy law (code) defines the payment order of the creditors' claims at the end of the bankruptcy procedure, i.e. the absolute priority order (*APO*). In general, the employees are highly ranked in such order. For instance, the employees' claims are ranked above the unsecured claims in U.K. (Nyombi, 2013) and above the secured claimants in France (Davydenko and Franks, 2008). A high ranking in the *APO* increases their chances to recover partially or/entirely their claims from the bankrupt debtor. In this sense, the bankruptcy law provides a certain degree of protection to employees. In addition, the bankruptcy system may also focus on the preservation of employment in case of firm's bankruptcy. As confirmed by the previous subsection, some national systems may encourage the survival of bankrupt firms through the reorganization procedure.

The employee's protection in bankruptcy may play a key role in the employer's decision to adopt a layoff rescue strategy to prevent the firm's bankruptcy. On the one hand, a high degree of employee's protection may encourage low-ranked creditors in the *APO* to put pressure on the debtor to prevent bankruptcy. Moreover, such layoffs will diminish the amount of the total debt due by the firm to creditors in the advent of bankruptcy. On the other hand, employees may have strong

incentives to trigger bankruptcy for unpaid wages in order to benefit from such protection.[6] Consequently, legal changes dealing with the protection of employee's interest in bankruptcy should have an impact on the use of bankruptcy. However, our previous estimations do not control for such legal protection granted to employees in bankruptcy.

To our knowledge, there is no legal database available or any legal index that may allow to assess the employees' protection or treatment in case of the employer's bankruptcy. Hence, we used the NATLEX database of the International Labour Organization to identify employee-friendly bankruptcy reforms. The reforms are presented in table 9 of Appendix C. In our sample, 8 countries adopted employee-friendly reforms that strengthen the employee's protection in case of the debtor's bankruptcy. For instance, Australia adopted the *Fair Entitlements Guarantee Act* in 2012 that provides financial assistance for unpaid workers in case of a bankrupt employer. In Canada, the *Wage Earners Protection Act* adopted in 2005 enforces the priority in payment of wages over the claims of ordinary or general claimants of the liquidated firm. Some European countries had to transpose in their national law certain regulations of European directives dealing with the protection of employees in the event of employer's insolvency. For example, Ireland and France amended their national laws following the adoption of the directive 2002/74/EC of the European Parliament that ensures the payment of employees' outstanding claims.

Furthermore, we constructed a variable *Reform* that equals 1 in the years following the adoption of a employee-friendly reform and 0 otherwise. Table 6 presents the estimations of our regressions. We introduced the variable *Reform* in regression (1) as follows: the variable *Reform* without the *FRI* in the first column of table 6, the 1-year lagged values of *Reform* and *FRI* in the second column and the 2 years lagged values of *Reform* and *FRI* in the third column. None of the coefficients of *Reform* is significant in table 6. In addition, *FRI* $_{t-2}$ continues to exert the same positive and significant influence on the number of bankruptcies in column (3) of table 6 as in the first column of table 3. Those results suggest that such employee-friendly reforms are not a significant determinant of the bankruptcy use. Such insignificance may be explained by the fact that the bankruptcy triggering decision can be justified by other causes that are independently of the employer's decisions [7] or by other motivations, e.g. the need to protect the firm's assets or to conclude a formal agreement with the creditors (or the debtor). Hence, the impact of the amount of

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[6] If the law allows creditors to trigger bankruptcy.

[7] For a detailed classification of the bankruptcy causes see Blazy et al. (2013).

firing restrictions on bankruptcies is robust even after we control for the adoption of employee-friendly bankruptcy reforms.

{Table 6}

*5.4. Caveats*

Our econometric approach shows that the *ex ante* difficulty of firing can increase the degree of bankruptcy use. However, this approach has two major caveats. First, the labor regulations that we considered are not exhaustive. Other firing restrictions are provided by the World Bank such as the approval from a third party for the layoff of one worker, the application of priority rules to redundancy dismissals or the obligation of retraining a worker prior his dismissal. Nevertheless, such regulations are time-invariant aspects which hamper the use of fixed-effects in the regressions. Second, the estimations do not control for the regional tendency of using the bankruptcy procedure. Although *Bankruptcy* measures the national number of bankruptcies, the distribution of bankruptcies is not homogeneous among the regions and/or counties of the country. A most suitable approach would be to identify such distribution and to integrate the regions instead of the countries in the estimations.

## 6. Conclusion

National labor law may impose some restrictions that delay or hamper the firing decision of the employer. As opposed to flexible laws, such rigid labor laws can be in contradiction to firms' objectives to use layoffs as an *ex ante* mechanism to avoid bankruptcy. Labor regulations that delay the layoff decision may incite owners and/or managers to find other rescue strategies. If no other solution cannot hamper the payment default of debts, firms may be forced to file for bankruptcy. After controlling for the economic and legal environment, time effects and country fixed-effects, our study shows that the amount of firing restrictions 2-years prior the bankruptcy triggering leads to more bankruptcies. Rigid laws with a slowdown layoff process are associated with a high level of bankruptcy use. Although employees' interests benefit from such laws, it seems that the failure risk of firms tends to be higher when rescue layoff strategies cannot be so easily implemented by the firms.

Moreover, two firing regulations play a significant role as determinants of bankruptcy use. Firstly, the employer's legal obligation to notify a third party prior the dismissal of one employee increases the use of bankruptcy. It is very likely that a third party such as a public institution or a labor union act as a legal guardian for the dismissed employee. The employer may endure an intense *ex post* monitoring of the employment contracts and/or a strong legal opposition to the layoff decision from such third party. Secondly, labor codes that apply priority rules in case of reemployment can determine the firm's bankruptcy by harming *ex post* its financial health. It is very likely that the priority rules applied in case of reemployment of unskilled individuals can worsen the financial health of the firm that may be forced to file for bankruptcy. Hence, a legal alternative that could help diminish the growth of bankruptcies without modifying the content of the bankruptcy law could consist in acting on the content of the labor law. However, certain policymakers would want to protect employment at the expense of some bankruptcies in the economy. The trade-off between diminishing the bankruptcy risk and protecting the employees can be the subject of further research.

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**Table 1.** Descriptive statistics

| Country | Bankruptcy | R1 | R2 | R3 | R4 | FRI |
|---|---|---|---|---|---|---|
| **Australia** | 14236 | 0 | 0 | 0.63 | 0 | 0.44 |
| **Austria** | 6099 | 1 | 1 | 0 | 1 | 3 |
| **Belgium** | 9930 | 0 | 0 | 0 | 0 | 0 |
| **Brazil** | 2045 | 0 | 0 | 0 | 0 | 0 |
| **Bulgaria** | 553 | 0 | 0 | 0 | 0 | 0 |
| **Canada** | 4391 | 0 | 0 | 0 | 0 | 0 |
| **Chile** | 146 | 1 | 1 | 0 | 0 | 2 |
| **Czech Republic** | 5365 | 0 | 0 | 0 | 0 | 0 |
| **Denmark** | 4775 | 0 | 0 | 0 | 0 | 0 |
| **Estonia** | 490 | 0.38 | 0.38 | 1 | 0.56 | 2.67 |
| **Finland** | 2879 | 0.88 | 0.88 | 1 | 1 | 4 |
| **France** | 59613 | 0 | 1 | 1 | 1 | 3 |
| **Germany** | 28952 | 1 | 1 | 1 | 0 | 3 |
| **Hungary** | 15960 | 0 | 0 | 0 | 0 | 0 |
| **Ireland** | 1189 | 0.75 | 1 | 0 | 0 | 1.89 |
| **Italy** | 11077 | 0.38 | 1 | 1 | 1 | 3.22 |
| **Japan** | 12998 | 0 | 0 | 1 | 0 | 1 |
| **Korea** | 1628 | 1 | 1 | 0 | 1 | 3 |
| **Latvia** | 1347 | 0.63 | 0.63 | 1 | 0 | 2.56 |
| **Lithuania** | 771 | 0 | 0 | 1 | 0 | 1 |
| **Netherlands** | 7053 | 1 | 1 | 1 | 0 | 3 |
| **New Zealand** | 1872 | 0 | 0 | 1 | 0 | 1 |
| **Norway** | 4183 | 0 | 0 | 1 | 1 | 2 |
| **Poland** | 689 | 0 | 0 | 0.88 | 1 | 2 |
| **Portugal** | 6788 | 1 | 1 | 1 | 1 | 4 |
| **Singapore** | 185 | 0 | 0 | 0 | 0 | 0 |
| **Slovakia** | 1197 | 1 | 1 | 1 | 0 | 3 |
| **Slovenia** | 767 | 0 | 0 | 0.88 | 0.89 | 1.89 |
| **South Africa** | 3959 | 1 | 1 | 1 | 0 | 3 |
| **Spain** | 5476 | 1 | 1 | 0 | 0 | 2 |
| **Sweden** | 7035 | 0 | 1 | 1 | 1 | 3 |
| **U.K.** | 20718 | 0 | 0 | 0 | 0 | 0 |
| **U.S.** | 42133 | 0 | 0 | 0 | 0 | 0 |
| **Average** | **9091** | **0.38** | **0.46** | **0.53** | **0.32** | **1.69** |

Notes: Average values of the 2007-2015 period are provided for each country of the first column. A detailed description of the variables is provided by Appendix A.

22

**Table 2. Regressions of the number of bankruptcies and the firing regulations lagged by 1-year**

| Independent Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FRI $_{t-1}$ | 0.034 | | | | | |
| | (0.137) | | | | | |
| R1$_{t-1}$ | | 0.215** | 0.117* | | | |
| | | (0.013) | (0.064) | | | |
| R2$_{t-1}$ | | −0.165 | | 0.046 | | |
| | | (0.243) | | (0.527) | | |
| R3$_{t-1}$ | | 0.044 | | | 0.048 | |
| | | (0.510) | | | (0.473) | |
| R4$_{t-1}$ | | −0.009 | | | | 0.026 |
| | | (0.952) | | | | (0.829) |
| Log(Bankruptcy) $_{t-1}$ | 0.664*** | 0.663*** | 0.665*** | 0.665*** | 0.664*** | 0.665*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Rule of Law $_{t-1}$ | 0.678** | 0.705** | 0.650** | 0.647** | 0.692** | 0.654** |
| | (0.018) | (0.034) | (0.025) | (0.024) | (0.030) | (0.022) |
| LRI $_{t-1}$ | 0.128** | 0.129** | 0.123** | 0.123** | 0.128** | 0.124** |
| | (0.032) | (0.046) | (0.041) | (0.037) | (0.041) | (0.033) |
| Rule of Law $_{t-1}$ * LRI $_{t-1}$ | −0.067 | −0.069 | −0.062 | −0.064 | −0.070 | −0.065 |
| | (0.108) | (0.146) | (0.141) | (0.130) | (0.128) | (0.117) |
| Logarithm (GDP per capita) $_{t-1}$ | −0.063 | −0.071 | −0.035 | −0.039 | −0.076 | −0.044 |
| | (0.892) | (0.881) | (0.938) | (0.931) | (0.877) | (0.924) |
| Growth Rate $_{t-1}$ | −0.012** | −0.013*** | −0.013*** | −0.012** | −0.012*** | −0.012*** |
| | (0.011) | (0.009) | (0.008) | (0.011) | (0.009) | (0.016) |
| LTIR $_{t-1}$ | −0.005 | −0.006 | −0.007 | −0.004 | −0.003 | −0.003 |
| | (0.718) | (0.673) | (0.632) | (0.776) | (0.847) | (0.819) |
| Intercept | 1.732 | 1.795 | 1.644 | 1.693 | 1.826 | 1.718 |
| | (0.422) | (0.407) | (0.434) | (0.430) | (0.416) | (0.428) |
| Observations | 297 | 297 | 297 | 297 | 297 | 297 |
| Time effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.622 | 0.625 | 0.624 | 0.621 | 0.621 | 0.621 |

Notes: Fixed effects and time effects are included in each regression. The dependent variable is the logarithm of *Bankruptcy*. A detailed description of the other variables is provided in Table 1. *p*-values are reported in brackets. * indicates a significant coefficient at 10%, ** at 5% and *** at 1%.

23

**Table 3. Regressions of the number of bankruptcies and the firing regulations lagged by 2-years**

| Independent Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FRI $_{t-2}$ | 0.031** | | | | | |
| | (0.014) | | | | | |
| R1$_{t-2}$ | | 0.263*** | 0.104** | | | |
| | | (0.000) | (0.016) | | | |
| R2$_{t-2}$ | | −0.264*** | | 0.055 | | |
| | | (0.004) | | (0.122) | | |
| R3$_{t-2}$ | | 0.032 | | | 0.033 | |
| | | (0.717) | | | (0.699) | |
| R4$_{t-2}$ | | 0.071* | | | | 0.075** |
| | | (0.066) | | | | (0.028) |
| Log(Bankruptcy) $_{t-1}$ | 0.571*** | 0.566*** | 0.570*** | 0.573*** | 0.572*** | 0.573*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Rule of Law $_{t-1}$ | 0.466 | 0.515 | 0.441 | 0.428 | 0.465 | 0.440 |
| | (0.162) | (0.206) | (0.183) | (0.198) | (0.239) | (0.183) |
| LRI $_{t-1}$ | 0.098 | 0.103 | 0.094 | 0.093 | 0.098 | 0.096 |
| | (0.150) | (0.186) | (0.170) | (0.171) | (0.196) | (0.151) |
| Rule of Law $_{t-1}$ * LRI $_{t-1}$ | −0.039 | −0.043 | −0.034 | −0.034 | −0.040 | −0.036 |
| | (0.417) | (0.475) | (0.481) | (0.474) | (0.482) | (0.448) |
| Logarithm (GDP per capita) $_{t-1}$ | 0.015 | −0.000 | 0.033 | 0.033 | 0.008 | 0.032 |
| | (0.975) | (0.997) | (0.948) | (0.946) | (0.987) | (0.949) |
| Growth Rate $_{t-1}$ | −0.015*** | −0.015*** | −0.015*** | −0.015*** | −0.015*** | −0.015*** |
| | (0.004) | (0.002) | (0.003) | (0.004) | (0.004) | (0.004) |
| LTIR $_{t-1}$ | −0.008 | −0.008 | −0.009 | −0.008 | −0.007 | −0.007 |
| | (0.574) | (0.595) | (0.548) | (0.594) | (0.635) | (0.598) |
| Intercept | 2.369 | 2.438 | 2.327 | 2.346 | 2.442 | 2.329 |
| | (0.290) | (0.302) | (0.298) | (0.295) | (0.294) | (0.301) |
| Observations | 264 | 264 | 264 | 264 | 264 | 264 |
| Time effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.507 | 0.510 | 0.508 | 0.507 | 0.506 | 0.507 |

Notes: Fixed effects and time effects are included in each regression. The dependent variable is the logarithm of *Bankruptcy*. A detailed description of the other variables is provided in Table 1. *p*-values are reported in brackets. * indicates a significant coefficient at 10%, ** at 5% and *** at 1%.

24

**Table 4. Regressions of the number of bankruptcies and the firing restrictions change**

| Independent Variables | (1) | (2) | (3) |
|---|---|---|---|
| $\Delta$FRI $_t$ | –0.074 | | |
| | (0.104) | | |
| $\Delta$FRI $_{t-1}$ | | –0.111** | |
| | | (0.038) | |
| $\Delta$FRI $_{t-2}$ | | | –0.078** |
| | | | (0.036) |
| Log(Bankruptcy) $_{t-1}$ | 0.663*** | 0.664*** | 0.569*** |
| | (0.000) | (0.000) | (0.000) |
| Rule of Law $_{t-1}$ | 0.709** | 0.748** | 0.517*** |
| | (0.015) | (0.014) | (0.139) |
| LRI $_{t-1}$ | 0.131** | 0.135** | 0.103 |
| | (0.030) | (0.030) | (0.143) |
| Rule of Law $_{t-1}$ * LRI $_{t-1}$ | –0.070* | –0.074* | –0.045 |
| | (0.096) | (0.087) | (0.364) |
| Logarithm (GDP per capita) $_{t-1}$ | –0.103 | –0.105 | –0.015 |
| | (0.824) | (0.823) | (0.976) |
| Growth Rate $_{t-1}$ | –0.013*** | –0.012*** | –0.015*** |
| | (0.009) | (0.009) | (0.004) |
| LTIR $_{t-1}$ | –0.007 | –0.007 | –0.008 |
| | (0.650) | (0.655) | (0.572) |
| Intercept | 1.951 | 1.924 | 2.545 |
| | (0.365) | (0.374) | (0.267) |
| Observations | 297 | 297 | 264 |
| Time effects | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes |
| $R^2$ | 0.623 | 0.625 | 0.507 |

Notes: Fixed effects and time effects are included in each regression. The dependent variable is the logarithm of *Bankruptcy*. The changes per country of *FRI* are the followings: Australia in 2011 (change to *R3*=1), Estonia in 2011 (change to *R1*=*R2*=*R4*=0), Finland in 2015 (change to *R1*=*R2*=0), Ireland in 2014 (change *R1*=0), Italy in 2013 (change to *R1*=1), Latvia in 2013 (*R1*=*R2*=0), Poland in 2015 (*R3*=0) and Slovenia in 2014 (change *R4*=0) and in 2015 (change *R3*=0). *p*-values are reported in brackets. * indicates a significant coefficient at 10%, ** at 5% and *** at 1%. Appendix A provides a detailed description of our variables.

25

**Table 5. Firing restrictions and bankruptcy regimes**

| Independent Variables | Pro-Reorganization Regime | | Pro-Liquidation Regime | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| FRI $_{t-1}$ | 0.313*** | | 0.025 | |
| | (0.000) | | (0.364) | |
| FRI $_{t-2}$ | | 0.240*** | | 0.027** |
| | | (0.004) | | (0.017) |
| Log(Bankruptcy) $_{t-1}$ | 0.688*** | 0.548*** | 0.615*** | 0.542*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Rule of Law $_{t-1}$ | 1.209* | 0.728 | 0.991** | 0.976* |
| | (0.087) | (0.149) | (0.032) | (0.054) |
| LRI $_{t-1}$ | 0.184 | 0.103 | 0.163* | 0.157 |
| | (0.437) | (0.635) | (0.063) | (0.101) |
| Rule of Law $_{t-1}$ * LRI $_{t-1}$ | −0.143 | −0.090 | −0.101 | −0.096 |
| | (0.262) | (0.394) | (0.139) | (0.198) |
| Logarithm (GDP per capita) $_{t-1}$ | −0.708 | −0.803 | 0.238 | 0.343 |
| | (0.402) | (0.190) | (0.719) | (0.658) |
| Growth Rate $_{t-1}$ | −0.020** | −0.010 | −0.012** | −0.017*** |
| | (0.016) | (0.249) | (0.044) | (0.007) |
| LTIR $_{t-1}$ | 0.025 | 0.036* | −0.008 | −0.013 |
| | (0.160) | (0.094) | (0.607) | (0.395) |
| Intercept | 3.741 | 6.175 | 0.325 | 0.463 |
| | (0.253) | (0.021) | (0.918) | (0.898) |
| Observations | 108 | 96 | 189 | 168 |
| Time effects | Yes | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes | Yes |
| $R^2$ | 0.785 | 0.714 | 0.564 | 0.458 |

Notes: Fixed effects and time effects are included in each regression. The dependent variable is the logarithm of *Bankruptcy*. Columns (1) and (2) deal with the subsample of countries where the bankruptcy regime facilitates the use of the reorganization procedure. Columns (3) and (4) use the subsample of countries where the bankruptcy regime has a pro-liquidation orientation. *p*-values are reported in brackets. * indicates a significant coefficient at 10%, ** at 5% and *** at 1%. Appendix A provides a detailed description of our variables.

**Table 6. Employee-friendly reforms and the use of bankruptcy**

| Independent Variables | (1) | (2) | (3) |
|---|---|---|---|
| Reform | 0.080 | | |
| | (0.243) | | |
| Reform $_{t-1}$ | | 0.012 | |
| | | (0.196) | |
| Reform $_{t-2}$ | | | 0.042 |
| | | | (0.222) |
| FRI $_{t-1}$ | | 0.026 | |
| | | (0.302) | |
| FRI $_{t-2}$ | | | 0.029** |
| | | | (0.028) |
| Log(Bankruptcy) $_{t-1}$ | 0.658*** | 0.655*** | 0.568*** |
| | (0.000) | (0.000) | (0.000) |
| Rule of Law $_{t-1}$ | 0.694** | 0.732** | 0.474 |
| | (0.015) | (0.013) | (0.159) |
| LRI $_{t-1}$ | 0.124** | 0.130** | 0.099 |
| | (0.032) | (0.030) | (0.149) |
| Rule of Law $_{t-1}$ * LRI $_{t-1}$ | −0.067 | −0.072* | −0.039 |
| | (0.109) | (0.094) | (0.416) |
| Logarithm (GDP per capita) $_{t-1}$ | −0.098 | −0.110 | 0.009 |
| | (0.829) | (0.812) | (0.986) |
| Growth Rate $_{t-1}$ | −0.012** | −0.011** | −0.014*** |
| | (0.024) | (0.032) | (0.005) |
| LTIR $_{t-1}$ | −0.002 | −0.002 | −0.007 |
| | (0.908) | (0.875) | (0.618) |
| Intercept | 1.974 | 1.959 | 2.407 |
| | (0.365) | (0.369) | (0.282) |
| Observations | 297 | 297 | 264 |
| Time effects | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes |
| $R^2$ | 0.623 | 0.626 | 0.508 |

Notes: The dependent variable is the logarithm of Bankruptcy. *Reform* is a dummy variable equal to 1 for the years following the adoption of a new law and/or amendment that strengthen(s) the protection of employees in case of employer's bankruptcy and 0 otherwise. *p*-values are reported in brackets. * indicates a significant coefficient at 10%, ** at 5% and *** at 1%.

27

**Appendix A**

**Table 7. Definition of variables**

| Variable | Definition |
|---|---|
| *Bankruptcy* | Annual number of bankruptcy procedures opened in court. |
| *R1* | Dummy variable equals 1 if the employer must notify a third party to terminate one redundant worker, 0 otherwise. Source: World Bank. |
| *R2* | Dummy variable equals 1 if the employer must notify or consult a third party prior a collective dismissal, 0 otherwise. Source: World Bank. |
| *R3* | Dummy variable equals 1 if the employer requires approval from a third party to initiate a collective dismissal, 0 otherwise. Source: World Bank. |
| *R4* | Dummy variable equal 1 if priority rules must be applied for reemployment, 0 otherwise. Source: World Bank. |
| *FRI* | Firing restrictions index equal to the sum between *R1*, *R2*, *R3* and *R4*. |
| *ΔFRI* | Dummy variable equal to 1 after the year of change from a period of severe firing restrictions, and 0 otherwise, and it equals 0 after the year of change from a period of weaker firing restrictions, and 1 otherwise, it also equals 0 for countries that suffered no change in the firing restrictions index (*FRI*). |
| *Reform* | Dummy variable equal to 1 for the years following the adoption of a new law and/or amendment that strengthen(s) the protection of employees in case of employer's bankruptcy, 0 otherwise. Source: The International Labour Organization (ILO), NATLEX. |
| *Rule of Law* | An annual index that aggregates indicators that deals with the quality of contract enforcement, property rights, the police and the courts and the likelihood of crime and violence. The index ranges from -2.5 to 2.5. Source: World Bank, Worldwide Governance Indicators. |
| *LRI* | Legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 10. Source: World Bank. |
| *GDP per capita* | Gross domestic product in current U.S. dollars divided by midyear population. Source: World Bank. |

| | |
|---|---|
| *Growth Rate* | Annual percentage growth rate of GDP at market prices based on constant 2010 U.S. dollars. Source: World Bank. |
| *LTIR* | 10-year benchmark government bond yields. Source: National Banks. |

**Appendix B**

**Table 8. Sources of bankruptcy data**

| Country | Data Source |
|---|---|
| **Australia** | Australian securities & investments commission |
| **Austria** | Kreditschutzverband von 1870 |
| **Belgium** | Statistics Belgium |
| **Brazil** | Serasa Experian |
| **Bulgaria** | Coface |
| **Canada** | Office of the Superintendent of Bankruptcy Canada |
| **Chile** | Superintendencia de Insolvencia y Reemprendimiento y Banco Central |
| **Czech Republic** | Creditreform |
| **Denmark** | Statistics Denmark |
| **Estonia** | Creditreform |
| **Finland** | Statistics Finland |
| **France** | Altares |
| **Germany** | Statistisches Bundesamt |
| **Hungary** | Creditreform |
| **Ireland** | Insolvency Journal |
| **Italy** | Cerved |
| **Japan** | Tokio Shoko Research |
| **Korea** | The Bank of Korea |
| **Latvia** | Creditreform |
| **Lithuania** | Creditreform |
| **Netherlands** | Centraal bureau voor de statistiek |
| **New Zealand** | The Insolvency and Trustee Service (ITS) |
| **Norway** | Statistics Norway |
| **Poland** | Creditreform |
| **Portugal** | Racius |
| **Singapore** | Insolvency & Public Trustee's Office |
| **Slovakia** | Creditreform |
| **Slovenia** | Creditreform |
| **South Africa** | Statistics South Africa |
| **Spain** | Instituto Nacional de Estadistica |
| **Sweden** | The Swedish Agency for Growth Policy Analysis |
| **U.K.** | The Insolvency Service |
| **U.S.** | American Bankruptcy Institute |

**Appendix C**

**Table 9.   Employee-friendly reforms in case of employer's insolvency**

| Country | Adoption Year | Bankruptcy Regulations |
|---|---|---|
| **Australia** | 2012 | Fair Entitlements Guarantee Act 2012 (Act No. 159 of 2012) |
| **Austria** | 2011 | Federal Act to amend the Labour Market Financing Act and the Wages Guarantee in case of Insolvency Act (BGBI. 39/2011) |
| **Belgium** | 2011 | Collective work convention n° 102 |
| **Bulgaria** | 2011 | Law of February 16, 2011 |
| **Canada** | 2005 | Wage Earners Protection Act |
| **Czech Republic** | 2006 | Consolidated version of Act No. 118/2000 on protection of employees in case of insolvency of their employer |
| **France** | 2008 | Law n° 2008-89 |
| **Ireland** | 2005 | Protection of Employees (Employers' Insolvency) (S.I. No. 682 of 2005) |

Notes: The table reports the new laws and/or amendments adopted by the countries of our sample between 2005 and 2015 that are dealing with the protection of employees in case of employer's insolvency. Source: The International Labour Organization (ILO), NATLEX.