

Strategic Leverage and Employee Protection in Bankruptcy

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Preliminary draft

15 April 2015

Abstract

The seniority of employees' claims relative to other creditors in the liquidation of insolvent firms, and their rights in the renegotiation of their debt varies greatly across countries. Using a simple model, we show that the balance between these rights of employees and those of other creditors affects the strategic value of debt: in equilibrium, stronger employees' seniority rights in bankruptcy liquidation increases firm leverage, unless bankruptcy costs are very high or the workers' claim are senior to all other debt. Moreover, employees' seniority invariably increases the response of leverage to increases in the value of its assets and in its cash flow. Conversely, stronger employees' rights in the renegotiation of corporate debt are predicted to decrease firm leverage. To test these predictions, we construct novel measures of employees' protection in bankruptcy via questionnaires to law firms and other sources, and investigate whether these measures affect the response of firm leverage in a sample of 12,445 companies in 28 countries between 1988 and 2013. We find that increases in the value of these firms' real estate is associated with a greater increase in leverage for companies located in countries where employees have stronger seniority in company liquidation and weaker rights in debt renegotiation, as predicted by the model. For a subsample of 928 mining and oil companies, we find a similar differential response of leverage to profitability shocks resulting from changes in the prices of the commodities produced by these companies.

JEL Classification: G31, G32, G38, H25, H26, M40.

Keywords: workers' rights, bankruptcy, seniority, leverage, wage bargaining.

Acknowledgements: We thank Isaac Hacamo, Kristoph Kleiner, Greg Udell, Yishay Yafeh, and participants to seminar at Indiana University. We are deeply indebted to Carlo Croff of the Chiomenti law firm for his invaluable support in gathering data about the protection of employees in insolvency procedures around the world. Other data have been kindly provided by Kathy Zechner. This research has been sponsored by grants from the ERC (FINLAB project no. 295709), the Italian Ministry for University and Research (MIUR) and the Einaudi Institute for Economics and Finance (EIEF).

How does firm leverage respond to workers' bargaining power? Much research in corporate finance has argued that the response should be – and actually is – positive: firms use leverage to “take surplus off the bargaining table” in wage negotiations, so that greater workers' bargaining power induces employers to take on more debt and thus moderate their wage demands (Baldwin, 1983; Bronars and Deere, 1991; Perotti and Spier, 1993; Matsa, 2010, among others). Others argue instead that when workers have greater bargaining power, they obtain higher wages and thereby reduce the future cash flow that their firm can pledge to creditors, hence shrink its debt capacity (Simintzi, Vig and Volpin, 2014). The controversy has not been settled by the empirical evidence to this date, as we shall see below.

But all these studies share a common fault: they neglect that the strategic value of debt in wage bargaining depends on the seniority of employees' claims relative to other creditors in the liquidation of insolvent firms, as well as on employees' rights in the renegotiation of their employer's debt. In practice, the balance between the rights of workers and those of other creditors varies greatly across countries. We show that this balance affects the strategic value of debt, and therefore the predictions regarding the relationship between company leverage and workers' bargaining power, as well as to their wages. Indeed, depending on worker' rights in liquidation and in debt renegotiation, the relationship between the bargaining power of workers and corporate leverage can even switch sign, which may reconcile some of the conflicting findings reported so far.

Specifically, using a simple model we show that the seniority of employees' claims relative to other debt in a firm's liquidation weakens the strategic value of debt in wage bargaining; but as a result the firm may want to issue more debt, not less. The intuition is that, as workers' seniority tends to stoke their demands in wage bargaining, the firm will want to be even more levered to deter such demands, unless bankruptcy costs are very high or the workers' claim are senior to all other debt. Moreover, the increase in leverage triggered by workers' seniority is larger the greater is the firm's cash flow and the value of its assets, since in these circumstances workers would otherwise be more aggressive in wage bargaining. Similar results emerge when workers' claims are protected not by seniority but by a government insurance scheme in case of bankruptcy: again, the optimal response by their employer is to choose a higher leverage, the more so the more generous is the coverage offered by the insurance scheme.

If instead workers and creditors can renegotiate their respective claims to avoid the company's liquidation, the workers' rights in the debt renegotiation process become relevant, but turn out to have the opposite effect: the stronger are workers' rights in debt renegotiation, the less bite the firm's leverage will have *ex ante* in deterring their wage demands, and therefore the lower is the firm's optimal leverage. So while the strength of their seniority rights in case of liquidation calls for more leverage, the strength of their rights in case of debt renegotiation calls for less leverage.

To test the models' predictions about the strategic use of debt to counter workers' claims we first collect novel data about workers' legal rights during liquidation and reorganization in 30 countries by way of a questionnaire (reproduced in Appendix B and discussed in Section 2) sent to law firms in each country participating in the Lex Mundi project. Importantly, these rights differ from those attributed to employees by legislation on dismissals outside of bankruptcy and widely used in other studies, notably the Employment Protection Legislation (EPL). First, we collect data on the seniority of employees' unpaid salaries and severance pay relative to six other types of creditors, when the firm enters liquidation: (i) creditors with lien on property (e.g., bank mortgage), (ii) administrative expenses incurred by bankruptcy trustee, (iii) post-petition credit, (iv) claims for contributions to employee pension benefit plans, (v) claims arising from unpaid taxes, and (f) unsecured credit. Second, we gather information on the protection of workers' rights during reorganization allowed by the law, namely whether employees' claims and collective agreements can be impaired and whether to do so their consent should be sought. These two broad dimensions of workers' rights during bankruptcy procedures – employee seniority and debt renegotiation rights – capture two key parameters of the model (θ and β respectively). We also collect country-level data that provide plausible measures of employees' bargaining power in wage bargaining (parameter α in the model), specifically the EPL and union density.

We use these novel legal indicators jointly with firm-level data from Worldscope and Osiris (for non-U.S. firms) and Compustat databases (for U.S. firms) over the period 1988-2013 to test the model's prediction that firms which experience an increase in the value of their assets or of their cash flow increase their leverage more if their employees are better protected by seniority or government-provided insurance mechanisms in case of liquidation, while they increase their leverage less if their employees have stronger rights in case of debt renegotiation.

Our empirical strategy is designed to measure the firm's use of leverage following either an asset value shock or a cash flow shock that should change the firm's bargaining position vis-à-vis workers. Our maintained hypothesis is that, *ceteris paribus*, an asset value shock should lead firms incorporated in countries that grant workers more rights in bankruptcy to increase leverage more compared to firms incorporated in countries with lower workers' rights in bankruptcy. We use two different identification strategies aimed specifically at using plausibly exogenous shocks to firms' asset values and cash flows.

First, we use the shock arising from country-level real estate prices that have a direct impact on the firm's market value through the real estate assets it holds. Real estate assets are very important in firms' balance sheets: Cheney et al. (2012) reports that 59% of U.S. firms in their study report some real estate holdings. In our international sample we find that this figure rises to 71%, underlying the importance of this type of asset and, as a consequence, any shock that happens to its valuation. A change in the country-level real estate values is a plausibly exogenous shock to the single firm and we exploit the impact of the change of the value of real estate owned by the firm to test whether the firm subsequently changes its leverage strategically vis-à-vis its employees. More precisely, we carry out a difference-in-difference estimation comparing the leverage response of firms incorporated in countries with different levels of workers' rights in bankruptcy, following a valuation shock to their real estate assets.

Second, we focus on firms in the extraction and mining industry, and estimate these firms' leverage response to changes in their profitability arising from changes in the price of the commodities that they produce, so as to condition on a plausibly exogenous source of changes in the firm's profitability. For example, we use oil prices, exogenous to the individual oil producer, to instrument for oil companies' profitability, to investigate whether oil companies increase their leverage in response to increases in their profits associated with oil price hikes, so as to avoid sharing the bounty with their employees. This second strategy is reminiscent of the one used by Bertrand and Mullainathan (2001). Similar to the first diff-in-diff strategy, this one compares the leverage reaction of two otherwise identical firms in each of these two industries, but incorporated in countries with different levels of workers' rights, following an exogenous shock to their profitability level and the consequent change in the bargaining positions.

Our main empirical results are as follows. First, as predicted by the model, firms whose workers face greater rights in bankruptcy (i.e. incorporated in countries where

workers rank high in the distribution of proceeds in liquidation) increase leverage when they experience a positive shock to their real estate valuations. The same result is obtained when we investigate the extraction and mining industries, where the shock being considered concerns the firm's profitability. These results are robust across different measures of leverage and are stronger in labor intensive industries.

In all specification we control for the firm-level variables that existing literature has found to influence leverage decisions (namely, firm size, profitability, asset tangibility and market-to-book to proxy for growth opportunities). The shock to firm's real estate values can also impact directly the firm's financial constraints and, as a consequence, the level of investments. Leverage may change because of this channel. It should be noted, however, that this channel will operate for both types of firms: those incorporated in low workers' rights and high workers' rights countries. To account for this channel we also control for capital expenditure in all our specifications. We use firm fixed effects to absorb time-invariant characteristics at the firm level, and industry-time fixed effects to absorb time-varying industry characteristics. Importantly, we control for country-level time-varying characteristics: in specifications with either firm or industry-time fixed effects, we also control for a gamut of country time-varying characteristics such as unemployment rate, GNP growth and inflation rates. We also use specifications where we use country-level time varying characteristics together with country fixed effects to absorb any country unobserved heterogeneity.

These results indicate that the balance of workers' and other creditors' rights play an important role in shaping the strategic use of company debt, which may help explain some of the contrasting results reported so far in the literature. Most empirical work based on U.S. firm-level data shows that the strategic use of debt allows companies to compress wages in negotiations: Hanka (1998) finds that U.S. firms with more debt pay lower wages and fund their pension plans less generously, controlling for performance; Benmelech, Bergman and Enriquez (2010) document that U.S. airlines in distress obtain wage concessions from workers with underfunded pension plans; consistently, Myers and Saretto (2010) show that in wage negotiations unions are more likely to strike and "win" if firm debt has decreased in previous years. Moreover, there is evidence that when workers are protected by more favorable regulation or are more unionized, firms choose higher leverage to counter-balance their employees' bargaining power: using U.S. data from 1950 to 2008, Agrawal and Matsa (2011) document that increases in state

unemployment insurance benefit entitlements are associated with significant increases in firm leverage, and the increases are larger for firms with greater layoff separation rates, greater probability of firing workers in adversity (low operating cash flow, no dividend) and greater labor intensity. Similarly, Matsa (2010) finds that in the U.S. collective bargaining coverage and pro-union changes in state labor laws increase firm leverage (except in industries with low union presence), and the same is found for Sweden by Cronqvist, Heyman, Nilsson, Svaleryd and Vlachos (2009). Moreover, Bronars and Deere (1991) report that in the U.S. firms facing greater threat of unionization have higher leverage. Consistently with these results, this does not apply to firms that want to be nice to their workers: Bae, Kang and Wang (2011) report that companies with a high rating as “employee-friendly” keep their leverage low.

However, these results have recently been challenged by Chemmanur, Cheng, and Zhang (2008), who report empirical evidence of a positive relation between wages and leverage, and justify this finding by appealing to the idea that risk-averse employees require greater wages from more levered employers in order to compensate them for the greater bankruptcy risk, an idea formalized by Berk, Stanton and Zechner (2010). Moreover, the cross-country evidence of Simintzi, Vig and Volpin (2009) appears inconsistent with the strategic leverage hypothesis: using firm-level data from 21 countries, they find that greater employment protection (which should increase the power of employees) is associated with lower company leverage. Simintzi et al. argue that when workers have greater bargaining power, their higher wages reduce their employer’s debt capacity: in their wording, the resulting increase in operating leverage reduces the firm’s financial leverage. However, they do not take into account that the balance of power between workers’ and other creditors’ rights in bankruptcy law varies greatly from country to country.

The rest of the paper is as follows. Section 1 presents a simple model that allows for different degrees of legal protection of worker’s rights in bankruptcy procedures, and derives the predictions that guide our subsequent empirical analysis. Section 2 compares the key predictions offered by the model and maps them into testable hypotheses. It also describes the data and lays out our empirical strategy, Section 3 presents our empirical results. Section 4 concludes.

1. The Model

As stated in the introduction, existing work on the relationship between corporate leverage and wages neglects the role of the degree of protection of workers in bankruptcy, that is, the extent to which their wage and pension claims are protected by: (i) seniority in liquidation procedures; (ii) their rights in corporate restructuring; and (iii) government-provided insurance schemes. To explore the role of each of these forms of worker protection in bankruptcy, and thereby guide our empirical analysis, in this section we study their impact on the optimal leverage chosen by firms and on the wage paid to employees in the context of a simple model of strategic debt choice. The model is based on the idea, common to several papers in this literature, that firms can use leverage to push money off the bargaining table and thereby reduce the wages that are paid on average to their employees. However, in our model leverage also exposes firms to an increase danger of insolvency and therefore to higher expected bankruptcy costs – a time-honored idea in the literature on capital structure.

In model's baseline version, presented in Section 1.1, workers' claims in bankruptcy are protected only by their seniority. Then, in Section 1.2 the model is extended to allow for the possibility that the firm is restructured rather than liquidated, and that workers' claims are renegotiated in the restructuring process. Next, in Section 1.3 we consider a variant of the model where the employees of an insolvent firm are protected to some extent by a publicly-provided insurance mechanism, even though they have lower seniority than other creditors.

1.1 The Role of Employee Seniority in Firm Liquidation

We consider a model where a firm bargains with its employees to determine the wage w and therefore how the firm's surplus (after deducting non-labor costs) is to be split between shareholders and workers. Management runs the firm in the shareholders' interest, and all the claimants to the firm's cash flow (shareholders, creditors and workers) are risk neutral. With no loss of generality, we standardize the number of workers hired by the firm to 1 and the interest rate to 0. The firm has initial assets (property, plants and equipment) whose market value is A . By combining these assets with labor it generates a cash flow (net of non-labor costs), y , which is uniformly distributed on the support

$[\underline{y}, \bar{y}]$, so that its range of variation $\sigma \equiv \bar{y} - \underline{y}$ captures the variability of the firm's cash flow.¹ We assume that the firm is viable, in the sense that it generates an expected surplus at least when workers are paid their reservation wage w_0 : $A + (\bar{y} + \underline{y})/2 - w_0 > 0$, i.e. its assets and expected cash flow exceed the minimum wage bill that workers are willing to accept. This is equivalent to stating that the firm has a positive value when workers have no market power.

Before bargaining with the union, shareholders can vote to issue debt with face value and pledged repayment D and pay to themselves the sum raised by debt issuance, via a debt-for-equity swap. More precisely, as shown in Figure 1, the time line of the model consists of four stages. At $t=1$, debt is issued and equity is correspondingly reduced. At $t=2$, the firm hires workers pledging a wage whose expected value is at least equal to the workers' reservation wage w_0 : if not, workers will not even start working in the firm. At $t=3$, the workers, upon forming a union, negotiate the actual wage w : bargaining occurs via alternating take-it-or-leave-it offers, which are made with frequency α by the union and with frequency $1-\alpha$ by the firm's management. Hence, the wage w is effectively set by the union at its preferred level w_u with frequency α and by the firm at its preferred level w_f with frequency $1-\alpha$, where α can be regarded as the union's bargaining power. At $t=4$, the firm's cash flow y is realized and, depending on its magnitude, the company is either solvent or insolvent. If the company is solvent, creditors receive D ; otherwise, the firm incurs a bankruptcy cost C , and the firm's net worth $A + y - C$ is divided between creditors and workers according to the seniority rules established by the law.

[Insert Figure 1]

Hence, the split of the realized firm's cash flow among the claimants depends not only on the terms of the debt contract signed by the firm and its creditors at $t=1$ and of the labor contract agreed at by the firm and its employees $t=3$, but also on whether at $t=4$ the company is solvent or not, and – in case of insolvency – on the seniority rights of creditors and workers. To capture the relative seniority of workers, we assume that in bankruptcy a fraction θ of the agreed wage w is senior to the creditors' claim, and the

¹ Up to a constant, the range of variation equals to the standard deviation of y , which is $(\bar{y} - \underline{y})/\sqrt{12}$.

residual fraction $1 - \theta$ of the wage w is junior. The parameter $\theta \in [0, 1]$ is the degree to which the legal system entitles the employees of a defaulted company to be protected by seniority, and therefore determines the balance between workers' and creditor rights if the company is liquidated in the bankruptcy procedure. As we shall see in Section 3, there are large cross-country differences in the seniority rights attributed to workers regarding their unpaid wages.

At $t = 4$ the firm is insolvent if the sum of its assets A and of the realized value of its cash flow y are insufficient to repay its debt D and the agreed wage w entirely: $A + y < D + w$. As illustrated in Figure 2, what workers receive from the liquidation depends on the value of the firm's assets and cash flow $A + y$, hereafter denoted by X for brevity. Specifically, the realized X determines one of four possible outcomes:

- (i) *default on debt and on both workers' claims*: if X falls short even of the workers' senior claim θw , workers get the whole of X , and other creditors get zero;
- (ii) *default only on debt and workers' senior claim*: if X covers the workers' senior claim θw but cannot repay entirely also the debt claim, i.e. $X \in [\theta w, \theta w + D)$, workers receive θw and other creditors the remaining amount $X - \theta w$;
- (iii) *default only on workers' junior claim*: if X covers both the workers' senior claim θw and the entire debt claim of other creditors but not the workers' junior claim $(1 - \theta)w$, i.e. $X \in [\theta w + D, w + D)$, workers receive $X - D$ and other creditors get repaid in full;
- (iv) *no default*: if X covers both the workers' entire claim w and the other creditors' claim D , i.e. $X \in [w + D, A + \bar{y}]$, both get repaid in full.

[Insert Figure 2]

The wage is set at $t = 3$ by bargaining over the firm's expected cash flow, and it takes a different value depending on whether it is set by the union or by the firm.

When the union makes the take-or-leave-it offer, it sets the contractual wage w_u so as to maximize the expected income that workers can get from the firm, considering that their payoff is a random variable that takes different values over the four regions (i)-(iv). As shown in Appendix A, the contractual wage that maximizes the workers' expected income is

$$w_u^* = A + \bar{y} - (1 - \theta)D. \quad (1)$$

Hence the union's wage demands are greater the higher is the value of the firm's assets A and the higher is its maximum cash flow \bar{y} (hence also its mean $(\bar{y} + \underline{y})/2$ and range of variation σ). The reason is that when the firm has valuable assets or abundant cash flow, employees know that there is a considerable surplus after paying down the company's debt, and therefore feel that the firm can accommodate large wage demands. By the same token, such wage demands are moderated if the firm increases its debt D . However, this strategic value of leverage is diminished by the workers' seniority θ , and vanishes altogether in the limiting case in which the workers' claim is entirely senior to the firm's debt ($\theta = 1$).

When instead the firm makes the take-or-leave-it offer, it sets the wage schedule $w_f(X)$ so as (i) to pay workers only their reservation wage, i.e. just meet their participation constraint $E[w_f(X)] = w_0$, and (ii) to minimize expected bankruptcy costs. So the firm will pledge to pay a positive wage only for $X > D$ and in this region it will set it so to avoid defaulting on its employees. Due to the risk neutrality of both workers and shareholders, the precise form of the schedule $w_f(y)$ does not matter, once it meets these two conditions.² For instance, the firm may offer a wage proportional to the cash flow in solvency states, i.e. once debt is repaid: $w_f = \phi y$ for $y \geq D - A$, picking the proportionality constant ϕ so as to just meet the employees' participation constraint, i.e. $\phi = 2\sigma w_0 / [\bar{y} - \max((D - A)^2, \underline{y}^2)]$. Hence, the firm designs its offer so as to default only on creditors other than its employees. The results would be slightly more complex, but qualitatively unchanged, if the firm were to pledge a constant wage to its workers, as in this case it may default on them as well for low enough realizations of its cash flow; but in this case its shareholders would bear the bankruptcy costs more often, without any countervailing labor cost savings.

When the union sets a contractual wage equal to w_u^* , workers obtain a random income \tilde{w}_u , which varies depending across regions (i)-(iv), whose expected value is

² Any wage schedule is equivalent from the employees' standpoint, insofar as its expected value is w_0 .

$$E(\tilde{w}_u | w_u = w_u^*) = \frac{[A + \bar{y} - (1 - \theta)D]^2 - (A + \underline{y})^2}{2\sigma}. \quad (2)$$

Hence the workers' expected payoff is given by expression (2) with probability α and equals w_0 with probability $1 - \alpha$. Correspondingly, the firm's expected labor cost is

$$E(W) = (1 - \alpha)w_0 + \alpha \frac{[A + \bar{y} - (1 - \theta)D]^2 - (A + \underline{y})^2}{2\sigma}. \quad (3)$$

This expression is decreasing in D , highlighting the most basic prediction of strategic debt models, namely that on average wages should be negatively correlated with corporate debt, and the more so the greater is employees' bargaining power α .

The firm will want to choose its debt D so as to maximize its value V , which equals its expected cash flow *minus* expected labor costs $E(W)$ in (3) and expected bankruptcy costs $E(C)$ (derived in Appendix A):

$$V = A + \underbrace{\frac{\bar{y} + \underline{y}}{2}}_{E(y)} - \underbrace{\left\{ \alpha \frac{[A + \bar{y} - (1 - \theta)D]^2 - (A + \underline{y})^2}{2\sigma} + (1 - \alpha)w_0 \right\}}_{E(W)} - \underbrace{\left[1 - \frac{(1 - \alpha)(A + \bar{y} - D) - \alpha\theta D}{\sigma} \right] C}_{E(C)}, \quad (4)$$

The initial debt D cannot however be so high as to violate the workers' participation constraint, i.e. force the union to set the wage so low that the workers' expected income is below their reservation level. So D must be such that $E(\tilde{w}_u | w_u = w_u^*) > w_0$, i.e. from (2):

$$\frac{[A + \bar{y} - (1 - \theta)D]^2 - (A + \underline{y})^2}{2\sigma} \geq w_0. \quad (5)$$

So we must consider two cases:

- (i) If the participation constraint (5) is not binding, the optimal debt level is given by the first-order condition obtained maximizing (4) with respect to D :

$$\hat{D} = \frac{A + \bar{y}}{1 - \theta} - \frac{[1 - \alpha(1 - \theta)]C}{\alpha(1 - \theta)^2}, \quad (6)$$

that is, optimal leverage balances the benefit of lower wages stemming from the strategic use of debt (the first term) with the cost deriving from higher expected bankruptcy costs (the second term).

- (ii) If instead the debt \hat{D} prescribed by expression (6) violates the workers' participation constraint (5), the firm's debt is given by this constraint taken with equality, i.e. it is set just high enough as to eliminate any mark-up of the wage over its reservation level. As shown in Appendix A, this results in the following debt level:

$$\bar{D} = \frac{1}{1-\theta} \left[A + \bar{y} - \sqrt{2w_0\sigma + (A + \bar{y})^2} \right], \quad (7)$$

which can be shown to be strictly positive due to the assumption that the firm generates a positive expected surplus when it pays the reservation wage to its employees (see Appendix A). So the firm's optimal debt D^* is the smaller of the two levels in (6) and (7):

$$D^* = \min(\hat{D}, \bar{D}) = \frac{\bar{y} + A}{1-\theta} - \max \left(\frac{1-\alpha(1-\theta)}{\alpha(1-\theta)^2} C, \sqrt{2w_0\sigma + (A + \bar{y})^2} \right). \quad (8)$$

Expression (8) yields several predictions regarding the optimal debt level D^* :

Proposition 1 (Optimal Debt Level and Employee Seniority)

If employees' claims are not senior to all other debt ($\theta < 1$), then

- (i) *the optimal debt level is increasing in the value of assets and the average cash flow, weakly increasing in workers' bargaining power, and decreasing in bankruptcy costs;*
- (ii) *if debt is such that the wage exceeds its reservation level ($D^* = \hat{D}$), an increase in employees' seniority increases the optimal debt level if bankruptcy costs are below a critical threshold, and decreases it otherwise;*
- (iii) *if debt is such that the wage equals its reservation level ($D^* = \bar{D}$), an increase in employees' seniority always increases the optimal debt level.*

If employees' claims are senior to all other debt ($\theta = 1$), the optimal debt level is zero.

Proof. See Appendix A.

The distinction between bankruptcy regimes in which $\theta < 1$ and those in which $\theta = 1$ is intuitive: if not all of the employees are senior to other debt ($\theta < 1$), leverage has a strategic value, while it loses any bite when employees' claims must be paid before all other claimants in liquidation ($\theta = 1$). Since in this simple model leverage serves only as a strategic device in wage bargaining, the prediction is that in this case the firm chooses zero leverage: of course the model would still predict positive leverage it were to include other advantages of leverage (such as tax shield). So this prediction is to be read as saying only that the firm will not issue debt for strategic reasons.

The intuition behind the effects in point (i) of the proposition is straightforward: more valuable assets, higher cash flow and stronger unions tend to elicit more aggressive wage demands, and thus require greater leverage to maximize the value of the firm. Instead, higher bankruptcy costs call for lower debt issuance – as in standard trade-off theories of capital structure. Incidentally, the model can easily incorporate a tax shield motive for debt issuance, which would contribute to its benefits and thus increase debt compared to (8).

The effect of greater seniority level on debt in points (ii) and (iii) is more subtle. As workers' seniority tends to reduce the strategic value of debt, an increase in their seniority requires greater leverage in order to achieve the same deterrence of workers' demands; but this increases the likelihood of bankruptcy, because for any given level of debt creditors will compete with a larger claim by workers: hence, beyond a critical level of the bankruptcy cost the firm will react to stronger seniority rights of workers by scaling down leverage. This non-monotonic response of leverage to seniority only arises when debt is not so high as to push the wage down to its reservation level ($D^* = \hat{D}$). This non-monotonicity does not arise if bankruptcy costs are so low that leverage is raised to the point where workers are paid just their reservation wage: if $D^* = \bar{D}$, greater employee seniority is invariably associated with more leverage. Intuitively, a greater seniority tends to increase the expected income of employees, and therefore calls for more leverage in order to push their expected income down to the reservation wage.

Expression (8) also yields an unambiguous prediction regarding the response of optimal leverage to changes in the firm's asset value and cash flow:

Proposition 2 (Optimal Debt Response to Changes in Asset Value and Cash Flow)

The sensitivity of the optimal debt level to the value of the firm's assets and to its expected cash flow is increasing in the seniority of workers and in their bargaining power.

Proof. See Appendix A.

Intuitively, in the presence of greater surplus shareholders will want to increase leverage *more* in a country that gives strong seniority rights to workers or/and features strong unions. In Section 3 we test this prediction, investigating the firms' differential response to asset value and cash flow shocks in countries where bankruptcy law affords different seniority rights to employees' claims.

1.2 The Role of Workers' Rights in Debt Renegotiation

So far we have assumed that, when the firm is insolvent, it gets liquidated, so that creditors simply cash the firm's value, net of bankruptcy costs and the senior portion of workers' wages. This is a reasonable assumption if it is hard to renegotiate the company's debt, for instance because creditors are dispersed. If instead creditors are concentrated (e.g. a small number of banks) and therefore are able to coordinate, then they will have the incentive to renegotiate their debt with workers to reduce their claims to the firm's actual value, keep it operating as a going concern, and thus save the bankruptcy cost C (which may be thought as also including the continuation value of the firm, which would be lost under liquidation).

We can think of renegotiation as an additional phase in the model's timeline, occurring at $t = 5$, after the realization of the firm's cash flow y . In this renegotiation, each of the two parties' outside option will be given by the payoff that it can obtain if the firm is simply liquidated. An important element in the outcome of debt renegotiation is the bargaining power of workers vis-à-vis the firm's creditors, which we shall denote by β . This bargaining power depends on the extent to which workers are protected in a corporate restructuring, which may differ from their bargaining power α in wage negotiations when the firm is still operating.

Thus, if the company is insolvent, at the debt renegotiation stage workers expect to get an additional quasi-rent βC and creditors an additional expected repayment $(1 - \beta)C$. In anticipation of the outcome of renegotiation between creditors and workers, the initial

value of the firm is reduced only by a fraction β of the bankruptcy cost C (the only portion that is “lost” to workers). Hence, the value of the company will be given by an expression identical to (8) except that C is replaced by βC . As a result, with debt renegotiation the optimal amount of debt becomes

$$D^{**} = \frac{\bar{y} + A}{1 - \theta} - \max \left(\frac{1 - \alpha(1 - \theta)}{\alpha(1 - \theta)^2} \beta C, \sqrt{2w_0\sigma + (A + \underline{y})^2} \right). \quad (9)$$

The only change in this expression relative to (8) is in the first term within the parentheses, which corresponds to the optimal debt when the workers’ participation constraint is not binding. From expression (9), one can establish further predictions regarding the optimal debt level D^* :

Proposition 3 (Optimal Debt and Employee Rights in Debt Renegotiation)

- (i) *If debt is such that the wage exceeds its reservation level ($D^* = \hat{D}$), the optimal debt level is decreasing in employee rights in debt renegotiation. This effect is proportional to the size of bankruptcy costs, is stronger if workers have high seniority rights in liquidation and weaker if they have strong wage bargaining power.*
- (ii) *If debt is such that the wage equals its reservation level ($D^* = \bar{D}$), the optimal debt level is unaffected by employee rights in debt renegotiation.*

Proof. See Appendix A.

The intuitive reason for result (i) is that workers’ bargaining power β in debt renegotiation allows workers to take surplus away from creditors in bankruptcy, which reduces the *ex-ante* value of debt from the standpoint of shareholders, and therefore reduces the debt capacity of the firm. This explains why the parameters α and β have opposite effects on debt issuance, even though both of them refer to the bargaining power of workers: their power in wage negotiations, α , calls for greater debt issuance as a wage-reducing strategic device, as in Matsa (2010) and other models of strategic debt, while workers’ power vis-à-vis creditors at the renegotiation stage, β , induces less debt issuance, because it reduces the firm’s debt capacity, an effect akin to the idea by Simintzi, Vig and Volpin (2014) that “operating leverage reduces financial leverage”. (Though it is important to notice that here this effect does not operate via a financing

constraint, which would change the results about seniority, as shown in Section 1.4.) Both effects operate via the bankruptcy cost: the depressing effect of bankruptcy cost on debt issuance is mitigated if workers have great bargaining power in wage negotiations (high α) while it is amplified if workers have great bargaining power vis-à-vis creditors once the firm is in distress (high β). Hence, the empirical prediction here is that the issuance of corporate debt should be greater in countries that offer lower protection to workers and stronger protection to creditors in the restructuring of insolvent companies.

The fact that the leverage effect of employee rights β in debt renegotiation is proportional to the firm's bankruptcy costs follows from the fact that the saving of these costs is precisely what creates the surplus that employees and creditors can share at the renegotiation stage. Incidentally, if these costs were increasing in the size of the assets A to be liquidated, also in this case we would have an interaction between the value of the firm's assets and the effect of worker protection on leverage, but with the opposite sign relative to employee seniority: an increase in the value of the firm's assets would be predicted to have a smaller effect on firm leverage in countries where employees have comparatively strong rights in debt renegotiation (high β), while it has a larger impact on leverage where they have high seniority in firm liquidation (high θ), from Proposition 2.

The effects on leverage of the interactions of employee rights in renegotiation, their seniority and their bargaining power are more subtle. When workers have high seniority θ in liquidation, an increase in debt increases more the likelihood of bankruptcy and thus also that of eventual debt renegotiation, and this amplifies the negative effect of β on debt issuance. The opposite happens when workers have strong wage bargaining power α , which reduces the negative effect of β on debt issuance: hence, not only the two types of bargaining power have opposite direct effects on debt issuance, but they also attenuate each other's effects.

1.3 The Role of Government Insurance in Bankruptcy

In many countries, the government provides direct insurance to the employees of firms in a bankruptcy procedure, by repaying immediately part or all of their claims directly, irrespective of their seniority position, and taking their place in the liquidation procedure. This is for instance the case in Germany, where workers' claims have very low seniority in bankruptcy, but are very well protected by such an insurance scheme. The key

difference with seniority rights is that the cost of this form of insurance is borne by taxpayers; in contrast, strengthening workers' seniority rights occurs at the expense of the firm's creditors, and therefore ultimately of the firm itself.

To capture this form of intervention, we consider a variant of the model where the government pays employees a fraction γ of the agreed salary w if their employer is insolvent, and the government is entitled to claim from the employer whatever workers would have been able to obtain otherwise. For simplicity, we consider the case in which employees have no seniority relative to other creditors ($\theta = 0$), so that neither the government does when it surrogates employees in the bankruptcy procedure.

The resulting payoff for employees is shown in Figure 3: in the insolvency states (when $X < D + w_u$), workers are paid γw and the government gets from the firm whatever is left after paying other creditors. So, compared with what they would earn in the absence of this insurance scheme, the workers have an expected gain given by the area of the region shaded in dark grey, and surrender to the government any claims in excess of γw from the firm's liquidation, so that they expected loss is measured by the light grey triangle in Figure 3: when the dark grey area exceeds the light grey one, as in the case shown in Figure 3, workers receive an implicit subsidy from the government. This happens whenever the parameter γ is set high enough that the government cannot expect to recover fully from the failed firm what it has paid to its employees. By the same token, in this case the expected income of the workers no longer coincides with the expected cost paid by the firm.

[Insert Figure 3]

As shown in Appendix A, when the union sets the wage, the expected income of the employees now is

$$\frac{w_u}{\sigma} [(1 - \gamma)(A + \bar{y} - D - w_u) + \gamma\sigma], \quad (10)$$

which the union maximizes by picking the following contractual wage:

$$w_u^*(\gamma) = \frac{A + \bar{y} - D}{\sigma} + \frac{\gamma}{1 - \gamma} \frac{\sigma}{2}. \quad (11)$$

This exceeds the wage that the union would pick absent the government insurance ($\gamma = 0$), and it is increasing in the generosity of insurance γ . In Appendix A we show that

the government insurance scheme raises also the expected income of employees above what it would have been in the absence of insurance if $\gamma > \bar{\gamma} \equiv w_u / (2w_u + D - A - \underline{y})$, where $\bar{\gamma} > 0$ if the firm is insolvent in at least some states. If $\gamma = \bar{\gamma}$, the wage chosen by the union would be independent of γ : the government-provided insurance affects the wage chosen by the union only if it provides a subsidy to workers in default states.

Going through similar steps as in Section 1.1 (see Appendix A), it can be shown that when the government insures workers' claims in bankruptcy, the optimal debt level is

$$\hat{D}(\gamma) = A + \bar{y} + \frac{1}{3} \frac{\gamma}{1-\gamma} \sigma - \frac{4}{3} (1-\alpha) C, \quad (12)$$

if the employees' participation constraint is not binding. Compared to expression (6), the novelty is that in (12) the optimal debt level is increasing in γ , i.e. the generosity of government-provided insurance, which intuitively plays a role akin to employee seniority θ : it stokes wage demands by the union, and therefore calls for greater strategic leverage. Otherwise, the comparative statics of $\hat{D}(\gamma)$ with respect to other parameters is qualitatively similar to that found in Section 1.1: it is increasing in A and in the mean and variance of the cash flow y , and decreasing in bankruptcy costs C .

As in Section 1.1, one obtains a different expression for the optimal debt level if the employees' participation constraint is binding:

$$\bar{D}(\gamma) = A + \bar{y} + \frac{\gamma}{1-\gamma} \sigma - 2 \sqrt{\frac{w_0 \sigma}{1-\gamma}}. \quad (13)$$

Also in this case, the optimal debt level can be shown to be increasing in γ , and other comparative statics results are similar to those of expression (12). Considering both cases, the optimal debt level is

$$D^*(\gamma) = \min(\hat{D}(\gamma), \bar{D}(\gamma)) = A + \bar{y} + \frac{1}{3} \frac{\gamma}{1-\gamma} \sigma - \max\left(\frac{4}{3} (1-\alpha) C, 2 \sqrt{\frac{w_0 \sigma}{1-\gamma}} - \frac{2}{3} \frac{\gamma}{1-\gamma} \sigma\right),$$

whose comparative statics properties can be summarized as follows:

Proposition 4 (Optimal Debt Level and Public Insurance of Employees)

When the government insures a fraction of the employees' claims in bankruptcy states, the optimal debt level is increasing in the fraction of insured claims, in the value of assets and

the average cash flow, weakly increasing in workers' bargaining power, and decreasing in bankruptcy costs.

Proof. See Appendix A.

The above expression for $D^*(\gamma)$ also implies that the generosity of the public insurance scheme amplifies the response of optimal leverage to the firm's average cash flow:

Proposition 5 (Optimal Debt Response to Changes in Average Cash Flow under Public Insurance of Employees)

The sensitivity of the optimal debt level to the firm's expected cash flow is increasing in the fraction of the employees' claims insured by the government in bankruptcy states.

Proof. See Appendix A.

In what follows, we will describe how the different dimensions of employee protection in bankruptcy – seniority θ , debt renegotiation rights β and government insurance γ – differ across countries, and how these cross-country differences affect the leverage decision of companies around the world.

2. Empirical Strategy and Data Description

As illustrated in Section 2, the model yields three sets of related predictions: (a) stronger employees' seniority rights in bankruptcy liquidation increases firm leverage, (b) employees' seniority invariably increases the response of leverage to increases in the value of its assets and in its cash flow, and (c) stronger employees' rights in the renegotiation of corporate debt is predicted to decrease firm leverage. To test the model, we use firm-level data from Worldscope and Osiris (for non-U.S. firms) and Compustat (for U.S. firms) over the sample period from 1988 to 2013. The dataset has detailed income statement and balance sheet data.

2.1 Empirical Methodology

Our methodology is best illustrated by considering the baseline specification that we use to investigate how firm's leverage decisions are affected by workers' rights in bankruptcy when an asset valuation or a profitability shock occurs to a firm in our sample:

$$D_{ijt} = \lambda_0 S_{ijt-1} + \lambda_1 \theta_c S_{ijt-1} + \lambda_2 \beta_c S_{ijt-1} + \lambda_3 \alpha_c S_{ijt-1} + \delta' X_{ijt-1} + \phi' X_{ct} + \mu_i + \mu_t + \varepsilon_{ijt}, \quad (14)$$

where the subscripts i, j, c and t index firms, industries, countries and years respectively, D_{ijt} is the (debt or market) leverage of firm i in industry j in year t , θ_c is employees' seniority rights in bankruptcy in country c , β_c is employees' rights in debt renegotiation in country c , α_c is employees' bargaining power in wage negotiations in country c , S_{ijt-1} is a shock to the value of firm i 's assets or to its cash flow in year $t-1$, X_{ijt-1} is a vector of company-specific variables measured in year $t-1$: firm size (log of total assets), asset tangibility (ratio of plant, property and equipment to total assets), profitability (return on total assets), growth opportunities (market-to book ratio), and capital investment (capex ratio scaled by lagged total assets); and X_{ct} is a vector of country characteristics measured in year t (unemployment rate, GNP growth rate, inflation rate and, in some specifications, creditor rights). Finally, μ_i is a firm effect, μ_t is a year effect, and ε_{ijt} is the error term. Some specifications include industry fixed effects or industry-time fixed effects instead of firm effects, and country-industry effects instead of country effects.

The coefficients λ_1 , λ_2 and λ_3 respectively measure the response of leverage to workers' seniority rights in bankruptcy, to employees' rights in the renegotiation process, and to employees' bargaining power in wage negotiations, all following a shock to the firm i 's asset value or cash flow. Recall that the model predicts $\lambda_1 > 0$: ceteris paribus, a shock to asset valuation or profitability should lead a firm to increase leverage in a country where workers have a higher seniority compared to an identical firm facing the same shock but located in a country with low workers' seniority. It also predicts $\lambda_2 < 0$ (if bankruptcy costs are increasing in the firm's asset value or cash flow): ceteris paribus, a shock to asset valuation or profitability should lead a firm to decrease leverage in a country where workers have strong rights in reorganization compared to a firm located in a country where workers have weaker rights in reorganization, or to increase leverage less than the second. Third, the model predicts $\lambda_3 < 0$, implying that, ceteris paribus, a shock to asset

valuation or profitability will lead a firm to increase leverage by more in a country where workers have higher bargaining power.

We use two different identification strategies to measure an exogenous shock to the firm's asset valuation and profitability. The first relies on the change of the value of its real estate to capture the asset valuation shock. When we adopt this strategy, we use the entire sample to estimate the coefficient estimates. The second strategy relies on change in commodity prices as an instrument for the firm's profits. In this case, we use only firms in the extraction and mining industries for the estimation.

In the first identification strategy we interact the asset value shock (namely, the change in the market value of the firm's real estate assets) with measures of workers' rights in bankruptcy and reorganization and with measures of employment protection. The latter, being based on country-level characteristics, are largely time invariant (the exception being EPL, used to measure employment protection, that changes over time) and does not vary across firms in the same country. Changes in the value of firms' real estate vary over time, as well as across firms in the same country, since firms typically have different amounts of real estate assets. In other words, the power of our identification strategy comes from these shocks' differential effect across firms depending on the country-level legal protection of workers.

The first task is to measure the market value of real estate assets owned by each firm since the balance sheet books these assets at their historical cost. Real estate assets are largely made up of two main components: land and buildings. One important difference between these two components is their depreciation: existing literature argues that depreciation is very important for buildings, but significantly less so for land, which tends to appreciate, not depreciate, over time. Hence we use two different methodologies (Chaney et al. (2012), and Cvijanovic (2014)) to get the real estate's market valuation.

Our first measure uses only the land component of real estate assets as in Cvijanovic (2014). Importantly, we do not want in our measure to include the increase (i.e. new acquisition) of the physical stock of land through our sample period. As argued above, depreciation is not a significant issue for land, and therefore in computing our first measure we disregard any accumulated depreciation reported by the firm. We check the robustness of the results using a variant of this measure where we use the net historical cost value of land after depreciation. We thus use the (historical cost) valuation of land of

each firm for the year in which it appears for the *first time* in our dataset.³ We then use the residential real estate price index in the country where the firm is incorporated to inflate the original value of land and get its market valuation. In this case we measure the change in the value of a firm's real estate based on the market value of land scaled by the lagged valuation of the firm's property, plant and equipment (PPE).

Our second measure is based on both land and buildings and follows the methodology used by Chaney et al. (2012). Because this measure contains the building component, for which depreciation is an important item, we first need to adjust the valuation of buildings for their accumulated depreciation. Thus the first step is to compute the accumulated depreciation of buildings to the historic cost of buildings, in order to measure the proportion of the original value of the building claimed as depreciation. As Chaney et al. (2012), we assume a depreciable life of 40 years (and we then check the robustness of results by varying this from 30 to 50 years), and we compute the average of buildings for each firm. We use the (historical cost) valuation of land and buildings of each firm for the year in which it appears for the *first time* in our dataset⁴ and then use the residential real estate price index in the country where the firm is incorporated to inflate the original value of land and get its market valuation. We infer the market value of a firm's real estate assets for each year in the sample period by inflating the historical cost with the country-level residential real estate price index. In this case, our measure of the change in the value of a firm's real estate is based on the market value of land and building scaled by the lagged value of PPE.

Our alternative identification strategy relies on estimating the response of firm's leverage to changes in profitability. Since we require the shock to be exogenous, we cannot use profitability measures such as the Return on Assets because this is likely to be affected by leverage, as shown by the literature. Instead we focus on the extraction and mining industries and use changes in commodity prices as exogenous profitability shocks. Similar to Bertrand and Muillanathan (2001), we argue that the movement of commodity

³ Thus, for older firms and that have been in our dataset from the beginning, this will be year 1989. For relatively younger firms, that enter later in our sample, this will be their IPO year.

⁴ Thus, similar to what we do in our first measure, for older firms and that have been in our dataset from the beginning, this will be year 1989. For relatively younger firms, that enter later in our sample, this will be their IPO year. However, in the case of this second method there is an additional layer of complexity. For certain countries there is no data for accumulated depreciation after a particular year. For example, in the case of the United States there is no data on accumulated depreciation of building after 1993. Thus, when using this second measure we will lose all companies that went public after the last year for which accumulated depreciation is available, resulting in a smaller sample.

prices are exogenous from the point of view of the single firm but they have a first order impact on cash flow of commodity producing firms. From our sample of firms, we extract a subsample of 928 firms that operate in extraction and mining, and for each we identify the core commodity that it produces. Then we use the commodity price as an instrument for the firm's Return on Assets (ROA).

2.2 Data Sources and Definitions

Accounting and financial data for firms outside the U.S. are drawn from Worldscope and Osiris and for U.S. firms from Compustat. We collect data for firms incorporated and listed in 28 countries in the period 1988-2013, with two screens: we eliminate financial institutions and utilities and those with at least 9 years of data. We also winsorize the data at the 1% and 99th percentiles. This leaves us with 12,445 firms and 205,192 firm-year observations. Table 1 shows the descriptive statistics of our sample.

[Insert Table 1]

We draw residential real estate price indices from the Banks for International Settlements, and commodity prices from Bloomberg. Country-level data on workers' employment protection and other country-level variables come from various sources, mostly from the OECD and Bank for International Settlements datasets.

2.3 Worker Protection in Bankruptcy around the World

To measure the legal rights of employees in bankruptcy procedures, we construct a completely novel dataset, mostly obtained from law firms. Table 2 shows the most important rights of employees in bankruptcy in each of country for which we have data, based on the replies of law firms to the questionnaire shown in Appendix B.

[Insert Table 2]

The first question relates to the ranking of workers' (a) unpaid salaries and wages, and (b) severance pay against the claims of other creditors when it comes to distribute the proceeds from liquidation. We consider six other types of creditors competing workers in case of liquidation: (a) creditors with lien on property (e.g., bank mortgage), (b) administrative expenses incurred by the trustee, (c) post-petition credit, (d) claims for

contributions to employee pension benefit plans, (e) income and other taxes due to local or central government, and (f) unsecured creditors.

Column 1 of Table 2 shows the rank of employees' unpaid salaries and wages. A value of 5 is given in countries where workers are ranked first, 4 where they are ranked second, and so on. There are very significant differences in the rank of workers. In Brazil, Czech Republic, France and Mexico, when an insolvent company is liquidated, its employees have the highest seniority (the value of their value is 5), before any other creditor of the company. The seniority of employees is much different in other countries: for instance, in Austria, Finland, Germany and Ireland they are ranked last (the value of their rank is 1). Employee seniority in other countries lies between these two extremes: it is low in countries such as Sweden, Switzerland and Denmark, and rather high (they come second) in countries such as Israel and South Korea. While employees' ranking among creditors is very important, it should be seen as the only relevant dimension. Another important aspect is whether workers' unpaid wages are capped to a maximum amount payable or not. Even here there are considerable cross-country differences, although for the sake of brevity we do not report this data. We also collect data on the rank of severance payments, which turns out to be very correlated with that of unpaid wages and salaries and again is not reported for sake of brevity.

Even if employees have relatively low seniority, the government can effectively secure (all or part of) their claims by creating an insurance fund to cover workers' unpaid salaries (and even severance pay and pension contributions). Thus, in countries where workers rank amongst the most junior creditors in case of liquidation, a government-mandated insurance fund can attenuate the cost to workers by covering at least part of the unpaid salaries. Again, it should be noted that any payment made out by this government fund can be limited and capped at a certain level. We show the presence of a government fund to cover (at least part of) unpaid wages in Column 2 of Table 2. Most countries do have such a fund, but the amount covered varies significantly across countries (not reported for brevity). For example, while in both Finland and Germany employees are junior to all other creditors, and both countries have a government-mandated fund, the amounts covered in the two countries is quite different: in Finland the amount is uncapped, while in Germany the maximum amount covered is 3 months of unpaid salaries and wages. Importantly, in the case of Brazil and Mexico, where workers are ranked at the top rank by law, there is no such government fund. On the other hand, while workers are

ranked fourth in the Netherlands, Sweden, Switzerland, Turkey and the United States, the first four countries have a government-mandated fund but the United States have none, which aggravates the position of workers in the United States even further.

We also collect information about legal rights of workers during reorganization procedures. The first piece of evidence is information about whether the reorganization plan can impair the claims of employees without their consent. In Column 3 of Table 2 we code with a value of 1 instances where the law allows such impairment. In most countries, such impairment is not allowed but in others – such as Australia, India, Spain and the United States – employees’ claims can be impaired. The second piece of information relates to whether collective bargaining agreements previously entered into can be modified by the reorganization plan, and, if so, whether any new plan should be proposed to employees (or their representatives) for approval. In Column 4 we rank the responses from 1 (highest impairment of workers’ collective bargaining agreements) to 8 (lowest impairment). The results show significant cross-country heterogeneity: in countries such as the France, Germany, and the United States previously entered into collective bargaining agreements can be modified with relative ease (each have a value of 1) while in countries such as Canada and Finland (each with a value of 8), Austria, Denmark, Norway and Turkey (each with a value of 7) modifying collective bargaining agreements is relatively difficult in reorganization.

The rest of the data in Table 2 provides information on other country-level labor market characteristics and measures of creditor rights, which we use as control variables in our empirical methodology. Two important labor market variables are the Employment Protection Legislation (EPL) and union density. The EPL indicator is time-varying and takes the value from 0 to 6, with 6 indicating the highest level of protection to workers. It measures the difficulty with which individual and collective dismissal can be made in each country. It has three distinct components: Regular Contracts (for workers with regular contracts), Temporary Contracts (for workers with fixed-term, temporary contracts), and Collective Dismissals (regulations applying to collective dismissals). Union density measures the level on unionization in each country.

We show the correlations between the different dimensions of workers’ rights in bankruptcy and between them and country-level characteristics in Table 3. Starting with workers’ seniority (rank) in liquidation, we find that the rank is negatively correlated with the government mandated fund and workers’ rights in reorganization. Although these

correlations are not statistically significant they do show that these two dimensions of workers' legal rights in bankruptcy tend to be more substitutes rather than complements: where workers enjoy higher seniority, they are more likely to see their collective bargaining agreements get modified during a reorganization process. The rank of workers is positively correlated with EPL, implying that employment protection tends to complements worker' rights in bankruptcy, but does so imperfectly. This indicates that there are important dimensions of workers' rights that are not simply captured by the EPL indicator that the literature on company leverage has widely used so far. It should also be noted that workers' seniority correlate negatively with union density (the same applies for EPL and union density): unions tend to be stronger in countries where employees have low seniority. Finally, employees have low seniority in countries where creditors' rights are stronger (and where creditors' have an automatic stay on assets), thus showing that in these countries the balance between these two groups of stakeholders in case of bankruptcy is strongly skewed in favour of creditors.

[Insert Table 3]

3. Empirical Results

To investigate how firm's capital structure is affected by workers' rights in bankruptcy we estimate variants of the regression described by specification (14), the key coefficients of interest being λ_1 , λ_2 and λ_3 , namely those of the interaction between our measures of employee protection in bankruptcy and asset value or profitability shocks.

3.1 Regressions Based on Real Estate Valuation

We start from the results obtained from the identification strategy that relies on the shock arising from changes in country-level real estate prices: these should have a direct impact on the firm's market value through its real estate asset holdings. The first set of results are shown in Table 4 where we use industry- or firm-level fixed effects.

[Insert Table 4]

Our maintained hypothesis is that, *ceteris paribus*, an asset value shock should lead firms incorporated in countries that grant employees greater seniority rights in bankruptcy to increase leverage *more than* firms incorporated in countries where employees have lower seniority. Hence, our identification strategy is based on a difference-in-difference

estimation that compares the leverage reaction of two otherwise identical firms, but incorporated in countries with different levels of workers' rights in bankruptcy, following a valuation shock to their real estate assets.

The first row of Table 4 shows that the coefficient estimate of the interaction between the real estate assets' value and workers seniority (the parameter θ in our model) is positive, as predicted by the model, and highly significant. Whether we include industry (in Column 1), industry-year fixed effects (Column 4) or firm fixed effects (Columns 2, 3 and 5), we always find that firms incorporated in countries where workers have high seniority in liquidation increase leverage when they experience a positive shock to their real estate valuations compared to an identical firm incorporated in countries where workers rank low. The effect is economically significant as well: a shift from a situation where employees have the lowest seniority (a rank equal to 5) to one where they have the highest seniority (a rank of 1) is associated with an increase in leverage of about 40% of its standard deviation.

The result in the second row of Table 4 shows that the coefficient estimate of the interaction of real estate assets' valuation and workers' wage bargaining power (parameter α in our model) is positive, as predicted by the model, and highly significant in every specification we use.

Finally, the result in the third row shows that the coefficient estimate of the variable that interacts real estate assets' valuation and workers' rights during reorganization (parameter β in our model) is negative, as predicted by the model, but it is significant at the 5% confidence level only in the specification we use in Column 1 where we use industry fixed effects. Its statistical significance gets weaker when we use industry-year fixed effects and firm fixed effects although it remains significant at the 10% confidence level. We also include the interaction between the insurance provided by government to employees of companies in bankruptcy liquidation and real estate valuation. Ignoring the presence of the government-mandated fund may have amplified the importance of workers' priority, and its inclusion gives us comfort about the robustness of the results.

It is important to note that these results, largely consistent with the model in Section 1, are obtained after controlling for various channels that may influence the leverage decision. First, in every specification we control for the traditional firm-level time variant variables that existing literature has found to influence leverage decisions (namely, firm

size, profitability, asset tangibility and market-to-book to proxy for growth opportunities). Any time-invariant firm characteristic is absorbed by the firm fixed effects.

Second, the shock to firm's real estate values can also impact directly the firm's financial capacity and, as a consequence, its indebtedness. Leverage may change because of this channel. In fact we find that the coefficient estimate of real estate valuation is positive, large and statistically significant in every specification. It should be noted, however, that this effect should be present for both types of firms: those incorporated in low workers' rights and high workers' rights countries. Having included the real estate valuation variable in the specification means that the effect that is documented in the first three rows, where we interact workers' rights with real estate valuation, is over and above that of the expansion in financial capacity. Moreover, for greater financial capacity to translate into greater leverage one should also observe larger investments made by the firm: to this purpose, we also control for capital expenditure in all our specifications, and we still find a differential impact between firms incorporated in countries with high employees' seniority vis-à-vis those incorporated in countries with low employees' rights.

Finally, an important channel to consider in our analysis is the impact cross-country characteristics may have on the outcome. One potential concern with a cross-country specification is that there may possibly be country-level characteristics and macroeconomic factors that may be driving both real estate prices and firms' financing choices, in this case leverage. The most likely reason is a demand channel: a positive aggregate demand shock is likely to be accompanied by an increase in real estate prices, providing a stimulus for economic growth to which firms respond by increasing investments. If this increase in investment is financed through borrowing, then we should find an impact on leverage due to omitted variables. For this concern to be relevant for our analysis, the omitted variables have to correlate with workers' rights and drive the differential impact that the real estate price increase has on firm's leverage in countries where workers' rights differ.

Therefore, in each specification in Table 4 we control for unemployment rate and GDP growth, to control for the effect of country-level economic growth may have on both real estate prices and leverage decisions. Furthermore, in the specification with industry-time fixed effects (Column 4) we also include creditor rights.

We further control for country-level unobserved heterogeneity in the specifications shown in Table 5, including either country fixed effects or country-industry fixed effects to check the robustness of the results. We find that three key predictions of the model hold: the coefficient estimate of the interaction of real estate assets' valuation with employee seniority is positive, that of its interaction with workers' wage bargaining power is also positive, and that with workers' rights during reorganization is negative, and all three are statistically significant.

[Insert Table 5]

3.2 Regressions Based on Commodity Prices

We next turn to the analysis that focuses on firms from the extraction and mining industries and on those in the construction industry, and measure the response of their leverage to exogenous shocks to their profitability. We use the price levels of the commodities produced by these firms to instrument the profitability shock. For example, we use oil prices, exogenous to the single oil company, to instrument for the change in firm's profitability which should change the bargaining position vis-à-vis workers. This second strategy is reminiscent of the one used by Bertrand and Mullainathan (2001). Similarly to the first diff-in-diff strategy, this one compares the leverage reaction of two otherwise identical firms in each of these two industries, but incorporated in countries with different levels of workers' rights, following an exogenous shock to their profitability level and the consequent change in the bargaining positions. The results are shown in Table 6.

[Insert Table 6]

The broad results found in Tables 4 and 5 are confirmed in Table 6 where we use different specifications with either firm-level fixed effects or country-level fixed effects. We find that two out of the three predictions made by the model hold: the coefficient estimates of the interaction between real estate assets' valuation and workers seniority is positive, and (b) interacts real estate assets' valuation and workers' wage bargaining power is positive and statistically significant. The coefficient estimate of the variable that interacts the profitability shock and workers' rights during reorganization is negative but significant only in the first specification shown in Column 1. Overall, even if we use one specific industry, and sample smaller than the entire sample (thus reducing the power of

our tests), we find broad agreement with the importance of workers' rights in bankruptcy for the mining firms' leverage decisions.

3.2 Robustness of the Results

We next move on to describe the robustness checks of our results. First, we check whether our results hold when we use different measures of leverage. We find that all our results are not sensitive to whether we use book leverage or market leverage. Second, we use the second measure of the market valuation of firms' real estate: instead of using land assets only we use land and building assets. Recall that the sample of firms for which we can obtain this measure is smaller given data limitations. In general, when we use this second measure we find that results get stronger. Third, larger firms may own real estate assets outside their country of incorporation and thus a bias may be introduced when using the real estate price index in their country of incorporation to find the market valuations of their assets. We thus check the robustness of the results by splitting the sample in small and large firms, using country specific median values of market capitalization. Although we find the documented impact for both groups of firms, we also find that results are stronger for smaller firms. Finally, we also split the sample between firms in high and low labor-intensive industries and find results to be stronger in the former.

4. Conclusions

Existing literature argues and finds evidence that supports the hypothesis that firms use leverage to "take surplus off the bargaining table" in wage negotiations, so that greater workers' bargaining power induces employers to take on more debt and thus moderate their wage demands. However, the literature so far neglects that the strategic value of debt in wage bargaining depends on the seniority of employees' claims relative to other creditors in the liquidation of insolvent firms, as well as on employees' rights in the renegotiation of their employer's debt. In practice, the balance between the rights of workers and those of other creditors varies greatly across countries.

In this paper, we show theoretically and empirically that this balance affects the strategic value of debt, and therefore the predictions regarding the relationship between company leverage and workers' bargaining power, as well as to their wages. Indeed,

depending on worker' rights in liquidation and in debt renegotiation procedures, the relationship between the bargaining power of workers and corporate leverage can even switch sign, which may reconcile some of the conflicting findings reported so far.

To test the models' predictions about the strategic use of debt to counter workers' claims we collect novel data about workers' legal rights during liquidation and reorganization in 30 countries by way of a questionnaire sent to law firms in each country participating in the Lex Mundi project. Importantly, these rights differ from those attributed to employees by legislation on dismissals outside of bankruptcy and widely used in other studies. We find that, as predicted by the model, firms whose workers face greater rights in bankruptcy increase leverage when they experience a positive shock to their real estate valuations. The same result is obtained when we investigate the extraction and mining industries and when the shock is at the firm's profitability level. These results are robust across different measures of leverage and are stronger in labor intensive industries.

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Appendix A

A.1. Derivation of the optimal wage set by the union

When the contractual wage is set by the union, i.e. $w = w_u$, the expected value of the workers' actual income \tilde{w}_u is

$$\begin{aligned} E(\tilde{w}_u) &= \int_{A+\bar{y}}^{\theta w_u} X f(X) dX + \int_{\theta w_u}^{D+\theta w_u} \theta w_u f(X) dX + \int_{D+\theta w_u}^{D+w_u} (X-D) f(X) dX + \int_{D+w_u}^{A+\bar{y}} w_u f(X) dX \\ &= \frac{[A + \bar{y} - (1-\theta)D] w_u}{\sigma} - \frac{w_u + (A + \underline{y})^2}{2\sigma}. \end{aligned}$$

As this expression is increasing and concave in w_u , the optimal value of w_u is given by the first-order condition, which yields expression (1). Substituting w_u^* from (1) in the previous expression yields the maximal value of workers' expected income, i.e. (2).

A.2. Derivation of the expected bankruptcy cost

The firm defaults on creditors and/or workers if the wage is set by the union at w_u^* and $X \in [A + \underline{y}, D + w_u^*)$, and on creditors if the wage is set by the firm and $X \in [A + \underline{y}, D)$.

The expected bankruptcy cost is the product of the default probability and the bankruptcy cost C :

$$E(\tilde{w}_u) = \alpha \int_{A+\bar{y}}^D f(X) dX + (1-\alpha) \int_{A+\bar{y}}^{D+w_u^*} f(X) dX = \left[1 - \frac{(1-\alpha)(A + \bar{y} - D) - \alpha\theta D}{\sigma} \right] C.$$

A.3. Derivation of the debt level \bar{D}

The debt level \bar{D} is defined by the workers' participation constraint (5) taken with equality:

$$\bar{D} = \frac{1}{1-\theta} \left[A + \bar{y} \pm \sqrt{2\sigma w_0 + (A + \underline{y})^2} \right],$$

where we must take the smaller root, since the large one would imply $\bar{D} > \hat{D}$, so that it would violate the workers' participation constraint (5) whenever \hat{D} violates it. This yields expression (7). To show that $\bar{D} > 0$, notice that expression (7) is positive if and only if

$$(A + \bar{y})^2 > 2\sigma w_0 + (A + \underline{y})^2. \quad (\text{A1})$$

Recalling that $\sigma \equiv \bar{y} - \underline{y}$, inequality (A1) can be rewritten as

$$2\sigma \left(\frac{\bar{y} + \underline{y}}{2} + A \right) > 2\sigma w_0,$$

which coincides with our maintained assumption that the firm is viable when it pays workers their reservation wage: $A + (\bar{y} + \underline{y})/2 - w_0 > 0$.

A.4. Proofs of Propositions 1, 2 and 3

Proof of Proposition 1. First, the fact that optimal debt is positive only if $\theta < 1$ is immediate from expression (4) for the firm's value V : with $\theta = 1$, the expected labor cost $E(W)$ no longer depends on D , while the expected bankruptcy cost $E(C)$ is still increasing in D . Hence, it is optimal to set D equal to zero. Then, assuming that $\theta < 1$, we show that:

(i) D^* is increasing in the value of assets A :

$$\frac{\partial \hat{D}}{\partial A} = \frac{1}{(1-\theta)^2} > 0, \quad \frac{\partial \bar{D}}{\partial A} = \frac{1}{1-\theta} \left[1 - \frac{A + \underline{y}}{\sqrt{2\sigma w_0 + (A + \underline{y})^2}} \right] > 0,$$

where the second inequality follows from the observing that the ratio is smaller than 1.

D^* is also increasing in the upper bound of cash flow \bar{y} for given σ , hence in the average cash flow $(\bar{y} + \underline{y})/2$:

$$\frac{\partial \hat{D}}{\partial \bar{y}} = \frac{1}{(1-\theta)^2} > 0, \quad \frac{\partial \bar{D}}{\partial \bar{y}} = \frac{1}{1-\theta} > 0,$$

and is non-decreasing in α :

$$\frac{\partial \hat{D}}{\partial \alpha} = \frac{C}{\alpha^2(1-\theta)^2} > 0, \quad \frac{\partial \bar{D}}{\partial \alpha} = 0.$$

(ii) If $D^* = \hat{D}$, its derivative with respect to the worker's seniority θ is

$$\frac{\partial \hat{D}}{\partial \theta} = \frac{A + \bar{y} + C}{(1 - \theta)^2} - \frac{2}{(1 - \theta)^3} \frac{C}{\alpha} = \frac{A + \bar{y}}{(1 - \theta)^2} - \frac{[2 - \alpha(1 - \theta)]C}{\alpha(1 - \theta)^3},$$

whose sign depends on the bankruptcy cost C : it is positive if $C < \bar{C}$, zero if $C = \bar{C}$, and negative if $C > \bar{C}$, where $\bar{C} = [\alpha(1 - \theta)(A + \bar{y})] / [2 - \alpha(1 - \theta)]$.

(iii) If $D^* = \bar{D}$, its derivative with respect to the worker's seniority θ is positive:

$$\frac{\partial \bar{D}}{\partial \theta} = \frac{\bar{D}}{1 - \theta} > 0,$$

recalling that $\bar{D} > 0$ (see point A.3 above in this Appendix).

Proof of Proposition 2. The response of D^* to an increase in the value of assets A and in the upper bound of cash flow \bar{y} for given σ (hence in the average cash flow $(\bar{y} + \underline{y}) / 2$) is an increasing function of employee seniority θ :

$$\frac{\partial^2 \hat{D}}{\partial A \partial \theta} = \frac{\partial^2 \hat{D}}{\partial \bar{y} \partial \theta} = \frac{1}{(1 - \theta)^2} > 0,$$

and

$$\frac{\partial^2 \bar{D}}{\partial A \partial \theta} = \frac{1}{(1 - \theta)^2} \left[1 - \frac{A + \underline{y}}{\sqrt{2\sigma w_0 + (A + \underline{y})^2}} \right] > 0, \quad \frac{\partial^2 \bar{D}}{\partial \bar{y} \partial \theta} = \frac{1}{(1 - \theta)^2} > 0.$$

Proof of Proposition 3. It is immediate that in expression (9) D^{**} is decreasing in β when it equals the first expression (i.e. the employees' participation constraint is not binding), and is invariant to β when it equals the second (i.e. the employees' participation constraint is binding). To show the additional comparative statics in point (i) of Proposition 3, note that if D^{**} equals the first expression in expression (9), then

$$\frac{\partial^2 D^{**}}{\partial \beta \partial \alpha} = \frac{C}{\alpha^2 (1 - \theta)^2} > 0, \quad \frac{\partial^2 D^{**}}{\partial \beta \partial \theta} = -\frac{2 - \alpha(1 - \theta)}{\alpha^2 (1 - \theta)^2} C < 0.$$

A.5. Derivations of results in Section 1.3

To derive the expected income of employees when the union sets the wage, consider that the government insurance is provided in insolvency region $X \in [A + \underline{y}, D + w_u)$, not in the solvency region $X \in [D + w_u, A + \bar{y}]$:

$$\begin{aligned} \int_{A+\underline{y}}^{D+w_u} \gamma w_u f(X) dX + \int_{D+w_u}^{A+\bar{y}} \gamma w_u f(X) dX &= \gamma w_u \frac{D + w_u - A - \underline{y}}{\sigma} + w_u \frac{A + \bar{y} - D - w_u}{\sigma} \\ &= \frac{w_u}{\sigma} [(1 - \gamma)(A + \bar{y} - D - w_u) + \gamma \sigma], \end{aligned} \quad (A2)$$

which can be rearranged to yield expression (10). Differentiating expression (10) with respect to w_u , one finds the wage $w_u^*(\gamma)$ chosen by the union and shown in expression (11). This is to be compared with the wage $w_u^* = A + \bar{y} - D$ in the absence of insurance (obtained by setting $\theta = 0$ in equation (1)), which would entail an expected income:

$$w_u \frac{A + \bar{y} - D}{\sigma} - \frac{w_u^2}{2\sigma}. \quad (A3)$$

Expressions (A2) and (A3) are equal for $\gamma = \bar{\gamma} \equiv w_u / (2w_u + D - A - \underline{y})$. Hence, only for this choice of γ , government insurance does not affect the workers' expected income; instead, for larger values of γ , it raises it relative to the case of no government insurance.

To derive the optimal debt $\hat{D}(\gamma)$ when the participation constraint of employees does not bind, the first step is to compute the firm's expected labor cost when the union sets the wage $w_u^*(\gamma)$ given by (11). Notice that in this case the firm's expected labor cost generally differs from employees' expected labor income as government insurance creates a wedge between the two (unless $\gamma = \bar{\gamma}$). The firm's expected labor cost is

$$\begin{aligned} E(W) &= \alpha \int_D^{D+w_u^*(\gamma)} (X - D) f(X) dX + w_u^*(\gamma) \int_{D+w_u^*(\gamma)}^{A+\bar{y}} f(X) dX + (1 - \alpha) w_0 \\ &= \alpha \frac{w_u^*(\gamma)}{\sigma} \left[A + \bar{y} - D - \frac{w_u^*(\gamma)}{\sigma} \right] + (1 - \alpha) w_0 \\ &= \alpha \left[\frac{3}{8} \frac{A + \bar{y} - D}{\sigma} \right]^2 + \frac{1}{4} \frac{\gamma}{1 - \gamma} (A + \bar{y} - D) - \frac{1}{8} \left(\frac{\gamma}{1 - \gamma} \right)^2 \sigma + (1 - \alpha) w_0, \end{aligned}$$

where in the last step the wage $w_u^*(\gamma)$ has been replaced by expression (11).

Hence, the firm's value is given by

$$V = A + \underbrace{\frac{\bar{y} + y}{2}}_{E(y)} - \underbrace{\left\{ \alpha \left[\frac{3}{8} \frac{A + \bar{y} - D}{\sigma} \right]^2 + \frac{1}{4} \frac{\gamma}{1 - \gamma} (A + \bar{y} - D) - \frac{1}{8} \left(\frac{\gamma}{1 - \gamma} \right)^2 \sigma + (1 - \alpha) w_0 \right\}}_{E(W)} - \underbrace{\left[1 - \frac{(1 - \alpha)(A + \bar{y} - D) - \alpha \theta D}{\sigma} \right]}_{E(C)} C,$$

whose first-order condition with respect to D yields the optimal debt level $\hat{D}(\gamma)$ in (12).

If instead the employees' participation constraint is binding, the optimal debt level is obtained by computing the expected income of employees in (A2) when the wage w_u is set equal to its optimal level $w_u^*(\gamma)$ and setting the resulting expression equal to the reservation wage w_0 :

$$\frac{w_u^*(\gamma)}{\sigma} \left[(1 - \gamma)(A + \bar{y} - D - w_u^*(\gamma)) + \gamma \sigma \right] = \frac{1}{4\sigma(1 - \gamma)} \left[(1 - \gamma)(A + \bar{y} - D) + \gamma \sigma \right] = w_0,$$

which yields

$$D = A + \bar{y} + \frac{\gamma}{1 - \gamma} \sigma \pm 2 \sqrt{\frac{w_0 \sigma}{1 - \gamma}}.$$

Taking the smaller root (as the larger one would imply a negative wage $w_u^*(\gamma)$) yields expression (13) for the optimal debt $\bar{D}(\gamma)$. Using (13) in the expression for $w_u^*(\gamma)$ given by (11), it turns out that a necessary condition for the participation constraint to hold is

$$w_0 \leq \frac{\sigma}{1 - \gamma}. \quad (\text{A4})$$

If condition (A4) were does not hold, it would be $w_u^*(\gamma) < w_0$; as in bankruptcy employees receive $\gamma w_u^*(\gamma)$ from the government, this would imply that employees are be paid less than their reservation wage in all states. Assumption (A4) is important in the comparative statics of $\bar{D}(\gamma)$, as shown below.

Proof of Proposition 4. First, it is immediate from expression (12) that $\hat{D}(\gamma)$ is increasing in A and \bar{y} , for given σ (and therefore in the average cash flow $(\bar{y} + \underline{y})/2$), increasing in α , and decreasing in C . Finally, it is increasing in γ :

$$\frac{\partial \hat{D}(\gamma)}{\partial \gamma} = \frac{1}{3} \frac{1}{(1-\gamma)^2} \sigma > 0. \quad (\text{A5})$$

It is also immediate from expression (13) that $\bar{D}(\gamma)$ is increasing in A , and invariant to changes in α and in C . Its derivatives with respect to \bar{y} and γ are

$$\frac{\partial \bar{D}(\gamma)}{\partial \bar{y}} = \frac{1}{1-\gamma} \left[1 - \sqrt{\frac{w_0(1-\gamma)}{\sigma}} \right] > 0, \quad \frac{\partial \bar{D}(\gamma)}{\partial \gamma} = \frac{\sigma}{(1-\gamma)^2} \left[1 - \sqrt{\frac{w_0(1-\gamma)}{\sigma}} \right] > 0, \quad (\text{A6})$$

where the positive sign of both derivatives follows from inequality (A4).

Proof of Proposition 5. Recalling that $\sigma \equiv \bar{y} - \underline{y}$ and differentiating the derivative $\partial \hat{D}(\gamma) / \partial \gamma$ in (A5) with respect to \bar{y} yields

$$\frac{\partial^2 \hat{D}(\gamma)}{\partial \gamma \partial \bar{y}} = \frac{1}{3} \frac{1}{(1-\gamma)^2} > 0.$$

Similarly, differentiating the derivative $\partial \bar{D}(\gamma) / \partial \bar{y}$ in (A6) with respect to γ yields:

$$\frac{\partial^2 \bar{D}(\gamma)}{\partial \gamma \partial \bar{y}} = \frac{1}{(1-\gamma)^2} \left[1 - \sqrt{\frac{w_0(1-\gamma)}{\sigma}} \right] + \frac{1}{1-\gamma} \sqrt{\frac{w_0}{\sigma(1-\gamma)}} > 0,$$

where the positive sign follows from inequality (A4).

Appendix B. Questionnaire on Employees' Rights in Bankruptcy Procedures

Consider an employee of a medium or large company, hired with a permanent employment contract, and suppose that the company becomes **insolvent**. Typically this results in one of two types of bankruptcy procedures:

1. **liquidation** of the company's assets;
2. **reorganization** aimed at preserving the company (at least in part) as a going concern.

This questionnaire aims at determining the degree of protection of the employee's claims on the insolvent company in your country under either scenario.

It also aims at elucidating creditors' rights in the choice between liquidation and reorganization.

1. LIQUIDATION

1.1. Which is the **priority in the distribution** of the proceeds from liquidation? Please rank them by assigning a lower number to higher-priority creditors:⁵

Type of creditors	Priority in the distribution	Amount for which priority is valid (write "100%" if priority applies to the entire claim)
Creditors with lien on property (e.g., bank mortgage)		
Administrative expenses incurred by the trustee		
Post-petition credit extended to debtor		
(a) Unpaid wages and salaries and (b) severance pay of employees		
Claims for contributions to employee pension benefit plans		
Income and other taxes due to local or central government		
Unsecured creditors		No priority

⁵ If a claim in one of the first 6 lines is treated on a par with unsecured credit, please write "no priority" in last column.

1.2. Is there a government fund protecting employees' claims if they cannot be repaid fully in bankruptcy?

Type of claim	Does such fund exist?	Is there a limit to the guaranteed amount? (If so, please indicate it.)	If such a fund pays off employees' claims, does it acquire the employees' priority in liquidation?
Unpaid wages and salaries			
Severance pay			
Claims for contributions to employee pension benefit plans			

1.3. Since 1980, have there been considerable changes to the rules regarding the protection of the claims of employees (wages, severance pay and pension benefits) in the liquidation of a bankrupt company? If so, please describe the main ones.

2. REORGANIZATION

2.1. Are there different reorganization procedures for companies in your country? Please list the most widely used ones below, in order of importance:

Name of procedure in your language	English translation (or one-line description)	Date of introduction of the procedure (if after 1980)
(i)		
(ii)		
(iii)		

2.2. Consider the two most common form of reorganization procedures indicated under (i) and (ii) above:

Reorganization procedure:	(i)	(ii)
Can the reorganization plan impair the claims of employees without their consent?		
Under the plan, can employees be dismissed more easily than in normal circumstances? If so, specify how is their protection attenuated.		
Can collective bargaining agreements previously entered into by the debtor be modified by the reorganization plan?		
Must the employees' representatives (e.g. unions) be informed of the plan?		
Must the plan be proposed to employees' representatives (e.g. unions) for approval?		
If there employees do not approve the plan, can it still be carried out if authorized by court (possibly in a modified version)?		

2.3. Since 1980, have there been considerable changes to the rules regarding the protection of the claims of employees (wages, severance pay and pension benefits) in reorganization? If so, please describe the main ones.

3. CHOICE BETWEEN LIQUIDATION AND REORGANIZATION

3.1. Consider again the reorganization procedures described above:

Reorganization procedure:	(i)	(ii)
Which is the fraction of creditors who must agree to the reorganization plan? (Indicate whether it refers to the number of creditors or to the claims' value, and whether the fraction refers to unsecured creditors or to all creditors.)		
If not enough creditors agree to it, can the reorganization plan still be authorized by a court decision?		

3.2. If there been considerable changes to the above rules since 1980, please describe the main ones.

3.3. **In your own professional experience**, how frequently have you observed insolvency by a company ending up with the liquidation of assets (as opposed to reorganization)?

Approximate frequency of liquidation of assets by insolvent companies in your experience	Less than 25%	Between 25% and 50%	Between 50% and 75%	Between 75% and 100%
Please tick relevant box:				

Appendix C. Variable Definitions

Name of the Variable	Definition
Book Leverage	$(\text{Long Term Debt} + \text{Debt in Current Liabilities}) / \text{Total Assets}$
Market Leverage	$(\text{Long Term Debt} + \text{Debt in Current Liabilities}) / (\text{Long Term Debt} + \text{Debt in Current Liabilities} + \text{Market Equity})$
Market-to-Book Ratio	$\text{Market Value of Equity} / \text{Book Value of Common Equity}$
Asset Tangibility Ratio	$\text{Net property, plant and equipment} / \text{lagged total assets}$
Log Total Assets	Natural logarithm of total assets
Return on Assets	$\text{Net income} / \text{total assets}$
Stock Returns	Cumulative stock returns over the previous two years
Stock Returns Variability	Standard deviation of monthly stock returns over the previous five years
Measures of Workers' Rights	
Workers Seniority	The workers' priority in the distribution of the proceeds from liquidation against other creditors. It ranges from 1 to 5, 5 being assigned to a country where workers are senior to all other creditors, and 5 to one where they are junior to all other claims
Government Insurance Fund (Salary)	Equals 1 if there is a government fund protecting employees' claims (unpaid wages and salaries) if they cannot be repaid fully in bankruptcy, 0 otherwise
Impairment of Workers Rights in Reorganization	Equals 0 if the reorganization plan can impair the claims of employees without their consent
Workers' Rights in Reorganization	Based on the following three questions aimed at measuring if workers' collective bargaining agreements can be changed during reorganization: (i) "Can collective bargaining agreements previously entered into by the debtor be modified by the reorganization plan?" (ii) "Must the plan be proposed to employees' representatives (e.g. unions) for approval?" (iii) "If there employees do not approve the plan, can it still be carried out if authorized by court (possibly in a modified version)?" The variable ranges from 0 to 8, where 8 (0) is assigned to a country where it is harder (easier) for collective bargaining agreements to be changed without the consent of workers and where workers will have the right to approve any new plan.
Employment Protection Legislation (EPL)	It ranges from 0 to 6, with 6 indicating the highest level of worker protection. It measures the difficulty with which individual and collective dismissal can be made in each country. Obtained from OECD and other sources.
Unemployment Duration	The share of long-term joblessness of 12 months or more

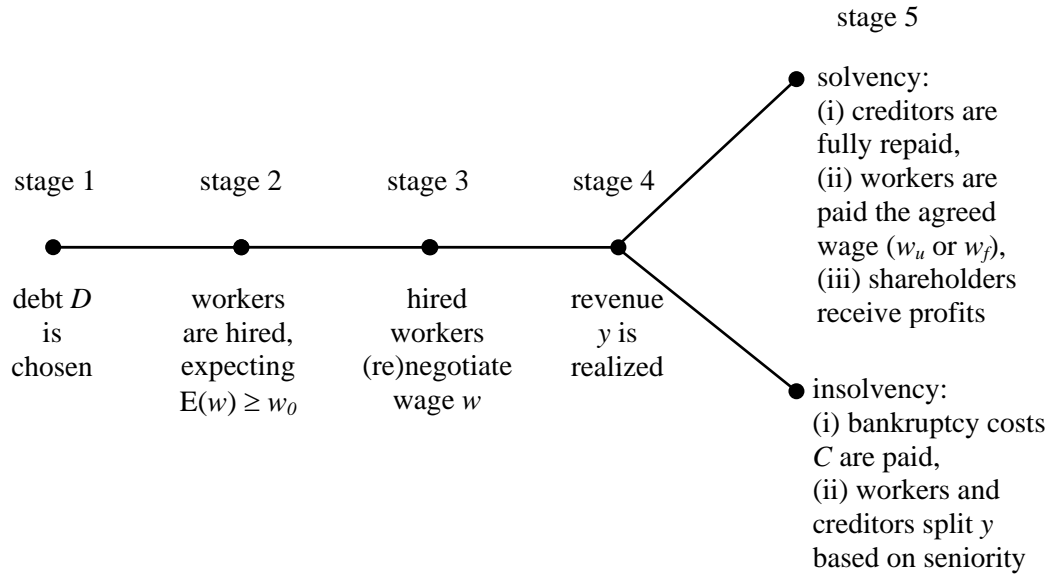


Figure 1. Timing of baseline model

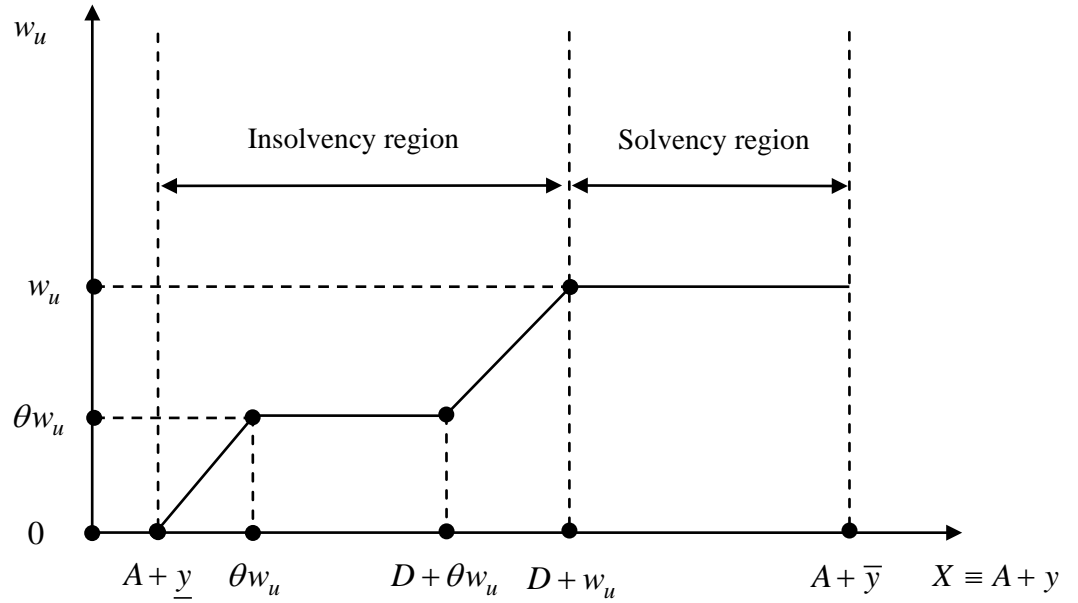


Figure 2. Employees' Payoffs as a Function of the Firm's Asset A and Cash Flow y , with Union-Set Wage w_u and Employee Seniority $\theta \in (0, 1)$

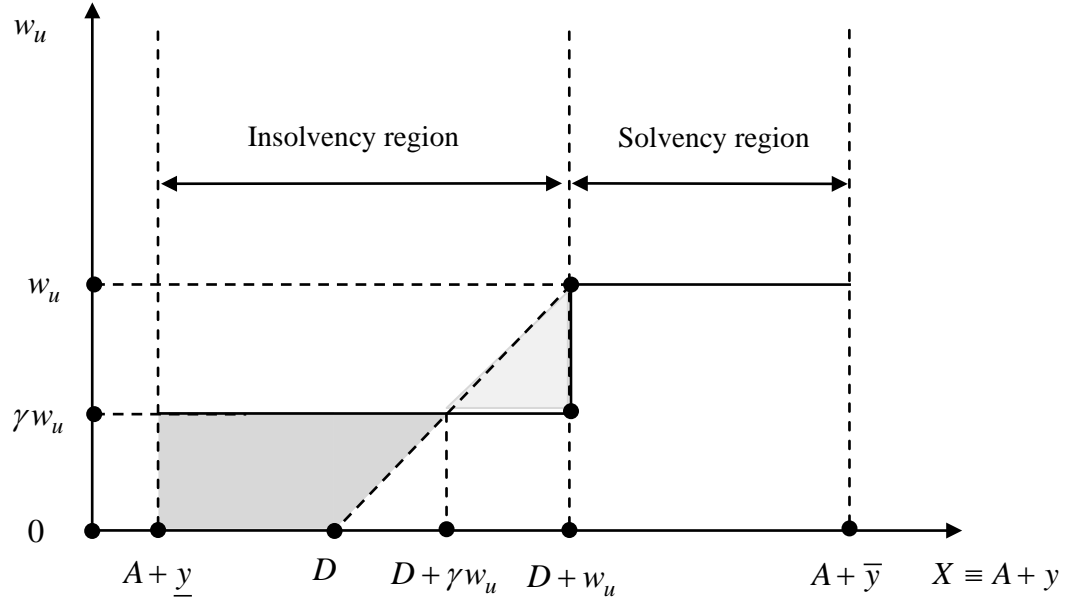


Figure 3. Employees' Payoffs as a Function of the Firm's Asset A and Cash Flow y , with Union-Set Wage w_u , Government Insurance $\gamma \in (0,1)$ and No Employee Seniority $\theta = 0$

Table 1. Descriptive Statistics

The table presents firm-level descriptive statistics of the variables used in the regressions. The sample contains firm-year observations of 12,445 firms incorporated in 28 countries, over the period 1988-2013. Variables are defined in Appendix C.

	No. of Observations	Mean	Median	Standard Deviation	Min. Value	Max. Value
Book Leverage	205,192	0.2456	0.2180	0.2605	0	0.9087
Market Leverage	205,192	0.2683	0.2245	0.2324	0	0.9282
Assets (in \$000,000)	205,192	4,647	345	20,084	2.92	575,244
Sales (in \$000,000)	205,192	3,776	356	12,055	0.23	160,883
Market-toBook Ratio	205,192	1.6418	1.1702	6.1437	0.3751	12.68
Investments	205,192	0.071	0.058	0.046	0.009	0.182
Return on Assets	205,192	0.0442	0.0548	0.1672	-0.151	0.339
PPE Ratio	205,192	0.3640	0.3194	0.2301	0.0072	0.9284
Market Capitalization (in \$000,000)	205,192	4,828	675	14,108	18.70	280,115

Table 2. Country-level Descriptive Statistics

This table shows the country-level descriptive statistics of the main variables that measure employees' rights in bankruptcy (Columns (1) to (5)), the level of employment protection (EPL) given to employees in the course of their employment, union density, unemployment duration and creditors' rights. All variables are described in Appendix C.

	Workers' Seniority	Government Insurance Fund (Salary)	Impairment of Workers' Rights in Reorganization	Workers' Rights in Reorganization	Ease of Renegotiation	Employment Protection Legislation	Union Density	Unemployment Duration	Creditors' Rights
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Argentina	4	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1
Australia	2	1	0	0	6	1.11	34.49	21.67	3
Austria	1	1	0	7	3	2.12	43.68	24.49	3
Belgium	3	1	n.a.	n.a.	n.a.	2.53	52.98	48.88	2
Brazil	5	0	n.a.	n.a.	n.a.	2.75	n.a.	n.a.	1
Canada	3	1	1	8	3	0.75	32.21	9.84	1
Czech Rep.	5	1	1	7	5	1.93	39.72	44.05	3
Denmark	2	1	1	7	8	1.74	75.59	19.26	3
Finland	1	1	1	8	1	2.09	73.73	25.67	1
France	5	1	1	1	8	3.01	10.76	39.8	0
Germany	1	1	1	1	4	2.55	29.29	50.43	3
Greece	3	1	0	5	3	3.26	33.24	44.05	1
Hong Kong	3	1	1	5	3	n.a.	n.a.	n.a.	4
India	4	0	0	0	3	2.77	n.a.	n.a.	2
Ireland	1	1	1	5	5	0.99	49.41	37.52	1
Israel	4	1	1	2	3	1.37	n.a.	27.34	3
Italy	3	1	1	7	5	2.69	38.74	51.41	2
Japan	4	1	1	5	5	1.59	24.45	38.25	2
Mexico	5	0	1	0	5	3.13	18.26	1.62	0
Netherlands	2	1	1	5	6	2.40	25.3	34.99	3
New Zealand	2	0	0	5	3	1.15	38.37	13.16	4
Norway	4	1	1	7	1	2.70	56.48	9.09	2
Poland	4	1	1	7	3	1.53	33.02	41.91	1
South Korea	4	0	0	0	8	2.32	13.1	1.93	3

Spain	3	1	0	3	5	3.16	13.86	29.4	2
Sweden	2	1	1	5	8	2.47	79.9	19.61	1
Switzerland	2	1	1	5	3	1.14	22.86	28.5	1
Turkey	2	1	1	7	3	3.74	14.16	26.52	2
UK	3	1	1	6	6	0.66	37.05	27.67	4
United States	2	0	0	1	4	0.21	15.24	11.42	1

Table 3. Correlation between Measures of Workers' Rights, Employment Protection, and Creditors' Rights

The table presents the correlation between the main variables used in the regressions and that measure employees' rights in bankruptcy, the level of employment protection (EPL) given to employees in the course of their employment, union density, unemployment duration and creditors' rights. All variables are described in Appendix C. P-values are shown in parenthesis.

	Workers' Seniority	Government Insurance Fund (Salary)	Impairment of Workers' Rights in Reorganization	Workers' Rights in Reorganization	Employment Protection Legislation	Union Density	Creditors' Rights	Automatic Stay on Assets
Salary Priority	1							
Government Insurance Fund (Salary)	-0.2521 (0.15)	1						
Impairment of Workers' Rights in Reorganization	0.1109 (0.29)	0.4287 (0.10)	1					
Workers' Rights in Reorganization	-0.3103 (0.14)	0.5097 (0.00)	0.3497 (0.07)	1				
Employment Protection Legislation	0.4112 (0.09)	0.0815 (0.29)	0.0316 (0.46)	-0.1881 (0.16)	1			
Union Density	-0.4508 (0.06)	0.6295 (0.00)	0.3186 (0.12)	0.6299 (0.00)	-0.1008 (0.23)	1		
Creditors' Rights	-0.3134 (0.14)	-0.0197 (0.42)	-0.2868 (0.12)	0.1103 (0.26)	-0.2826 (0.12)	-0.0891 (0.35)	1	
Automatic Stay on Assets	-0.2831 (0.16)	-0.0700 (0.37)	-0.4082 (0.06)	-0.1784 (0.15)	-0.0552 (0.42)	0.0891 (0.36)	0.8546 (0.00)	1

Table 4: Leverage and Workers' Rights in Bankruptcy

This table presents the coefficient estimates of a panel regression for 12,445 firms from 28 countries and controlling for industry/time and firm-level time invariant heterogeneity using industry/time and firm fixed effects. The dependent variable is book leverage defined as long term debt and debt in current liabilities scaled by total assets. In all specifications we use Real Estate Valuation, which is the market price of land owned by each company. The independent variables are defined in Appendix C. T-statistics are reported in parenthesis. Standard errors are clustered at the firm level. Asterisks (*, ** and ***) indicate statistical significance (at the 10%, 5% and 1% level, respectively).

	(1)	(2)	(3)	(4)	(5)
Real Estate Valuation \times Workers' Seniority	0.3066*** (3.23)	0.2775*** (3.04)	0.2315*** (2.86)	0.2287*** (2.67)	0.2002** (2.44)
Real Estate Valuation \times Workers' Bargaining Power	0.1975*** (2.75)	0.1887** (2.39)	0.1604** (2.30)	0.1655** (2.19)	0.1518** (2.00)
Real Estate Valuation \times Workers' Rights in Reorganization	-0.1494** (-2.07)	-0.1314* (-1.94)	-0.1339* (-1.77)	-0.1118 (-1.56)	-0.1007 (-1.44)
Real Estate Valuation \times Government-provided Insurance				0.2101 (0.99)	0.2001 (0.97)
Workers' Seniority				0.0302** (1.77)	
Workers' Bargaining Power	-0.0723*** (-4.22)	-0.0633*** (-3.83)	-0.0554*** (-3.46)	-0.0465*** (-3.01)	-0.0391** (-2.62)
Workers' Rights in Reorganization				-0.0140 (-1.02)	
Real Estate Valuation	0.4030*** (6.25)	0.3499*** (5.33)	0.3037*** (4.55)	0.2531*** (3.73)	0.2109*** (3.06)
Market-to-Book Ratio	Yes	Yes	Yes	Yes	Yes
Total Assets	Yes	Yes	Yes	Yes	Yes
Return on Assets	Yes	Yes	Yes	Yes	Yes
Stock Returns	Yes	Yes	Yes	Yes	Yes
Asset Tangibility	Yes	Yes	Yes	Yes	Yes
Capital Investments	Yes	Yes	Yes	Yes	Yes
Government-provided Insurance	No	No	No	Yes	No
Unemployment Rate	Yes	Yes	Yes	Yes	Yes
GDP Growth	Yes	Yes	Yes	Yes	Yes
Creditor rights	No	No	No	Yes	No
Fixed Effects	Industry	Firm	Firm	Industry-Year	Firm
Year Fixed Effects	Yes	Yes	Yes		Yes
R ²	0.41	0.52	0.54	0.45	0.59
Number of Observations	205,192	205,192	205,192	205,192	205,192

Table 5: Leverage and Workers' Rights in Bankruptcy

This table presents the coefficient estimates of a panel regression for 12,445 firms from 28 countries and controlling for country-level time invariant heterogeneity using country fixed effects. The dependent variable is book leverage defined as long term debt and debt in current liabilities scaled by total assets. In all specifications we use Real Estate Valuation which is the market price of land owned by each company. The independent variables are defined in Appendix C. T-statistics are reported in parenthesis. Standard errors are clustered at the firm level. Asterisks (*, ** and ***) indicate statistical significance (at the 10%, 5% and 1% level, respectively).

	(1)	(2)	(3)	(4)	(5)
Real Estate Valuation \times Workers' Seniority	0.3802*** (5.21)	0.3443*** (4.84)	0.3619*** (4.51)	0.2712*** (4.02)	0.2358*** (3.59)
Real Estate Valuation \times Workers' Bargaining Power	0.2409*** (3.04)	0.2102*** (2.85)	0.2320** (2.59)	0.2019** (2.32)	0.1852** (2.12)
Real Estate Valuation \times Workers' Rights in Reorganization		-0.1697** (-2.45)	-0.1708** (-2.31)	-0.1261** (-2.06)	-0.1328* (-1.89)
Real Estate Valuation \times Government-provided Insurance			0.2603 (1.18)	0.2479 (1.16)	0.2361 (1.13)
Workers' Bargaining Power	-0.0447*** (-2.80)	-0.0309** (-2.53)	-0.0403** (-2.31)	-0.0349*** (-2.09)	-0.0301*** (-2.02)
Real Estate Valuation	0.4443*** (5.57)	0.3889*** (5.05)	0.3905*** (4.57)	0.2861*** (3.98)	0.2404*** (3.46)
Market-to-Book Ratio	Yes	Yes	Yes	Yes	Yes
Total Assets	Yes	Yes	Yes	Yes	Yes
Return on Assets	Yes	Yes	Yes	Yes	Yes
Stock Returns	Yes	Yes	Yes	Yes	Yes
Asset Tangibility	Yes	Yes	Yes	Yes	Yes
Capital Investments	Yes	Yes	Yes	Yes	Yes
Unemployment Rate	Yes	Yes	Yes	Yes	Yes
GDP Growth	Yes	Yes	Yes	Yes	Yes
Creditor Rights	Yes	No	Yes	No	No
Fixed Effects	No	Country	No	Country	Country-Industry
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
R ²	0.34	0.36	0.37	0.40	0.41
Number of Observations	205,192	205,192	205,192	205,192	205,192

Table 6: Leverage and Workers' Rights in Bankruptcy

This table presents the coefficient estimates of a panel regression for 928 firms in the mining and extraction industries and controlling for firm-level and country-level time invariant heterogeneity. The dependent variable is book leverage defined as long term debt and debt in current liabilities scaled by total assets. In all specifications we instrument for Return on Assets (Profitability) by using the market prices of the firm's core commodity. The independent variables are defined in Appendix C. T-statistics are reported in parenthesis. Standard errors are clustered at the firm level. Asterisks (*, ** and ***) indicate statistical significance (at the 10%, 5% and 1% level, respectively).

	(1)	(2)	(3)	(4)
Profitability \times Workers' Seniority	0.1683*** (2.92)	0.1780*** (2.88)	0.1410** (2.45)	0.1291** (2.23)
Profitability \times Workers' Bargaining Power	0.1084** (2.45)	0.1047** (2.29)	0.1011** (2.05)	0.0976* (1.87)
Profitability \times Workers' Rights in Reorganization	-0.0920* (-1.76)	-0.0785 (-1.51)	-0.0751 (-1.29)	-0.0718 (-1.22)
Profitability \times Government-provided Insurance		0.1233 (0.54)	0.1237 (0.56)	0.1240 (0.58)
Workers' Bargaining Power	-0.0397* (-1.93)	-0.0351* (-1.82)	-0.0310* (-1.74)	-0.0275 (-1.61)
Market-to-Book Ratio	Yes	Yes	Yes	Yes
Total Assets	Yes	Yes	Yes	Yes
Profitability	Yes	Yes	Yes	Yes
Stock Returns	Yes	Yes	Yes	Yes
Asset Tangibility	Yes	Yes	Yes	Yes
Capital Investments	Yes	Yes	Yes	Yes
Unemployment Rate	Yes	Yes	Yes	Yes
GDP Growth	Yes	Yes	Yes	Yes
Fixed Effects	Firm	No	Country	Firm
Year Fixed Effects	Yes	Yes	Yes	Yes
R ²	0.28	0.32	0.37	0.48
Number of Observations	14,286	14,286	14,286	14,286