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Risk Sharing within the Firm: A Primer

by

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Abstract

Labor income risk is key to the welfare of most people. This risk is mainly insured "within the firm" and by public institutions, rather than by financial markets. This paper starts by asking why such insurance is provided within the firm, and what determines its boundaries. It identifies four main constraining factors: availability of a public safety net, moral hazard on the employees' side, moral hazard on the firms' side, and workers' wage bargaining power. These factors explain three empirical regularities: (i) family firms provide more employment insurance than nonfamily firms; (ii) the former pay lower real wages, and (iii) firms provide less employment insurance where public unemployment benefits are more generous. The paper also explores the connection between risk sharing and firms' capital structure: greater leverage calls for high wages to compensate employees for greater job risk; nevertheless, firms may want to lever up strategically in order to offset the bargaining power of labor unions. Hence, the distributional conflict between shareholders and workers may limit risk sharing within the firm. By contrast, bondholders and workers are not necessarily in conflict, as both are harmed by firms' risk-taking. In principle, firms may also insure employees against uncertainty about their own talent, but their capacity to do so is constrained by workers' inability to commit to their employer: in the presence of labor market competition, high-talent employees will leave unless paid in line with their high productivity, making uncertainty about talent uninsurable. The paper concludes by showing that risk sharing within firms has declined steadily in the last three decades, and by discussing the financial, competitive, technological and institutional developments that may have conjured this outcome.

Keywords: risk sharing, insurance, unemployment, public safety net, trade unions, implicit contracts, family firms.

JEL codes: D21, D22, D80, G32, G39, H55, J63, J65. M51, M52.

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1. Introduction

The magnitude of labor income risk and the way it is allocated within society are essential factors in social welfare, as wages are the primary source of income for most people, especially the young. At the start of working life, the wealth of the average individual consists almost entirely of human capital, i.e., the present discounted value of labor income; and even at age 55 human capital accounts for 60% to 80% of total wealth, depending on education (Guiso and Sodini, 2013, based on 2007 SCF data).

The risk to human capital – the riskiness of a worker's lifetime compensation – stems not only from the variability of wages but also from the risk of dismissal and subsequent unemployment (Low, Meghir, and Pistaferri, 2010). The losses from unemployment comprise the immediate earnings loss, the costs of job search, and the likely decrease in earnings upon reentry into the workforce (Jacobson, LaLonde, and Sullivan, 1993). This permanent drop in earnings, often called the "scarring effect" of joblessness, may arise from general skill depreciation and loss of match-specific human capital, as well as from the reputational effects, vis-à-vis future employers, of dismissal. Scarring effects are particularly severe when unemployment is due to dismissal[1] but are present even after layoffs due to the employer's failure[2] or, for asset management employees, to a fund liquidation.[3]

Unsurprisingly, job loss entails considerable welfare costs for workers. During periods of unemployment, even when the income drop is temporary, households cut back on spending (Gruber, 1997; Browning and Crossley, 2001) if they face

[1] Gibbons and Katz (1991) noted that workers dismissed on an individual basis should on average be less capable than those fired in a plant closing, because the former are drawn from the bottom tail of the ability distribution and the latter from the whole distribution. Hence individually dismissed workers suffer from a greater loss of reputation. And Gibbons and Katz, using CPS data, find that they earn lower wages and face more protracted joblessness than those losing their jobs in a plant closing. Hallock (2009, pp. 79-81) reviews several other papers that estimate the scarring effects of job loss.

[2] Graham, Kim, Li and Qiu (2019) study how bankruptcies affect the careers of rank-and-file employees, analyzing matched employer-employee panel data from the U.S. Census, and document a persistent 15-percent drop in wages following bankruptcy – most likely reflecting labor market frictions. Other studies focus on managers: Eckbo, Thorburn and Wang (2016) report that only a third of CEOs maintain executive positions after a bankruptcy filing, especially when their firm's previous profitability was below the industry average, and departing CEOs suffer large income and equity losses. Similarly, using Danish administrative data, Nielsen (2017) shows that the personal income of ousted CEOs drops by 35 to 45 percent in the 5 years after dismissal.

[3] In asset management, hedge fund liquidations have significant scarring effects on the employees, but strictly through the reputation-loss channel. Using hand-collected data on 1,948 professionals, Ellul, Pagano and Scognamiglio (2020) find that top managers for funds liquidated after persistently poor relative performance suffer demotion and a significant loss in imputed compensation. When liquidations are preceded by normal relative performance, this scarring effect is absent.

borrowing constraints and hold illiquid assets (Browning and Crossley, 2009). There is also evidence that job loss also compromises the physical and emotional health of displaced workers. For instance, Sullivan and von Wachter (2009) find that, in the year immediately after job loss, high-seniority male workers experience a 50% to 100% increase in mortality hazard compared with similar workers who did not suffer job loss, and even twenty years after displacement, their annual death hazard is 10% to 15% higher. Job loss also triggers an increased probability of depression: using individual panel data, Dooley, Catalano and Wilson (1994) estimate that workers who became unemployed had over twice the risk of increased depressive symptoms and of becoming clinically depressed as those who retained their jobs.

Accordingly, how and how far workers can obtain insurance against human capital risk is an important issue. In practice, this risk is mainly shared "within the firm"; that is, it is borne to some extent by shareholders (and possibly bondholders), as well as being partly assumed by public institutions, which provide a safety net against layoffs via unemployment insurance and other welfare programs,[4] as well as public insurance to employees of insolvent firms,[5] and bail-outs of distressed companies.[6] Financial markets, instead, play at most a strictly limited role in insuring human capital risk, in contrast with their essential role in the reallocation and sharing of risks involving other asset classes.

The customary view of the way risk is shared within the firm is that it rests mainly on the employer, not on employees: entrepreneurs insulate workers from most of the risk stemming from output shocks by guaranteeing a stable income flow. This view dates at least back to Knight (1921): "The system under which the confident and

[4] Topel and Welch (1980) and Topel (1983, 1984) argue that public unemployment insurance reduces both employment risk and the compensating wage differentials associated with such risk. However, according to Low, Meghir, and Pistaferri (2010), the welfare value of U.S. transfer programs such as Food Stamps, which provide partial insurance against income risk, exceed that of unemployment insurance, which provides partial insurance against employment risk. Similarly, Deshpande and Lockwood (2020) show that U.S. disability programs provide valuable insurance against a wide range of risks, including unemployment risk, and the insurance they provide against non-health risks accounts for much of their value.

[5] In several countries, a government-mandated insurance fund secures the claims of employees of insolvent companies, so as to mitigate the cost of bankruptcy to workers by covering unpaid salaries, pension contributions, and/or severance pay, possibly capped at some fraction of the claims, irrespective of the employees' seniority in the bankruptcy process (Ellul and Pagano, 2019).

[6] Especially at times of crisis, governments often rescue large companies to prevent or mitigate the massive layoffs that would otherwise occur. For instance, this motivated the 2009 bailout of General Motors and Chrysler by the U.S. government, as well as the widespread company bailouts effected in many countries in the wake of the COVID-19 pandemic.

venturesome assume the risk and insure the doubtful and timid by guaranteeing to the latter a specified income in return for an assignment of the actual results ... is the enterprise and wage system of industry". The idea is that employees typically get insurance – mainly implicit – from their employers, as the latter bear most of the risk arising from demand and technology shocks, rather than transferring them to workers via changes in wages or employment.

Upon more careful thought, however, this customary view is puzzling both theoretically and empirically. At the theoretical level, it is not obvious that labor income or job risk should be insured by employers rather than by financial markets or intermediaries: what makes employers particularly suited to this task? And even the most casual empirical observation indicates instead that workers bear a very substantial amount of risk stemming from market or technology shocks. Layoffs associated with corporate restructuring or firm liquidation are commonplace. In the past two decades, aggregate shocks such as financial crises, international trade wars and the digital revolution have cost millions of workers their jobs, in many cases permanently eliminating their tasks from the production process. So it is natural to ask whether employers' ability or willingness to "insure the doubtful and timid" has declined over time and, if so, why.

A related question is why there are such large variations in job stability across firms, at any given time. In any given country and period, not all firms appear to be able or willing to provide the same degree of insurance to their employees. In particular, there is solid evidence that family firms feature greater employment stability than nonfamily firms; and the same can be said of business groups compared to standalone firms. Also, highly leveraged firms, being more exposed to financial distress and bankruptcy, tend to place more risk on their employees.

There are substantial differences between countries, too. The availability of government safety net programs is an obvious potential explanation for such international variation. To some extent a public safety net against unemployment risk may displace the provision of insurance by firms: there may be substitution between the two, with firms being more inclined to dismiss workers in countries and historical periods where unemployment benefits are more generous.

Finally, not all human capital risk arises from firm-related shocks, i.e. from market or technological factors: some is worker-related, stemming from uncertainty over a worker's actual skills. In principle, a firm may be able to insure employees also against this risk, as by retaining less capable employees at the cost of rewarding the better ones less. As we shall see, however, competition for talent may limit firms' ability to provide such insurance.

The foregoing suggests that the customary view of risk sharing between firms and employees is a gross oversimplification. As neither the rationale nor the limitations of risk sharing within the firm are obvious, this paper explores both in the context of simple models. First, it asks why firms may be better positioned than financial markets to protect employees from wage or employment risk (Section 2); next, it shows that four main factors limit their ability or willingness to do so: availability of a public safety net, moral hazard on the employees' side, moral hazard on the firms' side, and workers' market power (Section 3).

The predictions of these models provide a guide to the evidence, particularly to the empirical work on the provision of insurance by family vs. nonfamily firms and on the substitutability between firm and public unemployment insurance (Section 4). This analysis naturally leads to a related question, namely what role risk sharing within the firm plays in the choice of corporate leverage (Section 5). Clearly, employment stability requires low leverage, but this may not be optimal if workers have significant power in wage setting: in that case, the firm may want high leverage in order to gain a strategic advantage in wage bargaining. The presence of both workers and creditors as stakeholders also raises the question of whether they should be expected to be in conflict with each other or to ally against shareholders in the choice of leverage. On each of these points, there is rich empirical evidence.

Next, the paper will turn to another risk faced by employees, that stemming from uncertainty about their own ability, and the extent to which firms can insure them against this risk too (Section 6). We shall see that whereas speedier resolution of this type of uncertainty increases risk for employees, it also allows better allocation of workers across tasks, which creates a tension between in-firm insurance and the productivity gains from faster learning. This tension can lead workers to inefficient labor market choices, such as opting for talent-insensitive jobs or churning across employers to delay learning their true skill level.

The overall picture provided by the paper is that the insurance implicitly provided by firms to their employees is constrained by a number of economy-wide factors and affected by several firm characteristics. Thus, it is natural to ask whether and how firms' provision of employment insurance has changed over time, under the impact of changes in the economic environment or in firm characteristics. Section 7 provides some exploratory evidence on this point: it turns out that over the past 25 years, firms have substantially reduced their provision of employment stability, not only in the U.S. but worldwide. Based on the analysis of this paper, I venture several conjectures on why this may have occurred. While I provide some initial evidence about its possible causes, this "fraying of the implicit employment contract", in the words of Hallock (2009), is likely to be the result of several concomitant forces, whose relative importance for the outcome is yet to be determined.

Section 8 concludes the paper, not only by summarizing the main ideas that guide the analysis, but also by outlining some of the issues that call for further research in this area.

2. Why risk sharing within the firm?

The thesis of Knight (1921) that entrepreneurs insulate workers from technology and demand shocks appears to rest on the assumption that entrepreneurs and workers self-select into their respective roles based on their preferences: entrepreneurs are risk-neutral and workers risk-averse, so it is efficient for the former to bear firm-related risk and insure the latter via stable wages. This idea was later formalized in the implicit contract model of Baily (1974) and Azariadis (1975), in which risk-neutral entrepreneurs insure risk-averse workers by insulating their wages and (under more restrictive conditions) jobs from adverse shocks to production, in exchange for a lower average salary. These points can be captured via two simple examples, referring respectively to implicit insurance against wage and employment risk.

2.1. Wage risk

Consider a firm whose revenue, net of non-labor costs, is y_H with probability p and $y_L \in (0, y_H)$ with probability $1-p$. The firm employs a unit-sized mass of workers

with reservation wage $w_0 \geq 0$ and is viable, its expected revenue exceeding the reservation wage: $\bar{y} \equiv py_H + (1-p)y_L > w_0$. Wages can be state-dependent (w_H, w_L), e.g. proportional to revenue. Workers are risk-averse, and their consumption equals their wage, so that their utility is $u(w_s)$ for $s = H, L$. The firm maximizes expected profits $\bar{y} - [pw_H + (1-p)w_L] = \bar{y} - \bar{w}$. If workers exceed the jobs to be filled and act competitively, in equilibrium wages (w_H, w_L) will be bid down to yield the reservation level of expected utility: $pu(w_H) + (1-p)u(w_L) = u(w_0)$.

In other words, in equilibrium the firm must offer wages whose certainty equivalent is the reservation wage. If wages differ across states, the expected wage will exceed its certainty equivalent. Thus $\bar{w} > w_0$, the difference between the two being the risk premium π required by workers as compensation for wage risk: $\bar{w} = w_0 + \pi$. Hence, to maximize expected profit the firm will want to eliminate the risk premium by offering a stable wage $w_H = w_L = w_0$. As workers value wage stability, offering wage insurance allows the firm to lower its labor cost by the premium π.

2.2. Employment risk

In the previous example, the firm has no incentive to shut down, since its revenue, net of non-labor costs, is assumed to be positive in both states. Suppose instead that in the low state the firm's revenue, net of non-labor costs, is negative: $y_L = -f < 0$, due, say, to a fixed operating cost. Hence, as soon as the firm learns that the low state prevails, it would save this cost by going out of business and firing its employees.

To capture workers' sensitivity to employment risk while assuming that they value wage income in a risk-neutral fashion, they are now supposed to suffer a loss *l* from unemployment, reflecting the disutility of job search and the depreciation of their human capital upon dismissal. Public unemployment insurance can offset part of this loss: this is captured by assuming that the loss is $l = (1-\gamma)\bar{l}$, where $\bar{l}$ is the maximal loss and the fraction $\gamma \in [0,1]$ measures the generosity of the public safety net, as gauged, say, by the ratio of unemployment benefits to wage (the "replacement rate").

If the firm does not commit to continue operating also in the low state, it can only

hire workers by pledging an expected wage that exceeds the reservation wage by the expected loss from unemployment, namely $\bar{w} = w_0 + (1-p)l$, where $(1-p)l$ plays the same role as the risk premium π. Hence, its profits are

$$py_H - \bar{w} = py_H - w_0 - (1-p)l \,. \tag{1}$$

If instead the firm were to commit credibly to operate even in the low state, it would lower its expected revenue by $(1-p)f$ but spare its employees the expected loss from unemployment $(1-p)l$, and thus reap a labor cost saving: to hire workers, it must pledge only the average wage $\bar{w} = w_0$, so that its expected profits will be

$$py_H - (1-p)f - w_0 \,. \tag{2}$$

Comparing expected profits without and with protection against employment risk, i.e. expressions (1) and (2), it is immediate that the firm will offer employment stability if and only if $l > f$; that is, if the workers' loss from unemployment exceeds the firm's losses from operating also in the bad state. Intuitively, under this condition, the implicit insurance premium that workers are willing to pay in the form of a wage discount exceeds the cost of providing such insurance, so it is efficient for the firm to offer job stability.

As public unemployment insurance reduces workers' loss *l*, the more generous its coverage γ, the less inclined firms are to shield employees from job loss: the condition $(1-\gamma)\bar{l} > f$ becomes harder to meet. Hence, there should be substitutability between private and public unemployment insurance. In what follows this prediction resurfaces also in other models, and is shown to be corroborated by the evidence (Section 4.3).

2.3. The role of financial markets

The idea that insurance should be provided within the firm rather than via financial markets is anything but self-evident. In a competitive and frictionless economy with complete markets, technology and demand shocks affecting the marginal revenue product of labor would be fully reflected in the equilibrium wages of workers. Irrespective of the magnitude of the resulting risk, workers would not need to get insurance from their employers in the form of stable wages: if the risk can be diversified or hedged, workers can do so via financial markets by appropriate saving

and portfolio choices. And this does actually happen, to some extent: insofar as workers can engage in precautionary saving or get consumer credit from banks and credit card companies to smooth unanticipated income losses (as when dismissed), they are able to hedge labor income risk.

Nevertheless, empirically labor income fluctuates less than firms' revenue (more on this below), so that firms do appear to insulate employees partially from shocks. What may explain this observation? The most likely reason is that financial markets are not complete, because human capital is not tradable: workers cannot issue and sell claims to their labor income in each state, as firms can do by selling shares, bonds and other financial instruments. This is what was implicitly assumed in the wage insurance example of Section 2.1.1, where workers are taken simply to consume their wage income and thus do not have recourse either to precautionary saving or to credit or insurance markets. In the employment insurance example of Section 2.1.2 as well, workers are implicitly assumed to be unable to hedge the unemployment loss l via financial markets.

The prime constraint on workers' access to financial markets to hedge their labor income risk consists in informational issues and transaction costs. For a bank or an insurance company, it is hard to monitor whether employees are working hard to keep their jobs or find new ones when unemployed. Debt overhang tends to intensify this moral hazard: workers who obtain large loans have little incentive to work hard or to seek new jobs so as to repay the loan, and potential lenders are accordingly unlikely to grant them credit. This problem can be compounded by loan enforcement costs: recovering defaulted loans from workers may be very costly or impossible when the latter have little or no liquid assets, especially if they are protected by bankruptcy exemptions (Gropp, Scholz and White, 1997).

These informational and enforcement issues are less significant (though not, as we shall see, totally absent) within the firm. Suppose that the marginal revenue product of a worker's labor declines, owing say to a temporary fall in the price of the firm's product or a rise in the cost of some other input. If the firm retains its workforce and keeps paying the same wage, it is implicitly lending to its employees resources equal to the resulting shortfall, expecting to recoup them from future increases of their marginal revenue product above the wage. Hence, the firm's profits become more volatile owing to the provision of insurance to workers, and its equity becomes

correspondingly riskier because of the operating leverage due to the fixed wage commitment.

A firm's ability to provide such insurance is clearly greatest when its risk is idiosyncratic and therefore diversifiable via financial markets: a firm's idiosyncratic risk should not be priced by the stock market, so a firm that insures its employees against such risk (and absorbs it via profit fluctuations) should not be penalized by a higher cost of equity than a firm that does not. Hence, the assumption that entrepreneurs are risk-neutral, as in Knight (1921), is unnecessary. Insofar as firms' risk is diversifiable, even risk-averse investors will behave "as if" they were risk-neutral in pricing it and impose no penalty on firms that offload the labor market risk assumed from workers in capital markets. Moreover, some firms can offer insurance to their employees against diversifiable risk because they are intrinsically diversified across product lines or even industries: this applies especially to business groups, which can reallocate employees in response to product or industry specific shocks by exploiting their internal labor markets (Tate and Young, 2014; Giroud and Mueller, 2015; Cestone, Fumagalli, Kramarz and Pica, 2017; Faccio and O'Brien, 2018).

In principle, firms may also offer employees insurance against aggregate, i.e. non-diversifiable, risk. This would heighten the systematic risk of firms' equity, hence their equilibrium cost of capital. Danthine and Donaldson (2002) present a model where workers cannot invest in financial markets and investors are endowed with wealth but not with productive labor time, and analyze how firms' insurance of workers against systematic risk impacts the equity risk premium. Berk and Walden (2013) study this issue in a model with two types of employees: inflexible, tied to a given firm; and flexible, mobile across firms. They show that in equilibrium flexible workers end up earning their marginal product and investing in financial markets, while the inflexible obtain a lifetime contract whose wage equals their Pareto optimal equilibrium allocation in all future states. Hence, even if these workers could hedge risk with financial assets, in equilibrium they would not want to do so, as they already receive their complete markets allocation via their wage. Since in some states the wages of inflexible employees exceed productivity, firms must hold capital to cover the resulting losses and must credibly commit to keep operating even in those states, drawing down capital to make up for the shortfall, exactly as they do in the example of Section 2.2 if they commit to keep operating in the low state.

Thus, even in the presence of systematic risk, the labor market allows for trading of human capital risk. How much systematic risk is actually absorbed by investors rather than by workers is an interesting empirical question. Rettl, Stomper and Zechner (2019) use data about firms in electricity generation to analyze the effects of industry shocks on the stability of firms' total employment and wages, as well as that of their payouts to shareholders, and find that exogenous variation in firms' exposure to aggregate risk does not affect wage stability, but does compromise payout stability to shareholders. The exogenous variation is based on differences in the flexibility with which a firm's competitors respond to industry-level demand shocks. Similarly, Ellul, Pagano and Schivardi (2018) document that firms (especially family firms) offer employment insurance to their workers against industry-level sales shocks, absorbing them via changes in their profits, dividends and cash reserves (see Section 4.1).

The idea that investors bear more systematic risk than workers is also consistent with evidence that equity is more volatile than total wealth, and human capital less volatile (Lustig, Van Nieuwerburgh and Verdelhan, 2013). It also squares with evidence that the operating profits of firms with a high labor share are more sensitive to economic shocks and that these firms have higher expected returns than others, due to the greater operating leverage arising from their larger fixed wage commitments (Donangelo, Gourio, Kehrig and Palacios, 2019).

3. What limits risk sharing within the firm?

We have seen why firms may want to provide wage or employment insurance, but in practice one often sees distressed firms laying off workers or imposing wage cuts, even in response to purely firm-specific shocks. Massive layoffs also occur, when entire industries or countries are hit by shocks, such as financial crises or shifts in international trade, i.e. when aggregate risk materializes. Hence, there would appear to be a number of factors that constrain – sometimes severely – firms' ability or willingness to provide insurance. One, already highlighted in Section 2, is the availability of public unemployment insurance. This section analyzes other three factors that may limit risk sharing within the firm: (i) moral hazard on the part of workers, (ii) moral hazard by firms, and (iii) market power of workers in wage setting.

3. 1. Worker moral hazard

Moral hazard on the part of workers limits the firm's ability to protect them against wage and employment risk. As the principal-agent literature makes clear, preserving the incentive to exert effort requires that the agent's reward vary with performance; this incentive is obviously not compatible with workers' being entirely shielded from wage risk (Shavell, 1979) and is lessened if they are protected from unemployment risk (Shapiro and Stiglitz, 1984), as is discussed in the next two subsections.

3.1.1. Wage risk

Consider again the setting of Section 2.1, where workers are risk-averse, but now suppose that they can affect the probability of the high-revenue state by exerting some unobservable effort at a private cost *c*: if they exert the effort, the probability of the high state rises from *p* to $p+\Delta \leq 1$. Effort is efficient, as it generates an expected revenue gain greater than the cost, i.e. $\Delta(y_H - y_L) > c$, hence a surplus to be shared between the firm and its employees. But for workers to exert effort, their incentive compatibility constraint must be met:

$$u(w_H) - u(w_L) \geq c / \Delta . \qquad (3)$$

Hence, to elicit effort the firm must make pay "performance-sensitive", compensating employees more in the high than in the low state. Interestingly, the range of variation of this performance-sensitive salary, $w_H - w_L$, is increasing in c/Δ, i.e. the ratio between the cost of the effort and the resulting increase in the probability of the high state, which can be seen as a measure of the severity of moral hazard. In other words, the more severe the incentive problem is, the more risk the firm has to pass to its employees rather than insure.

3.1.2. Employment risk

Moral hazard also limits the extent to which firms protect workers from job loss. To see why, consider risk-neutral workers who incur a loss *l* when fired, as in Section 2.2, but may increase the probability of the high state by Δ by exerting costly effort, as in the previous subsection. Moreover, assume limited worker liability, so wages

cannot be negative. If firms shut down and fire employees in the low state to save the cost *f*, their payment $w_L \geq 0$ to workers takes the form of severance pay.

In this case, workers' incentives differ depending on whether or not firms provide employment stability. Intuitively, if they do, they must rely solely on performance-based pay to elicit effort from their employees; while if they do not, workers will exert effort also out of the fear of unemployment.[7] However, the risk of unemployment is not always a cost-effective discipline device from the standpoint of firms: it enables firms to incentivize employees more cheaply if the loss l from unemployment is not too large; but if the loss l is large enough, it prompts workers to require a compensation for unemployment risk that raises firms' labor cost. Hence, firms will want to provide insurance against employment risk if (and only if) workers' loss l from unemployment is sufficiently high. To show this, consider first the case where firms do not provide employment stability and then the case where they do.

No employment stability. When employment is risky, workers' expected utility is $(p+\Delta)w_H + (1-p-\Delta)(w_L - l) - c$ if they exert effort and $pw_H + (1-p)(w_L - l)$ if they do not. Hence their incentive constraint is

$$w_H - w_L \geq \max(c/\Delta - l, 0)\,. \tag{4}$$

To elicit effort at the lowest cost, the wages w_H and w_L should be set so as to make this constraint binding, i.e. $w_H - w_L = \max(c/\Delta - l, 0)$. Hence the loss l from unemployment reduces the variation of wages across states that is required to elicit effort from workers: this variation is maximal (c/Δ) for $l = 0$, and decreases to zero for $l = c/\Delta$. Wages must also satisfy the workers' participation constraint, namely:

$$(p+\Delta)w_H + (1-p-\Delta)(w_L - l) \geq c\,, \tag{5}$$

[7] Lushner, Schnorr and Taylor (2020) document that workers exert less effort when faced with a reduced loss from unemployment, due to increased generosity of unemployment insurance. They match changes in the duration of unemployment insurance benefits between December 2008 and February 2011 to scanner data for individual supermarket cashiers, and find that cashiers who experienced increased benefit duration took significantly longer to complete customer transactions. Moreover, they find that a measure of shirking based on self-reported data from the American Time Use Survey is significantly and positively associated with the duration of unemployment benefits duration between 2003 and 2014, suggesting that the response of workers' effort to these benefit changes is not limited to the sample of cashiers.

where for simplicity the reservation wage is set at zero ($w_0 = 0$). If workers exceed the number of available jobs and behave competitively, firms will minimize their labor costs by setting wages so as to make workers' participation constraint (5) binding. However, firms must also take a third constraint into account, namely that the low-state wage cannot be negative, i.e. $w_L \geq 0$: limited liability implies that workers cannot be penalized with negative wages.

Wages in the two states depend on the interplay between the incentive constraint (4), the participation constraint (5) and the non-negativity constraint $w_L \geq 0$: which of them binds depends on the loss *l* from unemployment. Three situations can arise, as shown in Figure 1:

(a) If $l < pc/\Delta$, i.e. if the loss from unemployment is low compared with the severity of moral hazard, the participation constraint (5) is slack: if it held with equality, it would imply $w_L < 0$. Hence in this interval only the incentive constraint (4) and the non-negativity constraint are binding, and the wages are

$$w_L = 0, \quad w_H = \frac{c}{\Delta} - l, \tag{6a}$$

Intuitively, in this interval the loss from unemployment is too small to spur workers to exert effort: it must be supplemented by performance-based pay. This, combining with limited liability, enables workers to obtain a "rent": their expected utility exceeds the reservation level by $pc/\Delta - l > 0$. This rent decreases as the loss *l* increases, and drops to zero for $l = pc/\Delta$.

(b) In the intermediate region where $l \in (pc/\Delta, c/\Delta)$, both the incentive constraint (4) and the participation constraint (5) bind, so that the wages are

$$w_L = l - \frac{pc}{\Delta}, \quad w_H = (1-p)\frac{c}{\Delta}. \tag{6b}$$

As shown in Figure 1, in this interval w_L (the dashed line) rises from zero to w_H (the solid line) as *l* rises. Intuitively, here workers obtain no rent, and thus must be compensated with an increasing low-state wage as the potential loss from unemployment increases. The difference between the wages paid in the two states shrinks further, as the increasing loss from unemployment keeps workers' incentives in check.

(c) In the top region where $l \geq c/\Delta$, by condition (4) the wage is the same in both states (the dashed and the solid lines coincide): the fear of unemployment alone is large enough to elicit effort, so that performance-based pay is redundant. This condition, jointly with the binding participation constraint (5), yields

$$w_L = w_H = (1-p-\Delta)l + c\,, \qquad (6c)$$

i.e., in this region the wage equals the expected loss from unemployment plus the cost of effort.

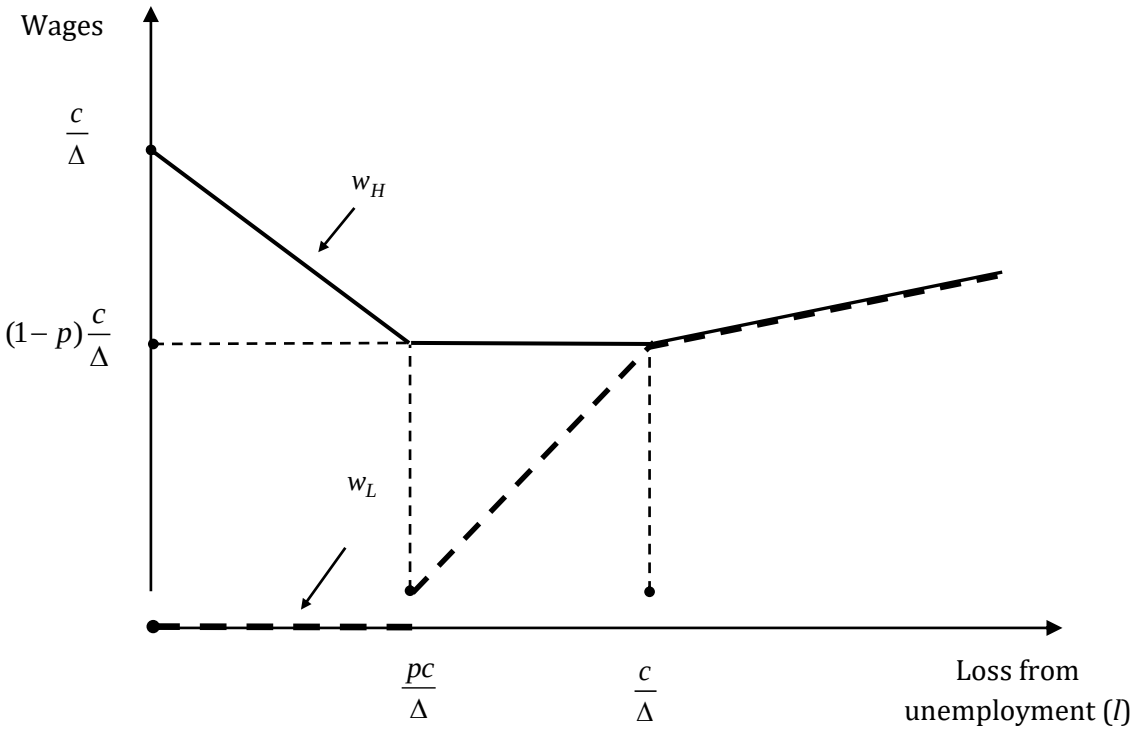

Figure 1. Wages and loss from unemployment with worker moral hazard

Employment stability. If instead firms guarantee stable jobs, workers do not bear any loss from unemployment, so that the corresponding wages are obtained simply by setting $l = 0$ in expression (6a):

$$w_L' = 0, \quad w_H' = c/\Delta\,. \qquad (6a')$$

Hence, when workers are protected from employment risk, they obtain the maximal rent $pc/\Delta > 0$, as moral hazard is countered only by performance-based pay.

Not surprisingly, the firms' decision to provide employment stability also depends on the size of the loss from unemployment. In region (a), where $l < pc/\Delta$, i.e. the loss from unemployment is lowest, firms will not protect workers from employment risk, for two reasons. First, this enables them to save $(p+\Delta)l$ in expected labor costs, because the fear of unemployment reduces the rents to be paid to incentivize workers: if firms do not stabilize employment, their expected labor cost is $(p+\Delta)(c/\Delta - l)$, based on the wages in (6a), while if they do, it would rise to $(p+\Delta)c/\Delta$, based on the wages in (6a′). Second, when they do not guarantee job stability, firms are free to shut down in the low state, thus avoiding expected losses $(1-p-\Delta)f$ from non-labor costs. Hence, in total they increase expected profits by $(p+\Delta)l + (1-p-\Delta)f$.

Instead, in regions (b) and (c), where $l \geq pc/\Delta$, the loss from unemployment is large enough that firms must trade off the beneficial incentive effect of employment risk with the additional compensation that it entails. Using expressions (6b) or (6c) for wages, one finds that expected labor costs are $c + (1-p-\Delta)l$ for firms that do not provide employment stability, to be compared with $(p+\Delta)c/\Delta$ for firms that do. Recalling that by not guaranteeing job stability firms also avoid losses f in the low state, protecting workers from unemployment raises expected profits if and only if

$$\frac{pc}{\Delta} < (1-p-\Delta)(l-f). \qquad (7)$$

This condition is intuitive: guaranteeing steady jobs is worthwhile if the rent pc/Δ paid to elicit employee effort only via performance-based pay is less than the expected wage increase $(1-p-\Delta)l$ required to compensate workers for unemployment risk, net of the expected loss from operating in the low state, $(1-p-\Delta)f$. So firms offer employment protection if worker moral hazard is not too severe (c/Δ not too large) and/or the loss from unemployment is sufficiently great (l large enough). And if they do provide job stability, firms make wages more variable to motivate employees.

Hence, moral hazard decreases the firm's willingness to offer job stability: condition (7) is tighter than the condition $l > f$ that applies in the model of Section 2.2, where there is no moral hazard. With moral hazard, firms provide employment stability only if the resulting wage discount exceeds not only the cost f of operating in

loss-making states but also the rents needed to incentivize employees without the threat of unemployment. Insofar as public unemployment insurance γ reduces the loss l from unemployment, it also reduces firms' willingness to insure workers. Hence, both more severe worker moral hazard (higher c) and more generous public unemployment insurance (higher γ) tend to deter firms from providing employment stability. This is illustrated by Figure 2, which plots in (c,γ) space the firm's indifference condition between providing and not providing employment stability:

$$c^* = \frac{\Delta(1-p-\Delta)}{p}\left[(1-\gamma)\bar{l} - f\right]. \qquad (8)$$

Firms will not guarantee stable jobs if the effort cost c exceeds the threshold c^* in expression (8), i.e. in the region above the indifference locus in Figure 2, where moral hazard is too severe (high c) and/or public unemployment insurance is too generous (high γ), so that the loss from unemployment l is small. Conversely, the firm will commit to stable employment in the region below the locus ($c < c^*$), where there is little moral hazard and/or limited public unemployment coverage.

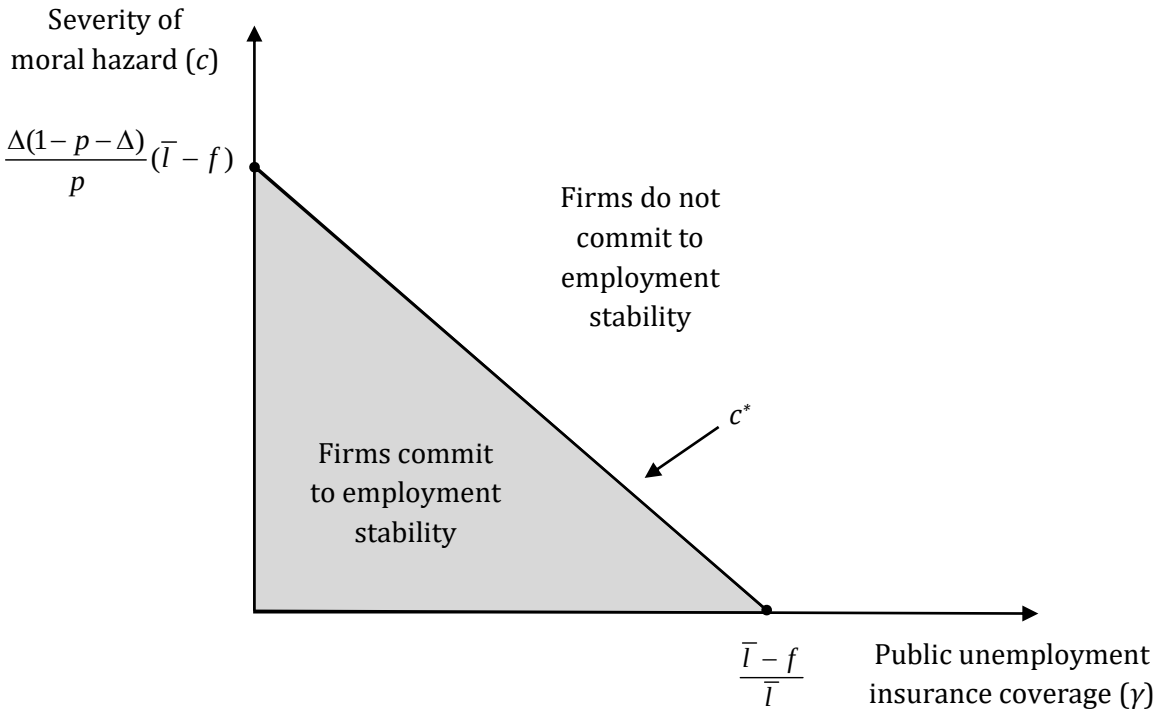

Figure 2. Firms' commitment to employment stability, worker moral hazard and public unemployment insurance

This model implies two interesting empirical predictions. First, firms facing lower moral hazard – such as, arguably, family firms owing to the proximity between entrepreneur and employees – should offer implicit insurance against employment risk, but with greater wage variability. Second, even firms facing severe moral hazard (high c) are likely to offer employment stability if the government offers little unemployment insurance (low γ). Hence, as noted at the end of Section 2.2, one should observe substitutability between private and public unemployment insurance: in Figure 2, this substitutability is highlighted by the negative slope of the indifference locus. As we shall see in Section 4, both of these predictions are consistent with the empirical evidence.

3.2. Firm moral hazard

The provision of wage and employment insurance may also be hindered by moral hazard on the part of the firm. Even if it pledges a fixed wage, the firm has an interest in renegotiating it in states where it makes losses, and these states are more likely if the firm makes risky investments. In this respect, the firm has an interest in risk-shifting vis-à-vis employees, just as it does vis-à-vis creditors, who also have a claim to a fixed payment. Shareholders' interest lies, where this is possible, in risky investment projects whose upside margin benefits them and whose downside risk is borne by workers and creditors; by the same token, they have little incentive for costly actions to limit downside risk, as by stepped-up plant maintenance or strict risk management.

The firm's commitment problem is even more evident when it comes to providing job stability, because this is an "implicit contract", while wage claims are based on legally binding agreements, i.e. explicit labor contracts. When firms make losses (as in the low state in Section 3.1.2), they have the option of cutting back operations or even shutting down altogether. As Berk and Walden (2013, p. 18) note, if they are to provide employment stability, firms must "choose to give up this option – they commit to continue to pay wages even when, *ex post*, the value maximizing decision would be to shut down and pay out the remaining capital to equity holders."

How can firms commit to such a policy, which is clearly sub-optimal ex-post? Absent a legally binding agreement, whatever trust employees can have in the firm's provision of job stability must rest on reputational mechanisms. And in fact there are cases in which reputation can support such a commitment. As we shall see (Section 4.1), in family firms the owner's reputation with employees is at stake, whereas in nonfamily firms the decision to honor any implicit commitments is up to managers whose time horizon is short due to rapid turnover. Not only control but also ownership is more stable in family than in nonfamily firms, especially listed corporations, whose controlling shareholders can divest readily and who may also be exposed to the risk of losing control to hostile corporate raiders, as argued by Shleifer and Summers (1988).[8]

Complementary commitment mechanisms may be instituted by law and social norms. In particular, employment protection legislation (EPL) generally limits firms' ability to dismiss workers, to varying extent in different countries, and trade unions can also fight against layoffs and plant closures, possibly by lobbying government to intervene and pressure firms. Hence, the firing costs created by labor law and social pressure can force firms to honor their implicit commitment to job stability in the face of adverse shocks, although these constraints become ineffective if a firm shuts down entire plants or ceases operations altogether. Labor participation in firm governance is another mechanism for enforcing implicit insurance contracts for employees: using German establishment-level data, Kim, Maug and Schneider (2018) show that skilled employees in firms with 50% labor representation on boards are protected against layoffs during adverse industry shocks, and pay an insurance premium of 3.3% in the form of lower wages, while unskilled blue-collar workers are not protected.[9]

Moreover, even firms that manage to keep employment stable via "labor hoarding" when shocks are temporary may be unable to do so in the face of a permanent shock, such as the entry of low-cost competitors or an innovation that makes their product or production technology obsolete. In these cases, protecting existing jobs may result in bankruptcy – clearly a self-defeating policy. The hypothesis that firms are more likely

[8] Shleifer and Summers (1988) argue that a corporate raider may be attracted precisely by the short-run gain from breaching these implicit contracts, for example by firing workers when sales diminish or cutting wages once employees' investment in firm-specific human capital is sunk.

[9] This is reminiscent of Berk and Walden (2013), if one takes white-collar employees as "inflexible" workers due to their firm-specific human capital and blue-collar workers as "flexible".

to offer insurance against transitory than persistent shocks, formalized by Gamber (1988), has been tested in several papers. Guiso, Pistaferri, and Schivardi (2005) show that the earnings of Italian workers are insured fully against transitory shocks to the firm's value added and only partially against permanent shocks. Similar evidence is reported by Cardoso and Portela (2009) for Portugal, by Kátai (2008) for Hungary, and Guertzgen (2014) for Germany; Guiso and Pistaferri (2020) review the empirical literature on wage insurance within the firm. Ellul et al. (2018) instead test whether firms offer greater employment stability under transitory than under persistent shocks, and find that in fact they do, using an international firm-level panel dataset.

3.3. Workers' bargaining power

Another reason why firms may not want to offer insurance to employees is that this reinforces the latter's power in wage negotiations, enabling them to extract quasi-rents from their employer. The logic is akin to that set out in the moral hazard model of Section 3.1.2, where insurance against unemployment risk may increase the rents that the employer must offer to elicit effort. Here we shall see that insurance provision may have the same effect even in the absence of incentive problems, if workers have bargaining power: intuitively, protecting workers against the risk of job loss should make them more aggressive in their wage demands and thus lower profitability.

However, firms may still be willing to provide employment insurance if workers' bargaining power is not too strong, because workers do value such insurance and accept lower wages in exchange for it. This naturally requires that firms too have some bargaining power in wage negotiations. If this is the case, then insurance provision may still result in an increase in the firm's profits, on balance. But this will not apply if workers already have sufficiently generous public unemployment benefits, undercutting their valuation of employment protection by the firm, which will accordingly gain from not providing it. Hence, empirically one should observe firms providing employment stability only in labor markets where trade unions are not too strong and public unemployment insurance is not too generous.

To illustrate these points requires a few changes in the assumptions of the model of Section 2.2, where workers are risk-neutral but face a loss l if they are fired. First, wages are assumed to be set via bilateral bargaining between the firm and a union that

maximizes the workers' expected wage less their expected loss from unemployment. Wage bargaining is formalized via the random proposer model of Binmore (1987): the union and the firm make take-it-or-leave-it offers with frequency α and $1-\alpha$, respectively, so that the wage w is set at the union's preferred level with frequency α and at the firm's preferred level with frequency $1-\alpha$, where α can be thought of as the union's bargaining power. Naturally, the wage set cannot be less than the reservation wage w_0, or workers would not take the job.

Second, the contractual wage is fixed, not contingent on the firm's revenue y_s: apart from being realistic, this assumption is natural if the firm's revenue is not observed by the union: the firm would have the incentive to lie and always report the low state if wages were indexed to revenue.

Third, to make the analysis interesting, the firm's revenue is assumed to take one of three, not two, possible values: low $y_L < w_0$ with probability p_L, medium $y_M \in (w_0, y_H)$ with probability p_M and high y_H with probability p_H. In the medium state, revenue exceeds the workers' reservation wage, and in the low state it falls short of it, so that the firm makes losses and thus has the incentive to shut down. The distribution is assumed to be unimodal and symmetric, i.e. $p_M \geq p_L = p_H$.

The time line is as follows. At $t=1$, the firm announces whether it commits to offer employment insurance or not: if it does, it will operate and retain workers also in states where it makes losses; if it does not, it will shut down and fire workers in these states (although it is assumed to keep operating in the borderline case of zero profits).[10] At $t=2$, firm and union bargain over the wage according to the random proposer protocol, i.e. either one of them is randomly drawn to make a take-it-or-leave-it offer as described above. Finally, at $t=3$ the firm learns what revenue y_s it can generate, where $s=L,M,H$ with the probabilities defined above. If it has not committed to provide employment insurance, then it shuts down in states in which it would make losses; otherwise, it produces, pays the contractual wage, and distributes

[10] As argued in Section 3.2, the firm will have the incentive to violate such commitment to employment stability in the states where it entails losses: here it is assumed that reputational concerns prevent such opportunistic behavior. In these states, to honor its commitment the firm must sell assets and write off equity or else incur debt. However, it must at least break even in expected value, on the assumption that over the long run its profits are on average at least sufficient to cover its occasional losses.

profits, if any, to shareholders. To understand when the firm does not offer job stability and when it does, let us consider these two scenarios in what follows.

No employment stability. If the firm does not guarantee job stability, at $t=3$ it shuts down in loss-making states, where $y_s < w$. Anticipating this, if at $t=2$ the union makes the take-it-or-leave-it offer, it must weigh any expected wage gain against the implied increase in unemployment risk. As the wage cannot be less than the reservation level w_0, the union-set wage must exceed y_L (by assumption lower than the reservation wage), so that in the low state the firm will shut down. Since in the middle state the firm earns zero profits for $w \in [w_0, y_M]$, in this wage range the expected loss from unemployment stays constant at $p_L l$. Then for higher wages $w \in (y_M, y_H]$ it jumps to $(p_L + p_M)l$, and for even higher wages $w > y_H$ it jumps further again to l, as the firm shuts down in all states. Given this stepwise pattern of the expected loss from unemployment, the only wage levels among which the union can choose are y_M and y_H, respectively associated with unemployment probabilities p_L and $p_L + p_M$. Denoting by $\Pr(a)$ the probability that the firm is active, the workers' expected payoff in the two cases is

$$\Pr(a)w - [1-\Pr(a)]l = \begin{cases} (p_M + p_H)y_M - p_L l & \text{if } w = y_M, \\ p_H y_H - (p_L + p_M)l & \text{if } w = y_H. \end{cases} \tag{9}$$

In this situation, the fear of unemployment pushes workers to moderate their wage demands, as they expect to gain more by setting the lower wage y_M than the higher one y_H. This gives them a higher expected payoff, the difference between the expression in the second line and that in the first line of (9) being negative.[11]

Hence, when the firm offers no employment insurance, the union sets the wage at the level y_M, and the firm earns profits only in the top state. Its expected profit is

$$E(\Pi_{NI}^U) = p_H(y_H - y_M), \tag{10}$$

[11] This difference is $[p_H(y_H - y_M) - p_M y_M] - p_M l < 0$. To prove that this expression is negative, notice that the expected wage gain (the term in square brackets) is at most zero, since what workers can expect to gain in the top state by picking the higher wage never exceeds what they can expect to lose from shutdown in the middle state, due to the symmetry of the distribution: this can be easily shown graphically by plotting the density function of the revenue y_s. In addition, if workers were to pick the higher wage, in the middle state they would bear the loss from unemployment (whose expected value is the last term in the expression).

where the superscript *U* stands for union wage-setting and the subscript *NI* for no insurance provisions by the firm.

When instead it is the firm that makes the wage offer, it will invariably choose to set the wage at the lowest possible level consistent with the workers' reservation utility. As the probability of unemployment cannot be reduced below p_L, the lowest wage that the firm can promise is $(w_0 + p_L l)/(1-p_L)$. Hence in this case the firm earns the maximum expected profit in the middle and high states and nothing in the low state, in which it is not active. So the expected profit is

$$E(\Pi_{NI}^F) = p_H y_H + p_M y_M - (w_0 + p_L l). \tag{11}$$

Recalling that the wage is set with frequency α by the union and $1-\alpha$ by the firm, the profit that the firm can expect at $t=1$, when it chooses whether to provide insurance, is the weighted average of expressions (10) and (11):

$$E(\Pi_{NI}) = \alpha p_H (y_H - y_M) + (1-\alpha)\left[p_H y_H + p_M y_M - (w_0 + p_L l)\right]. \tag{12}$$

Employment stability. To guarantee stable jobs, the firm must stay in business in all three states. So in this case when the union sets the wage, it knows that its choice has no effect on unemployment risk. Thus it picks the highest wage consistent with the firm earning zero expected profits, so as to avoid inducing it to leave the negotiating table:[12] $E(\Pi_I^U) = 0$. When instead the firm sets the wage, it will set it at the reservation level w_0, as workers face no employment risk. Hence, if it provides stable jobs, as of $t=1$ the firm anticipates that it will earn expected profits $E(\Pi_I^F) = p_H y_H + p_M y_M + p_L y_L - w_0$ with frequency $1-\alpha$:

$$E(\Pi_I) = (1-\alpha)\left[p_H y_H + p_M y_M + p_L y_L - w_0\right]. \tag{13}$$

We are now able to tell when the firm will commit to offer employment stability to its workers at $t=1$: this occurs if expression (13) exceeds (12), namely if

$$\begin{aligned} E(\Pi_I) - E(\Pi_{NI}) &= (1-\alpha) p_L (y_L + l) - \alpha p_H (y_H - y_M) \\ &= p_L \left[y_L - \alpha y_M + (1-\alpha) l\right] > 0, \end{aligned} \tag{14}$$

[12] Given the symmetry of the distribution of the firm's revenue, this wage will again be y_M but, as it will be paid in all three states, workers' expected wage income will exceed that under no insurance, i.e. $p_M y_M + p_H y_H = y_M - p_L y_L$.

where the second step exploits the conditions $p_H = p_L$ and $y_H - y_M = y_M - y_L$, based on the symmetry of the distribution function. Expression (14) is decreasing in α and increasing in l. Intuitively, the firm has less incentive to offer insurance if workers have substantial wage bargaining power, because such insurance would elicit aggressive wage demands. Conversely, the firm gains more from providing insurance if workers' loss from unemployment is severe, as in this case they are willing to take a significant wage cut (in the states in which the firm sets the wage) in exchange for the promise of employment stability. Indeed, in the limiting case where the union has no bargaining power ($\alpha = 0$) condition (14) holds, as $p_L(y_L + l) > 0$; conversely, in the polar opposite case ($\alpha = 1$) the condition is violated, as $p_L(y_L - y_M) < 0$. The firm is indifferent between providing and not providing employment stability for a critical value α^* of workers' bargaining power:

$$\alpha^* = \frac{y_L + (1-\gamma)\bar{l}}{y_M + (1-\gamma)\bar{l}}, \tag{15}$$

which is a downward-sloping locus in (α, γ) space, as shown in Figure 3.

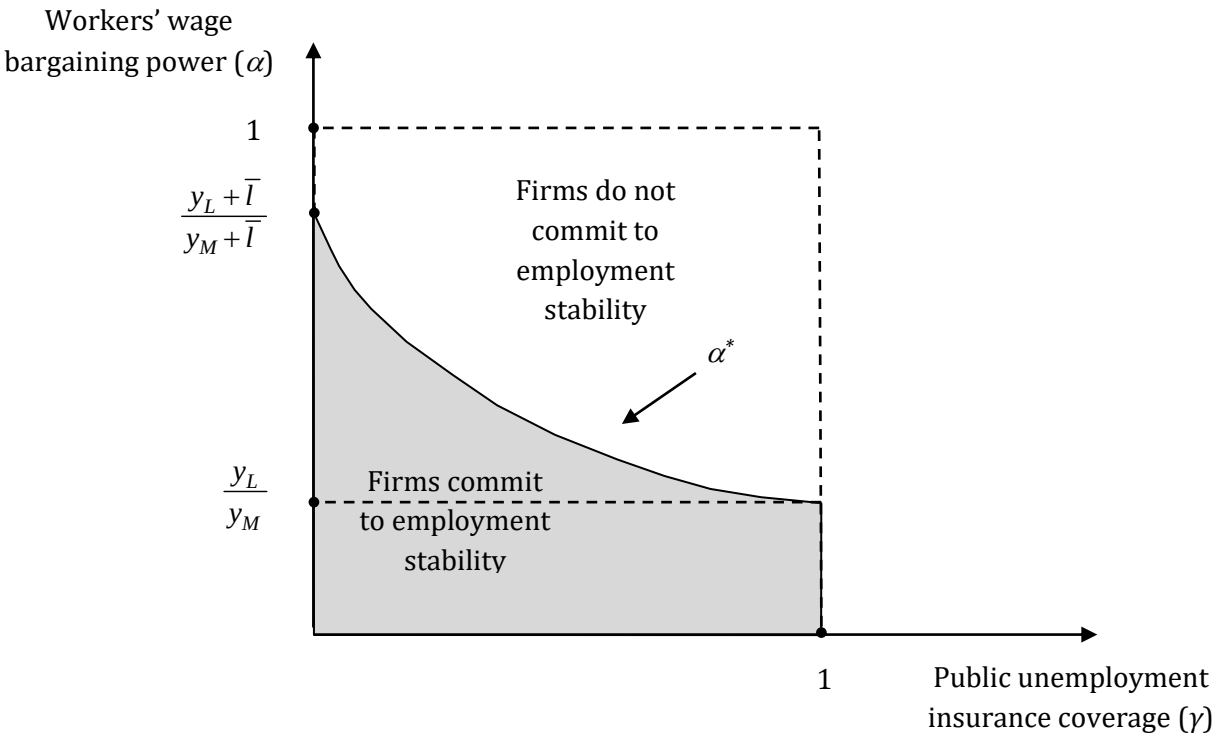

Figure 3. Firms' employment insurance, workers' bargaining power and public unemployment insurance

Firms will not provide stable jobs if workers have strong bargaining power (α high) or are already well protected by public unemployment insurance (γ high). Intuitively, if workers have strong bargaining power, protecting their jobs enhances the concessions they can extract at the negotiating table. This parallels the prediction from the moral hazard model of Section 2.2, where protecting jobs may push the rents necessary to prevent shirking too high: indeed, the region where firms commit to offer stable employment has a similar shape in Figures 2 and 3. And both figures highlight that firm-provided job stability acts as a substitute for public unemployment insurance.

This tradeoff between reducing employment risk and protecting the firm's bargaining position against workers resurfaces in the choice of leverage, as we shall see in Section 5. In that case, the issue is not whether the firm should reduce employment risk by operating even in unprofitable states, but instead whether it should do so by decreasing its leverage. We shall see that firms may choose high leverage and thus high employment risk to counteract workers' bargaining power: in that setting too, the distributional conflict between firms and workers may hinder efficient risk sharing.

4. Insurance provision by family firms and government programs

The models presented above yield three important empirical predictions. First, for firms to be willing and able to provide job stability, there cannot be severe moral hazard either on the workers' or on the firms' part: in short, there must be mutual trust, which is arguably easier to establish and maintain within family than nonfamily firms. Hence, family firms should provide more implicit insurance to workers. Second, insofar as firms provide implicit insurance to their employees by stabilizing wages or employment in the face of adverse shocks, they should be able to pay lower average wages: that is, if such insurance is valuable to workers, it should come at a price, in the form of a wage discount. The third prediction to emerge consistently from the models of Sections 2 and 3 is that firms should be less willing to offer employment stability where workers are already well protected by public

unemployment insurance, or more generally by government safety nets. Empirical studies have taken all three predictions to the data.

4.1. Do family firms provide more insurance?

Moral hazard on the part of workers may be overcome either by firms' ability to monitor effort or by reputational mechanisms based on repeated interaction, allowing workers to establish their loyalty and encouraging them to maintain it over time. Symmetrically, reputational mechanisms may enable such firms to credibly commit to shield their employees from wage or employment risk: again, this requires repeated interaction, as well as a low discount rate for the entrepreneur. As is argued in Sections 3.1 and 3.2, in both respects family firms are better positioned to provide implicit insurance to their employees: their owner-managers tend to have closer relationships with employees, and thus greater monitoring ability; moreover, they are longer-term players, which allows them to develop a reputation – associated with the family name – of loyalty towards their employees, and to maintain it even when this imposes financial losses.

There are countless historical episodes to attest that family firm owners are capable of such loyalty, rooted in ethical values and a social role that the family considers to be more important than money. For instance, nearly a century ago at Endicott Johnson (a shoe manufacturer in New York), the firm's patriarch, George F. Johnson, was ready to cut dividends, defying the anger of his fellow stockholders, in order to maintain employment stability and the company's welfare program during the Depression (Mueller and Philippon, 2011).

Similarly, when FIAT faced a severe crisis in the 1970s, its owners chose to avoid the mass layoffs that the necessary restructuring would have entailed. This difficult choice is recounted by Carlo De Benedetti, CEO at the time and *not* a member of the controlling Agnelli family: "In 1976 I faced Gianni Agnelli with a drastic choice: here at FIAT, I told him, we have to lay off 25,000 employees. He thought about it for a couple of days, then replied: it cannot be done. That reply embodied the moral heritage of his grandfather, his Savoy spirit, a sense of a commitment towards the country and Turin and also his respect for workers' dignity. I could not stay at FIAT and watch the company's coffers bleed empty, so I quit. In retrospect, from the

company's standpoint I was right, but from a broader historical and social standpoint, he was right."[13]

More recently, the loyalty of family firms to their employees was highlighted by President Obama with reference to the recession of 2008-09: "The family business in Warroad, Minnesota, that didn't lay off a single one of their four thousand employees during this recession, even when their competitors shut down dozens of plants, even when it meant the owners gave up some perks and pay […] understood their biggest asset was the community and the workers who helped build that business".[14]

Apart from such anecdotal evidence, family firms' greater tendency to provide employment stability has been documented by several empirical studies. Sraer and Thesmar (2007) and Bassanini et al. (2013) show that in French heir-managed firms, employment is less sensitive to industry-wide sales shocks, average wages are lower, and profits are higher than in other firms. Family firms also feature lower layoff risk during dynastic CEO transitions, as documented by Bach and Serrano-Velarde (2015). This greater job stability appears to buy social peace: family firms have fewer strikes and less unionized workers, as well as less frequent sanctions and litigation (Mueller and Philippon, 2007).

Ellul et al. (2018) provide the most comprehensive evidence on this issue. Using firm-level panel data for 7,822 firms in 41 countries from 1988 to 2013, they estimate the degree to which shocks to firms (measured as fluctuations in industry-level sales or as the unanticipated component of the change in firm-level sales) are passed on to employment: the lower the pass-through, the greater the amount of insurance provided. Since insurance only matters for adverse shocks, the estimation is repeated separately for negative changes in shocks. Moreover, since firms should be better positioned to insure their employees against transient than persistent shocks, employment insurance in response to each type of shock is also assessed. All these tests confirm that family firms provide more stable employment. In the baseline regression the estimated elasticity of employment to industry sales shocks ranges from 14% to 20% depending on the specification, but in family firms it is considerably lower than in nonfamily firms,

[13] *La Repubblica*, "Agnelli, Intervista a De Benedetti", 13 February 2013.

[14] *Baltimore Sun*, "Obama's full remarks", 6 September 2012. An extreme example of such loyalty is that of the owner of a family firm producing furniture near Naples, who committed suicide in May 2020, during the COVID-19 crisis, fearing that he might have to lay off his employees, should he be unable to reopen his business after the end of the lockdown (*Corriere della Sera*, "Napoli, l'imprenditore suicida: 'Antonio Nogara aveva paura di non farcela' ", 6 May 2020).

with an implied estimate ranging just from 2% to 3% depending on the specification. Indeed, in most specifications the hypothesis that family firms' employment does *not respond at all* to industry-wide sales contractions is not rejected. In particular, family firms provide full insurance against transitory shocks but no more insurance than non-family firms against persistent shocks.

An obvious concern is that these results may be vitiated by endogenous selection of firms, as family ownership is not random.[15] However, the authors show that in their sample the fraction of family firms is not correlated with country-level institutional variables. They also repeat the estimation on a sample of family firms matched with similar nonfamily firms in the same industry and country, and the results are again consistent with those found for the full sample. That is, their findings cannot be explained by systematic differences in the observable characteristics of the two types of firm, including their different international or sectoral distribution.

Investigating whether firms differ in their provision of wage insurance, Ellul et al. (2018) find that family firms actually provide *less* wage insurance than nonfamily firms. This accords with the prediction of the moral hazard model in Section 3.1.2 that firms offering greater job stability should have greater wage variability to induce worker effort. In other words, greater trust in industrial relations enables family firms to provide job security in exchange for wage flexibility.

The authors also investigate the mechanisms through which family firms provide insurance. They document that profits, dividends and cash reserves buffer the impact of sales shocks, especially adverse ones, much more than in nonfamily firms. They show, further, that access to financial markets is important to their ability to provide insurance: during banking crises, family firms provide less insurance than in normal times, while in recessions not associated with a banking crisis they still provide employment insurance, as they presumably retain access to finance. This squares with the finding of Lins, Volpin and Wagner (2013) that during the 2008-09 banking crisis family firms were as likely as other firms to dismiss employees and cut labor costs.

[15] They use the expression "selection out of family ownership" rather than "selection into family ownership" because typically firms originate as family firms and go over to a different ownership structure only subsequently.

4.2. Is firms' employment risk protection priced?

A key prediction of the foregoing models is that the implicit insurance provided by firms should be "priced": that is, in exchange for more stable employment, workers should earn lower wages. To test this prediction, Ellul et al. (2018) estimate the sensitivity of each firm's employment level to idiosyncratic sales shocks, obtaining an inverse measure of the job insurance the firm offers, and plot each firm's average real wage against this estimated sensitivity of its employment to sales shocks.[16] The relationship is clearly positive, as shown by Figure 4: the firms whose work force level responds more sharply to sales shocks compensate their employees with higher real wages. The fitted line is obtained from a regression of the firm-level real wage regression residuals (on the vertical axis) on a constant and on the firm-level coefficient of employment sensitivity to idiosyncratic shocks (on the horizontal axis). The *t*-statistic of the slope coefficient of this regression is 26.07. This confirms that workers do in fact value employment insurance: the more substantial the job insurance, the greater the wage discount.

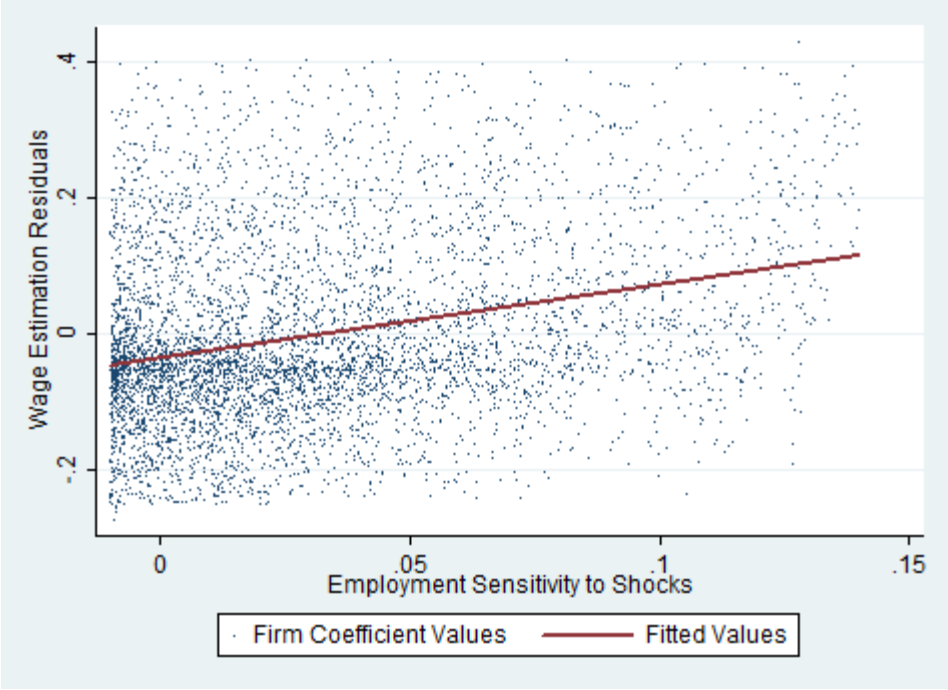

Figure 4. Employment sensitivity to firm-level sales shocks and average real wage (from Ellul et al., 2018)

[16] More precisely, the measure plotted on vertical axis is the residual of a cross-sectional regression of the average real wage on country, time and industry fixed effects (in order to control for variability relating to those factors); the measure on the horizontal axis is a firm-level estimate of the elasticity of employment to sales shocks.

Consistent with their more stable jobs, family firms pay lower wages: in the sample studied by Ellul et al. (2018), on average they obtain a statistically significant real wage discount of between 2% and 7% relative to nonfamily firms, depending on the specification – a finding consistent with the evidence of Sraer and Thesmar (2007) for French firms.

4.3. Are firm and government insurance substitutes?

Another prediction of the models in Sections 2 and 3 is that firms should be less willing to protect workers from employment risk if public unemployment insurance (UI) already does so. Empirically, the generosity of UI systems can be measured by their income replacement rates, which differ widely not only between countries (from nil to over 50%), but also over time in the same country, due to changes in regulation. The prediction, accordingly, is that the higher the UI replacement rate is, the less will firms stabilize employment; or in other words, the more sales shocks will be allowed to affect employment. This substitutability should be stronger for family firms, which generally tend to provide greater job stability than nonfamily ones, as shown above.

Ellul et al. (2018) provide evidence on this issue as well, using a difference-in-differences approach that exploits both cross-country differences in UI and within-country changes due to UI reforms. They test whether the extra employment stability provided by family firms is lower where (and when) the UI income replacement rate is higher. And this is precisely what they find: when the replacement rate rises, family firms reduce the supply of insurance to their employees by increasing the pass-through of sales shocks, and conversely when the rate declines. Family firms (in contrast to nonfamily ones) almost wholly offset shocks when the UI replacement rate is zero, but the offset drops by about one-third for a replacement rate of 50%.

This substitutability between private and public unemployment insurance emerges more clearly for negative shocks and disappears for persistent shocks, which are more difficult to insure. To deal with possible reverse causality from employment growth to the replacement rate, Ellul et al. (2018) include country-time effects in all their regressions: thus changes in firm-level employment – their dependent variable – are purged of all aggregate country-level variation, including cyclical changes.

The substitutability between the insurance offered by family firms and by public UI is illustrated in Figure 5, which plots a measure of the employment insurance offered by family firms in each country against the average replacement rate of the national UI system between 1988 and 2013. To measure the private insurance offered by family firms in a given country Ellul et al. (2018) estimate the following regression based only on data for that country:

$$\Delta n_{it} = \beta_c \varepsilon_{it} + \gamma' X_{it-1} + \mu_j + \mu_t + u_{it}, \tag{16}$$

where Δn_{it} is the change in employment in firm i in year t, β_c is the pass-through coefficient in country c, ε_{it} are the idiosyncratic sales shocks, X_{it-1} are lagged firm level controls, μ_j are industry effects and μ_t are year effects. The insurance provided by family firms in country c is measured by $1-\beta_c$, i.e. the fraction of the shocks that family firms do not transmit to employment. The substitutability between private and public insurance is conveyed visually by the negative slope of the regression line.

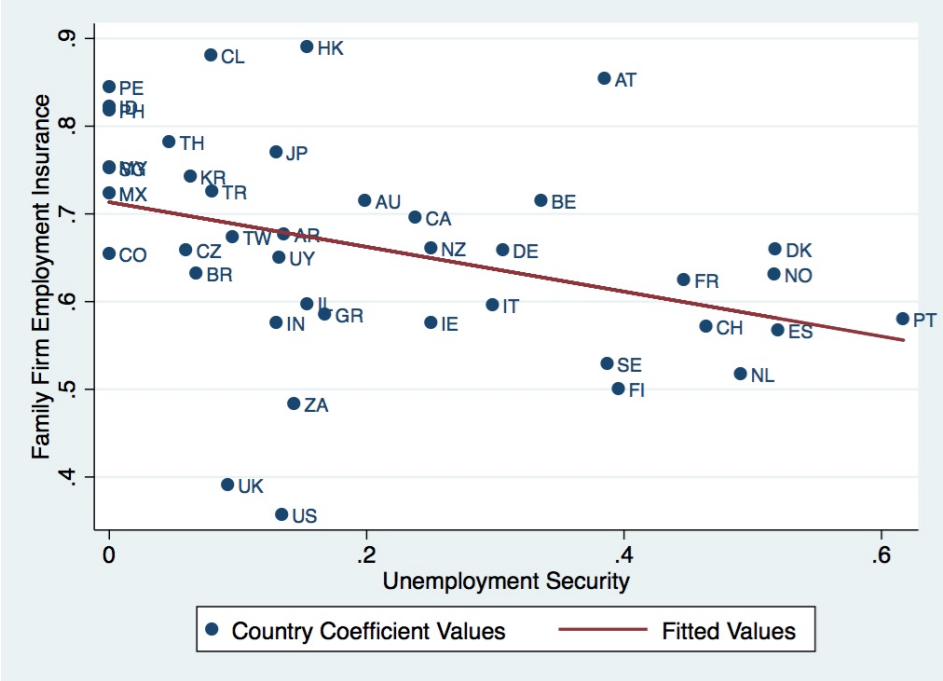

Figure 5. Employment insurance provided by family firms and public unemployment insurance (from Ellul et al., 2018)

Substitutability is also observed over time, as gauged by national time-series variations in the replacement rate. Figure 6 conveys the impact of major changes in UI systems on the job stability provided by family firms. On the vertical axis, the figure plots the change in the measure of the employment insurance provided by family firms (i.e. the change in $1-\beta_c$, as defined above) between the 5 years before and the 5 years after the reform. On the horizontal axis, the figure plots the change in the replacement rate triggered by a reform in a given country: for instance, the point "NO02" corresponds to a 2002 reform that reduced the replacement rate in Norway from 0.62 to 0.48.

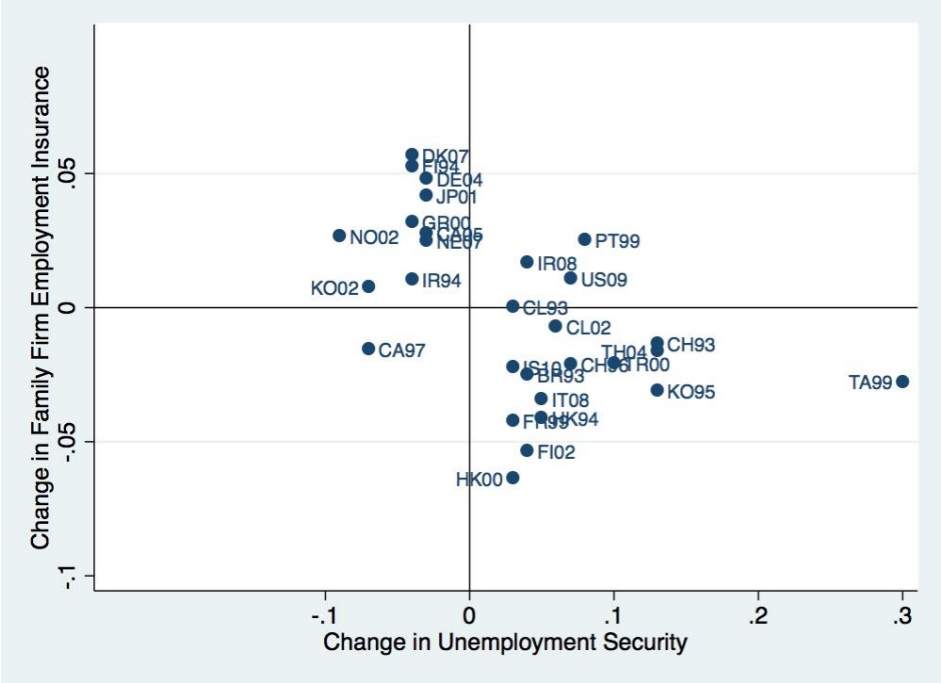

Figure 6. Employment insurance provided by family firms after major reforms of public unemployment insurance (from Ellul et al., 2018)

The figure shows that most of the reforms that increased unemployment benefits are associated with a reduction in the employment stability offered by family firms (points in Quadrant IV); that is, with an increase in the pass-through coefficient β_c. Conversely, most reforms that reduced the UI replacement rate coincide with greater provision of employment insurance by family firms (points in Quadrant II). Hence, Figure 6 shows that the substitutability between government and family-firm

employment insurance is apparent also in the temporal and not only the cross-country dimension illustrated by Figure 5 (where each observation refers to a single country for the whole sample period).

5. Firm leverage and employment risk

High leverage is an obvious threat to a firm's provision of employment stability: highly leveraged companies are more likely to end up in distress and fail, with consequent layoffs. Rather than obtaining a wage discount in exchange for insurance, as in Sections 2 and 3, highly leveraged firms will have to pay a wage premium as compensation for the human capital losses that workers expect to incur in case of bankruptcy (Berk, Stanton and Zechner, 2010). Beside paying workers more, highly levered firms find it difficult to attract new employees, especially at times of distress: Brown and Matsa (2016) document that job seekers accurately perceive firms' financial condition, and that major financial firms experiencing distress in the Great Recession received fewer and lower quality job applications. Moreover, distressed firms are at greater risk of losing their most skilled workers: Baghai, Silva, Thell and Vig (2020) find that Swedish export-intensive firms that suffer a negative export shock due to currency movements lose talented workers, but only if they are highly leveraged, and that more talent-intensive firms have more conservative capital structures. Hence, greater leverage is associated with incremental labor costs, which add to the other costs of financial distress, such as the legal fees incurred during bankruptcy and the loss of customers and suppliers. Other things equal, this labor cost concern should induce firms to moderate their leverage.[17]

However, insofar as firms and workers bargain over wages, the opposite may hold: firms may want to lever up in order to reduce the amount at stake in the bargaining and so compress wage demands, even though this creates employment risk. This strategic aspect of the choice of leverage has been formalized in several models (Baldwin, 1983; Dasgupta and Sengupta, 1993; Perotti and Spier, 1993).

[17] There is evidence that this concern by firms also depends on their employees' characteristics, being greater for firms whose employees are more exposed to financial risk due to personal bankruptcy (Pinto, 2019) or are less protected by public unemployment insurance (Agrawal and Matsa, 2013).

Strategic debt models deliver three important predictions. First, firms should rely more on leverage to strengthen their position when their employees have strong wage bargaining power. Second, strategic leverage will shift greater layoff risk onto employees. Third, firms will rely more on strategic leverage if workers are better protected by public safety nets and accordingly less fearful of losing their jobs. The next subsection presents a simple model capturing these three predictions and briefly reviews the vast empirical literature relating to them.

5.1. A simple model of strategic leverage

Consider again the two-state setting of Section 2.2, where the firm's revenue can be high (y_H) or low (y_L) with probabilities p and $1-p$ respectively, but assume now that in both states revenue exceeds the workers' reservation wage w_0 and the actual wage is determined by bargaining with trade unions, as in Section 3.3. Finally, the firm can issue an amount of debt promising to repay a sum d to risk-neutral creditors, and transfer the proceeds to shareholders via a debt-equity swap. The firm maximizes its total value, which under risk neutrality and no discounting is equivalent to maximizing the total expected cash flow to both creditors and shareholders. In the present setting, this boils down to identifying the wage-setting and debt-issuance decisions that minimize expected labor costs.

The time line is as follows. At $t=1$, the firm credibly announces the face value d of the debt it issues. At $t=2$, the firm and the union bargain over the wage according to the random proposer protocol, being randomly drawn to make take-it-or-leave-it offers with probabilities $1-\alpha$ and α respectively. Finally, at $t=3$ the firm's revenue materializes with the probabilities defined above. If it turns out to be less than the sum of the agreed wage and debt repayment, i.e. $y_s < d+w$, then the firm is insolvent. In this case, its revenue goes to creditors and workers according to the relative seniority of their claims: the workers' wage claim w is assumed to be junior to the debt d, so that workers are first in line to bear the brunt of the firm's insolvency (an assumption relaxed by Ellul and Pagano, 2019, as we shall see below). Insolvency inflicts on workers not only the direct financial loss of unpaid wages but also the loss l from unemployment, which captures job search and relocation costs as well as any "scarring effects" of bankruptcy. If instead the firm is solvent, it pays the pledged

amount *d* to creditors and the agreed wage *w* to workers, and distributes profits, if any, to its shareholders.

The equilibrium wage and leverage are found by backward induction, first deriving the wages set at $t=2$ and then the value-maximizing debt chosen at $t=1$. To find the optimal strategies of firm and union, it is best to analyze first the extreme cases where all the bargaining power is held by the firm ($\alpha=0$) or by the union ($\alpha=1$), respectively labeled as the case of "powerful firms" and of "powerful unions". The cases where the bargaining power of unions takes intermediate values, i.e. $\alpha\in(0,1)$, will be seen to "nest" the results obtained in these two polar cases.

5.1.1. Powerful firms

If the firm has all the bargaining power ($\alpha=0$) at $t=2$ – that is, it always sets the wage via a take-it-or-leave-it offer – it will minimize its expected labor cost by offering a wage that gives workers just their reservation utility. This wage depends on the amount of debt *d* issued by the firm at $t=1$, as this determines whether the firm defaults partially or entirely vis-à-vis its employees:

$$w=\begin{cases} w_0 & \text{if } y_L\geq d+w, \\ \dfrac{w_0}{p}-\dfrac{1-p}{p}(y_L-d)+\dfrac{1-p}{p}l & \text{if } y_L\in[d,d+w), \\ \dfrac{w_0}{p}+\dfrac{1-p}{p}l & \text{if } y_L<d. \end{cases} \tag{17}$$

The top line of expression (17) corresponds to the situation where in the low state the firm pays the pledged wage *w* entirely, the second line to partial insolvency and the bottom line to total default vis-à-vis employees. The expression considers default only in the low state, since the workers' participation constraint could not be satisfied if debt *d* were so large as to trigger default also in the high state. Hence, the expected value of the firm's wage costs *W* in these three cases is

$$\mathrm{E}(W^F)=\begin{cases} w_0 & \text{if } d\leq y_L-w_0, \\ pw+(1-p)(y_L-d)=w_0+(1-p)l & \text{if } d\in[y_L-w_0,y_L), \\ pw=w_0+(1-p)l & \text{if } d\geq y_L, \end{cases} \tag{18}$$

where the superscript *F* is a mnemonic recalling that here the firm is setting the wage.

From this expression, it is immediate that to minimize its labor cost, at $t=1$ the firm must choose a debt level $d \leq y_L - w_0$, i.e. low enough to avoid default: issuing more debt would require higher wages to compensate employees for bankruptcy risk, as in Berk et al. (2010). In this case leverage has no strategic value, as the firm already has all the bargaining power.

5.1.2. Powerful unions

A different conclusion applies when workers have all the bargaining power ($\alpha=1$). Like the firm, in setting the wage the trade union too must condition on the firm's level of debt. If $d \leq y_L - w_0$, the union can choose between a "moderate" and an "aggressive" wage negotiation strategy.

The moderate strategy consists in setting a wage low enough that it will not trigger default in the low state, i.e. $w = y_L - d \geq w_0$. In this way, in the low state workers get all the revenue not pledged to creditors, so that the firm will (barely) avoid default and will distribute a profit $y_H - w - d = y_H - y_L$ to its shareholders in the high state; moreover, workers will avoid bearing the loss *l* from unemployment in the low state. Hence their payoff will simply be their (certain) wage $y_L - d$.

The aggressive strategy instead consists in picking the highest possible wage consistent with no default in the high state and accepting default in the low state, i.e. $w = y_H - d > y_L - d$. (The union will not pick any lower wage $w \in (y_L - d, y_H - d)$, as this would still trigger default and thus entail the loss *l* in the low state.) As a result, the firm will default in the low state, and will be just able to repay creditors and employees in the high state: its financial stakeholders are worse off than when the union picks the moderate strategy, as now creditors face default risk and shareholders get no dividends. The workers' payoff is $y_H - d$ in the high state and $y_L - d - l$ in the low state: their wage claim $w = y_H - d$ will be fully honored only in the high state, and they will bear the loss *l* from unemployment in the low state. Hence, their expected payoff is $p(y_H - d) + (1-p)(y_L - d - l)$, which is greater than the payoff $y_L - d$ of the moderate strategy if

$$p(y_H - y_L) > (1-p)l, \tag{19}$$

i.e. if the implied expected wage gain outweighs the expected loss from unemployment. If this condition holds, the union will opt for the aggressive strategy. If instead the expected loss from unemployment is so severe as to exceed the expected income gain (condition (19) is violated), the union will choose the moderate strategy.

Note that if at $t=1$ the firm were to choose a higher level of debt, i.e. $d > y_L - w_0$, then at $t=2$ the union could no longer opt for the moderate strategy, as this would violate the workers' participation constraint. Hence, high leverage induces an aggressive union strategy.

In setting its debt level at $t=1$, the firm must consider whether condition (19) holds. If not, so that the union will pursue a moderate strategy if $d \le y_L - w_0$, then the firm chooses debt to be just high enough to steer the union to set exactly the reservation wage, namely:

$$d^* = y_L - w_0 . \tag{20}$$

This level of debt enables shareholders to appropriate the entire surplus over and above the reservation wage, partly *ex ante* via the issuance of debt d^* (and the distribution of its proceeds to shareholders) and partly *ex post* via the distribution of profits $y_H - y_L$ if the high state materializes.

If instead condition (19) holds, so that the union can be expected to pursue the aggressive strategy $w = y_H - d$, then the firm's expected wage cost will be

$$\mathrm{E}(W^U) = \begin{cases} p(y_H - d) + (1-p)(y_L - d) & \text{if } d \le y_L, \\ p(y_H - d) & \text{if } d > y_L, \end{cases} \tag{21}$$

where the superscript *U* denotes that here the union is setting the wage. To minimize this expression, the firm selects the highest debt level compatible with the workers' participation constraint, i.e. such that:

$$p(y_H - d) + (1-p)\max(y_L - d, 0) = w_0 + (1-p)l .$$

This condition implies the following optimal debt levels:

$$d^{**} = py_H + (1-p)y_L - w_0 - (1-p)l \tag{22}$$

if $p(y_H - y_L) \le w_0 + (1-p)l$, so that in the low state the firm defaults only partly on

wage claims, and

$$d^{***} = y_H - \frac{w_0}{p} - \frac{1-p}{p} l \tag{23}$$

if $p(y_H - y_L) > w_0 + (1-p)l$, in which case the firm defaults completely on wage claims in the low state. Comparing expressions (20), (22) and (23), it can be shown that $d^* < d^{**} < d^{***}$.[18] Intuitively, when the union is more aggressive the firm issues more debt, so as to counteract the union's higher wage demands. By setting debt at level d^{**} or d^{***} in the respective intervals, the firm neutralizes workers' bargaining power and brings expected labor costs down to $E(W^U) = w_0 + (1-p)l$, i.e. the reservation wage plus the unemployment risk premium.

5.1.3. Intermediate balance of power

Equipped with the solutions for these two polar cases, it is easy to address the situation where bargaining power is more evenly distributed between the firm and the union, i.e. $\alpha \in (0,1)$. Interestingly, this case shows that, in seeking to exploit the strategic value of debt, shareholders may end up creating risk for employees. In the extreme case where the union has all the bargaining power, the employment risk cannot be blamed on leverage, as it is aggressive wage bargaining by the union that triggers bankruptcy in the low state even if the firm has zero leverage. But as we shall see, this is not necessarily true with an intermediate balance of bargaining power: the firm can go bankrupt even in states where the agreed wage is low, so that employment risk truly does stem from the high debt that the firm issues for strategic reasons.

If the union can be expected to adopt the moderate wage-setting strategy $w = y_L - d$ (i.e. condition (19) is violated), the leverage choice is easily analyzed: the firm will choose the low debt level d^* in expression (20) for any $\alpha \in (0,1)$, as this guarantees no default and pushes wages down to the reservation level w_0. As in the extreme case $\alpha = 1$, low leverage yields the strategic gain of labor cost compression without the cost of bankruptcy risk.

[18] To see this, notice that, using equation (20), the debt level in expression (22) can be written as $d^{**} = d^* + p(y_H - y_L) - (1-p)l > d^*$ by condition (19), and the debt level in expression (23) is even greater, being obtained for $d > y_L$ rather than for $d < y_L$.

If instead the union can be expected to opt for the aggressive strategy $w = y_H - d$ (i.e. condition (19) holds), then the leverage choice at $t = 1$ is less obvious. Intuitively, low debt d^* enables the firm to save the labor cost premium $(1-p)l$ when it sets the wage but leaves a bargaining surplus on the table for the union to gain when it sets the wage. Conversely, the higher debt levels d^{**} and d^{***} allow shareholders to extract this bargaining surplus *ex ante* but at the cost of bankruptcy risk even when the firm sets the wage, which will therefore comprise an unemployment risk premium. This tradeoff varies with the frequency α with which the union is allowed to set the wage. If α is high, the firm has to protect itself against wage demands more often than it benefits from saving the unemployment risk premium. This makes higher debt preferable. Conversely, if α is low enough, lower debt will be preferable.

Formally, the firm's expected labor cost is a weighted average of expression (18) and expression (21), with weights α and $1-\alpha$ respectively; that is, $\mathrm{E}(W) = (1-\alpha)\mathrm{E}(W^F) + \alpha\mathrm{E}(W^U)$:

$$\mathrm{E}(W) = \begin{cases} (1-\alpha)w_0 + \alpha\left[p(y_H - d) + (1-p)(y_L - d)\right] & \text{if } d \le y_L - w_0, \\ (1-\alpha)\left[w_0 + (1-p)l\right] + \alpha\left[p(y_H - d) + (1-p)(y_L - d)\right] & \text{if } d \in (y_L - w_0, y_L), \\ (1-\alpha)\left[w_0 + (1-p)l\right] + \alpha p(y_H - d) & \text{if } d \ge y_L. \end{cases}$$

Since d enters with a negative sign in all three expressions, in each of the three intervals the firm will choose the largest amount of debt compatible with the workers' participation constraint, which is d^* in the top expression's range, d^{**} in the middle and d^{***} in the bottom. The expected wage costs are thus

$$\mathrm{E}(W) = \begin{cases} w_0 + \alpha p(y_H - y_L) & \text{if } d = d^*, \\ w_0 + (1-p)l & \text{if } p(y_H - y_L) \le w_0 + (1-p)l \text{ and } d = d^{**}, \\ w_0 + (1-p)l & \text{if } p(y_H - y_L) > w_0 + (1-p)l \text{ and } d = d^{***}. \end{cases} \quad (24)$$

Hence, from (24) the choice of the debt level that minimizes the firm's expected labor cost depends crucially on α, and more specifically on whether it is greater or smaller than the following threshold:

$$\alpha^* = \frac{(1-p)l}{p(y_H - y_L)}. \quad (25)$$

If $\alpha < \alpha^*$, workers have low bargaining power, so that they pocket the expected quasi-rents $p(y_H - y_L)$ in the high state only infrequently: in this case the firm is better off with low debt d^*, to avoid frequently paying the unemployment risk premium $(1-p)l$ when it sets the wage. Conversely, if $\alpha > \alpha^*$, workers have strong bargaining power in wage negotiations, so the firm is better off with one of the higher debt levels: d^{**} or d^{***}, depending on whether satisfying the workers' participation constraint is consistent with partial or total default in the low state.

Importantly, if the firm chooses low debt d^*, it does not default whenever it manages to set the wage (at w_0), while it defaults in the low state when the union sets it (at $w_0 + (1-p)l$). If instead the firm chooses the higher debt level d^{**} or d^{***}, it invariably defaults in the low state, even when it has had the chance to set the wage. Hence, with low debt the likelihood of default is $\alpha(1-p)$, while with high debt it is $1-p$, and unemployment risk is commensurately higher. Therefore, when the union opts for the aggressive strategy, the strategic use of leverage can increase employment risk.

The union's bargaining power α is not the only parameter relevant to the choice of leverage and hence to unemployment risk: as in the previous models, the other key parameter is the loss l from unemployment. As expression (25) shows, the threshold α^* is directly proportional to l: intuitively, the greater the loss from unemployment, the larger the bankruptcy wage premium, and therefore the larger the parameter region in which the firm opts for low leverage. In fact, if the loss l is so great as to violate condition (19), then the threshold $\alpha^* > 1$, which implies that the firm will choose low leverage for any α, including $\alpha = 1$. This is intuitive: if condition (19) is violated, the union opts for wage moderation, so that the firm's best strategy is to choose low leverage to avoid default and the implied bankruptcy wage premium, even if the union always gets to set the wage.

Recalling that the loss from unemployment depends inversely on the degree of protection offered by public safety nets, γ, we can rewrite the threshold in (25) as a decreasing function of this parameter and analyze how the leverage chosen by the firm and unemployment risk vary in the same space (α, γ) analyzed in Section 3.3:

$$\alpha^* = \frac{(1-p)(1-\gamma)\bar{l}}{p(y_H - y_L)}. \qquad (25')$$

This "indifference locus" between the bargaining power of unions, α , and the protection offered by public safety nets, γ, is drawn in Figure 7. Above the α^* locus, firms will strategically choose high debt, while below it they will choose low debt.

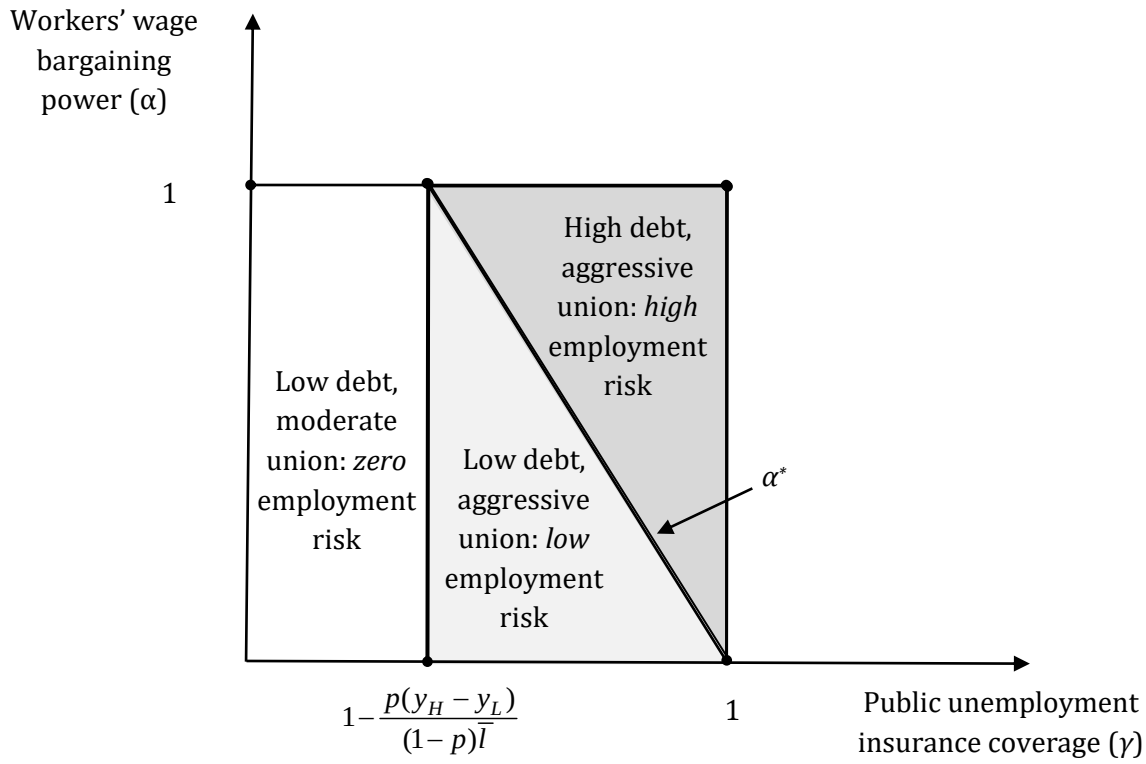

Figure 7. Firm leverage and employment risk: the role of workers' bargaining power and public unemployment insurance

The figure shows that, depending on the values of the parameters α and γ, the economy can be in one of three regions: with zero, intermediate, or high employment risk. If public unemployment insurance protects workers so little – i.e. γ is so low – as to violate condition (19), the union will opt for wage moderation and the firm for low leverage, so that there is no default risk regardless of workers' bargaining power α : ironically, employment risk is zero when the public safety net provides little protection against layoffs. For higher values of γ , the outcome depends also on α , as

shown by expression (25′): in the region below the indifference locus α^* the firm still chooses low leverage, even though the union opts for aggressive wage bargaining, as workers' bargaining power and public unemployment insurance coverage are still low enough. In this region the default probability is $\alpha(1-p)$, so that there is some employment risk. For still higher values of α or γ, one enters the region above the indifference locus α^*, where high leverage and aggressive wage bargaining combine to raise the default probability to $1-p$, and thus make employment risk highest.

5.2. Strategic leverage: the evidence

A good deal of the U.S. firm-level data is consistent with the strategic use of debt: controlling for corporate performance, more highly leveraged firms pay lower wages and fund their pension plans less generously (Hanka, 1998); distressed U.S. airlines obtain wage concessions from workers with underfunded pension plans (Benmelech, Bergman, and Enriquez, 2012); and unions are more likely to strike and "win" in wage negotiations following a decrease in firms' debt (Myers and Saretto, 2016). Michaels, Page, and Whited (2019), who provide the most comprehensive study based on U.S. firm-level data, find a strong inverse correlation between employee earnings and leverage, both across firms and over time. Interpreting this observation in a model that combines the strategic use of debt in wage bargaining with financing frictions, they find that both contribute to the inverse correlation.[19]

The evidence from the U.S. is also consistent with the two predictions illustrated by Figure 7, namely that firms increase their leverage strategically in response to increases in (i) workers' bargaining power (α) and (ii) public unemployment insurance protection (γ). Consistent with the first of these hypotheses, Matsa (2010) finds that collective bargaining coverage and pro-union changes to state labor laws increase corporations' leverage in the U.S., a result replicated for Sweden by Cronqvist et al. (2009). Moreover, U.S. firms facing more serious threats of

[19] This finding contrasts with Chemmanur, Cheng, and Zhang (2013), who produce U.S. evidence of a positive correlation between employee compensation and company leverage; however, their sample includes annual observations for only 10% of the companies present in Compustat, i.e. those reporting wage data, whereas Michaels, Page, and Whited (2019) merge Compustat balance-sheet data with wage data from the BLS Longitudinal Database of Establishments, which provides quarterly observations on establishments' total wage bill and employment.

unionization have higher leverage (Bronars and Deere, 1991), while those rated as "employee-friendly" keep their leverage low (Bae, Kang, and Wang, 2011). Consistent with the second prediction, Agrawal and Matsa (2013) present evidence that firms choose higher leverage in states where unemployment insurance is more generous, thus reducing workers' losses from unemployment.

The study by Ellul and Pagano (2019) tests these predictions on data for 22,592 listed corporations in 29 countries in the period 1988-2015, drawn from Worldscope and Osiris (for non-U.S. firms) and Compustat (for U.S. firms). They exploit changes in real estate and commodity prices as exogenous sources of variation in leverage. Specifically, they analyze how leverage responds to (i) changes in the value of firms' real estate assets and (ii) changes in their profitability triggered by fluctuations in international commodity prices. Both methodologies yield results consistent with the two hypotheses: firms increase leverage more in countries and periods where workers have greater bargaining power (as measured by union density) and more generous public unemployment insurance (proxied by the income replacement rate).

The main contribution of Ellul and Pagano (2019), however, consists in extending the strategic leverage model to explore the effects of the seniority of workers' and creditors' claims in bankruptcy (whereas in the model of Section 5.1 workers' claims are assumed junior). They show that the stronger are workers' seniority rights, the more firms will want to rely on leverage to compensate for its lesser effectiveness as strategic deterrent (unless bankruptcy costs are too high, in which case the effect of workers' seniority on leverage switches sign). Firms' incentive for strategic use of leverage is predicted to disappear only in the extreme case in which workers are senior to all creditor claims.

To test these additional predictions of the strategic debt model, they exploit the fact that the seniority of workers' claims varies greatly from country to country: for instance, it is far higher in Argentina, Belgium, France, Hungary, India, Mexico, and Singapore than in Australia, Denmark, Finland, Germany, Slovakia, Turkey, and the United States. On the whole, the evidence indicates that in countries where workers are more senior (or better protected by government insurance in bankruptcy), firms increase leverage more in response to real estate appreciation or a profit increase than in countries where employees are less protected in bankruptcy, again consistently with the predictions of the strategic leverage model.

Ellul and Pagano (2019) also highlight that the strategic leverage model requires firms to be financially unconstrained, i.e. free to increase leverage in response to shocks. If instead firms are financially constrained, their leverage should respond differently to employees' bargaining power and seniority rights: as both of these tend to increase labor costs, they eat into the future cash flow that firms can pledge to creditors, tightening financial constraints and thus reducing leverage. In the words of Simintzi, Vig, and Volpin (2015), financial leverage is crowded out by the greater operating leverage stemming from higher labor costs. Intuitively, if employees have strong bargaining power and/or are well protected in bankruptcy, they are entitled to a large fraction of the firm's resources in case of bankruptcy; so creditors, anticipating that their claims will take a back seat in liquidation, provide less additional credit when the firm's assets appreciate or its prospects brighten.

Indeed, empirical results become more nuanced when Ellul and Pagano (2019) distinguish between firms that are likely to be financially constrained and those that are not. Irrespective of the methodology used to identify constrained firms, the results accord with the strategic debt model only for the unconstrained: if employees have high seniority in liquidation, the leverage of unconstrained firms increases more in response to real estate appreciation or higher profits, while the leverage of constrained firms responds less to these shocks. Hence, the evidence appears to bear out the strategic leverage hypothesis only for unconstrained firms; for the financially constrained, greater employee bargaining power and seniority rights are associated with lower leverage. The latter result accords with the international evidence reported by Simintzi, Vig, and Volpin (2015), who find leverage to be inversely correlated with employment protection regulation and interpret this as a sign that leverage is determined by credit constraints rather than strategic concerns.

5.3. Workers and creditors: friends or foes?

When a firm goes bankrupt, the interests of workers and creditors generally clash: when assets are liquidated, the greater the fraction of the workers' claim paid, the smaller the fraction of creditors' claims honored. The respective seniority rights will determine precisely the split between the two classes of claimants. Moreover, this conflict is not limited to insolvencies: the very idea of strategic leverage is that

financially unconstrained firms can use creditors' claims to compress potential workers' claims, whereas in financially constrained firms wage and pension claims tend to crowd out financial leverage, hence potential creditors' claims, as we have seen above.

Seemingly, then, workers and creditors are natural foes, but this proposition is subject to an important qualification: namely, they share the common interest in avoiding excessive risk-taking by shareholders. The reason is they both have fixed claims, and therefore concave payoff functions: their claims are honored only partially if the firm's revenue is so low as to trigger insolvency, but fully in solvency states. Hence, when the firm makes a risky instead of a safe investment, it shifts downside risk onto workers and creditors alike, while increasing the upside potential enjoyed by shareholders. This implies that, insofar as workers can pressure management to avoid such risk-shifting behavior, they will benefit creditors as well; symmetrically, if creditors can monitor the firm to achieve the same purpose, they will benefit workers too. In other words, insofar as either workers or creditors can engage in some "activist" strategy with an impact on management's risk-taking, they are natural allies, with a common interest against that of shareholders.

Evidence of such a convergence of interests has been provided by Chen, Kacperczyk and Ortiz-Molina (2012), who find that U.S. firms in more unionized industries pay lower bond yields, especially when their financial conditions are worse. This relationship cannot be explained by the correlation of unionization with industry characteristics, governance mechanisms, or financial leverage; rather, it reflects the fact that in unionized industries investment policies are less risky and firms are less likely takeover targets. The authors' interpretation is that unions are viewed favorably in the bond market because, through their influence on management, they protect bondholders' wealth.

Further evidence consistent with synergy between organized labor and creditors is offered by Lin, Schmid and Xuan (2018), who study whether mandatory employee representation on supervisory boards in Germany ("codetermination") affects firms' leverage. As this legal requirement applies only to firms with more than 2,000 domestic employees, they exploit this discontinuity and the law's introduction in 1976 for identification, and find that the resulting increase in employees' power raises financial leverage and lowers the cost of debt. Firms where employees wield greater

power enjoy significantly smaller loan spreads, as well as longer debt maturities and fewer covenants. They trace these effects to an increase in the supply of credit to these firms: since the interests of banks are similar to those of employees, greater employee power reassures debtholders, leading to better financing conditions. Codetermined firms, in fact, tend to take less risk than those without employee representation: they are less likely to conclude M&A deals, and when they do, they tend to focus on value-increasing operations; their cash flows and profits are less volatile, and their idiosyncratic risk lower.

6. Insuring employees against talent uncertainty

So far the focus of the analysis has been on the protection that workers may receive against the risks arising from their firm's activity, such as a drop in sales. But employees also face uncertainty regarding their own productive ability, hence the value of their human capital.[20] Over the course of an employment relationship, often both parties learn whether the employee's skill set is suited to the tasks assigned. This kind of learning may relate to the employee's intrinsic abilities or the quality of their match with specific tasks. The resolution of this uncertainty is beneficial for productive efficiency because it enables a better assignment of employees to firms or tasks: workers who are found to be talented or fit for their jobs will be retained or promoted; those that are not, reassigned or dismissed, and possibly hired by a new employer. Thus while this type of learning benefits productive efficiency, from the worker's standpoint it generates risk (Hirshleifer, 1971): the worker may turn out to be less talented than expected, resulting in demotion or dismissal, and a possible reputational decline vis-à-vis other potential employers, i.e. persistent scarring effects. Hence, the possibility of learning about talent heightens human capital risk – and all the more so, the more precise is the prospective learning.

Can firms also insure their employees against uncertainty about their talent, just as they can for the risks arising from their own operations? And do they have an interest

[20] The distinction is akin to that drawn by Low, Meghir and Pistaferri (2010) between "employment risk", defined as "the uncertainty about having a job and also about the firm type", including that stemming from firm closure or job destruction, and "productivity risk" as "individual-specific uncertainty that exists independently of the employer's characteristics" (p. 1433).

in doing so? After all, the logic of the arguments developed so far should apply to this case as well. If firms are risk-neutral or can perfectly diversify the risk arising from uncertainty about workers' ability, they can gain from insuring risk-averse employees, with a lower salary in return. And even if competition for talent allows workers to extract part or all of the benefit from such insurance, in equilibrium firms will still have an incentive to provide it, as those that do not will be unable to hire.

However, for such insurance, commitment on both sides is needed: the firm must commit to retain workers found to be untalented, while workers must commit not to resign and seek employment elsewhere at better terms if found to be talented. They may make such a commitment either out of loyalty towards their employer, or because they cannot readily change jobs owing to search costs or imperfect observability of their performance. Absent such commitment by workers, employees' coinsurance is not viable, as it would eventually saddle firms with untalented workers only (Harris and Holmström,1982).

The uninsurability of human capital risk will generally lead not only to inefficient risk-sharing within firms but also to production inefficiency: workers will seek ways to hinder talent discovery, resulting in a poorer allocation of skills: forgoing efficient risk-sharing thus also brings less efficiency in production. The next two subsections present two settings in which the uninsurability of human capital risk triggers two different responses by workers to hinder talent discovery. Section 6.1 presents a simplified version of the model in Pagano and Picariello (2017), where workers prevent learning by taking jobs that are not informative about their talent. This results in lower average productivity, as untalented workers are retained, but public unemployment insurance can eliminate this inefficiency and establish efficient risk sharing. Section 6.2 illustrates the model in Acharya, Pagano and Volpin (2016), where managers delay discovery of their skills by churning across employers, heightening firm-level risk. In this setting, labor market frictions that decrease workers' mobility across employers restore learning within firms and reduce inefficient risk taking.

6.1. Learning about talent and public unemployment insurance

As in Pagano and Picariello (2017), consider a setting where labor income risk does not originate from firm-level shocks but from the unknown quality of employees. Specifically, suppose they may be either talented or untalented, with probabilities *p* and $1-p$ respectively, and before hiring their quality is unknown to everyone, including themselves. Talented workers contribute $y_H > 0$ to their employer's net revenue, defined as revenue *minus* the cost of non-labor inputs, while the untalented do not generate enough revenue to cover these other costs, so that their contribution to net revenue is negative: $y_L = -f < 0$. But hiring a worker of unknown quality increases net revenue: $\bar{y} = py_H - (1-p)f > 0$.

Firms differ in production technology. Some are "safe" from an employee's standpoint, as working there implies no learning about talent: performance on the job is uninformative. In these firms any worker is expected to generate the unconditional mean revenue $\bar{y}$. Other firms are "risky", in the sense that their technology requires workers to undergo initial training that perfectly reveals their true ability.

At the hiring stage, there is competition for workers, their number being less than that of available job positions. Firms bid each worker's wage to the point where it equals the expected net revenue that the worker generates, provided that net revenue is non-negative. Due to limited liability, wages cannot be negative: the lowest wage that can be paid to a worker known to be untalented is zero, so that firms are better off not employing such a worker. Hence, once a "risky" firm identifies untalented employees, it will want to fire them, to avoid a loss f on each.

As in Section 2.1, firms and workers differ in attitude towards risk. Firms maximize expected profit, being able to fully diversify the risk generated by differences in individual workers' talent, while workers are risk-averse, their utility being a concave function $u(\cdot)$, but with different degrees of risk aversion ρ. For simplicity, but with no loss of generality, the reservation wage is set to zero.

The time line consists of three stages: a hiring stage ($t=1$), when firms bid for workers, committing to a given wage but retaining the option of dismissal; a learning stage ($t=2$), where risky firms learn the quality of their employees and can dismiss them; and the production stage ($t=3$), where firms produce and pay wages. A key

feature of the model is whether or not workers commit to stay with their initial employer: in principle, those that discover that they are talented have the incentive to renegotiate their wage at $t=2$ under the threat of resigning. Whether they can do so or not depends on whether they can credibly switch to a competing employer; that is, on whether or not there is competition for their talent at this stage.

If there is no labor market competition at $t=2$, so that workers effectively commit to remain with their initial employer, then at $t=1$ risky firms can attract workers by offering them a strictly better compensation package than safe firms, i.e. greater but equally risk-free income. This may appear surprising, considering that profit maximization induces these firms to dismiss untalented employees. However, precisely by avoiding the losses the latter generate, risky firms earn a revenue py_H per worker that exceeds the revenue $\bar{y}$ per worker of safe firms. Still, they can offer risk-free compensation, paying py_H as wage to each worker retained and as severance pay to each one dismissed. Hence, risky firms exploit their talent discovery by allocating labor efficiently via their dismissal policy, but still insure their employees against human capital risk via a coinsurance arrangement among them. Hence in equilibrium these firms attract all the workers, irrespective of their risk aversion, so that safe (and less productive) firms will be unable to operate.

If instead there is labor market competition at $t=2$, such coinsurance becomes impracticable: the workers who learn they are talented succeed in raising their wage to y_H under the credible threat of resigning, so that risky firms have no funds left for the severance pay of the untalented. Hence, at $t=1$ employees in risky firms have a stochastic income: y_H if they are found to be talented and 0 if untalented and thus dismissed. In this case, that is to say, a job in a risky firm still entails higher expected income than one in a safe firm ($py_H > \bar{y}$), but it may yield lower expected utility to a sufficiently risk-averse employee. To be indifferent between the two types of job, the expected utility from a job at a risky firm, $pu(y_H)+(1-p)u(0)$, must be equal to that at a safe firm, $u(\bar{y})$; put another way, the certainty equivalent of the risky wage must equal $\bar{y}$. Recalling that the certainty equivalent of a lottery is the difference between its expected payoff and the relevant risk premium π, the marginal worker will have risk aversion ρ^* such that

$$py_H - \pi(\rho^*) = \bar{y}\,. \qquad (26)$$

This is illustrated in Figure 8, which plots the certainty equivalent of the risky job as a function of workers' degree of risk aversion.

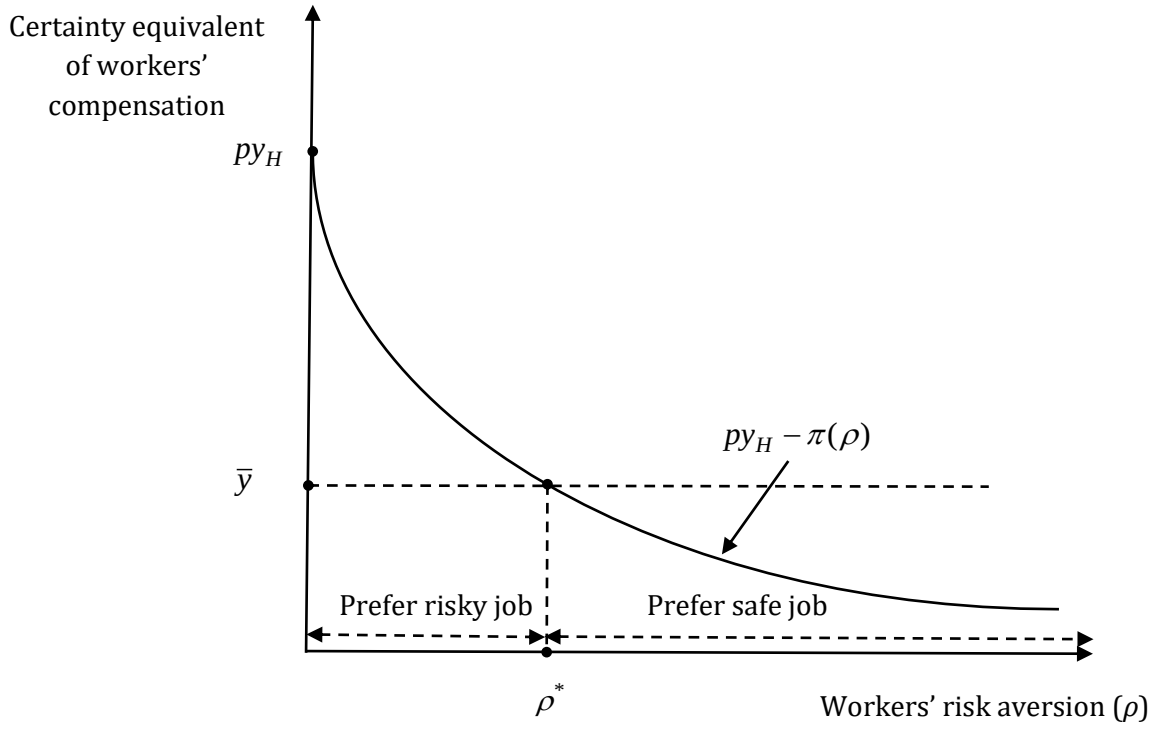

Figure 8. Workers' job choice as a function of degree of risk aversion

In the figure, workers with risk aversion below this threshold ($\rho < \rho^*$) are satisfied with a lower risk premium π than that in condition (26) and prefer jobs in risky firms: in the extreme case of risk neutrality, the worker will certainly take this option, as $\pi(0) = 0$. Conversely, workers with risk aversion above the threshold ($\rho > \rho^*$) prefer jobs in safe firms. Hence, if all workers are sufficiently risk-averse, none will work for risky firms, even though they can expect to be more productive there and earn higher average wages. Intuitively, by lessening workers' incentive to stay with their initial employer, labor market competition prevents risky firms from insuring their employees. This market failure, in turn, triggers an inefficiency in production, as workers will seek jobs in safe firms, where there is no learning about workers' quality and the untalented are kept on.

However, as noted by Pagano and Picariello (2017), this "double inefficiency" in risk sharing and in talent allocation can be avoided via public unemployment insurance. If each worker retained pays a contribution $(1-p)y_H$ and each one dismissed receives an unemployment benefit py_H, all employees in risky firms will receive a risk-free income stream py_H. Since this exceeds the wage that safe firms can pay, $\bar{y}$, risky firms can still attract all workers, irrespective of their risk aversion. Thus public intervention can restore efficiency, by providing insurance when risk sharing within firms breaks down because firms compete too aggressively for workers.

6.2. Learning about talent and employees' mobility

While in the model just set out employees could hinder learning about their quality by taking a job in firms where performance does not reveal talent, in Acharya, Pagano and Volpin (2016) workers can delay learning by moving to a new employer who is not able to observe their previous performance. In this model, the employees considered are managers who can be assigned either to a project whose payoff is talent-sensitive but highly profitable if well run or to a safe project with a low payoff irrespective of the manager's talent. Managers are risk-averse and differ in talent, labeled as "alpha", i.e. the ability to generate high returns without incurring high risks: lacking such talent, managers can generate high returns only by exposing their firm to the risk of substantial losses. But risk only materializes in the long run, so talent can be discovered only if the managers entrusted with talent-sensitive projects stay with their employer long enough.

In this setting, if managers were bound to their employer, then over time firms could determine which are talented and assign them to talent-sensitive (hence risky) projects while confining the untalented to safe projects. In the process, firms could insure managers against the risk of being found to be untalented. This would produce two efficiency gains: first, efficient project allocation (once skills are known, managers can be assigned to the project they are best suited for); and second, efficient risk sharing (managers who prove to be untalented can be cross-subsidized at the expense of the more talented).

However, as above, competition for managers can prevent both of these gains, as it enables managers to leave before the long-term risks materialize. Hence, the managers who are discovered to be talented will extract all rents from their firms by generating competitive offers that reward their talent, and so prevent firms from subsidizing untalented managers. Now, if firms assign managers of unknown quality to talent-sensitive projects (which they will do if on average such projects outperform alternative projects by a large enough margin), then the managers have an incentive to move to another firm before the risk materializes. Once there, they will replicate the same behavior.

In the aggregate, managers tend to churn from firm to firm, being assigned to skill-sensitive projects regardless of their ability to avoid the risks. Talented executives are identified only in the long run. Since talent discovery is not quick enough, the efficient allocation of managers to projects is impeded and too many projects fail relative to the case of no labor market mobility. So competition for managerial talent produces a negative externality: every firm effectively offers an "escape route" to the others' employees, slowing talent discovery and impeding the assignment of skill-sensitive projects to the few managers who can competently manage them, as well as preventing efficient insurance of managers' human capital risk.

The model generates several additional results. One is that the more risk-averse managers are, the stronger is their incentive to churn across employers to enjoy the implied insurance, and thus the more likely it is that untalented managers will be assigned to skill-sensitive projects: ironically, greater risk aversion of managers generates greater overall risk for society. Moreover, it turns out that frictions in the market for managers (e.g., search costs) and asymmetric information about their quality can actually mitigate inefficiency by reducing churning: reducing the competition for managers can be efficient, because it tends to restore firms' ability to offer insurance against human capital risk, while at the same time discovering their employees' skills and thus allocating them to their best use.

7. Whither firms' insurance provision?

The analysis in the paper highlights the economy-wide factors and the firm characteristics that constrain the scope of the insurance that employers implicitly provide to their employees. A natural question at this point is whether some of these constraints on firms' implicit insurance provision have become more stringent over time, so that currently employees can rely on it less than in the past. This section will review evidence that indeed points to a trend decline of risk sharing within the firm, but identifying the causes of this decline is not easy, because there are several potential "culprits", and some of them may in fact jointly account for the outcome.

7.1. Worldwide fraying of the implicit employment contract

Building on several studies of the U.S. evidence, over ten years ago Hallock already convincingly argued that we are witnessing "the fraying of the implicit employment contract". In his own words: "firms are more willing to lay off workers than they have been in the past. Layoffs have become more common, and there is some evidence that firms appear to be treating those layoffs as more routine. Job tenure has fallen, especially for older men in the private sector. Because an involuntary job loss has a powerful and long-term effect on income, employment, and health, workers have reason to be concerned that they are less protected against the risk of layoff than in the past" (Hallock, 2009, pp. 86-87).

It turns out that "the fraying of the implicit employment contract" is not just a U.S. phenomenon: throughout the world, the average firm's propensity to let shocks to sales impact its employment level has grown significantly between 1990 and 2013. This can be seen by estimating an employment growth regression where the "pass-through" coefficient is allowed to vary over time, based on the same cross-country firm-level panel data set used by Ellul et al. (2018):

$$\Delta n_{it} = \beta_t \varepsilon_{it} + \gamma' X_{it-1} + \phi' Z_{it} + \mu_j + \mu_t + u_{it}, \qquad (27)$$

where Δn_{it} is the change in employment in firm i in year t, β_t is the pass-through coefficient in year t, ε_{it} are idiosyncratic sales shocks, X_{it-1} are company controls,

Z_{it} are country controls (GDP growth, unemployment rate, etc.), μ_j are industry effects, and μ_t are year effects.

The estimated pass-through coefficient β_t, which is an inverse measure of employment security provided by firms in year *t*, is plotted in Figure 9 together with its 95-percent confidence bounds. The figure shows that in 1990-2013 the coefficient increased significantly: in 1990 on average firms allowed only 20% of sales shocks to pass through to employment variation in the same direction, but in 2010-13 they passed almost 40% on to employment levels. The increase is almost monotonic: there appears to be a trend decline in the employment insurance provided by firms.

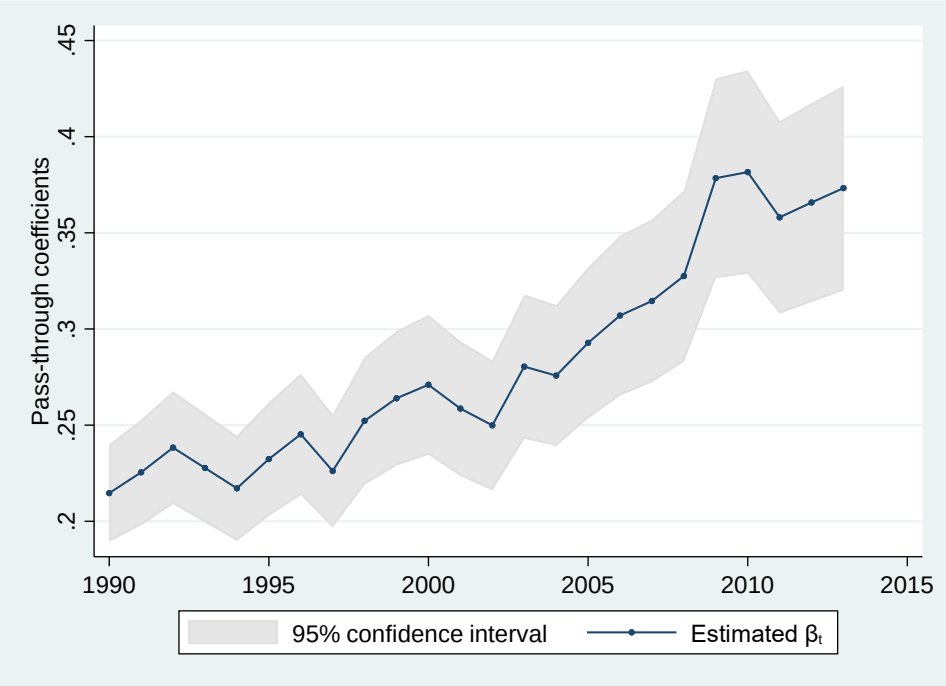

Figure 9. Estimated employment pass-through of sales shocks by year

7.2. Possible explanations?

In principle, the change in employment relationships documented above may stem from several, possibly complementary causes: (i) the increased frequency and severity of financial crises; (ii) the expansion of the public safety net; (iii) global competition;

(iv) technological innovation; (v) changes in the legal protection of employees against dismissal. In what follows, I explain why each of these forces may have played a role.

7.2.1. Financial crises

The last two decades have seen severe and widespread financial crises, which restricted firms' access to finance at the same time as they reduced sales. These crises may have forced firms to cut back on implicit employment insurance, by limiting their access to credit: recall that during banking crises family firms provide less insurance against idiosyncratic risk than in normal times (Section 4.1), and that financial distress reduces the job stability that firms can offer (Section 5). The evidence is indeed consistent with the hypothesis that financial crisis is a factor in reducing risk sharing within firms. If equation (27) is modified by interacting the sales shock ε_{it} not with year effects but with a "banking crisis period" dummy (equal to 1 in the years of financial crisis and in the subsequent year, to capture the persistence of the effects of crises, and 0 otherwise), the pass-through coefficient in crisis periods is estimated to be 0.33, versus 0.27 in non-crisis periods, and the difference between the two coefficient is statistically significant at the 10% level.[21] Thus the recent financial crises may have had some influence in the observed trend decline in firm employment insurance.

7.2.2. Stronger public safety nets

A second possible explanation for the trend decrease in employment stability offered by firms is that governments may have stepped up public unemployment insurance since the early 1990s: the generosity of public safety nets may have increased in response to more frequent and severe crises, and firms may have reduced their employment insurance accordingly, as suggested by several of the models and the evidence illustrated in the previous sections.

The data are consistent with this hypothesis: firms have reduced their insurance provision mainly in the countries where governments have provided more public unemployment insurance, in line with the substitutability already documented by Ellul

[21] Banking crisis periods vary across countries, and are taken from Laeven and Valencia (2012), who define a systemic banking crisis as one in which there are both significant signs of financial distress in the banking system and significant banking policy intervention measures in response to significant losses in the banking system.

et al. (2018). When equation (27) is estimated separately for the subsample of countries where the replacement rate of the unemployment insurance system increased by more than 3% between 1988 and 2014 and for the subsample where it did not, the trend increase in "pass-through" (i.e. the decrease in insurance provided by firms) is strong and statistically significant only in the former countries, as shown by Figure 10.

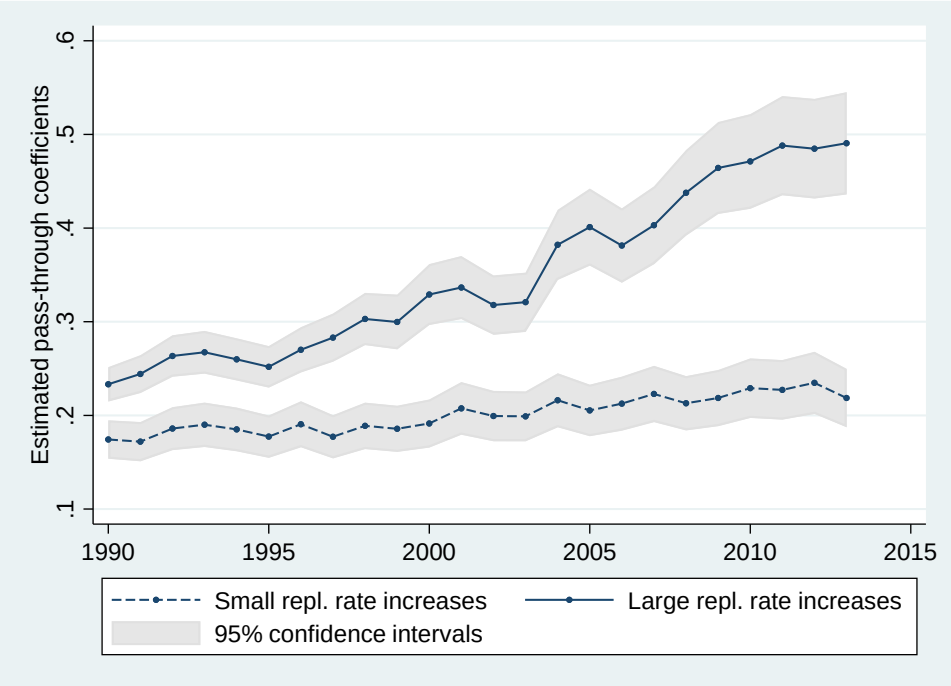

Figure 10. Estimated employment pass-through of sales shocks by year, in countries with over 3% increase in replacement rate and in other countries

However, this finding does not necessarily imply that causality runs from the generosity of unemployment benefits to firm-level employment instability. Instead, causality might run the other way: less provision of firm-level insurance could prompt regulatory reforms to protect workers from more frequent spells of unemployment. Alternatively, both trends could be driven by a third factor, such as the frequency and severity of financial crises, which could simultaneously prompt reforms extending public safety nets and impede firms from guaranteeing employment stability.

7.2.3. Globalization

The increasing pressure of global competition on firms may also have affected their relationships with employees. First, the penetration of imports from emerging countries (especially China) has eroded the profit margins and equity buffers of firms in advanced economies. This may have prevented these firms from engaging in labor hoarding as much as in the past when faced with adverse shocks, by limiting their ability to absorb the resulting losses.

Second, globalization has enabled (and indeed often induced) firms to shift a substantial portion of their production and employment to offshore locations. By increasing the distance between company headquarters and many of its employees, this is likely to have made implicit employment contracts harder to sustain. In fact, U.S. and European companies have offshored employment to emerging countries to take advantage not only of lower wages but also of greater flexibility in firing workers, due to laxer employment protection regulation in these countries. Moreover, being internationally mobile and less subject to local political and media pressure, when faced with losses from their foreign operations such employers are more likely to shed excess labor, slash wages and/or shut down plants to reinvest elsewhere than the typical domestic company.

However, globalization has also affected employment relationships in advanced countries, where cash-rich companies from emerging countries have acquired established but struggling rival companies, and have often later engaged in substantial layoffs in response to drops in demand or in order to cut costs. An example is the 2006 acquisition of the European steel maker Arcelor steelmaking group by Mittal, an India-based group. In December 2008, ArcelorMittal announced plant closings in the U.S. and from 2012 to 2014 it began curtailing its European production to match the reduced demand for steel, laying off employees and closing plants. In 2017, it led a consortium that successfully bid for Ilva, a state-owned Italian steelmaker with the largest plant in Europe, pledging a production increase and guaranteeing employment levels; yet in 2019 it started a legal battle to withdraw from the acquisition, shut down the plant and lay off employees.

7.2.4. Technological change

The past thirty years have also witnessed very pervasive technological innovation, especially via the increasingly widespread use of digital technologies. This has generated persistent shocks to firms' profitability, in many cases leading to the market exit of some firms and the entry and growth of others. In the process, increased reliance on digital technologies has redefined the set of available jobs (Acemoglu and Restrepo, 2020), eliminating a number of intermediate positions within firms (the so-called "hollowing out" of the occupational structure) and triggering the dismissal of workers whose tasks could be handled by robots or algorithms (Brynjolfsson and McAfee, 2014; Autor, 2019). Clearly, these technological shocks are far more persistent than those arising from cyclical changes in demand, so that it is much harder for firms to shield workers form the resulting impact on employment.

At times of fast and widespread technological innovation, the efficient re-allocation of capital and labor becomes more important for firms than in a more stable environment, and the need to raise fresh external capital to innovate increases the cost of insuring employees against shocks. In this situation, the conflict between the discipline provided by financial markets and the stability of employment relationships becomes more acute, and social norms may change so as to favor shareholders and break down stable employment relationships. In contrast, before the digital revolution, technology was more mature and stable, so that the risk-sharing benefits of implicit employment contracts were more important than their costs, and accordingly social norms developed to restrain the creative destruction induced by financial markets.

7.2.5. Weaker employment protection laws

As noted in Section 3.2, employment protection legislation (EPL) may also affect the job security offered by firms, either by simply constraining their ability to dismiss employees or by offering them a commitment device, whereby firms wishing to pledge greater job security could offer a regular contract rather than a temporary one. The stringency of EPL differs widely across countries, being higher in continental Europe, Japan and Korea than in the U.K., U.S., Canada, Australia and New Zealand.

But it can also vary over time as a result of legal reforms and changes in judicial enforcement.[22]

For many years, the Organization of Economic Cooperation and Development (OECD) has systematically collected and coded information about EPL in advanced countries (and increasingly also in some developing countries), producing comparable measures of EPL across countries and over time. Figures 11 and 12 plot two EPL indicators produced by the OECD. Specifically, the measure shown in Figure 11 refers to regular workers' protection against wrongful individual dismissals, while that in Figure 12 refers to the latitude of lawful employment of temporary workers.[23] Both measures range from 1 to 6. Each dot in the figures corresponds to one of 24 OECD countries, its abscissa corresponding to that country's average EPL from 1985 to 1999, and its ordinate to its average EPL from 2000 to 2013.[24] Hence, dots below the 45° line refer to countries whose EPL has decreased between the first and the second period, while the opposite applies to dots above the 45° line.

Most of the dots in Figure 11 lie either along the 45° line or slightly below it, indicating that EPL has been quite stable over time, with at most a small relaxation of regular workers' protection, especially in continental Europe. Instead, almost all the dots in Figure 12 are well below the line: with a few exceptions, OECD countries have significantly extended firms' freedom to employ temporary workers rather than regular ones. Interestingly, in both figures the dots that lie further below the 45° line are those further away from the origin: the reforms that relaxed employment protection laws occurred mostly in high-protection countries.

[22] In the United States, where workers are considered by default to be at-will employees, meaning that they may be fired at any time without cause (except in Montana), employment contracts may limit employers' ability to dismiss workers without cause, in which case dismissed employees may bring wrongful termination claims under the terms of the contract. Hence in the U.S. court decisions play an important role in shaping legal employee protection. Autor, Kerr and Kugler (2007) find that the adoption of wrongful discharge protection by U.S. state courts from the late 1970s to the early 1990s reduced annual employment fluctuations, as well the entry of new establishments in the adopting states.

[23] The two measures are respectively the variables EPRC_V1 and EPT_V1 from the OECD Indicators of Employment Protection, drawn from the data available at http://www.oecd.org/. The protection against dismissals of regular workers plotted in Figure 11 is a weighted average of indicators of procedural inconvenience, length of notice and severance pay for no-fault individual dismissal, and difficulty of dismissal (which measures the definition of justified or unfair dismissal, length of trial period, compensation following unfair dismissal, possibility of reinstatement following unfair dismissal, maximum time to make a claim of unfair dismissal). Instead, the protection against individual dismissals of temporary workers in Figure 12 is a weighted average of indicators measuring the extent to which firms can legally adopt fixed-term contracts, the maximum number of successive fixed-term contracts, and the maximum cumulated duration of successive fixed-term contracts.

[24] Except for Korea, Mexico, New Zealand and Tukey, where in the first interval EPL is measured from 1990 to 1999 in both figures.

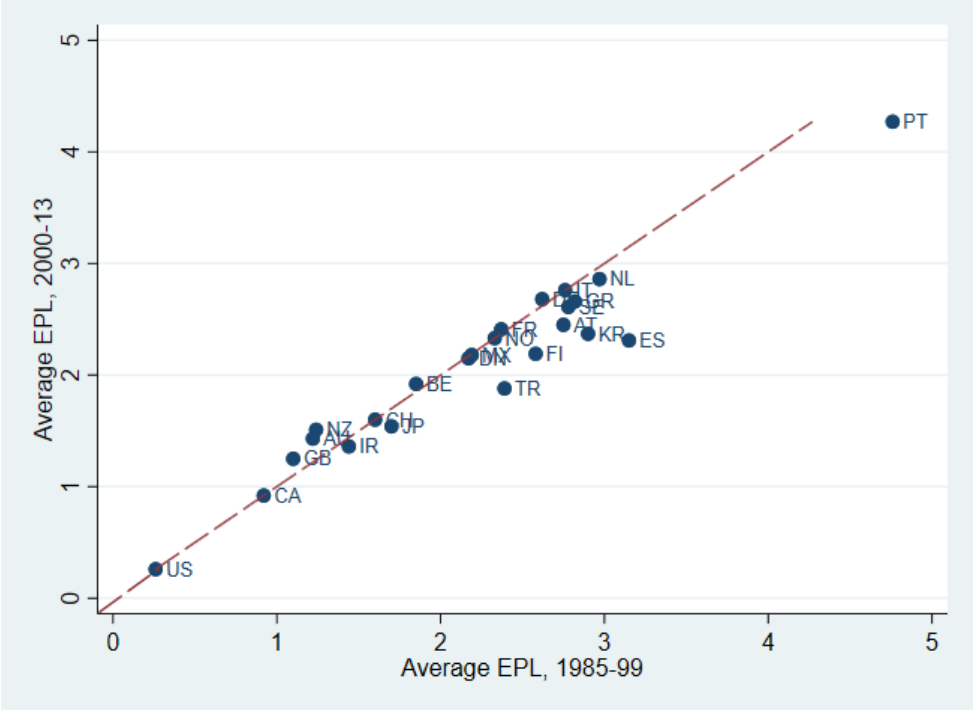

Figure 11. Legal protection of regular workers against wrongful individual dismissals, in 1985-99 (horizontal axis) and 2000-13 (vertical axis), OECD data.

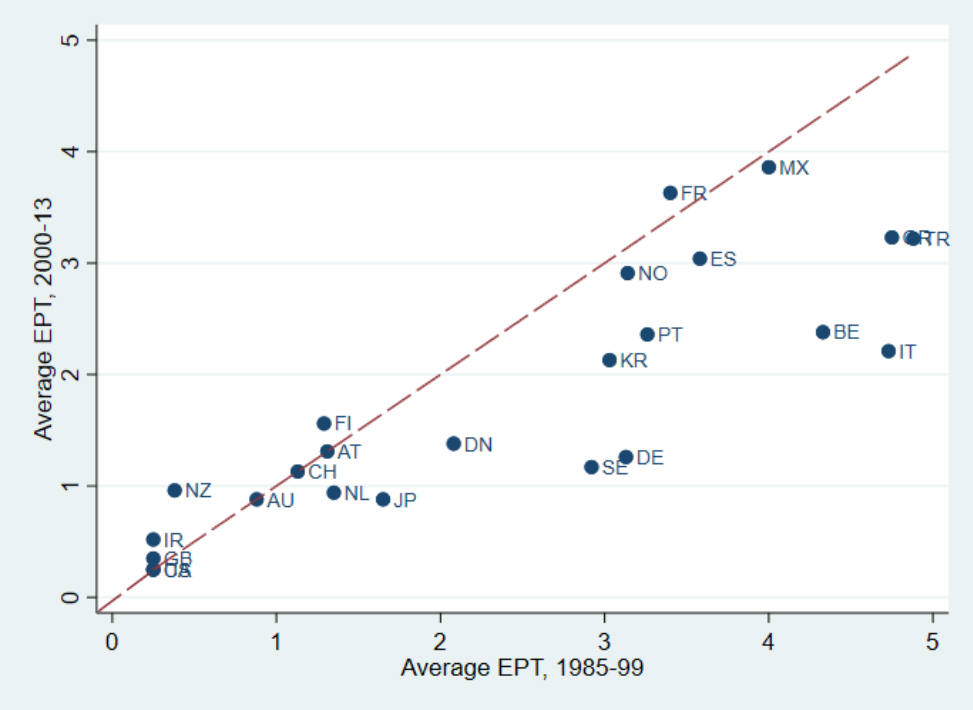

Figure 12. Latitude of lawful employment of temporary workers, in 1985-99 (horizontal axis) and 2000-13 (vertical axis), OECD data

Especially in Europe, the increased freedom to hire temporary workers has resulted in the creation of a “dual labor market”, where workers with full-time and permanent jobs keep being shielded by strict laws, while new entrants in the labor market are typically hired with temporary, part-time employment contracts. Highly protected workers with regular contracts are mostly senior employees, while less protected workers with temporary contracts tend to be junior employees with entry-level positions. The incidence of temporary employment has greatly increased in response to these changes in EPL: for instance, in Spain the fraction of employees under flexible employment contracts with low severance payments rose from 15.6% in 1985 to 33.6% in 1996, following the 1984 liberalization of fixed-term employment contracts (Dolado, García-Serrano and Jimeno, 2002). The higher frequency of fixed-term contracts and their lower firing costs relative to regular employment contracts has increased the volatility of employment by raising both hiring and firing rates (García-Serrano, 1998).

By now, temporary employment contracts have become prevalent in the European Union, rising from 37.5% of the total in 2000 to 56.9% in 2018, based on OECD data. This effectively enables firms to face a lower degree of legal employee protection, and gives them considerable freedom to downsize their work force: the workers hired with temporary contracts act as a buffer, as firms wishing to reduce employment can simply avoid renewing expiring contracts.

As for changes in the unemployment insurance arrangements, however, causality may not necessarily run from the change in regulation to firm-level employment instability. An alternative interpretation of the evidence is that, faced with the combined pressure of financial crises, globalization and technological innovation, firms could no longer provide the same standards of job security that they typically guaranteed in the past, so that legislators relaxed employment protection regulation to avoid widespread firm closures and the resulting unemployment. Hence, the reduction in EPL and in the employment stability provided by firms could be jointly driven by more fundamental changes in the economic environment.

8. Conclusion and directions for future research

This paper started by asking why firms provide insurance to their employees as part of an implicit employment contract, and what determines the extent to which firms do so. At a theoretical level, the key factors are (i) the availability of a public safety net, which substitutes to some extent for firm-level job security; (ii) moral hazard on the employees' side, which induces firms to weigh the labor cost savings from providing insurance to employees against its negative effects on their incentives; (iii) moral hazard on the firms' side, as implicit insurance provision requires firms to be able to commit not to slash wages or dismiss workers when hit by adverse shocks; and (iv) workers' wage bargaining power, which determines the extent to which job security leads to inflated wage demands rather than labor cost savings.

The interplay between these factors provides a rich set of empirical predictions. The paper has highlighted three of them, and reviewed the relevant evidence: (i) family firms provide more employment insurance than nonfamily firms; (ii) the former pay lower real wages, and (iii) firms provide less employment insurance where and when public unemployment benefits are more generous.

The paper has also explored the connection between risk sharing and firms' capital structure: greater leverage calls for high wages to compensate employees for greater job risk. In fact, the evidence shows that highly leveraged firms have to pay a wage premium as compensation for the human capital losses that workers expect to incur in bankruptcy. Moreover, highly levered firms find it difficult to attract new employees and are at greater risk of losing their most skilled workers, especially when they are close to distress.

Even though leverage reduces the job security that they offer, firms may want to lever up strategically in order to offset the bargaining power of labor unions. Hence, the distributional conflict between shareholders and workers can limit risk sharing within the firm. By contrast, bondholders and workers are not necessarily in conflict, as both are harmed by firms' risk-taking: in fact, there is evidence that the cost of debt for firms is lower when workers are able to monitor firms' risk taking.

In principle, firms may also insure employees against the risk due to uncertainty about their own talent, but their capacity to do so is constrained by workers' inability to commit to their employer: in the presence of labor market competition, high-talent

employees will leave unless their pay is commensurately high, making uncertainty about talent uninsurable. In this case, public unemployment insurance has an important efficiency role to play, since it can accelerate learning of employees' quality and thus their allocation across tasks, besides enhancing the allocation of risk.

Lastly, the paper offers evidence that risk sharing within firms has declined steadily in recent decades throughout the world. Several factors may have arguably been at work in conjuring this "fraying of the implicit employment contract", as it has been described by Hallock (2009) with reference to the U.S. evidence: the frequency and severity of financial crises, the expansion of public safety nets, global competition between firms and their growing cross-border span, the digital revolution, and the decline in the legal protection of employees in most countries. A narrative that could account for the evidence would go as follows: the combined pressure of financial crises, globalization and technological innovation has made it increasingly difficult (and in many cases impossible) for firms to provide the same standards of job security that they typically guaranteed in the past. Hence legislators realized that, in order to avoid widespread firm closures and layoffs, employment protection laws had to be softened, especially in high-protection countries, while the generosity of the unemployment insurance system was to be increased so as to shield workers from the increased dismissal risk. As a result, regulation moved towards "flexicurity" regimes of low job protection and high public support to the unemployed (Boeri, Conde-Ruiz and Galasso, 2012). Both of these regulatory changes may have in turn contributed to undermine implicit employment contracts.

In this area, there are challenging and barely understood issues waiting for future research. One is the relative importance of the financial, competitive, technological and institutional factors just described in determining the trend decline in risk sharing within firms in the last three decades. A related issue is whether the increased generosity of public unemployment insurance systems has fully compensated for the decreased guarantee of job stability by firms, or whether instead overall employment risk has increased. Of course, the answer to these questions may well differ considerably from country to country.

Another issue worth investigating is whether the decreased insurance role of firms is associated with greater or lesser productive efficiency: guaranteeing stable employment requires firms to withstand inefficiencies, at least in the short run, by

paying wages that exceed employees' marginal revenue product; but these losses may be more than offset by long-run efficiency gains, such as those stemming from the strengthening of workers' incentive to invest in firm-specific human capital or accept jobs that are more talent-sensitive, and hence riskier, but also more productive.

Finally, research is just starting to address an important development that is making firms' boundaries increasingly blurred, namely the growth of the gig economy and of alternative work arrangements that differ from typical employment relationships, even from temporary work contracts. For instance, the status of delivery riders and Uber drivers is somehow intermediate between that of employees and self-employed, leading to heated controversies among lawyers regarding the legal protection these workers are entitled to. The growing number of these workers is yet another factor reducing the scope for employment insurance by firms, given their loose relationship with their "employers" and their high degree of flexibility in managing their work. It remains to be understood how much employment risk these "solo self-employed workers" are left to bear. On the one hand, Boeri, Giupponi, Krueger and Machin (2020) argue that their status is intermediate between employment and unemployment, and that they "express a strong demand for social protection and are willing to pay even more than the rate charged to the traditional forms of employment in order to get some social insurance coverage" (p. 172). On the other hand, Paul Oyer has recently argued that the solo self-employed may be less exposed to employment risk than traditional workers: "if a company closes or has layoffs, some people will lose their jobs entirely, which is a much bigger disruption. People who might lose their full-time jobs in a down economy are at even greater risk than gig workers who might lose some, but not all, of their income".[25]

[25] "What an Economist Is Learning by Driving for Uber," https://www.gsb.stanford.edu/insights/what-economist-learning-driving-uber.

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