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Auteurs

Bruno DEFFAINS, Yannick GABUTHY, Eve–Angéline LAMBERT

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Faculté des sciences économiques et de gestion
Pôle européen de gestion et d'économie (PEGE)
61 avenue de la Forêt Noire
F-67085 Strasbourg Cedex

Secrétariat du BETA
Christine Demange
Tél. : (33) 03 90 24 20 69
Fax : (33) 03 90 24 20 70
demange@cournot.u-strasbg.fr
http://cournot.u-strasbg.fr/beta

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Labor Conflicts and Inefficiency of Relationship-Specific Investments: What is the Judge's Role?*

Bruno Deffains[†] Yannick Gabuthy[‡] Eve-Angéline Lambert[§]

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Abstract

This paper presents a model of litigation in the context of a labor contract. The main objective of our analysis is to determine whether and under which conditions it is efficient that the judiciary arbiters a labor conflict and how the judge's decision should be made in order to be optimal. We embed this idea by considering a relationship between an employer and his worker, in which they can make (non contractible) relationship-specific investments. The optimality here refers to the best investment incentives of the parties allowing to maximize the generated surplus. We derive conclusions about the judge's behavior giving right investment incentives and determine how the division of the surplus should vary depending on several economic and social parameters.

Keywords: Labor Law, Litigation, Investment Incentives, Bargaining.

JEL codes: C78, K31, K41.

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[†]BETA, CNRS and University Nancy 2; 13, place Carnot, F-54035 Nancy, France.

[‡]BETA, CNRS and University Nancy 2; 13, place Carnot, F-54035 Nancy, France.

[§]BETA, CNRS and University Nancy 2; 13, place Carnot, F-54035 Nancy, France.

"There are some respectable arguments in favor of (some) employment protection. One in particular is based on incomplete contracts. If workers sink some costs in the relation, say to spend some time and money training for job specific skills, firms, once the cost is sunk, may have excessive bargaining power. Firing costs may then reestablish the balance, and lead workers to invest the right amount in the relation.", Olivier Blanchard, *Employment Protection and Unemployment*, 1998.

1 Introduction

This paper proposes a contribution to the study of the "ex-ante" optimal design of an economy's institutional and legal environment. Globalization has led to an increased interest in the relationship between the legal and institutional design of societies and their respective economic performance (*e.g.*, Botero *et al.*, 2004; Caballero *et al.*, 2004; The World Bank Doing Business Report, 2006). Most of these studies insist on the design of the legal and institutional framework as a way to improve the efficiency of the firms' organization (Deffains and Demougin, 2006). The paper deals with legal proceedings governing labor relationships. More precisely, it focuses on individual litigation in labor law and mainly the judicial process in case of breach of a labor contract by the employer. The main question refers to the judge's role in such a context: is it important to have a coercive third party to solve a conflict between an employer and an employee? Or is it better in an efficiency perspective to limit the intervention of a third party? These questions are crucial but, surprisingly, they did not receive much interest in the literature. The main reason is that labor economics as well as industrial organization, when considering the regulation of labor relationships, generally focus on the role of the legislator and not on the way courts enforce labor law. This kind of discussion is typically the concern of the Law and Economics approach, but labor law has never been seriously investigated by the specialists of this approach.

The Employment Outlook report (1999) ranks OECD countries according to their degree of labor protection. This degree is a function of the difficulty to dismiss, the legal procedures in case of layoff, the amount of severance payments, etc. European countries that are, traditionally, the most protective of labor are Italy, Spain, Portugal, France and Germany.[1] In these countries, legal procedures in case of layoff are generally complex, take a long time and therefore, appear to be vague for contracting parties, specially for small firms.[2] This is typically the case in France

[1]See The Employment Outlook report, 1999, table 2.5, for country specific overall employment protection legislation (EPL) strictness in the late 1990s.

[2]In the paper, we will not distinguish between the terms "dismissal" and "layoff".

where the enforcement of the labor code by courts seems quite complicated. But it is also the case in other countries: Goerke et Pannenberg (2006) insist on the fact that the German regulation of labor is frequently perceived as "indefinite", implying a great scope for judicial decisions.

We propose to evaluate the effect of labor law enforcement on the firm/worker relationship, in which each party can make specific investments. Such investments may be of a wide variety and manifold. For example, investments by the firm can be in new productive technology (*i.e.*, physical capital), while those by the worker, in firm-specific skills and job training (*i.e.*, human capital). We develop a simple two-stage model to analyze this issue. In the first stage, the parties independently and non-cooperatively choose their respective levels of relationship-specific investments. In the second stage, a negative industry shock may occur with some positive probability, inducing a breach of the contract which implies that the parties negotiate over the *severance pay* requested by the worker (with the possibility to litigate in case of disagreement). The main objective is to determine the judge's optimal behavior when fixing the severance pay allowance if the parties go to trial. In other words, we are looking for the judge's decision that provides the parties with the best investment incentives. Notice that the judge's decision implies a "certain" division of the economic surplus generated by each party's investment. Using this simple framework, we show that the mere presence of a judge *in the background* of negotiations may entirely drive their outcome and prevent the partners from behaving opportunistically ex-post, thereby promoting efficient (second-best) investments ex-ante. The intuition underlying this idea is the following one. The size of the economic surplus depends on the equilibrium investments made at the first stage. The latter depend on the equilibrium distribution of the surplus between the two parties determined at the second stage, which, in turn, depends on the parties' relative bargaining powers that are in general influenced by their respective disagreement payoffs and hence by the court's behavior. In other words, the judge's decision may have distributive consequences influencing the parties' respective bargaining powers and, hence, the partition of the surplus. Finally, it matters for efficiency because it modifies the parties' incentives to invest. Furthermore, we show that the judge should take into account some economic, social, and institutional parameters which are central to the determination of the optimal distribution of the surplus.

The remainder of the paper is organized as follows. Section 2 displays some related literature's references. Section 3 lays down our model and studies the equilibrium implications of the judge's presence and potential behavior. Section 4 discusses our main results and concludes. For ease of exposition, all technical proofs

are relegated to the Appendix.

2 Related Literature

For a few years, new questions related to labor law, the efficiency of the judicial system and the role of judges in labor conflicts have arisen. On this latter point, the judges' decision criteria have been considered for a long time as a black box in economics. Recently, some attemps to determine how judges make their decisions have emerged through empirical studies on the judge's behavior. Ichino *et al.* (2003) show through an empirical analysis on Italian courts' decisions that when a firing litigation goes to trial, not only the characteristics of the case but also the local labor market conditions are taken into account in the courts' decisions. More specifically, they find that higher unemployment would induce judges to tend to be more favorable to workers (or symmetrically, less indulgent with firms), despite the fact that more serious cases for misconduct may be brought to them. Thus, judges would not be completely impartial but biased in their decisions by macroeconomic conditions. Likewise, Marinescu (2005) asserts the idea that judges would maximize the joint welfare of the firm and the dismissed worker, and tailor firing costs to both individual and local economic circumstances. Using UK employment tribunals data, she finds notably that the higher the unemployment rate, the more likely the unemployed dismissed worker is to win the case. These original studies highlight the existence of a (more or less strong) deviation of the judges' behavior from the law and this might explain in part why some economists currently plead for a limitation of the judges' role in labor disputes.

Blanchard and Tirole (2003, 2004) challenge both the importance of the judiciary and the role of the judge. They argue that in labor conflicts due to a layoff, the judge should not interfere in the decision of a firm to fire a worker. Their argument is that if the employer is willing to bear the firing costs, the judge's role should be simply to verify that the rules governing the firing procedure have been observed (*i.e.*, that law has been correctly enforced and administrative formalities respected). Thus, the judge should not be able to substitute himself to the judgment of a manager, because the former has neither necessary information nor the proper skills to make this kind of decision. In other words, the judge should be confined to pure legal questions and stay away from economic considerations. Following the same idea, Cahuc and Kramarz (2004) imagine a new "unique labor contract" which would allow to simplify the judge's role: their suggestion is to make the employer responsible for dismissals by establishing a "solidarity tax" due whenever firing a

worker. This procedure should enable the employer to make a firing decision exclusively on his own by taking into account the social cost of a dismissal that he would have to bear. In this context, the question of the fairness of firing (usually supervised, if need be, by a court) becomes irrelevant. As a result, the internalization of the dismissal's social cost would lower the judge's role. These analyses have then in common to recommend to restrict greatly this role. We do adopt a different view and argue that the mere presence of the judiciary may contribute to labor relations' efficiency, having thus a fundamental role in labor relationships.

A growing number of studies show that judicial decisions may have some ex-ante consequences in the context of work relations and possibly on labor conflicts. This argument comes originally from Mnookin and Kornhauser (1979) who highlight the fact that legal rules and courts' decisions for adjudicating disputes affect the pre-trial bargaining process that occurs between divorcing parties. The parties would use the legal framework provided by law when negotiating outside the court room (*i.e.*, "*in the shadow of the law*"). Applying this concept to labor conflicts, Goerke and Pannenberg (2006) show that the shadow of employment protection rules has an impact on the outcomes of dismissal conflicts in Germany. Both theoretically and empirically, they find that criteria defined by law regarding the entitlement and amount of severance payment affect significantly the magnitude and incidence of severance pay amounts decided or bargained between parties. For example, they show that an employee with personal characteristics such as greater tenure, more extensive alimony duties or higher age is more likely to receive higher severance payments. Malo (2000) models the determinants of severance pay for individual dismissals in Spain and shows that the legal framework determines severance payment through an ex-post (*i.e.*, after a negative shock) bargaining process between the worker and the employer.

Still focusing on this idea, other analyses have been interested in the welfare effects of employment protection, which is defined as the set of restrictions used to secure labor use.[3] Even if there is no unanimity about overall employment protection effects (especially on unemployment rate), it is often argued that employment protection legislation can encourage productivity enhancing investments through the stimulation of training investments, reduction of turnover, etc. Belot *et al.* (2006) study the opposite effects of employment protection, which implies costs (such as

[3]According to Addison and Teixeira (2003), "employment protection would cover dismissals protection [...], limitations on the use of fixed-term and temporary work agency contracts [...], the regulation of working hours [...] as well as additional labor standards as regulations on parental/maternity leave, posted workers, health and safety, equality of treatment of atypical workers, mandatory sick pay, worker representation rights, and minimum wages inter al."

firing costs) for employers who want to make readjustements in their workforce, but which also stimulates productivity enhancing investments from workers by protecting them from being fired. The authors build a model in which they put in balance adjustment costs and productivity growth, recommending a trade-off between them. The hold-up problem has been largely studied in the economics literature, especially on questions such as contract renegotiation whose prospect may induce one party to underinvest in relationship-specific capital (see, for instance, Hart and Moore, 1988).[4] This problem can also arise in case of termination of a relationship such as between an employer and a worker, especially in cases of dismissal and resignation. Ruehmann and Suedekum (2003) question the effect of severance payments on firm-specific human capital. Severance payments can increase workers' incentives to invest in such capital because, relying on a long-term duration of their job, workers are willing to fit the job as well as possible for their specific employer. But this can also have an opposite effect because, anticipating a severance payment when fired, the worker may perceive firing as less costly and this may reduce his incentives to invest in specific capital. The first effect joins the idea of Wasmer (2006) who highlights that high employment protection increases the probability that workers will choose specific skills (in opposition with general ones), notably because in raising the duration of jobs, it also raises the relative return to specific skills. Finally, Cahuc and Zylberberg (2000) find that in a framework where contracts are incomplete and may be renegotiated, increases in severance payments have a negative effect on welfare. Given that some separations are efficient, compulsory severance payments may prevent the parties from separating, even though the separation may be efficient in some cases.

Linking different strands of literature and adopting a positive view, we assert the idea that the problem of underinvestment in specific skills may be solved through the mere presence of the judicial system: the shadow of the judge's intervention, in case of disagreement on the severance payment, may induce parties in a work relation to invest in relationship-specific capital despite the risk of termination of that relation. Thus, our preoccupations are close to those of Belot *et al.* (2006) but we do not consider employment protection as a whole but highlight the role of the court's possible intervention in a positive way. Moreover, in our model, both parties (*i.e.*, not only the worker) are assumed to be able to make specific investments. Furthermore, our paper is an attempt to rehabilitate the judge in his functions. We show that his intervention is necessary in terms of overall economic efficiency: the

[4]See MacLeod and Malcomson (1993) and Tirole (1999) for surveys of the literature on incomplete contracts, specific investments, and hold-up problem.

fact that he takes an active part in judicial decisions (such as firing decisions) by considering economic criteria is desirable.

3 The Model

3.1 The Framework

We consider the relationship that exists between a firm f and its worker w. The parties are contemplating undertaking (non-contractible) productivity-enhancing, relationship-specific investments, which would increase the size of the aggregate surplus (or profit) that they can generate from their relationship. Before any investments are made, the firm and the worker produce one unit of output and the worker's wage agreement is $\overline{w}$, where $\overline{w} \in (0, 1)$. With this labor contract in place, the two partners interact over two dates. At date 1, the firm and its employee simultaneously and non-cooperatively choose their respective investment levels $I_f \geq 0$ and $I_w \geq 0$, which are sunk once they have been made. The cost to player i ($i = f, w$) of investing I_i equals cI_i, where $c > 0$ is his marginal cost of investment.[5] If the firm invests I_f and the worker invests I_w, then the output would increase by $\Pi(I_f, I_w)$, provided, of course, that the parties continue to work together. It is assumed that $\Pi(I_f, I_w)$ is increasing in each of its arguments, strictly concave, smooth and satisfies the Inada endpoint conditions. However, it is possible that once the investments have been undertaken and sunk, the parties cannot continue to work together. At date 2, we assume that two states of nature may be realized:

1/ The firm may incur some economic difficulties for exogenous reasons which oblige her to fire the worker.[6] This "bad" state of the world is assumed to happen with probability $q \in (0, 1/2]$. In that eventuality the firm and the employee try to find a *compromise* and bargain over the severance pay s that the employee will get.[7]

[5]For simplicity and without loss of generality, we assume that the firm and the worker have an identical and constant marginal cost of investment. This assumption has been introduced for algebraic convenience and could be relaxed without altering the gist of our arguments.

[6]An economic layoff is a dismissal due to the non requirement of or a reduced need for certain jobs resulting itself from an economic reason, such as economic difficulties, technological issues, the necessity of preserving competitiveness of the company or the end of the activity/purpose of the company.

[7]A compromise between a firm and a worker is a contract by which parties put an end to an existing dispute or prevent themselves from a dispute arising. This type of contract is widely used following up a layoff. This concerns especially skilled workers who negotiate over their severance payment under the threat of suing their employer for unfair dismissal if they cannot find a compromise: this practice is called "golden parachutes", taking the form of bonus, severance pay, stock

We adopt the Nash bargaining solution (NBS) to describe the outcome of these negotiations, in which the parties' payoffs from disagreement are identified with the threat points in Nash's bargaining solution.[8] If the parties strike a negotiated settlement on s, then the utility payoffs to the firm and the employee are respectively:

$$u_f^1 = 1 + \gamma\Pi\left(I_f, I_w\right) - s \quad \text{and} \quad u_w^1 = s$$

The firm gets the initial output (*i.e.*, 1) plus some part of the surplus and pays the severance payment s to the worker. The parameter $\gamma \in [0, 1)$ formalizes the degree of specificity of investments and captures the fact that the investments are more valuable inside the relation rather than with outside parties ($\gamma = 0$ is the most extreme form of specificity, and $\gamma \to 1$ corresponds to the least extreme form of specificity). In this context, layoff entails that only a fraction (and possibly none) of the benefits from the investments are obtainable (even if the parties are able to reach a negotiated settlement over s). In case of bargaining impasse, we consider that the labor conflict is resolved by litigation such that a judge is empowered to impose a severance pay allowance s_J. The disagreement payoffs are as follows:

$$d_f = 1 + \beta\Pi\left(I_f, I_w\right) - s_J \quad \text{and} \quad d_w = s_J, \quad \text{where} \;\; s_J = \lambda\overline{w} + \alpha\Pi\left(I_f, I_w\right) \qquad (1)$$

The parameter $\beta \in [0, 1)$ will be called the worker resentment factor and captures the extent to which the employee refuses to cooperate with the firm (until his effective redundancy) in the event he goes to trial. Given that $\beta < \gamma$, it may be noted that the disagreement point is Pareto-inefficient, since the sum of the players' disagreement payoffs is strictly less than the aggregate surplus from an agreement (which is $1 + \gamma\Pi(I_f, I_w)$). Indeed, it seems reasonable to consider that the failure to reach a negotiated settlement on their own and the fact that the conflict is resolved by a judge entails some degree of inefficiency for the parties. The severance pay allowance s_J imposed by the judge may be interpreted as follows. The first term of s_J is a lump-sum payment which does not depend upon the investment levels and increases with the existing wage, while the second term is some fraction of the economic surplus Π and increases with the investments made by the parties at date 1.[9] In

options or a combination thereof. It can appear as a clause in the labor contract or be decided when it ends.

[8]Muthoo (1999) discusses the strategic non-cooperative foundations of the Nash bargaining solution and, using various versions of Rubinstein's alternating-offers model, shows why, when and how to use this bargaining solution concept.

[9]We implicitly assume that the worker remains unemployed and does not receive employment benefits. This assumption allows us to focus attention on the factors that influence the determination of the judge's optimal behavior, and thus allows us to develop in a clean way the impact of

most countries, the employer is entitled to give the dismissed worker a severance pay which is based upon a redundancy payment scale (indicating the minimum amount the employee should receive). In real world, this scale takes into account several elements such as the number of completed years of service, the age, the weekly or hourly pay, or at least the minimum required under the national minimum wage regulations. In our model, the redundancy payment scale is captured by the term $\lambda\overline{w}$ (where $\lambda \in \Re_+$ is exogenously determined by the law) and is assumed to depend only upon the existing wage (for simplicity). Furthermore, in reality, if a fired worker contests the dismissal, fails to reach a settlement with the employer, and goes to trial, then the judge may impose a severance pay allowance which moves away from this minimal amount prescribed by the law. In our model, the legal intervention is captured by the second term $\alpha\Pi(I_f, I_w)$, where α is decided by the judge.[10]

2/ If the "good" state of the world is realized, with probability $(1-q)$, we assume that the firm does not incur economic difficulties. In that case, the parties continue to work in "harmony" with the labor contract in place and all of the benefits from the investments are obtainable. The utility payoffs to the firm and the employee are then as follows:

$$u_f^2 = 1 + \Pi\left(I_f, I_w\right) - \overline{w} \quad \text{and} \quad u_w^2 = \overline{w} \tag{2}$$

There are different core parameters in our model, which are central to the determination of the optimal judge's decision (α): the technological parameters as captured by the properties of the function $\Pi(.)$, the degree of specificity of the parties' investments (γ), the extent of non-cooperation by the employee when the parties fail to reach an agreement on their own (β) and the industry shock probability (q). Our main objective is to analyze and develop the role and impact of these parameters on the optimal court's behavior.

Before analyzing the main question of interest, we have to characterize the unique subgame-perfect equilibrium (SPE) of our two-stage game using the backward induction procedure. We therefore begin by determining the equilibrium bargaining outcome at date 2, conditional on an arbitrary set of investments chosen at

such factors. Furthermore, given that such unemployment benefits do not depend on the investments, this hypothesis could be relaxed without altering our results. This is because what drives a party's investment incentives are the *marginal* returns on investment, which are unaffected by fixed costs.

[10]Notice that, from a theoretical standpoint, the parameter α may take any positive or negative value (*i.e.*, $\alpha \in \Re$). However, it seems reasonable to limit the feasible transfers between the firm and the worker by considering that $\alpha \geq 0$ (*i.e.*, worker's limited liability constraint) and $\alpha \leq \beta$ (given that only a fraction β of the surplus is realized if the parties go to trial).

date 1.

3.2 Bargaining Outcome

Let (I_f, I_w) denote an arbitrary pair of investments undertaken at date 1. Applying the NBS in which the threat point is given by (1), it is easy to show that the Nash-bargained utility payoffs to the firm and the worker are respectively:[11]

$$u_f^N = 1 - s_J + \frac{(\gamma + \beta)\,\Pi\,(I_f, I_w)}{2} \tag{3}$$

$$u_w^N = s_J + \frac{(\gamma - \beta)\,\Pi\,(I_f, I_w)}{2} \tag{4}$$

These expressions can be interpreted in the following way. The parties agree first of all to give player i $(i = f, w)$ what he would obtain from not reaching an agreement, and then they split the remaining surplus. In particular, the presence (and possible intervention) of the court implies that the worker claims and gets the share s_J he would obtain in case of disagreement. The remaining surplus is split in such a way that the employer (worker) keeps a fraction $(\gamma + \beta)/2$ $((\gamma - \beta)/2)$ of it, and the worker gets the remainder. Notice that the firm's Nash-bargained share of the remaining surplus is increasing in β, while the opposite is the case with regard to the worker's Nash-bargained share. Furthermore, the two players Nash-bargained shares are increasing in γ. The intuition behind these observations is straightforward. If the worker is not prone to resentment when he is constrained to go to court in order to get an acceptable dismissal payment (*i.e.*, when β is high), then the firm obtains a large part of the realizable benefits from the investments and, as such, the higher are those benefits (*i.e.*, the higher is the value of β), the bigger is the difference between the firm's and the worker's disagreement payoffs, which, in turn, implies that the greater is the difference in the players' bargaining powers. Furthermore, the less extreme is the form of specificity (*i.e.*, the higher is the value of γ), the less each party is "held-up" by the other party and, then, the lower is the difference in the players' bargaining powers.

Recall that this bargaining stage occurs only if the industry shocks occurs (with probability q), while the parties continue to work together in the other state of nature (with probability $(1-q)$). It follows that the date 1 expected utility payoffs to the firm and the worker are respectively:

$$u_f = q u_f^N + (1 - q)\, u_f^2 \tag{5}$$

$$u_w = q u_w^N + (1 - q)\, u_w^2 \tag{6}$$

[11] Recall that the parties bargain over the severance pay only in the bad state of the world (that is, when the employee is fired).

Hence, using (2), (3) and (4), after simplifying and re-arranging terms, it follows:

$$u_f = 1 - [\lambda q + (1-q)]\,\overline{w} + \Omega_f \Pi\,(I_f, I_w) \tag{7}$$

$$u_w = [\lambda q + (1-q)]\,\overline{w} + \Omega_w \Pi\,(I_f, I_w) \tag{8}$$

$$\text{where} \quad \Omega_f = 1 - q\left[1 + \alpha - \left(\frac{\gamma+\beta}{2}\right)\right] \quad \text{and} \quad \Omega_w = q\left[\alpha + \left(\frac{\gamma-\beta}{2}\right)\right] \tag{9}$$

The player i's ($i = f, w$) payoff is a fraction $\Omega_i \in (0,1)$ of the economic surplus $\Pi(I_f, I_w)$, which implies that Ω_i defines i's bargaining power. Notice that the party i's bargaining power depends on the judge's behavior (captured by the parameter α), the degree of investments' specificity (formalized by γ), the worker resentment factor (captured by β) and the industry shock probability (which is modelized by q).

3.3 Equilibrium Investments

Having characterized the outcome of the date 2 negotiations over the partition of the surplus (for an arbitrary set of decisions made at date 1), we now proceed in the standard backward induction fashion and determine the equilibrium investment levels chosen by the parties at date 1. However, we first characterize the first-best (or Pareto-efficient) investment levels. The first-best levels of investments (I_f^e, I_w^e) maximize the aggregate net surplus which is given by:

$$S\,(I_f, I_w) = 1 + (\Omega_f + \Omega_w)\,\Pi\,(I_f, I_w) - c\,(I_f + I_w) \tag{10}$$

Thus, the first-best investment levels I_f^e and I_w^e are the unique solutions to the following first-order conditions:

$$(\Omega_f + \Omega_w)\,\Pi_1\,(I_f, I_w) = c \tag{11}$$

$$(\Omega_f + \Omega_w)\,\Pi_2\,(I_f, I_w) = c \tag{12}$$

where Π_1 (Π_2) is the first-order derivative with respect to I_f (I_w). The left-hand sides in (11) and (12) are respectively the *social* marginal benefits of the firm's and the worker's investments, while the right-hand sides denote their respective private (which are identical to the social) marginal costs.

The Nash equilibrium investment levels, denoted by I_f^* and I_w^*, are chosen to maximize $u_f - cI_f$ and $u_w - cI_w$ respectively (where u_f and u_w are defined in (7) and (8)). Therefore, (I_f^*, I_w^*) comprise the unique solution to the following first-order conditions:

$$\Omega_f \Pi_1\,(I_f, I_w) = c \tag{13}$$

$$\Omega_w \Pi_2\,(I_f, I_w) = c \tag{14}$$

The left-hand sides in (13) and (14) are respectively the *private* marginal benefits of the firm's and the employee's investments, while the right-hand sides denote their respective marginal costs. Given that $\Omega_i > 0$ ($\forall i = f, w$), the social marginal benefit from each party's investment strictly exceeds its private marginal cost. It then follows that the parties underinvest relative to their respective first-best investment levels.

Proposition 1. *Whatever the judge's behavior, the equilibrium investments are strictly less than the corresponding first-best investment levels.*

This underinvestment result comes from the fact that neither party is able to obtain - in the bargaining equilibrium - the full social marginal benefit from its investment. Ex-post bilateral monopoly plus bargaining yields each party to be "held-up" after investments are sunk by the other party. Anticipating this opportunistic behavior from the other side, it is clear that each party will have less incentives to invest. This hold-up problem arises in many other contexts (see, for example, Hart, 1995) and it is precisely for this phenomenon that the presence of a judge in the background of negotiations may have efficiency consequences. Indeed, since I_f^* and I_w^* depend on the judge's behavior (*via* the impact of this parameter on each player's bargaining power Ω_i; $i = f, w$), it is clear that this behavior will be crucial in determining the investment incentives. We now turn to address this main issue.

3.4 The Judge's Optimal Behavior

We analyze the issue of what entails the "judge's optimal behavior". The optimal α is the one that maximizes the equilibrium aggregate net surplus (or social welfare) $S(I_f^*, I_w^*)$, where $S(.,.)$ is defined in (10). As mentioned above, the equilibrium aggregate net surplus depends on the value of α indirectly, *via* its influence on the equilibrium investment levels. We write it as $S^*(\alpha)$. So, the judge's optimal behavior, denoted by α^*, is the value of α that maximizes $S^*(\alpha)$ and thus provides the partners with the best investment incentives. It is clear that the optimal α will provide relatively higher equilibrium surplus, and relatively smaller distortions of the equilibrium investment levels with regard to their first-best levels. The following result is useful in developing our subsequent analysis of the judge's optimal behavior.

Lemma 1. *For any* $\alpha \in [0, 1]$,

$$\frac{\partial S^*(\alpha)}{\partial \alpha} \gtreqless 0 \Leftrightarrow \Pi_{22}(\Omega_w)^4 - \Pi_{11}(\Omega_f)^4 \gtreqless 0$$

where Π_{11} *and* Π_{22} *are evaluated at the equilibrium investment levels.*

Proof. See Appendix A □

Since this expression is still rather intricate, not much can be said about α^* without imposing further restrictions on the function $\Pi(.)$. Therefore, we consider the widely used class of functions of the Cobb-Douglas type, namely $\Pi(I_f, I_w) = (I_f)^{\mu_f}(I_w)^{\mu_w}$, where $0 < \mu_i < 1$ $(i = f, w)$ and $\mu_f + \mu_w < 1$. These functions are smooth, strictly increasing and strictly concave; the parameters μ_f and μ_w capture the parties' productivities. Our main objective is to analyze the impact of these technological parameters and of the other parameters - mentioned above - on the judge's optimal role. Our main result is summarized in the following proposition.

Proposition 2. *Assume that* $\Pi(I_f, I_w) = (I_f)^{\mu_f}(I_w)^{\mu_w}$*, where* $0 < \mu_i < 1$ *(*$i = f, w$*) and* $\mu_f + \mu_w < 1$*. Then the optimal judge's decision is to implement* $\alpha = \alpha^*$*, such that*

$$\alpha^* = \frac{2(1-q) + q[\beta(1+\tau) + \gamma q(1-\tau)]}{2q(1+\tau)}$$

$$\text{where} \quad \tau = \sqrt{\frac{\mu_f(1-\mu_w)}{\mu_w(1-\mu_f)}}$$

Proof. See Appendix B □

While the hypothesis of this proposition restricts the class of applicable functions Π, such a restriction has been deliberately chosen to enable us to develop our main results and insights in a focused and tractable manner, and its implications are powerful.

Corollary 1. *The comparative productivities of the two partners for the generation of the surplus are a key force determining the judge's optimal behavior:*

$$\mu_f \gtreqless \mu_w \text{ (hence, } \tau \gtreqless 1) \Leftrightarrow \Omega_f(\alpha^*) \gtreqless \Omega_w(\alpha^*)$$

The intuition behind this follows from the fact that when party i's investment is more productive than j's $(i = f, w;\ j = f, w;\ i \neq j)$, then the optimal value α^* translates into a greater bargaining strength of i compared to j, which it will use to obtain a larger share of the economic surplus.[12] In other words, if the worker's investment productivity is larger than the employer's one (*i.e.*, $\mu_w > \mu_f$), then the

[12] To see this, substitute the optimal value α^* from Proposition 2 into (9) to obtain: $\Omega_f(\alpha^*) = \frac{\tau}{1+\tau}[1 + q(\gamma - 1)]$ and $\Omega_w(\alpha^*) = \frac{1}{1+\tau}[1 + q(\gamma - 1)]$.

"optimal judge" has to disadvantage the employer, such that the worker's share of the economic surplus Π generated from the two parties' investments increases (*other things equal*). This will cause the worker's investment incentives to increase, and the firm's incentives to decrease, so that $I_w^* > I_f^*$. The opposite is true if $\mu_w < \mu_f$. Following the same idea, if $\mu_w = \mu_f$, then the optimal value α^* is the unique value of α such that $\Omega_f^* = \Omega_w^*$. A judge adopting such a behavior ensures that the parties' payoffs from disagreement are equalized, that the bargaining powers are "harmonized", and that the economic surplus is split equally. This balancing out of bargaining powers is central to the provision of appropriate investment incentives to the two parties. Indeed, in such a context, the players cannot make strategic use of their threat points in bargaining situations they encounter throughout their labor relationships. Both parties are thus willing to invest optimally because the judge's presence protects each of them from expropriation by the other. This presence, when implementing α^*, creates a particular game between the partners in which the ability of individuals to engage in rent-seeking behavior is minimized. In summary, the possible intervention of a judge in negotiations over the severance payment may prevent the parties from behaving *opportunistically* ex-post, thereby promoting efficient second-best investments ex-ante.

However, the result stated in Proposition 2 says also that the judge, when choosing α^*, has to take into account the industry shock probability (q), the worker resentment factor (β) and the degree of investments' specificity (γ). Conducting a comparative statics analysis on α^*, it is straightforward to show that:

$$\frac{\partial \alpha^*}{\partial \beta} > 0, \ \frac{\partial \alpha^*}{\partial q} < 0 \text{ and } \frac{\partial \alpha^*}{\partial \gamma} \gtreqless 0 \Leftrightarrow \mu_f \lesseqgtr \mu_w$$

We note first that the optimal value of α is increasing in β. This implies that the more the firm is able to capture the benefits from the investments when the parties fail to reach an agreement (*i.e.*, the higher is the value of β), the larger should be the share of the economic surplus given by the judge to the employee. This relationship is consistent with the idea that a key force underlying the determination of the optimal behavior adopted by the judge concerns the tendency to equalize players' bargaining powers. In other words, an increase in β, which increases the employer's (original) bargaining power in his labor relationships, should be partially offset by an increase in α. In this perspective, giving a larger share of Π to the worker whose the (original) bargaining power is relatively lower than the employer's one is consistent with the aim of endowing the worker with greater bargaining power and thus inducing him to provide the optimal level of investment. Indeed, the

party i's ($i = f, w$) relative bargaining power determines i's marginal returns on its investment, which, in turn, determines its marginal incentives.

The influence of q on the optimal value of α may be interpreted in a similar way. The firm has relatively better investment incentives in the case where it does not incur economic difficulties (which is more likely when q is low), precisely because layoff implies that only a fraction of the returns from the investments are obtainable, even if the parties reach a negotiated settlement over the severance payment. Furthermore, the bargaining situation which occurs when the "bad" state of the world is realized (which is more likely when q is high) gives the worker the opportunity to explicitly hold-up the firm (where the degree to which he can do so is captured by the magnitude of the parameter β). On the contrary, such an opportunistic behavior is not possible in the "good" state of the world, where the employer appropriates all the benefits from his investment (since the partners continue to work together with the existing contract in place). Therefore, an increase in q, which decreases the firm's incentives to invest, should be offset by a decrease in the share α provided by the judge to the employee.

Finally, the link between α and the degree of investments' specificity γ is straightforward. The intuition underlying this relationship is the following one. The less specific are the investments (i.e, the higher is the value of γ), the more the employer is able to capture the returns from the investments when he is constrained to fire the worker. This in turn creates less incentives for this latter to invest and entails some degree of inefficiency, especially when his investment is relatively more important (*i.e.*, $\mu_w > \mu_f$). Under these conditions, the judge should compensate this perverse effect by harmonizing the parties' respective bargaining powers, restore the appropriate incentives to invest, and, for that, increase the employee's share of the economic surplus.

4 Concluding Remarks

This paper studies the impact of the judge's decision on the incentives to invest of two parties (an employer and a worker) embedded in a labor relationship. The aim of our analysis is twofold. First, it is to determine which role should be given to the judge in the settlement of labor disputes. The second question refers to how the judge should make his decision, that is, how much he should make one party prevailing over the other one in his judgment in order to provide both parties with the optimal incentives to invest. We show that the *mere presence* of the judge allows to give the right incentives to the parties. Indeed, his ex-post decision and its

determinants are not neutral ex-ante on the investments allowing to create a surplus: not only the presence of the judge but also his behavior are crucial in determining the overall efficiency of investments in human and physical capital. In a more general way, this paper answers to a currently important question: what should the judge take into account when making a decision related to a labor conflict? We highlight that the optimal share of the surplus the worker should receive ex-post depends on four crucial parameters: the industry shock probability (q), the worker's resentment factor in case of disagreement (β), the degree of investments' specificity (γ) and the investments' productivities (μ_f and μ_w).

A major interest of our analysis would be to compare different judicial systems, which could be possible by considering the definition of these parameters from an aggregated standpoint. For example, let us conjecture and interpret the industry shock probability as representing the economic conjuncture in a given geographic area. Our model says that the worse this conjuncture is, the more the employer should be advantaged by the judge in case of labor conflict (*i.e.*, the smaller the share of the surplus the worker should receive). In the same way, the worker's resentment factor captures the ability of the worker to decrease the surplus in case of disagreement and may represent, for example, the occurrence of a strike. From a macroeconomic point of view, evaluating the right of strike of the labor force (which may be formalized by the magnitude of β) would allow to infer recommendations regarding the optimal division of the surplus by the judge.

In this sense, this paper is in line with the empirical studies showing that the judges would be influenced by economic conditions when deciding over a labor conflict (Ichino *et al.*, 2003; Marinescu, 2005). Our analysis provides some theoretical (and normative) foundations to the empirical results of these studies, and contributes to the current works and/or recommendations about the place of the judiciary in labor relationships. In a sense, our analysis is also in accordance with some measures proposed by Blanchard and Tirole (2003, 2004), who recommend the firms to be financially responsible for their layoffs, the cost of which depending optimally, among other elements, upon their layoff rate. The difference is that, in our model, this contribution is made possible thanks to the existence of the judiciary, whereas these authors plead for an important limitation of the judge's role. The economic consequence of both analyses is to make firms liable of their layoffs, but in one case this is made possible by limiting the role of the judiciary, while in the other case it becomes possible precisely through the existence of the judiciary.

The question of who should implement the optimal severance pay allowance is also interesting. In fact, we implicitly assume in our theoretical framework that the

parameter α is decided by the judge and λ by the law, but one can also consider that both parameters appearing in the severance pay allowance may be decided by the legislator himself. For example, the values of α and λ could be mentioned in codes (such as the French labor civil code). In this context, the judge would be entitled to enforce these values and could not individually decide of the way to divide the surplus. In this case, he would have no discretionary power. However, this possibility does not challenge our analysis, in the sense that the question of the existence and design of an efficient judiciary remains relevant (efficient in that it allows to provide the parties with the best investment incentives). In either case, the presence of the judiciary and the judge is essential. Then, one way to determine in which extent the judge should be partially independent would be to analyze who (the judge or the legislator, for instance) can observe the most easily the parameters inducing the optimal share of the surplus given to the employee (*i.e.*, q, β, γ, μ_f and μ_w). The available information for the court to make the optimal decision must also be discussed. In the paper, we have assumed that these parameters are common knowledge and, then observable by the judge. Although counter-intuitive at first, one can argue that this assumption is realistic and empirically relevant. Indeed, it is consistent with the practice of justice in Civil Law countries as well as in Common Law ones.[13] Legal procedures generally imply that the parties' private information is conveyed to each other and to the judge (Froeb and Kobayashi, 2001). Of course, strategic behaviors are possible and the literature on conflicts' resolution insists on the importance of informational asymmetries to explain the "bargaining in the shadow of the law"(Bebchuk, 1984; Cooter and Rubinfeld, 1989; Kennan and Wilson, 1993). However, it is also shown that at the time the judge makes his decision, he has collected the relevant information concerning the case he has to solve.

Furthermore, we do not consider here possible "insolvency" problems by assuming that the firm is always able to pay the severance pay allowance to the worker. While this might seem inconsistent with the occurrence of a redundancy (due to economic difficulties), we may consider that laying-off one (or several) worker(s) will allow the firm to get back some assets (or at least to allege its liabilities), making it able to pay damages to the laid-off worker(s). Moreover, following footnote 9 (p. 9), this assumption may also be justified through the fact that some part of the severance pay allowance is a share of the surplus generated by the relation, which

[13]Even if procedures are quite different in the two systems (*i.e.*, inquisitorial versus accusatory), the court is provided with all relevant information at the time of its decision. Under an inquisitorial system, the judge plays an active role to collect information, whereas under the accusatory one, he receives the information collected by the parties.

means that the surplus makes this allowance in part possible. Furthermore, the occurrence of such a problem is often limited by law. For example, in French law, the employees are among the "privileged creditors" of a firm, which means that they are among the first creditors to be paid in case of insolvency. Nevertheless, it might be interesting to extend this model by introducing the possibility for a firm to go bankrupt and to see how this would modify the investment incentives of the parties and the behavior adopted by the judge.

Another possible extension to our model would consist to consider an endogenous layoff decision by the employer. In the paper, we assume that the occurrence of the industry shock is systematically followed by the worker's dismissal. It would be relevant to extend our analysis by considering the separation decision of the firm in order to study, in particular, the impact of the judge's behavior on the ex-ante employer's layoff decision.

Annexe A. Proof of Lemma 1

Using (7), (8), (9) and (10), we get:

$$S(I_f^*, I_w^*) = 1 + [1 - q(1-\gamma)]\Pi(I_f^*, I_w^*) - c(I_f^* + I_w^*)$$

where I_f^* and I_w^* are defined by the first-order conditions in (13) and (14).
Differentiating S^* with respect to α, we obtain:

$$\frac{\partial S^*(\alpha)}{\partial \alpha} = [1 - q(1-\gamma)] \left(\Pi_1 \frac{\partial I_f^*}{\partial \alpha} + \Pi_2 \frac{\partial I_w^*}{\partial \alpha} \right) - c \left(\frac{\partial I_f^*}{\partial \alpha} + \frac{\partial I_w^*}{\partial \alpha} \right) \tag{A.1}$$

Furthermore, by totally differentiating the first-order conditions in (13) and (14) with respect to α, we find:

$$\frac{\partial I_f^*}{\partial \alpha} = \frac{q}{\Delta} \left(\frac{\Pi_1 \Pi_{22}}{\Omega_f} + \frac{\Pi_2 \Pi_{12}}{\Omega_w} \right) \text{ and } \frac{\partial I_w^*}{\partial \alpha} = -\frac{q}{\Delta} \left(\frac{\Pi_2 \Pi_{11}}{\Omega_w} + \frac{\Pi_1 \Pi_{21}}{\Omega_f} \right) \tag{A.2}$$

where $\Delta = \Pi_{11}\Pi_{22} - (\Pi_{12})^2$, with all the first-order and second-order partial derivatives evaluated at the equilibrium investment levels. The strict concavity of Π implies that $\Delta > 0$ and the Young's theorem states that $\Pi_{21} = \Pi_{12}$ for all pairs (I_f, I_w).
After substituting for the derivatives of the equilibrium investments (stated in (A.2) into the right-hand side of (A.1), using the first-order conditions in (13) and (14) to substitute for Π_1 and Π_2, simplifying, and finally re-arranging terms, we obtain:

$$\frac{\partial S^*(\alpha)}{\partial \alpha} = \frac{c^2 q}{\Delta (\Omega_f \Omega_w)^3} \left[\Pi_{22} (\Omega_w)^4 - \Pi_{11} (\Omega_f)^4 \right]$$

The Lemma follows immediately since $c > 0$, $q \geq 0$, $\Delta > 0$ and $\Omega_i > 0$ $(\forall i = f, w)$.
■

Annexe B. Proof of Proposition 2

From the first-order conditions in (13) and (14), we obtain the following relationship between the equilibrium investment levels:

$$I_f^* = \left(\frac{\Omega_f \mu_f}{\Omega_w \mu_w} \right) I_w^* \tag{B.1}$$

It follows from Lemma 1 that for any value $\alpha \in [0, 1]$,

$$\frac{\partial S^*(\alpha)}{\partial \alpha} \gtreqless 0 \Leftrightarrow \frac{\Omega_f}{\Omega_w} \gtreqless \tau = \sqrt{\frac{\mu_f (1 - \mu_w)}{\mu_w (1 - \mu_f)}}$$

After substituting for the equilibrium values of Π_{11} and Π_{22}, by using (B.1) and replacing Ω_f and Ω_w by their values in (9), it follows that:

$$\frac{\partial S^*(\alpha)}{\partial \alpha} \gtreqless 0 \Leftrightarrow \alpha^* \lesseqgtr \frac{2(1-q)+q[\beta(1+\tau)+\gamma(1-\tau)]}{2q(1+\tau)}$$

Hence, given the strict concavity of $S(.)$, we have established that the stationary point $\alpha = \alpha^*$ is the point at which S^* achieves its maximum. ■

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