Cooperation and labour contracting: an intense relationship

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Abstract:

Whenever a labour contract is defined as an encounter between consenting parties, whatever the institutional context, the sole universal quality pertaining to that contract is its unrestricted duration (e.g. permanent contract). And to express this notion in terms of a dynamic model irrespective of any organisational or institutional structures, two additional conditions are both necessary and appropriate: a common intention (in this case their desire to enter into a contract) and the cooperation of all the parties involved in the contract. This cooperation (based on the concept of mutual trust) must be attained *ex ante* and sustained from one period to another, failing which the contractual gain incurred would be declared null and void. A kind of tactical game is then elaborated, based on an intertwining of transactional and relational aspects, in which trust is the basis for every new contract and ensures its duration even if the allocation of profits from one period to another may constitute a cause for conflict. A contract that is transactional and relational characterizes the global aspect of a joint enterprise in terms of the values and principles invested by its various participants. The contractual process provides the parties with an opportunity to actively define, by virtue of their mutual commitment, their general aspirations for such a relationship in terms of patrimonial or extra-patrimonial rights.

***Keywords*:** Labour contract, Cooperation, Relational, Transactional

JEL: K2, J3, C7

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There are a large number of legal institutions which, although operating throughout the world, are not truly legitimate in the universal sense. The (permanent) labour contract is a perfect example of such an institution. Distinct legal institutions such as *Common law* and German and Roman law deal with this type of contract in extremely different ways (Bessy and Eymard-Duvernay 1995). Since economic theory rarely tolerates its own analysis, as a rule no particular status is granted to the subject of labour contracts. Eric Brousseau (1993: 81) comments that "many neoclassical authors for example *find that contracts* aren't more *than a specific set of rules governing price rates and payment* given that the contract amounts to a monetary compensation mechanism.../...setting aside specific problematics - for instance how to define salaries from a macroeconomic stance - this type of approach only provides a very superficial insight into how in concrete terms economic agents interact". This analysis will essentially be limited to purely transactional and commensurable aspects.

The labour contract hinges on a triptych of commitments: of a material, a performance and a traditional variety. Each commitment carries its own particular contingent weight for each individual employer (representing the specific *alchemy* of each firm). Its non-financial aspects are often deemed insignificant; even though earnings constitute a necessary condition when formalizing by contract, they would not appear to constitute an adequate explanation for the contract's continuity. Analysts therefore concentrate more on the commitment to results (e.g. performance) since this is easier to quantify. Issues of material commitment (e.g. worker time in return for wages) and traditional commitments are rarely considered.

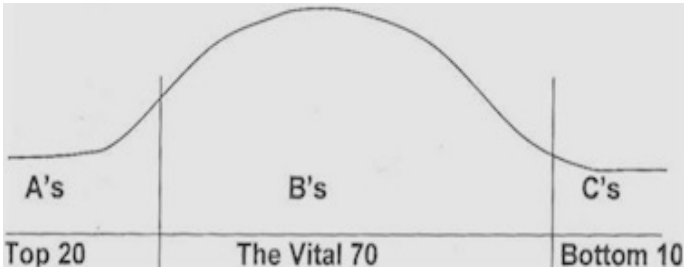
Yet, Authority (Simon 1951) or *Hierarchy* (Williamson 1975, 1985) do not perfectly prevent contractual incompleteness because frequently employers cannot observe all employees' actions. Indeed, if the employee's performance is observable, the employer assorts fixed wage with variable extra pay. This last is ordinarily indexed on the collective or individual effort.

An alternative consists in submitting work relation to a wages hierarchy. In such a case, promotions and pay raises occur when employees win tournaments organized between them (Lazear 1979, Lazear and Rosen 1981). But, when the employee's effort is unobservable, a tenure promotions' system (assorted with a lower pay, initially below marginal productivity but growing with the seniority) is more efficient (Lazear 1979, Salanié 1997)[1].

Therefore, an explicit long-term contract is conducive to efficient behaviour and the co-contractors select a specific optimal total investment. Some commitments are not always honoured because the cost of doing so exceeds the expected benefits given that the costs and benefits inherent to a transaction are uncertain when the contract is signed. Commitments are useful in dealing with this kind of problem by ensuring that a contract functions increase efficiency. Thus, contracting party use "stick and carrot" incentives.

For example, *Forced Ranking* management (also *rank and yank*) can be defined as an evaluation method to improve employees' performance. Managers are required to distribute ratings for those being evaluated, into a pre-specified performance distribution ranking to identify their best and worst performers (Cooper & Argyris, 1998: 480 and following).

[1] When the employer owns residual property rights that solve the problem for Grossman and Hart (1986: 691), Hart (1995: 76), for analytic criticism see also Chemla (1997).



Generally a bell curve with top performers (“A”) represented by one tail of the curve and low performers falling (“C”) under the other tail (e.g. for example, along a scheme of Top “A” 20%, Vital “B” 70% and Bottom “C” 10%,). Stick incentive consists in Laying off the worst (Least effective “C”), nothing for the intermediate and bonus (carrot) are given at the best performers (“A”).

Cooperative tactics can always be used in a non-cooperative game (trust is possible even in the absence of sanctions), but it is rather risky. Paradoxically, the most appropriate definition of *cooperation* is in fact a non-cooperative outcome in a non-cooperative game, hence *the prisoner's dilemma*. David Kreps (1990), in his reputation model, highlights that commitments (notably on the part of the employer) are not always sufficient to guarantee the stability of cooperation... Lynne Zucker (1986) points out that reputation generate a *process-based trust* since "*trust is linked to past exchange or expected exchange*".

"This type of market conception of the labour contract entails a precise *ex ante* definition of its clauses based on a number of quite specific variables. However in authority-based contracts, any regulation made to the relationship should be carried out ex post. This particular form of contract seems to be more flexible where there is uncertainty, particularly in extreme situations when contracts fall within the scope of an internal employment market associated with increasingly specialised tasks. Earnings, having been determined within the framework of pay

negotiations, are agreed in respect of the post held and promotion only occurs internally. Conversely when the economic environment fluctuates, greater horizontal coordination is more effective. Versatility is favoured when there is a higher degree of staff rotation and the hierarchical structure of the internal market is broken down into many related grades (Chaserant and Eymard-Duvernay 2003: 38-39)". Jean-Guy Belley (1998: 8) gives a good overview of the problematics in question: "...the contract carries out its functions in as many different forms as required by a given action's multiplicity of space and time. It operates according to a certain set of rules since the basic direction given to such exchanges must be coherent. .../... the contract comprises a combination of rules, cultural references, identities and strategies without which opportunities may be lost and resources may be wasted". Priority will therefore be given to this type of contractual arrangement following two criteria[1]:

1) The respective negotiating capacity of each party to the agreement (e.g. each party seeks to maximise the quasi-rent generated by the process of cooperation);

2) The environment (both competitive and institutional) governing collaboration (e.g. the different influences that incite the parties to maximize or not maximize the efficiency of their cooperation).

The aim of our resolutely microeconomic analysis is to observe *Homo contractus* as he really is, hindered by incomplete information and subjected to potentially different institutional constraints rather than as we would ideally like him to be (it is opportunist). Could it be that solidarity is nothing more than pure invention and trust a concept devoid of meaning? And yet, in one respect, labour contracts are often incomplete because employers are not able to be sufficiently objective when detailing all of the employee's duties to permit a third party, in the

event of conflict, to determine whether or not the terms of the contract have been observed (Malcolmson 1985). In another respect *the omnipresence of authority does not mean that authority is physically exerted in every transaction - this would resemble anarchy as much as slavery. It means that authority has been incorporated into certain procedural rules and that faith in these rules enables individuals and groups to function without fearing sanction providing they respect the rules when conducting economic transactions... the omnipresence of sovereignty is simply a function of futurity which lays down guidelines for present-day transactions in anticipation of the shape the exercise of power will take in the future. Futurity is the main principle of law and economics* ..." (Commons 1934: 696). Despite these constraints, how then can the emergence and persistence of cooperation be explained (1)? How can the legal framework be made endogenous to the model when faced with legal systems as different as Anglo-Saxon law and German and Roman law for example? In other terms who, in the absolute, is cooperating and why (2)?

From an ideological point of view, the saying "whatever is contractual is legitimate" prevails as regards contracts although these days, there is a decline in the theory of party autonomy as a result of greater intervention by legislators. Consequently, analytical difficulties arise from a *double bind* in which the individualism implicit in the contract gives way to a form of collective interdependence and collaboration... "Since they share a common economic fate and wish to preserve their business ties, the parties concerned tend to cast aside the conflicting climate of transactions and focus on concerted action instead. So, in the final analysis, cooperation embodies dominant values such as integrity and solidarity. […/…] The parties adhere to such values not out of virtue but out of contractual rationality based on a concern for greater economic efficiency!" (Rolland 1999: 915-916).

1 Cooperation and the long term

Harvey Leibenstein (1982) demonstrates through the prisoner's dilemma that there is, in the employer-employee relationship, a game theory situation. Each individual, driven by rational maximization, will adopt defensive behaviour when isolated {defection, defection}, as a Nash equilibrium and bargaining solution, and abandon the Paretian optimum principle {cooperation, cooperation} even though the latter guarantees higher individual gain. According to Jon Elster (1985) this dilemma represents the **ultimate** definition of both the problem of collective action and the antagonism between rationality and cooperation. The nature of a game is therefore not defined in terms of the players' behaviour but depends on the presence of a motorized mechanism (e.g. rationality guiding individual choices in a non-cooperative game) or an institutional mechanism (which constitutes a body authorised to sanction any failure to abide by the restrictive rules established in a cooperative game). These mechanisms ensure that commitments are honoured.

The prisoner's dilemma, on the other hand, repeated as an infinite-horizon game (or perceived as such), will have a tendency to elicit or sustain a sense of trust and confirm (among other things) that joint decisions {cooperation, cooperation} correspond to the Nash Equilibrium concept reiterated each time a "spot" game is played. Sustained commitment therefore influences behaviour and curbs any leanings towards opportunism. Eric Brousseau (1993: 88-89) finds that "*reputation has an effect on earnings as it has repercussions on the other agents' inclination to cooperate and also on their behaviour (suspicion ...). As outlined by Milgrom and Roberts (1988) "reputation raises the opportunity cost of opportunistic behaviour and thus attenuates opportunism*".

In *critical* transactions (featuring difficulties in establishing property rights unequivocally and free of charge) that are liable to incite opportunistic and strategic behaviour in the shape of shirkers (Alchian and Demsetz 1972: 780, Shapiro and Stiglitz 1984) or stowaways (e.g. *free riders*, Barzel 1989: 29) ... game theory attempts to *square the circle* (according to Binmore 1994: 173). In other words, to establish appropriate conditions for the emergence and persistence of cooperative behaviour as a source of optimal social stability. "*Globally speaking, problems concerning cooperative choices arise when joint strategies chosen by rational individuals lead to a strictly Pareto-ineffective result. If the outcome can indeed be improved for at least one of the players without affecting the result for the others, then it is indeed a cooperative strategy (both unstable and unfeasible on an individual basis) that should be adopted. By 'should' we mean reasonably rather than rationally* (Maître 1996: 129)".

In the prisoner's dilemma repeated as a finite-horizon game, an individual's rationality dissuades him from cooperating. Even though it benefits all parties (a shared increase in earnings and productivity), general cooperation would only appear to be present when there are lasting commitments. Consequently the distinction between a cooperative and non-cooperative game lies in its institutional context and not in the way the game is played. Cooperative tactics can always be used in a non-cooperative game (trust is possible even in the absence of sanctions), but it is rather risky. Paradoxically, the most appropriate definition of *cooperation* is in fact a non-cooperative outcome in a non-cooperative game. Hence *the prisoner's dilemma.*

David Kreps (1990a), in his reputation model, highlights that even when there is commitment (notably on the part of the employer) this is not always sufficient to guarantee the stability of cooperation... Lynne Zucker (1986) for her part points out that reputation is a means

of generating *process-based trust* since "*trust is linked to past exchange or expected exchange*". For Robert Axelrod (1984) finally, it is more difficult to make changes once habits are ingrained. It is therefore better to be *demanding* sooner rather than later. The sole flaw in the 'give and take' strategy is that it is only optimal over the long term. The transactional aspect of the contract is assumed to represent mutual awareness of the impact acts carried out in the present can have on the future. Thus each party adapts his course of action accordingly (e.g. by means of the appropriate strategy: opportunistic for a *"spot"* contract but inevitably cooperative for the long term). In order to both implement and uphold this strategy, Robert Axelrod puts forward five principles that could be described as *relational*:

1. Indicate a clear vision of the future (for instance mutual concession and its advantages).

2. Give information on the rules *(extra-patrimonial rights*) and the advantages (*patrimonial rights*) of cooperation on both an individual and collective basis in the long term.

3. Build up mutual trust by indicating the criteria for redistribution and inducing the contracting parties to take each other's concerns into consideration.

4. Develop a sense of empathy (e.g. one's ability to recognise the relational strategy of others).

5. Provide each individual with the capacity to understand the other participants' exchange strategies.

In this way, the relational aspects reinforce the transactional aspects of a contract with a view to mutual gain.

If we now suppose, while still speaking in general terms, that at least one of the parties (for instance the firm) must make an investment, it becomes apparent that long term contracting brings about efficient behaviour in decisions concerning optimal investment specific to both partners.

Let us set out that E and S (respectively Employer and Salaried worker bound by an employment contract) are joint producers of goods or of a service. If E is to gain from the contract that binds him to S, he must make an investment (i) particular to S (for example finance a training course for S, this being specific to S since training is associated with workers). For the sake of simplicity, let us consider two periods: the investment is made in the present period (p1) whereas productivity (and profits) will occur in the future (p2). The cost for S to provide the service stipulated in the contract by date p2 amounts to (c) (e.g. the cost of worker time). The profits gained by E from this contract for the future period (p2) are represented by E(i).

A long-term contract is in E's best interests. In the absence of a long-term contract in the present period (p1), when investment "i" is made, E runs the risk of losing his investment should S resign just before production in period p2.

Supposing that S does not resign and taking into account the investment "i" made by E, each party will gain a comparative advantage of [E(i) – c] which will then be shared out between the various partners according to Nash (this is one of several solutions that divides up into equal shares the surplus p = (E(i) - c)/2).

This results in E(i) - p = p – c

For the employer the net profit π of the contrast is: π=E(i)-p-i as p=(E(i)-c)/2

$\pi = E(i) - [(E(i) - c)/2] - i = E(i)/2 + c/2 - i$

The employer will therefore opt for investment i which will increase his profit margin:

$\partial\pi/\partial i = 0$ such as $\frac{1}{2} E'(i) - 1 = 0$ and if we set out $E(i) = \text{Log } i$ then $i^* = \frac{1}{2}$

If both partners jointly maximize their comparative advantage and halve the surplus, it becomes evident that the optimal investment total i* will be greater than ½ .

$\pi = E(i) - p - i$ therefore $\partial\pi/\partial i = E'(i) - 1 = 0 \rightarrow E'(i) = 1$

If we persist in expressing $E(i) = \text{Log } i$ we obtain $i^* = 1$. In this case, investment is double the previous amount.

A long term contract dated p1 at the same time as E makes his investment is a perfect incentive for E and S to cooperate and take advantage of the optimal investment total. Lack of efficiency comes from E's incapacity to obtain total return on his investment since in p2 S will not be able to produce as much income as E would like. A contract dated p1 solves the problem providing the sum to be shared p* is specified.

E opts to maximize: $\partial\pi/\partial i = E(i) - P^* - i$

Where $\partial\pi/\partial i = 0 = E'(i) - 1$ and if we write $E(i) = \text{Log } i$ then $i^* = 1$

An explicit long-term contract, therefore, is conducive to efficient behaviour on the part of the co-contractors in their choice of a specific optimal investment total. Certain commitments are not always honoured because the cost of doing so exceeds projected profits given that the costs

and profits inherent to a transaction are uncertain when the contract is signed. Commitments (or rather a myriad of commitments) are useful in dealing with this kind of problem by ensuring that a contract functions more efficiently. The major criticism aimed at neoclassical contracting by classical economists is based on a contractual analysis of good faith as being tacit and accepted as self-evident (e.g. it is guaranteed by the atemporal and transitive aspects of rationality). This, incidentally, explains how judges are able to interpret labour agreements based on these theories although there is always the risk of opportunism and the emergence of additional information.

In incomplete contract models, information between agents is presumed to be symmetric since contractual incompleteness is not related to asymmetric information between agents (thus differentiating these models from the normative agency theory). According to Kenneth Arrow (1987), incentive plans in the context of agency theory and incentives are often inapplicable due to development and management costs that are frequently neglected. Moreover, informational facts about agents and the potential for error concerning this information diminish when all the variables of the model (*ex ante and ex post*) are known, with one exception, whose liability to be affected by these possible states and laws of probability is already known... The concept of "under-information" on the part of agents is a *"myth"* which struggles to explain the existence of systems designed to compensate the failings of rationality and of radical informational and cognitive asymmetry frequent in human interaction. Similarly, asymmetric information between both the contracting parties and the third party responsible for the execution of contracts is not a fundamental notion conjured up by TCT to generate incompleteness, but merely serves to justify an individual's efforts to avoid court action (as this is long, costly, uncertain... and likely to cause an irrevocable breakdown in trade relations with irredeemable losses in idiosyncratic investments as a consequence). Williamson loses no time in modifying the positive impression he initially

perceived by recording conceptual differences (1996: 12) in the first instance and even, later, going so far as to quite openly criticise the incomplete contract theory (2000).

According to Eric Brousseau (1996) "Normative theory on contracts, incentive devices or perfect supervision mechanisms are all appropriate conditions for cooperation which in this example is defined as a renunciation of opportunistic behaviour. .../... In order to understand why agents who are basically opportunistic sign contracts that do not contain those incentive characteristics found in normative theory, it must be acknowledged that one of the roles incumbent to contracts is that they "symbolise" a commitment to cooperation. A basic degree of trust is thus established which sets up a virtuous circle of speculation, which in turn creates a climate of mutual trust conducive to cooperative behaviour, even though contract arrangements cannot eradicate opportunism. Having said this, the symbolic strength behind the concept of contracts lies in their credibility which is reinforced by the implementation of formal contractual mechanisms. These are especially designed to limit insignificant demonstrations of opportunism and to act as a means of discontinuing collaboration.

In our example of modelling below, cooperation is defined as the outlay of effort and investment over and above the *minimum levels* stipulated in the labour contract. It will be represented by an implicit, self-enforcing contract along the lines of Bentley MacLeod and James Malcolmson's (1989, 1993) efficiency wage contracts. In other terms, since the only basic minimum that can be verified by an arbitrator is generally limited to the amount of worker time spent in the work place, then if the employer wishes an increase in this time, he must be prepared to concede monetary *incentives* (e.g. on pay which is the least complicated incentive lever there is). There follows a study of the structure of earnings and bonuses that act as an incentive

arrangement in situations where the agent and principal need to foresee future productivity in relation to their actions in the present.

2 The Model: Employment contract as an iterated agency game

For hypothetical purposes, transaction costs will be considered as equals wherever country-specific institutional settings. Then, the fluctuations in potential bonuses will provide an insight into two institutional extremeness settings (e.g. Common Law and German and Roman law).

The employer's implicit desire is to increase productivity gains (in quality or quantity at a constant rate of effort), whereas the employee could maintain a constant level of output with less effort because *learning process* enhance performance. Indeed, this benefit may come from *learning by using, learning by doing, learning by sharing and learning by interacting* (emphasised for example by Arrow 1962, Dosi 1988, Rosenberg 1982, Lundvall 1995, and Dogson 1991).

In this instance, the payment of extra earnings (M) will increase cooperation (e.g. produce greater efforts than the conventional obligatory) and improve the employee's performance, yet it will at the same time incite the employer to non-cooperation and vice versa on the subject of redundancy payment (I).

In other words we use stick and carrot incentive tactics (e.g. like forced ranking process) to modelize.

A wage-earner "i" will perceive for the period t merit pay $M^i_t > 0$ with a probability of γ; he could be made redundant (thus necessitating the layoff) if he numbers among the least efficient

workers with a probability of (1-α). γ and α are chosen by the employer as $0 < \gamma < 1$ and as $0 < \alpha < 1$; β is the discount rate for the following period[2].

It is assumed that the scale-based productivity is constant and that the worker's productivity p at period t is such that $p_t > p_{t-1}$ as constant $\partial p/\partial t$ where ∂t trends towards 0, "all else being equal" assumption (e.g. *ceteris paribus*) and as $\partial p/\partial t > 0$ and $\partial^2 p/\partial t^2 < 0$ due to on-the-job training (and learning by sharing, by interacting…). Hence g productivity gains attained at a constant rate of effort over period $g_t = p_t - p_{t-1}$ as by hypothesis $\partial g/\partial t > 0$ and $\partial^2 g/\partial t^2 < 0$.

2.1 Range of strategies

Wage-earner "i" is said to cooperate when he produces the agreed effort, hence $p^i_t \geq p_0 \ \forall t$. The opposite applies where $p^i_t < p_0 \ \forall \ t$. The employee decides to cooperate during the first period t_0. At the next period t_{t+1}, he adopts a cooperative strategy when he is paid a bonus $M^i_t > 0$ (the employer acknowledges $p_{t+1} > p_t$) with a probability γ of being rated "A" or "excellent" or $M^i_t = 0$ (the employer acknowledges $p_{t+1} = p_t \geq p_0$) with chances as $(\alpha-\gamma)$[3].

A non-cooperative strategy on the part of the worker consists in investing only $pt_{+1} < p_t$ productivity in retaliation for planned redundancy. But an employer will dismiss a worker straight away if he ceases his efforts in order to avoid redundancy.

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[2] e.g. β demonstrates the agent's preference for the present.

[3] e.g. its relative output level is sufficient to remain in the "satisfactory performance" and to avoid the layoff that will hit them $(1-\alpha)\sum i$ last "unsatisfactory" employees with a forced ranking management.

The employer's cooperative strategy consists in determining (α, γ), allocating M_t and dismissing $(1-\alpha)\sum i$ workers, and vice versa in the event of non-cooperation. He will cooperate during the first period and will continue to do so as long as there is evidence of productivity gains.

The worker "i" can presumably make instant use of the formula: $u_i(a_s,a_e)= w_i+v_i(a_e)–z_i(a_s)$ (s for salaried worker, e for employer). Where w denotes earnings perceived, v(.) the satisfaction derived from the contractual relationship and z(.) the disutility associated with the worker's effort and investment. The strategy is cooperative when $a_s=c_s$ and non-cooperative when $a_s=nc_s$ (likewise for the employer, the level of non-cooperative effort and investment is minimal, thus $c_j > nc_j \ \forall j = s, e$).

Worker "i" decides on a particular level of effort and investment at each period as:

$$u_t(nc_s,c_e) > u_t(c_s,c_e) > u_t(nc_s,nc_e) \ \forall t$$

And,

$$\pi_t(nc_e,c_s) > \pi_t(c_e,c_s) > \pi_t(nc_e,nc_s) \ \forall t$$

If the game is restricted to just one period (one shot prisoner's dilemma), self-interest commends a non-cooperative course of action whereas joint cooperation is recommended in the common interest. Whenever the game is in repeated infinite horizon bargaining, numerous strategies, amongst which cooperative strategies, contribute to reaching a solution.

Thus $\mathbf{\Pi_t}$ is the profit expected by an employer (gained from t) collaborating with an employee with t seniority, and $\bar{\Pi}_t$ his expected reserve profit if he decides to dismiss the same

employee. Likewise U_t represents expected utility of a cooperative employee with t seniority and $\bar{U}_t$ his reserve utility[4] if he loses his work (Π^{nc}_t and U^{nc}_t respectively in the event of non-cooperation).

If the contract is broken, the employer has no difficulty engaging another worker who is prepared to cooperate at least for the first period. It is then possible to write $\Pi_t=\Pi_0 \ \forall t$. Therefore, the unemployment rate or starting salary are such that the worker would rather continue to work for his employer even without cooperation.

In accordance with the country-specific institutional concerned, the unemployed worker receives redundancy payment $I_t \geq 0$. The sum expressed as I_t is limited but increases with seniority. An employer will always prefer to dismiss a worker who fails to conform to his criteria of performance so as to prevent the problem from spreading and at the very least secure the constancy of G_t.

$I_t < \Pi_0 - \Pi^{nc}_t$ (2) and $U^{nc}_t > \bar{U}_t \ \forall t$ (3)

The worker's and employer's expected utility where they cooperate, are expressed as:

$U_t = u_t(c_s,c_e) + \beta(\alpha U_{t+1} + \gamma M_{t+1} + (1-\alpha)(\bar{U}_{t+1} + I_{t+1}))$ for the employee (4)

And,

$\Pi_t = \pi_t(c_e,c_s) + \beta(\alpha \Pi_{t+1} - \gamma M_{t+1} - (1-\alpha) I_{t+1})$ for the employer (5)

[4] The reserve utility corresponds to alternatives offered on work's market.

Cooperation will be established if the implicit contract verifies both the so-called participation and incentive constraints.

Participation constraints stipulate that the gains foreseen in a cooperative agreement are higher than reserve gains:

$U_t \geq \bar{U}_t$ and $\Pi_t \geq \bar{\Pi}_t \Leftrightarrow \Pi_t \geq \Pi_0 \ \forall t$

Incentive constraints guarantee that neither employer nor employee have any reason whatsoever to adopt non-cooperative behaviour as long as the other party cooperates:

$U_t \geq u_t(nc_s,c_e) + \beta(\bar{U}_{t+1}+I_{t+1})$ for the employee (6)

$\Pi_t \geq \pi_t(nc_e,c_s) + \beta(\alpha\Pi_0-I_{t+1})$ for the employer (7)

From (4) and (6) we can deduce that:

$\beta \geq \{u_t(nc_sc_e) - u_t(c_s,c_e)\} / \alpha(U_{t+1} - \bar{U}_{t+1} - I_{t+1} + (\gamma/\alpha)M_{t+1})$ (8)

The right-hand term indicates the utility expected from a non-cooperative strategy (being openly opportunistic) or even the “discount rate threshold" below which agents no longer have the slightest incentive to cooperate within the framework of the contract (e.g. the greater the incentive thresholds γ, the better their chances of being compatible with the worker's incentives).

Wage-earners would like $(u_t(nc_s,c_e) - u_t(c_s,c_e)) / (\gamma M_{t+1} + \alpha(U_{t+1} - \bar{U}_{t+1} - I_{t+1}))$ to be minimal and $(\alpha(U_{t+1} - \bar{U}_{t+1} - I_{t+1} + \gamma/\alpha M_{t+1}))$ to be substantial. The higher the payment I_{t+1} *the lesser the chances of reprisal for the worker* and, on the contrary, a strong M_{t+1} is a good incentive to

cooperate while the greater the trend of α to 1 (limited redundancy), the more inclined he will be to cooperate. The same is true when β is substantial (cooperation is rewarded). These effects are ambiguous since it is necessary to compare the sum of two products, γM_t and $\alpha(U_{t+1}- \bar{U}_{t+1}-I_{t+1})$ given that the employer alone decides on (α,γ).

For the employer of (5) and (7) the conclusion is:

$$\beta \geq (\pi_t(nc_e,c_s) - \pi_t(c_e,c_s)) / \alpha(\Pi_{t+1}-\Pi_0+I_{t+1} -(\gamma/\alpha)M_{t+1}) \ \forall t \quad (9)$$

From a symmetrical point of view the employer will cooperate all the more for redundancy payment being high and γ/α M_{t+1} being low (fewer bonuses at lower rates); and since like causes produce same effects, the comparison remains totally equivocal.

Cooperation (and efficiency) pay should be minimal for the employer yet remain compatible with the employee's incentive and participation constraints as:

$$U_{t+1}- \bar{U}_{t+1}=\{(u_t(nc_s,c_e)-u_t(c_s,c_e))/\beta\alpha\} +I_{t+1} -(\gamma/\alpha M_{t+1}) \quad (10)$$

The earnings pertaining to this period act on incentive through $\gamma/\alpha M_{t+1}$, reduced by redundancy payment I_{t+1} and disutility of effort $(u_t(nc_s,c_e)-u_t(c_s,c_e))/\beta\alpha$, in other words by means of $(z(c_s)-z(nc_s))$.

By inference $\{\hat{w}_0,\hat{w}_1,...,\hat{w}_t\}$ represents the earnings profile and $\underline{\Pi}_{t+1}$ profits that match the equation (10) as $\forall t$:

$$U_{t+1}\{\hat{w}_0,\hat{w}_1,...,\hat{w}_t\}- \bar{U}_{t+1}= \{(u_t(nc_s,c_e)-u_t(c_s,c_e))/\beta\alpha\} +I_{t+1}-(\gamma/\alpha)M_{t+1} \quad (11)$$

$$\beta \geq (\pi_t(nc_e,c_s)-\pi_t(c_e,c_s)) / \alpha(\underline{\Pi}_{t+1}-\Pi_0+I_{t+1}-(\gamma/\alpha)M_{t+1}) \quad (12)$$

It is far more difficult to assess the impact of I_{t+1} on employer incentives since there are two contradictory effects: an increase in I discourages the employee's cooperative attitude whereas an increase in M produces the opposite effect. It becomes evident from (12) that the higher $\alpha(\underline{\Pi}_{t+1}-\Pi_0+I_{t+1}-(\gamma/\alpha)M_{t+1})$, the greater the employer's cooperation. However, we can also see that the higher the probability of redundancy $(1-\alpha)$, the bigger the redundancy payments I_{t+1} (typically so in Europe) and the smaller the performance-related bonuses, the less the employer will cooperate.

Thus $\underline{\pi}_t\,(c_e,c_s)$ signifies profits associated with earnings $\hat{w}_t$; by recursion this may be rewritten as:

$$\Pi_0 = \sum^{t}_{k=0}(\alpha\beta)^{j}\pi_k + (\alpha\beta)^{t+1}\underline{\Pi}_{t+1} - \gamma\beta\sum^{t}_{k=1}(\alpha\beta)^{k-1} M_k$$

$$-\gamma\beta(\alpha\beta)^{t}M_{t+1} - \beta(1-\alpha)\sum^{t}_{k=1}(\alpha\beta)^{k-1}I_k - \beta(1-\alpha)(\alpha\beta)^{t}I_{t+1}$$

Hence

$$\underline{\Pi}_{t+1}-\Pi_0-(\gamma/\alpha)M_{t+1}+I_{t+1} = (1-(\alpha\beta)^{t+1})\underline{\Pi}_{t+1} + \gamma/\alpha((\alpha\beta)^{t+1}-1)M_{t+1} + (1-(\alpha\beta)^{t+1}+\alpha^{t}\beta^{t+1})I_{t+1}$$

$$-\sum^{t}_{k=0}(\alpha\beta)^{k}\pi_k + \gamma\beta\sum^{t}_{k=1}(\alpha\beta)^{k-1}M_k + \beta(1-\alpha)\sum^{t}_{k=1}(\alpha\beta)^{k-1}I_k \qquad (13)$$

2.2 Findings discussion

When the sum of bonuses in the second period is nil ($M_{t+1}=0$), does an increase of I_{t+1} incite the employer to cooperate?

$$\underline{\Pi}_{t+1}-\Pi_0+I_{t+1} = (1-(\alpha\beta)^{t+1})\,\underline{\Pi}_{t+1} + (1-(\alpha\beta)^{t+1}+\alpha^{t}\beta^{t+1})\,I_{t+1} - \sum^{t}_{k=0}(\alpha\beta)^{k}\,\pi_k + \beta(1\,\alpha)\sum^{t}_{k=1}(\alpha\beta)^{k-1}I_k$$

According to the utility function attributed to the employee, an increase in redundancy payment (e.g. severance pay) ΔI_{t+1} results in a pay rise of ($\Delta I_{t+1}=\sum_{i=1}\delta_i\Delta\hat{w}_{t+1}$) which represents the equivalent loss in profits ($\Delta\underline{\Pi}_{t+1}= -\sum_{i=1}\delta_i\Delta\hat{w}_{t+1}$), therefore $|\Delta I_{t+1}| = |\Delta\underline{\Pi}_{t+1}|$. Since only the first two terms of the equation depend on $\underline{\Pi}_{t+1}$ and I_{t+1} and since $0<\alpha^t\beta^{t+1}$, we can therefore draw the conclusion that $1-(\alpha\beta)^{t+1} <1-(\alpha\beta)^{t+1}+\alpha^t\beta^{t+1}$ with the result that ($\Pi_{t+1}-\Pi_0+I_{t+1}$) does indeed strictly monotonically increasing function of I_{t+1}. As a consequence, the probability of cooperation on the part of the employer increases with I_{t+1}.

These hypotheses are most evocative of the institutional systems operating in European countries.

Where redundancy payments are nil ($I_{t+1}=0$), as in the institutional system that exists in the United States and in certain other Anglo-Saxon countries, the unconditional probability of cooperation on the part of the employer increases with $\gamma/\alpha\ M_{t+1}$ but is only applicable to the first period since afterwards seniority is no longer rewarded by the growth of I_{t+1}. By determining α and γ employers can easily vary the benefit allocation system. In addition the threat of dismissal is particularly credible since it is costless.

$$\underline{\Pi}_{t+1} -\Pi_0 -(\gamma/\alpha)M_{t+1} = (1-(\alpha\beta)^{t+1})\ \underline{\Pi}_{t+1} -\gamma/\alpha(1-(\alpha\beta)^{t+1})M_{t+1} -\sum^t_{k=0}(\alpha\beta)^k\pi_k +\gamma\beta\sum^t_{k=1}(\alpha\beta)^{k-1}M_k$$

In terms of the utility function attributed to the employee, an increase in profits (ΔM_{t+1}) results in an equal increase in pay ($\Delta M_{t+1} = \sum_{i=1}\delta_i\Delta\hat{w}_{t+1}$) and thus in an equivalent profit loss ($\Delta\underline{\Pi}_{t+1} = -\sum_{i=1}\delta_i\Delta\hat{w}_{t+1}$) resulting in $|\Delta M_{t+1}| = |\Delta\underline{\Pi}_{t+1}|$. Since only the first two terms of the equation depend on $\underline{\Pi}_{t+1}$ and M_{t+1}, and in addition that $0 < \gamma/\alpha$ and $1-(\alpha\beta)^{t+1} > -\gamma/\alpha\ (1-(\alpha\beta)^{t+1})$

it emerges that $(\Pi_{t+1} - \Pi_0 - \gamma/\alpha M_{t+1})$ is indeed a strictly monotony decreasing function of M_{t+1} and that the probability of cooperation on the part of the employer decreases with M_{t+1}.

These two aforementioned cases are an illustration of employer-employee antagonism. When one party is institutionally *encouraged* to cooperate, the other chooses to defect a reciprocal love-hate relationship in spite of which the labour contract still manages to persist (e.g. *live long*) everywhere in the world[5].

Symmetrically, we can therefore deduce that $I_{t+1} = \gamma/\alpha M_{t+1}$ constitutes Nash equilibrium (Nash 1953) because parties share an equal benefit. Unless there were an exogenous shock that would seriously affect profits, there is no reason why either party should revise the joint choices they have made initially, since their common wish is that the α should *be as high as possible* (e.g. low layoff rate). The variables I_{t+1} and M_{t+1} have in some respects become exogenous to the model; as soon as one of them has been determined by the institutional framework (either through negotiation or coercion) it has an effect on the other γ/α, under the constraint of $\alpha \approx 1$ with the overall intention of maximizing the utility of both trade partners. According to Richard Posner (1986: 87)[6] "Each party, it is true, is interested in the joint profit; but the larger the joint profit is, the bigger the 'take' of each party is likely to be". Thus, accessory commitment is often indispensable to a useful execution.

The difference between the various legal systems doesn't prevent certain operational difficulties. For instance, if workers are rated in descending order from the top to the least productive without *onerous* consequences for the firm, where productivity is merely observable,

[5] Let's note that in all developed countries the percentage of employments caused by a labour contract represent the vast majority and that wage-earning's seniority is in the region of 9 years for the OECD (www.oecd.org).

how can *subjective* judgements be avoided? On what basis *non-productive* (white collar) work can be compared to *productive* (blue collar) work inasmuch as both are crucial to the smooth running of the firm?

3 Conclusion

At each period, if the different parties decide to contract (or pursue their relationship) they will find the necessary incentive to accept the contract by making concessions if they are required… Labour Contract implies parties collaborate, even if Common Law incites more the wage-earners to cooperate whereas they are employers with European's Laws (e.g. German and Roman Laws). This demonstrates the intrinsic that value the contract holds for both parties and the name of the game then resides in finding the payoff matrix which will lead to cooperation through incentives.

In this model, the differences that exist between the various legal systems have been *endogeneised* and the employee is not more risk averse than the firm. It is true to say that this process of contractual exploration, thus modelized. Firstly, because the environment's socio-institutional infrastructure acts as a component of the knowledge exchange's process; secondly, because is virtually identical to the innovative process[2]; finally, because relational and transactional aspects are indeed interwoven by a continuum, ranging from a very limited to an intense relational front (e. g. from discrete transaction or transactional contract to intertwined contract). The latter (relational) contracts put a greater emphasis on individuals (i), haves to adapt to the social environment (ii) and are durable, implying a certain notion of the long term and

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[6] See also Simon 1951.

requiring as a result a certain degree of flexibility (iii). In any case it is important to note the symbiotic nature of their transactional and relational aspects[3].

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5 Footnotes

[1] Also Bernardi and al. 1983, Salanié 1997, Brousseau 1993, Laffont and Tirole 1988, … Simon 1951.

[2] Because: It is a *process of problem-solving* within the firm (Dosi 1988, Dosi and al. 1988); It is an *interactive process*. The interaction can be either formal or informal within the firm between local agents or else with agents from a broader environment. In the specific example of innovation, these interactions incorporate the firm into a variety of networks (Kline and Rosenberg, 1986); It is a diversified *learning process*. It may come from *learning by using, learning by doing, learning by sharing, learning by interacting* (Arrow 1962, Rosenberg 1982, Lundvall 1995, Dogson 1991) and the socio-institutional infrastructure of the environment acts as a component of the learning process; It is *a process of learning and exchange of both coded and tacit knowledge*.

[3] This mathematical model doesn't exclude Ian Macneil's theory (1980: 39 and s.) and this ten norms common to the contractors (see also 1983, 1985).