

How do financial markets affect industrial relations: an institutional complementarity approach

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This article presents a simple formal model of institutional complementarity (IC) applied to industrial relations, and develops two important aspects of IC. We first develop a formal definition for the static and dynamic aspects of IC and then relate these to the interaction between financial relations and the outcome of a wage bargaining between firms and trade unions. Trade unions and firms have the choice between a cooperative negotiation targeting at the long-term success of the firm and a conflictual relation targeting at maximizing the current share. One important determinant in this game will be the time horizon financial investors have as they influence the realization of future gains of cooperation between workers and firms. When financial investors are patient, a pareto-superior cooperative equilibrium can be attained. On the other hand, whenever one of the two bargaining parties gets too weak, the viability even of the long-term equilibrium is threatened.

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1. Introduction

Systems of industrial relations are widely considered to arise out of the interaction between a particular type of labour–capital conflict on the one hand, and the coordinating national institutions that allow at least a short-term resolution to this distributive struggle on the other hand. How then can one make sense of the large diversity and the persistent difference between countries despite the common trends affecting unionization in a number of countries?¹ One answer would be

¹ About unionization trends, see Ebbinghaus and Visser (2000).

that institutional diversity is merely a manifestation of national folklore, with no consequence on the type of resolution of the capital–labour conflict or even the macroeconomic performance. But this position would basically amount to denying any influence of institutions on economics, a position difficult to defend considering the large amount of theoretical and applied works that conclude that institutions do play a role in economic dynamics.² This article tries to bring new light to the channels through which institutions may play such a role. By making use of the theory of institutional complementarities,³ we argue that one major dimension that interferes with coordinating institutions in the field of industrial relations is the type of financial relations that predominates in a particular country. Hence, our argument puts forward that the specific features characterizing a system of industrial relations in one country are not only the consequences of the institutional particularities pertaining to the realm of capital/labour relationships, but are also influenced by other institutions related, for instance, to the conflict between capital owners and the firm's management on the issue of corporate governance. More precisely, the type of influence that labour market institutions have on the capital/labour compromise are partly determined by other important institutional features of the economy which, although not directly concerned with the social compromise, exert an influence on the outcome of this compromise. In other words, institutions do not exert an influence on political economy equilibriums one at a time, but jointly. The joint influence of institutions on the labour and the financial markets cannot be reduced to their direct, individual effect on each market but have to be analysed as a system because of complementarities.

A vast empirical literature tries to disentangle the specific aspects of industrial relations (unionization, wage bargaining and coordination, corporatism, etc.) and their effects on particular measures of macroeconomic performance.⁴ In most cases, the results have been relatively disappointing, especially when benchmarked against the theoretical arguments. Some authors only found weak relationships, and often the detected relations do not seem to be robust to a change of the period under consideration or the number of countries included.⁵ As argued in Ernst (2004), part of the explanation for the weakness of the relations has to do with a missing

² The literature on the relation between institutions and economic performance is now so vast that one cannot pretend to give an exhaustive account. One may see for instance North (1990) on institutions and long-run growth, Boyer (2004) on institutions and growth regimes, Freeman (2000) on diversified capitalism, Esping-Andersen (1990) on the welfare state, Marsden (1990) on institutions and labour mobility.

³ On institutional complementarities, see Aoki (1994, 1996, 2000, 2001), Amable (2000, 2003).

⁴ See for instance Bassanini and Ernst (2002).

⁵ See Flanagan (1999) or Nickell and Layard (1999) for recent surveys.

dimension in the reduced-form regressions that have been used to detect the effect of industrial relations on economic performance. Some of the problems can be resolved in a straightforward manner by explicitly taking into account, for example, the importance of financial markets in the determination of industrial and macro-economic growth. This suggests that institutions concerning industrial relations and institutions of the financial sector are not independent, as argued by the various authors who insisted on the importance of institutional complementarities.

It is generally conceived that institutional complementarity stems from the interactions between the influences that different institutions have on agents' behaviour. One could simply conceive these interaction effects in standard terms of a general economic equilibrium. An institution affecting one market will affect other markets too through the interdependencies between different market prices and spillover effects. This will be the case if institutions produce positive spillovers in different markets and mutually enhance their respective beneficial effect. But such a view of complementarity would be too limited. Interactions between institutions not only affect prices on existing markets, they also affect non-price elements taken into account by agents even when markets do not exist. A specific institutional form may induce a certain type of behaviour from individual or collective agents, which in return will affect the behaviour of other agents. For instance, institutions that, taken together, raise the time horizon of actors or allow a better protection of specific investments on different markets would be said to be complementary while those that affect markets in opposite directions would not. Therefore 'local' institutions will not only have 'local' effects but will also affect the outcome in the whole economy.

Given these considerations, one can conceive two different definitions of institutional complementarity. The first one refers to a measure of performance. Two institutional forms are complementary when they push the economy towards a local optimum. Changing one form while leaving the other unchanged will lead to inferior systemic performance. The second definition of complementarity refers to the concept of dynamic stability. There is complementarity between two institutional forms when the existence of one form reinforces the existence of the other, without the need to refer to a concept of systemic performance.⁶

We apply this framework to a particular case of complementarity. This article analyses the impact of the firm's financing constraint on the pattern of industrial relations. The importance of the financing relationship in the institutional architecture of countries such as Germany and Japan on the one hand and the US and the UK on the other hand, has been emphasized in recent contributions (Aoki, 1994; Roe, 2003; Höppner, 2004). We choose to concentrate here on the impact of

⁶ See Amable (2003) for other definitions of institutional complementarity.

the financing relationship on the strategy choices of agents. The type of financial relationship between the firm and the capital owner or the financial markets will set a certain constraint on the firm's profitability, which will partly determine the firm's survival probability. This will, in turn, determine the management and the union's respective strategies and hence influence the outcome of the bargaining between these two actors. The mechanism linking the financial constraint to wage bargaining is based on the implied time horizon taken into account by each bargaining side. This time horizon will determine the pressure unions can exercise on the wage push. The shorter the time horizon, the stronger the pressure and the less important the firm's viability for the union's wage negotiation strategy will be.

The paper is organized as follows. The next section briefly discusses the evolution and main characteristics of some national industrial relation systems. We then present a short discussion of the concept of institutional complementarities. In Section 4 we set up a formal model for which we present the strategies of management and trade unions in Section 5. A final section concludes.

2. National systems of industrial relations

A particularly relevant field of application for the theory of institutional complementarity concerns the analysis of industrial relations. Wage (and employment) bargaining strategies pursued by labour unions and employer organizations are largely influenced by historical experience as well as by political configurations. One may speak of a certain 'style' of industrial relations, which sharply characterizes countries, shapes the expectations of the participating actors and affects their decision-making. In this respect, the different national models observed in Europe emerged some time between the end of the 19th century and the beginning of the 20th century, and have endured until now without major changes.

Crouch (1993) distinguishes between a model of 'extensive neo-corporatism', which presupposes strong and centralized unions, seemingly characterizing a large part of the history of Austria and the Scandinavian countries, and the simple model of neo-corporatism, characteristic of the German case, where unions are *relatively* weak but endowed with a strategic capacity. These two models are clearly different from both the 'pluralistic bargaining' model, where labour unions are strong but favour short-term objectives, which seems to represent adequately the case of Great Britain, before the 1980s at least, and the 'contestation' model typical of the French case, with weak unions and conflictual industrial relations.

'History matters' so much in defining patterns of industrial relations that one could imagine the diversity of national trajectories being explained in reference to the diversity in the national initial conditions: the variety of national characteristics in terms of religion, political compromises or patterns of economic development can account for the diversity in models of industrial relations just referred

to above. However, one may raise some questions regarding this inertia in reference to the concept of institutional complementarities.

The concept of institutional complementarity allows for a theoretically grounded interpretation of the fact that there exists a persistent diversity of 'models' of industrial relations. If the strategies of labour unions and employer associations are related to the institutional parameters that characterize the whole economic system, reasons related to systemic coherence could indeed thwart the tendency to convergence, which would derive from a possible 'superiority' of one model compared with others.

Therefore, we shall explain the persistence of a variety of 'styles' of industrial relations with the links between the respective strategies of trade-unions and employers and the relative power of labour and capital on the one hand and the mode of financing and pattern of corporate governance of the economy on the other hand. The formalization that we present is very simple: it concerns a limited number of institutional factors, while the concept of complementarity, which we will discuss in the next section, concerns the whole institutional architecture. The model, which was conceived to indicate the operating character of the concept of institutional complementarity, aims less at being an exhaustive explanation of the reality than an exercise in method. It is more about showing how the concept of institutional complementarity can intervene in a formal treatment of the topic of institutional diversity rather than proposing a comprehensive treatment of the relations between labour unions and employers' associations.

Nevertheless, the study of the links between the strategies of the different social actors and the mode of financing of the economy, supplies a theoretical interpretation of the variety of the systems of industrial relations with Europe. The four 'ideal types' that we evoked (Crouch, 1993) occupy the four cells of a matrix that differentiates unions on the basis of their bargaining power and the weight given to short-term *versus* long-term objectives (Table 1).

Empirical evidence shows that the relative bargaining power of capital and labour cannot alone explain the diversity of models of industrial relations. Why, for instance, would a relatively weak union choose to privilege short-term results in a given country, while a similarly weak union in another country would favour the long-run consequences of its action? Problems in answering this question are an

Table 1 Four types of industrial relations systems

Labour unions	Weak power	Strong power
Short term objectives	Contestation (France)	Pluralism (UK)
Long-term objectives	Neo-corporatism type 1 (Germany)	Neo-corporatism type 2 (Austria, Scandinavia)

echo of the difficulties met when trying to econometrically assess the impact of labour market institutions on macroeconomic outcomes. The model we present now allows us to give an answer to this type of question, as well as to supply some hypotheses on the future evolution of the systems of industrial relations in Europe.

3. Institutional complementarity

The concept of institutional complementarity has appeared in the recent economic literature dealing with the importance of institutions in the economy in general and the diversity of capitalism in particular.⁷ It extends the institutionalist approach in economics. The basic institutional approach supposes that institutions affect the economy and influence both short-term and long-term economic performance. Institutions may be considered as economic actors—i.e. players if one refers to a game-theoretic framework—rules of the game or equilibrium strategies adopted by players. In any of these three cases, institutions will shape the outcome of the game.

The notion of institutional complementarity goes one step further by considering the joint influence of institutions. One needs to take into account not one but several areas where institutions are likely to have a determining influence. Institutional complementarity is present when the existence or the particular form taken by an institution in one area reinforces the presence, functioning or efficiency of another institution in another area. A widely used example considers the domains of industrial relations and the financial system. Consider two possibilities for institutions in each area: a decentralized or a centralized mode of wage bargaining for the area of industrial relations, a market-based or a bank-based system for the financial area. Without complementarity, four different types of economic systems are *a priori* possible, combining the different possibilities for each different institutional domain. An often-told story⁸ reduces the possible variety to two cases: (i) a combination of a decentralized wage bargaining and a market-based financial system; (ii) centralized bargaining associated to a bank-based financial system. The rationale for complementarity is that in the former case, decentralized bargaining favours short-term strategies for each side and lack of involvement in the employment relationship, which has consequences for skill acquisition. This choice in favour of reversible arrangements is facilitated by the fact that the market-based financing relationship itself promotes reversibility and flexibility between lender and borrower. In the latter case, centralized bargaining favours long-term strategies and both sides invest in the relationship, for instance in terms of specific skill

⁷ See for instance Aoki (2001), Amable (2003).

⁸ For instance in Hall and Soskice (2001).

Table 2 The performance matrix

Institutions	A	A'
B	Ω_{AB}	$\Omega_{A'B}$
B'	$\Omega_{AB'}$	$\Omega_{A'B'}$

acquisition. This bilateral investment is made possible by the fact that the bank-based financial system supplies 'patient capital' (Albert, 1991), i.e. allows social partners to devise long-term arrangements. In both cases, the important point is that each institution reinforces the influence of the other institution.

From a more general point of view, one may actually distinguish two different notions related to institutional complementarity. Let us once again consider two different institutional domains (financial system and industrial relations, education system and research and innovation system, etc.),⁹ with two possibilities for institution forms in each domain: A and A' for the first institutional domain; B and B' for the second one. If the first domain is, for instance, the employment relationship, A could represent a centralized pattern of wage bargaining and A' a decentralized pattern; B could be a bank-based financial system and B' a financial markets-based system. Let us consider Ω —as a measure of performance, for instance the production level or total employment—for an economy with any two institutional arrangements. The performance matrix is then given by Table 2.

In a traditional game-theory setting, one would not consider a criterion for overall performance Ω , but rather individual payoffs, which will be done later on. A first notion of institutional complementarity ($compl_{\Omega}$) can be defined as:

$$A compl_{\Omega} B \text{ iff } \Omega_{AB} > \Omega_{A'B} \text{ and } \Omega_{AB} > \Omega_{AB'}$$

This means that institutions A and B are complementary if and only if the output (measuring performance) obtained in the presence of both A and B is greater than when A is combined with institution B', or B combined with A'. In this notion of institutional complementarity, the overall performance declines when one changes one institution, leaving the other unchanged. This is akin, but not identical, to a notion of stability of the institutional arrangements.

So far, nothing has been said regarding what the 'best' institutional arrangement could be. One may compare the diagonal or not, which amounts to questioning whether Ω_{AB} and $\Omega_{A'B'}$ are local or global maxima. One may remark that this notion of institutional complementarity is only defined in reference to a measure of performance.

⁹ This restriction is made for exposition purposes; nothing prevents the consideration of more than two institutional domains.

Another notion related to institutional complementarity is that of dynamic compatibility. With the same institutional setting as above, institution A and institution B are complementary to each other if the presence of one institution implies the presence of the other:

$$A \Rightarrow B \quad \text{and} \quad B \Rightarrow A$$

This time, it is not so much a comparison in terms of performance, or at least not economy-wide performance. A is complementary with B when A and B constitute a stable combination. Such a combination may not emerge, as agents may not define their strategies with respect to a general performance indicator such as Ω for instance, but in reference to their own individual payoffs. In this case, the presence of the specific institution A (B) would lead agents to adopt strategies leading to the adoption of institutional form B (A). This could either be the outcome of a decentralized, individual choice, or the result of a political process of building alliances between different social groups and making compromises over issues concerning all groups.¹⁰

This dynamic notion may explain why history matters in institutional configurations. Initial conditions and the dynamics of compatibility/complementarity of institutions give particular trajectories for economic systems and generate several varieties of capitalism. We will apply this general framework in the next section and consider a formal model of institutional complementarity.

4. A formal model: the set-up

We now turn to the issue of the complementarity between finance and industrial relations. We aim at two different but related objectives.

- (1) We can come back to the discussion of Crouch (1993) about the diversity of systems of industrial relations. We can show that this diversity can be related with complementarities with other institutional forms, in this case those in finance.
- (2) We can apply the concept of institutional complementarity developed above to a specific example.

Of course, the two objectives are compatible to a certain extent. There is a need for a model that is able to incorporate the major features of the institutional areas we choose to investigate, yet simple enough so as to clarify the theoretical concept of complementarity. We favour simplicity over richness of the model. We could develop this model by endogenizing some of the aspects that are treated as

¹⁰ Palombarini (2001, 2003).

parameters in what follows. An example is that of α , the wage share that prevails when both sides, wage-earners and management, choose the same strategy (cooperation or conflict). One may envisage that this reference wage-share could depend on the unemployment rate or the rate of unionization, two variables that could themselves be related with the number of firms' bankruptcies. Unionization could also be related with the actual wage share obtained by unions, so that one would have a feedback effect between the wage share and unionization. Since both the wage share and the firms' bankruptcy rate are endogenous variables in our model, the endogenous determination of α could explain the persistent differences in income distribution and the balance of power between capital and labour by the fact that institutional trajectories starting from different historical conditions do not systematically converge. However, we have tried to limit the developments of the model by focusing on the impact of the financing relation on actors' strategies, with no attention to the long-run evolution of income distribution in order to provide a simple example of institutional complementarity.

We consider a much stylized model of an economy with two strategic actors: a labour union and the firm's management. We define the long-term objectives of the union and the management as W and Π . They are respectively the discounted sums of wages and profits. To simplify matters, we will consider a fixed production outcome normalized to 1, so that w_t is the wage share at time t , and $1 - w_t$ is the profit share. For the sake of simplicity, we ignore any outside options that could be available for either workers or firms (other production or employment opportunities). The end of the relationship means that wages and profits fall to zero. The discount factor is denoted by β . Then, the two equations describing the evolution of the objectives of the different agents write as:

$$W_t = w_t + \beta e_t W_{t+1} \quad (1)$$

$$\Pi_t = (1 - w_t) + \beta e_t \Pi_{t+1} \quad (2)$$

e_t is the probability of continuation for the firm, the survival probability. It partly depends on the constraints defined by the firm's external financing. Outside investors may decide to withdraw their financing, which may lead to liquidation if the role played by these outside investors is important. We will see later how this survival probability is determined. We will only consider constant equilibriums for W and B in what follows.

s and b are continuous variables on $[0,1]$ that characterize the strategies of the union and the management, respectively. They may be thought of as investments in an asset that improves the firm's productivity, such as effort in production or management, or training and skill acquisition. This investment is costly for both sides and gives rewards in the long-term. Each side may *a priori* choose, for instance, a strictly 'short-term' ($s = 0$, $b = 0$) or a purely long-term strategy ($s = 1$, $b = 1$), or more 'intermediate' strategies with s and b between 0 and 1. These strategies

influence the income shares and the survival probability of the firm. In what follows, we will refer to the situation where both sides choose the long-term strategy as ‘cooperation’, although actors do not play the game in a cooperative way. The opposite situation, ‘conflict’ corresponds to a choice of short-term strategies.

Income distribution thus depends on two different factors.

- (1) An exogenous parameter α which is the reference wage share; it will be taken as a parameter which reflects the balance of power between labour and capital. A high α may either stem from the presence of strong unions or be the consequence of low unemployment. Regressing the actual wage on unemployment and unionization rates could help in determining α , also controlling for industrial conflicts intensity.
- (2) The strategies followed by both actors.

The wage share can therefore be determined by the following equation:

$$w_t = \alpha + \delta \cdot (b_t - s_t) \quad (3)$$

The equation above states that income distribution, measured by the actual wage share w , is at the same level when both sides choose the same value for b and s , i.e. both decide to opt for ‘long-term’ or ‘short-term’ strategies. In the latter case, i.e. situations of conflict, the balance of power determines income distribution. When both sides cooperate (in the case of high values for s and b) one may imagine that both sides agree on income distribution, and that it is the potential threat of a conflict, rather than actual conflict, which intervenes in the determination of the wage share w . δ is the income share that each side may appropriate when choosing conflict while the other side chooses cooperation. For instance, if labour chooses conflict ($s = 0$) while the firm’s management is cooperative ($b = 1$), it obtains a wage share of $\alpha + \delta$.

If we reduce the strategy set to a mere binary choice (s and b can only take values of 0 and 1), as will be the case in equilibrium, four strategy combinations and the resulting income distribution arise, as shown in Table 3.

Table 3 Income distribution

	Wage share w	
	$s = 0$	$s = 1$
$b = 0$	Conflict α	Firm’s domination $\alpha - \delta$
$b = 1$	Union’s domination $\alpha + \delta$	Cooperation α

The cases where one side chooses the long-term strategy while the other side chooses the short-term strategy is called 'domination' of the side that has opted for the short-term because it leads to a short-term premium for either the wage or the profit share over the reference value $\alpha(1 - \alpha)$. Lower and upper bound values for both s and b give the values for the wage share presented in Table 3.

Strategies followed by the union and the firm also have longer-term consequences as they affect the firm's survival probability. To choose cooperation means maximizing the probability of the firm staying in business. We can imagine that actors may use some resources at their disposal (time or effort) in a way that improves the survival chances of the firm instead of dedicating these resources to a conflict over income distribution. Therefore, values of s or b equal to 1 can be interpreted as an allocation of 100% of the resources to cooperation, whereas values of 0 for s or b correspond to 100% of the resources committed to conflict. We choose to express the survival probability e as follows:

$$e_t = k \cdot (1 - w_t) + \frac{1}{2} \cdot (1 - k) \cdot (b_t + s_t), \quad k \in [0, 1] \quad (4)$$

e is a weighted sum of two elements: short-term profits $(1 - w)$ and actors' strategies $(b + s)$. The weights $(k, 1 - k)$ depend on the importance of outside investors in the definition of the firm's strategy. The weight of outside investors is given by k . It represents the external, i.e. non-stakeholders, influence on the firm. When $k = 0$, financial investors only have a negligible influence on the firm's trajectory. This may be associated to either a very low share of external funding, or the importance of 'stakeholder value' in the financial decisions affecting the firm, as in, for instance, close relational banking. In this case, close monitoring allows outside investors to look beyond short-term performance and be more sensitive to the long-term strategy of the firm. On the other hand, $k = 1$ represents a larger sensitivity of outside investors to short-term profits, characteristic, for instance, of an arm's length financial relationship. Not being able to closely monitor the firm's activity, the only interesting signal that lenders have is given by the firm's current profitability. Allen and Gale (2000) have discussed the international differences between financial systems. Several dimensions differentiate countries in this respect, not only the sources of funds (i.e. whether firms use internal or external sources, whether they rely much on bank credit, on bonds or shares etc.), but also the type of corporate governance (close links or loose links between firms' owners and managers, whether labour is represented on boards, the presence of an active market for corporate control, etc.). For what matters here is that the corporate governance aspect may matter more than simply the source of funds. The crucial point in the determination of k is whether firms' owners ('outside' investors) are insisting on short-term profit objectives or not. This insistence on short-term profits is mostly linked with financial markets-based systems. Therefore, k may be thought of as a

parameter representing the relative importance of financial markets in the definition of firms' strategies.

The choice of the long-term strategy by either firms' management or workers improves the firm's survival probability. Another influence on the firm's survival chances is the pressure exerted by outside investors, which may decide on whether the firm must be liquidated or not. We suppose that these outside investors have little monitoring ability and therefore only take their decisions after having observed the firm's profitability. A high profit share is likely to please them, whereas a low profitability will lead them to withdraw their funding and seek other investment opportunities, which may force the firm to discontinue its activity.

5. Determination of union's and management's strategies

The union and the firm's management determine their strategies— s for the union and b for the management—in order to maximize their objective functions. It is obvious to see that the equilibrium strategies are corner solutions,¹¹ 0 or 1. In order to characterize the solutions, we adopt the following restrictions:

$$0 < \delta < 1/3; \quad 2\delta < \alpha < 1 - \delta.$$

These restrictions impose limits on the possibilities for deviating from the reference value α for the wage share. The equilibrium strategies b and s depend on the level of k , i.e. on the sensitivity of outside investors to short-term profits. In what follows, considering the arguments mentioned above on close *versus* arms' length financial relationships, we will refer to k as the influence of financial markets.

Given the above game we can define four threshold levels for k :

$$\begin{aligned} k_1 &= 1 - \frac{2 \cdot \delta}{(1 - \alpha) \cdot \beta} & k_2 &= 1 - \frac{2 \cdot \delta}{(1 - \alpha + 2 \cdot \delta) \cdot \beta} \\ k_3 &= \frac{\alpha \cdot \beta - 2 \cdot \delta}{\alpha \cdot \beta - 2 \cdot \beta \cdot \delta} & k_4 &= 1 - \frac{2 \cdot (1 - \beta) \cdot \delta}{\alpha \cdot \beta} \end{aligned}$$

where $k_1 < k_2; k_3 < k_4$.

Consequently, one obtains the equilibrium strategies as shown in Table 4. Given these equilibrium strategies one may thus deduce the following proposition.

Proposition: When financial markets' pressure is low ($k < k_1$ and $k < k_3$), union and firm choose long-term strategies. When financial markets' influence is high ($k > k_2$ and $k > k_4$), both choose short-term strategies.

Proof: See Appendix.

¹¹ See Appendix for the model's solution.

Table 4 Equilibrium strategies

$k < k_1 \Rightarrow b = 1$	$k_1 < k < k_2 \Rightarrow b = 1$	if $s = 1, b = 0$	if $s = 0$	$k > k_2 \Rightarrow b = 0$
$k < k_3 \Rightarrow s = 1$	$k_3 < k < k_4 \Rightarrow s = 1$	if $b = 1, s = 0$	if $b = 0$	$k > k_4 \Rightarrow s = 0$

Table 5 Ordering of the threshold levels for k

$\alpha < \alpha_1$	$\alpha_1 < \alpha < \alpha_2$	$\alpha_2 < \alpha < \alpha_3$	$\alpha_3 < \alpha < \alpha_4$	$\alpha > \alpha_4$
$k_3 < k_4 < k_1 < k_2$	$k_3 < k_1 < k_4 < k_2$	$k_3 < k_1 < k_2 < k_4$	$k_1 < k_3 < k_2 < k_4$	$k_1 < k_2 < k_3 < k_4$

We can further summarize the strategic choices according to the value of the reference wage share α . This wage share may be understood as the labour union's relative strength. We define four values for this wage share:

$$\alpha_1 = \frac{1 - \beta}{2 - \beta} \quad \alpha_2 = \frac{(1 - \beta) \cdot (1 + 2 \cdot \delta)}{2 - \beta}$$

$$\alpha_3 = \frac{1 - \beta + 2 \cdot \delta}{2 - \beta} \quad \alpha_4 = 2 \cdot \delta + \frac{1 - \beta}{2 - \beta}$$

and hence:

$$\alpha_1 < \alpha_2 < \alpha_3 < \alpha_4.$$

We can then order the threshold levels for k with respect to the wage shares, α , and summarize what the strategy choices will be (Table 5).

In general, a larger influence of financial markets (a higher value for k) on the firm's survival probability implies a non-cooperative choice for the firm and the union. Whatever the union's strength (the value of α), low values of k always imply the choice of a long-term strategy for both the labour union and the firm's management ($s = 1$ and $b = 1$). High values of k on the other hand cause both actors to switch to short-term strategies ($s = 0$ and $b = 0$). Therefore, whatever the union's relative strength, an increase in the pressure exerted by non-stakeholders (here the external creditors) will lead to the adoption of short-term strategies.

One may further notice that the long-term strategy disappears for both very high and very low values of the union's strength indicator, α . More precisely, if either $\alpha < 2 \cdot (1 - \beta) \cdot \delta / \beta$ or $\alpha > [\beta - 2 \cdot (1 - \beta) \cdot \delta] / \beta$, then the relevant thresholds (either k_4 or k_2) become negative and the adoption of a long-term strategy thus becomes impossible.

Important for the existence of the long-term strategy equilibrium is the survival of the firm. Two configurations are compatible with a high probability of survival

(a high value of e):

- (i) a weak influence of financial markets and a cooperative strategy between the union and the firm's management, whatever the relative strength of union and firm (the value of α);
- (ii) a large influence of financial markets and short-term strategies for the union and the management, with a weak union (a low value of α).

Let us consider the situations where the union's strength is either low ($\alpha < \alpha_1$) or high ($\alpha > \alpha_4$). As shown in Table 5, an increase in k leads the labour union to switch to a short-term strategy ($s = 0$) whilst the firm's management sticks to a long-term strategy ($b = 1$) when the union's relative strength is low ($\alpha < \alpha_1$), whereas the situation is reversed when the union's relative strength is high ($\alpha > \alpha_4$). In the latter case, the firm's management is the first to break the cooperative equilibrium. Therefore, a cooperative equilibrium is always destabilized by the weaker actor when the influence of financial markets rises.

We can sum up our different cases and propose different possible types of industrial relations according to the union's relative strength (the value of α) and the type of strategy followed by each side, under the influence of external creditors (Table 6). We have reproduced the four configurations mentioned in the introduction.

The first configuration, contestation, associates a weak union with short-term strategies. In the model presented here, such a configuration emerges when external creditors, non-stakeholders, exert a high pressure on management for short-term financial results. As mentioned above, the weaker actor, here the union, would break any cooperative agreement as k rises.

The second configuration, pluralism, differs from the previous one by the union's strength. Here, the labour is the stronger partner in bargaining, as indicated by the result i.e. a high α . A strong influence of financial markets implies a stress on short-term results, which leads the weaker side of the bargaining to opt for a short-term strategy.

The other configurations are characterized by long-term strategies adopted by both the labour union and the firm's management. This is possible only under a moderate influence of non-stakeholders on the bargaining. The third configuration, neo-corporatism of type 1, emerges when the union's strength is moderate, i.e. for relatively low values of the wage share. Adoption of a long-term strategy implies that the economic performance is good, i.e. the survival probability of the firm is high. A destabilization of this configuration through an increase in the influence of financial markets would lead labour unions to break cooperation first.

The last configuration differs from the previous one by the union's strength, which is high. In this case, an increase in the external creditors' pressure would lead firms' management to break cooperation.

These four possible configurations have been reproduced in Table 7 and compared with Table 1 and its different industrial relation regimes. As Table 7

Table 6 Strategy choices

$\alpha < \alpha_1$	$\alpha_1 < \alpha < \alpha_2$	$\alpha_2 < \alpha < \alpha_3$	$\alpha_3 < \alpha < \alpha_4$	$\alpha > \alpha_4$
$k < k_4$	$(b = 1, s = 1)$	$k < k_1$	$(b = 1, s = 1)$	$k < k_2$
$k_4 < k < k_1$	$(b = 1, s = 0)$	$k_1 < k < k_4$	$(b = 1, s = 1)$	$(b = 1, s = 1)$
		$(b = 0, s = 0)$	$(b = 1, s = 1)$	$(b = 1, s = 1)$
		$(b = 0, s = 0)$	$(b = 0, s = 0)$	$(b = 0, s = 0)$
$k > k_1$	$(b = 0, s = 0)$	$k > k_4$	$(b = 0, s = 0)$	$(b = 0, s = 0)$
		$k > k_2$	$(b = 0, s = 0)$	$(b = 0, s = 0)$
			$k > k_3$	$(b = 0, s = 0)$

Table 7 Four possible configurations

	Weak unions	Strong unions
Short term strategies	Contestation ($\alpha < \alpha_1, k > k_4$) possible when financial markets' influence is high. Management may be short-or long-term, depending on k .	Pluralism ($\alpha > \alpha_4, k > k_3$) takes place when financial markets are very influential. Management is short-term and industrial relations are characterized by conflict.
Long-term strategies	Neo-corporatism type 1 ($\alpha < \alpha_1, k < k_4$) possible with a weak influence of financial markets. An increase in k would lead unions to break the cooperative arrangement.	Neo-corporatism type 2 ($\alpha > \alpha_4, k < k_2$) possible with weak financial markets. An increase in k would lead firms to break cooperation.

makes clear, given our theoretical considerations and the complementarity between financial and industrial relations, it is possible to account for differences in industrial relations models by taking into account two variables: the union power and the financial markets' influence.

6. Conclusions

This article has presented a simple formal model of institutional complementarity applied to industrial relations. The explanatory power of the model should, however, not be overstated. Its aim is not so much to explain historical developments of actual industrial relations systems than to analyse the consequences of one particular type of complementarity, even though the model's results correspond to some stylized facts. One of the main results of the model is that the first side to break up a cooperative arrangement following an increase in the pressure set by non-stakeholders—in this case external financiers—is always the weaker side, i.e. the side that obtains a low share in the income distribution.

The main contribution to the understanding of industrial relations systems concerns the consideration of institutional forms apparently not related to the labour market and their importance in the management/union's definitions of strategies, as theorized with the help of the concept of institutional complementarity. In this respect, the two definitions of institutional complementarity given here can be seen in the model. If one chooses the firm's survival probability as a measure of performance, then (i) strong and influent financial markets are complementary to a weak union and (ii) weak and less influent financial markets are complementary to cooperative relations between union and management. Both configurations lead to a high survival probability for the firm. With respect to the second definition of

institutional complementarity, with reference to dynamic stability, one may say that strong financial markets tend to destabilize cooperative strategies.

However, in order to apply fully this second definition of institutional complementarity, it would be interesting to develop the model by incorporating hypotheses on the impact of management's and union's strategies on the development of the financing relationship. If one simplifies and says that financial markets favour short-term strategies whereas banks favour the establishment of long-term strategies, one may wonder whether both configurations are dynamically stable. To answer this question, one would need to know which type of industrial relations is likely to either bolster or hamper the development of financial markets.

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Appendix

Solving the model

The steady state objective functions for the union and the firm's management are

$$W = \frac{w}{1 - e \cdot \beta}, \quad \Pi = \frac{1 - w}{1 - e \cdot \beta}$$

Taking into account the definitions of w and e , one can check that the union's strategy will be to increase s whenever:

$$S(b, k) \equiv 2 \cdot (1 - k) \cdot \alpha \cdot \beta - 4 \cdot \delta \cdot \{1 - [b \cdot (1 - k) + k]\} > 0$$

and decrease it otherwise. Similarly, b will increase as long as:

$$B(s, k) \equiv 2 \cdot (1 - k) \cdot \beta \cdot (1 - \alpha + 2 \cdot s \cdot \delta) - 4 \cdot \delta > 0$$

S is increasing in b , B is increasing in s and both S and B are decreasing functions of k . We define k_1 and k_2 such that $B(0, k_1) = 0$ and $B(1, k_2) = 0$. k_3 and k_4 are such that $S(0, k_3) = S(1, k_4) = 0$.

$$k_1 = 1 - \frac{2 \cdot \delta}{(1 - \alpha) \cdot \beta} \quad k_2 = 1 - \frac{2 \cdot \delta}{(1 - \alpha + 2 \cdot \delta) \cdot \beta}$$

$$k_3 = \frac{\alpha \cdot \beta - 2 \cdot \delta}{\alpha \cdot \beta - 2 \cdot \beta \cdot \delta} \quad k_4 = 1 - \frac{2 \cdot (1 - \beta) \cdot \delta}{\alpha \cdot \beta}$$

and one has $k_1 < k_2; k_3 < k_4$.

The strategy choice of the firm's management is independent of the union's strategy for $k < k_1$ and $k > k_2$. Likewise, the union's strategy does not depend of the management's strategy for $k < k_3$ or $k > k_4$. Therefore, one actor's strategic choice will depend on the other's choice for values of k between k_1 and k_2 and k_3 and k_4 .

The order of the threshold values for k depends on the value of α . There exist *a priori* six possibilities:

(1) $k_1 < k_2 < k_3 < k_4$	(2) $k_1 < k_3 < k_2 < k_4$	(3) $k_3 < k_1 < k_4 < k_2$
(4) $k_3 < k_1 < k_2 < k_4$	(5) $k_3 < k_4 < k_1 < k_2$	(6) $k_1 < k_3 < k_4 < k_2$

- (1) is only possible when $\alpha > \alpha_4 \equiv \frac{1-\beta}{2-\beta} + 2 \cdot \delta$
(2) is only possible when $\alpha < \alpha_4$ and $\alpha > \alpha_3 \equiv \frac{1-\beta+2 \cdot \delta}{2-\beta}$. One can check that $\alpha_3 < \alpha_4$
(3) is only possible when $\alpha < \alpha_2 \equiv \frac{(1-\beta) \cdot (1-2\beta)}{2-\beta}$
(4) is only possible when $\alpha_2 < \alpha < \alpha_3$
(5) is only possible when $\alpha < \alpha_1 \equiv 1 - \frac{1}{2-\beta}$
(6) is only possible when $\alpha > \alpha_3$ and $\alpha < \alpha_2$, a contradiction since $\alpha_2 < \alpha_3$

One can easily check that $\alpha_1 < \alpha_2 < \alpha_3 < \alpha_4$.

