

# **INTEGRATION, COOPERATION AND THE FINANCING OF INNOVATION**

Jean-Pierre Allegret\* and Philippe Dulbecco\*\*

\* GATE, CNRS and University Lumière Lyon 2

93 chemin des Mouilles, 69130 Ecully, France, Tel: +33 (0) 472 29 30 19, Fax: +33 (0) 472 29 30 90, e-mail:  
allegret@gate.cnrs.fr

\*\* CERDI, CNRS and University of Auvergne Clermont 1

65 boulevard François Mitterrand, 63000 Clermont Ferrand, France, Tel: +33 (0) 473 43 12 18, Fax: +33 (0) 473 43 12  
28, e-mail: P.Dulbecco@cerdi.u-clermont1.fr

## **Abstract**

The purpose of this paper is to develop a joint analysis of the organisational and financial features of the innovative firm. In this way, we complete by determinants linked to financing factors the choice between integration and inter-firms co-operative agreements. We deduce the superiority of co-operation to resolve the specialisation-adaptability dilemma which faced the innovative firm.

# 1. Introduction

Over the past years, the analysis of the innovative firm's behaviour has gained renewed interest in the field of industrial economics, particularly through a series of studies aimed at determining the forms of co-ordination likely to favour the setting up of innovative projects and the management of economic change. But although none of the two alternative solutions that are usually proposed -integration and interfirm co-operation- really stands out, both in theory and in the real world (Robertson, Langlois, 1995), it is disturbing to note the relative lack of interest, in most studies, for the financing factor.

The revival of studies on financial systems as well as those related to national systems of innovation have brought to the fore the importance of the financing factors for the analysis of the firms' innovative behaviour<sup>1</sup> (Guerrieri and Tylecote, 1997; Mayer, 1996; Moerland, 1995; Tylecote, 1995; OECD, 1994; Nardozi, 1992; Berglöf, 1990; Dosi, 1990)<sup>2</sup>. Taking into account the financial constraints of innovation is indeed decisive on two accounts. First of all because such constraints reveal the fundamental nature of innovation, understood as a process of resource accumulation and utilisation over time (Amendola, Gaffard, 1988). And second, because such a question has repercussions on the nature of the organisational choices likely to accompany, or even to lead to technological innovation. In particular, there is a close relationship between the governance structure underlying the financing relations and the -temporal- nature of the constraints on innovative processes.

O. Williamson (1988) made a significant contribution to the analysis of the connection between "corporate finance" and "corporate governance". By highlighting the fact that contractual modes of asset financing cover procedures of incentive and control, as well as the modes of coordination between actors, this transaction cost analysis clearly identifies the key role played by the nature of contracts, for understanding the interactions between economic actors. The cornerstone of Williamson's analysis rests on the notion of asset specificity. A specific asset has, in a financial perspective, two essential features : (i) it is mildly negotiable since its secondary market is not very liquid, and (ii) it is unlikely to serve as a guarantee because of its intrinsic link to the considered firm. Its degree of transferability is, by nature, limited. On this ground, Williamson's conclusion is well known : the optimal financing contract -*i.e.* the one that minimises transaction costs- depends on internal financing or on calling on equity markets. Financial intermediaries have indeed very few incentives to get involved in the financing of such assets since debt contracts are incompatible with innovative investments, which are characterised by a low capacity of control and high costs of coordinating activities

---

<sup>1</sup> This study, based on the current characteristics of financial systems, does not take into account their historical evolution. For a historical analysis, see W. Lazonick and M. O'Sullivan (1996).

<sup>2</sup> These works lie within the scope of the now traditional partition between the market and the credit-based financial systems. Some kind of consensus seems to come out from these works : financial systems tend to show different capacities to promote innovation depending on whether we are along the technological path (credit-based system) or whether a new technological paradigm emerges (market-based systems).

and actors, as well as bankruptcy and liquidation costs. W. Lazonick (1992) very rightly criticised Williamson for developing " *a theory of the adaptive business organization*" on the grounds that the dynamic dimension of innovation is absent. The idea is that asset specificity is not a matter of some market imperfection but, on the contrary, that it constitutes the very essence of the innovative firm that tries to develop abilities and capabilities that will carry long term profits. In this perspective, the financing issue becomes that of commitment : the financial institution is assigned the role of sponsor, which makes the development and the utilisation of the productive means possible until these very resources start generating profits (Lazonick and O'Sullivan, 1996). In other words, the question of how to finance the innovative firm boils down to a trade-off between holding cash and being financially committed to innovative activities.

The analyses developed by both authors can actually be subjected to a common criticism : they both fail to consider what we have agreed to call the specialisation-adaptability dilemma, which crystallises, as we shall show, the temporal dimension of the innovative firm's commitments and allows us to better understand how important the nature of the co-ordination and the control underlying each contract is. Such taking into account implies to focus on the idea that the innovative firm's behaviour is best described as a commitment process and as a process of co-ordination of innovative investments over time (Section 2), such investments raising a problem of both organisational and financial flexibility (Section 3). It then becomes possible to suggest a few elements for a joint analysis of the organisational and financial flexibility of the innovative firm, in view of adding determinants related to the financing variables, for the choice between integration (Section 4) and inter-firm co-operation (Section 5), viewed as two governance structures that are supposed to accompany, or even to lead to innovation<sup>3</sup>. In particular, we show that co-operation is likely to lead to the emergence of a mode of interaction midway between organisational flexibility and financial flexibility. In a last section (Section 6), we propose a few elements for a typology of modes of co-ordination and contractual modes of financing.

## **2. The time constraints of the innovative firm**

The innovative firm can be described as a firm that chooses to develop its productive resources in order to make a new product at a competitive price (product innovation) and/or an existing product at a lower price (process innovation) (Lazonick, O'Sullivan, 1996). Even

---

<sup>3</sup> We are aware that the use, within the same analytical framework, of elements from theoretical backgrounds as specific as the microeconomics of the innovative firm, the theory of the financing and of the macroeconomics of the national innovative systems, may pose problems. Such difficulty is not peculiar to us, it is particularly underlined by Aoki and Dosi (1992). In this view, our work must rather be considered as a guideline than as a final representation of a complex reality.

though this definition of the innovative firm is widely acknowledged<sup>4</sup>, it may not be useless to look into the implications of adopting it, when dealing with the theoretical debate concerning the nature and the role of the firm within the processes of technological change.

The first characteristic of an innovative firm is that it deliberately confronts economic uncertainty by implementing investments that deal with options unknown until then. Uncertainty is two-faced : it is first technical/technological, in the sense that nothing guarantees *ex ante* that the firm will be in a position to develop and/or to acquire the technical and human factors required by the new activity. Such factors are indeed generally non contestable in the sense of Langlois (1993) and, as such, impose high dynamic transaction costs during the period of development of the new activity<sup>5</sup>. The innovative firm's main problem hence becomes to organise a process of creation of knowledge. The uncertainty also concerns competition. Competitive uncertainty deals with the relations between the firm and its market environment; it shows, firstly in the inability of the firm to forecast the evolution of supply and demand on its new markets, and secondly in its vulnerability during the period of development of the new activity, relative to the competing firms that have chosen a "passive" strategy of adaptation to the environment, *i.e.* which is delimited by the configuration of their respective routines (Amendola, Bruno, 1990)<sup>6</sup>.

The second characteristic of the innovative firm's behaviour is that it refers to a fundamentally temporal conception of innovation. Indeed, as we already partially mentioned, innovation is not an instantaneous process, rather it is submitted to delays : (i) a delay of construction of the production capacity before it can be actually used for the production of a new output, (ii) a delay of acquisition and/or of development of the abilities required by the new activity, *i.e.* by the construction of the new capacity (Foss, 1993), (iii) a delay for the transmission of the information to the set of actors involved in the implementation of the new production process (Robertson, Langlois, 1995). The economic output of the innovative firm quite naturally depends on its very ability to manage the constraints imposed by these delays. Two *a priori* contradictory time horizons must here be reconciled : that of the running or the optimal mobilisation of existing resources, and that of the exploration or the development of new production capacities (Cohendet, Llerena, Marengo, 1996).

The third element that we have retained as one of the main attributes of the innovative firm, relates to the irreversible nature of its commitments. It is indeed the idiosyncratic character of the assets that is sought after by the firm. Such idiosyncrasy originates in the accumulation

---

<sup>4</sup> Although we clearly focus on the productive side of the innovative processes at the expense of the cognitive and organisational sides. See Amendola and Bruno (1990), Langlois (1992), Robertson and Langlois (1995), Teece (1992).

<sup>5</sup> A non contestable factor is a factor that one cannot obtain on a market unless he is ready to spend more than the cost of its internal development. Dynamic transaction costs cover the prospection, persuasion, training and co-ordination costs that arise from resorting to an external supplier.

<sup>6</sup> The innovative firm is then labelled as "active" (Amendola, Bruno, 1995) or as "proactive" (Foss, 1993) to render the fact that the environment is more considered as a resource and as a choice than as constraints calling for an almost automatic adaptation.

over time of the specific assets dedicated to the construction of a new production capacity. Specialisation hence carries irreversibility insofar as it calls for a specific articulation over time of investments that are themselves specific. The external resources integrated into the firm also acquire an idiosyncratic dimension since they partake of a collective and cumulative learning; the firm then becomes place where knowledge is generated, maintained, replicated and modified (Cohendet, Llerena, Marengo, 1996).

### **3. The specialisation-adaptability dilemma**

If specialisation leads to comparative advantages and high profits, its main drawback is the sacrifice of adaptability. This point is crucial; it crystallises alone an important dimension of the problem faced by the innovative firm. Indeed, the latter is basically subjected to what is generally referred to as the specialisation-adaptability dilemma : specialisation is represented by the firm's involvement in the construction of new and specific production processes carrying profit opportunities, whereas adaptability is required by uncertainty and the risk intrinsic to the involvement in innovative investments<sup>7</sup>.

The theoretical debate on how to manage innovative investments gave rise to two types of analyses. On the one hand, the answer to this question was provided by the governance structure approach (*i.e.* the approach in terms of modes of co-ordination of economic activities), in view of comparing the respective qualities of integration, market and co-operative agreements between firms. On the other hand, it has mobilised works on the analysis of financing aimed at establishing links between the capital structure of the enterprise or the various modes of financing it has access to, and its tendency to get involved in innovative activities. Our presentation of how the innovative firm handles the specialisation-adaptability dilemma suggest that we drop such dichotomy and consider the complementarity between the organisational and financial approaches. Within the framework of our analysis, there are indeed two ways to loosen the constraints imposed on the innovative firm.

The first solution involves resorting to forms of co-ordination of innovative investments that, while allowing the firm to pursue the objective of specialisation, do not completely thwart the need for adaptability. What is directly aimed at here, is the very organisational abilities of the firm (Loasby, 1994). This will be achieved, by the choice of a mode of co-ordination that favours their involvement as well as the development of new capacities. In other words, the problem is to attain some kind of organisational flexibility that allows not only no react to new opportunities, but also to create them (Amendola, Bruno, 1990).

The second solution requires resorting to forms of financing that guarantee, at the same time, some kind of regularity and an appropriate control and selection of uncertain economic

---

<sup>7</sup> The formulation of this dilemma was inspired by Richardson's work (1990).

projects. The specialisation-adaptability dilemma also conveys a constraint on the financial resources : the risk of not being able to convert the specific assets formerly brought into play, in order to redeploy them adds to the risk of not being able to finance all or part of the construction of the new activity. Financial institutions naturally have the licence to lessen this financial constraint, yet the problem is not only of a financial nature in the strict sense of the word. Indeed, not only do financial institutions finance, *i.e.* put funds at the disposal of the innovative investments, they also carry out, although at different degrees and according to various modes, the control of the enterprise's behaviour and the selection of new productive opportunities (Aoki, Dosi, 1992). While too hasty and/or too drastic a selection discourages innovation *a priori*, a weak selection runs the risk of perpetuating poorly performing projects. Thus, the pursuit of financial flexibility does not boil down to a problem of financial commitment; it also conveys the enterprise's and the financial intermediary's ability to ensure a regular and sure financing with regards to a constraint of adapting to a rough environment. It hence becomes essential, following Williamson (1988), to take into consideration the governance structures that lie behind the modes of financing of innovative activities.

Finally, the pursuit of both an organisational and a financial flexibility serve the same target, which is the management of the specialisation-adaptability dilemma faced by the innovative firm. The issue then becomes to bring out some kind of coherence, between the behaviours directed by the pursuit of these two forms of flexibility.

#### **4. Innovation financing and vertical integration : the prevalence of the debt contract**

The integration thesis was recently the subject of a number of exemplary studies, in particular through the theory of the innovative firm (Lazonick, 1992; Lazonnick, O'Sullivan, 1996), the analysis in terms of dynamic transaction costs (Langlois, 1992, 1993) and the approach of the firm in terms of competences (Foss, 1993). The arguments put forward are the following.

Integration is supposed to allow the development of the capabilities required by the new activity. Indeed, the collective, cumulative, tacit and idiosyncratic nature of the knowledge involved in the innovative activities make it impossible to resort to the market, unless one is ready to bear prohibitive dynamic transaction costs<sup>8</sup>. Vertical integration could also offer a drastic solution to the problem of the appropriability of the outcomes of innovation. Integration could finally help achieve some kind of costs rationalisation. The problem here is to transform high fixed costs during the period of development into low unit costs when the new process enters the phase of utilisation : first by developing the production scale and second by integrating suppliers and distributors in order to avoid any disruption in the production process

---

<sup>8</sup> Moreover, the delays and costs of information transmission are minimised.

and to take advantage of the economies of synchronisation (Lazonick, 1992). In other words, integration represents a mechanism of co-ordination over time of innovative investments. By displaying tools for the management of technical and competitive uncertainty, both of which are based on an internalisation of resources and an increase of the production scale, integration secures the development of a new production capacity and the transition from development to utilisation.

The main problem is that the price to pay is likely to be prohibitive for a firm that has chosen to fight against the uncertainty of innovative activities. This price is the price of the sacrifice of adaptability. The logic that prevails here, in view of the search of economic efficiency, indeed requires to initiate cumulative processes in which the organisational capabilities of the enterprise never stop improving. Yet, because of the internal accumulation of knowledge, competences and capabilities, the firm runs a risk of inertia and of lack of organisational flexibility. This is partly due to the existence of a close relationship between the range of productive opportunities perceived by the enterprises and the origin of the investments engaged : the organisational capabilities are likely to apply to a number of options all the higher as their implementation comes from various sources, reflecting a variety of opinions concerning the coming threats and opportunities (Loasby, 1993). One of the important consequences of the logic of integration is then that the enterprise becomes less “ responding ” to its markets (Teece, 1992). Moreover, one can note that the type of integration proposed in this set of analyses assumes relatively high costs of capital redeployment -sunk costs- which thwart the firm’s potential for flexibility and adaptability all the more.

The loosening of the specialisation-adaptability dilemma thus logically requires us to focus on the conditions under which what we have agreed to call a financial flexibility may develop.

As regards a financing strategy based on the mobilisation of internal resources, two remarks are necessary. On the one hand, the mobilisation of financial resources may require a specific an irreversible productive organisation. Indeed, financing within the hierarchies (creation of an internal capital market) calls for structuring the productive activities according to the principles of portfolio management. This way, resources are re-deployed from the sectors with financing excess towards the sectors with financing need. Yet, the conflicts of interests that may exist between the different sectors and the difficulties to make the information flow within this complex structure, make it difficult to re-deploy the funds: contradictions between the phase of exploitation of existing opportunities and the phase of exploration of new opportunities may appear. On the other hand, the conglomerate financing of the productive activities is known to bring about a default in the selection of the activities, because the appearance of difficulties in one activity goes along with financial rationing in all the others.

Mobilising resources by calling on financial markets may also aggravate the terms of the specialisation-adaptability dilemma, and this at two main levels.

The first level deals with the characteristics of the financial systems based on the market (mainly the United States and the United Kingdom). The control over the firms is an outsider system in which capital ownership is split up between a big number of small shareholders. The latter have little incentive to exercise a direct control over the managers because of the costs of such control and because of the likelihood of free-riding behaviours. The methods of project evaluation are global, this is namely the case of resorting to the stock-market value of the enterprises. In this context, the control over the firms is exercised through the markets and takes the form of a hostile take-over aimed at disciplining the managers, yet this method has important drawbacks. First of all, although Steinherr and Huveneers (1990) consider that hostile take-overs give way to changes of strategy that are advantageous for the firm's growth -the resulting reduction of barriers to entry may enhance the market's dynamism-, Franks and Mayer (1996) do not succeed in proving the existence of a significant relationship between hostile take-overs and poor performances of the managers. Secondly, managers often find themselves in a precarious situation that incites them to elaborate prudential short term strategies<sup>9</sup>. In other words, the incentives given to the managers by the institutional investors may be inconsistent with the long term development strategy of the firm, because of a contradiction between the rules of financing and the objective of specialisation of the innovative firm. Moreover, the fragmentation of information increases the costs of intermediation because communication networks are more and more complex and deal with naturally complex information. This situation is amplified by the hierarchical organisation of the enterprise that gives rise to a stratification and to a specialisation of duties (Aoki and Dosi, 1992 ; Aoki, 1994).

The second level we must consider deals with resorting to venture capital. This type of financing is traditionally considered as the true financing of innovation (especially in the case of small and medium-sized firms). Indeed, its underlying governance structure is based on the cultural closeness between the capital-venturer and the entrepreneur-innovator. Not only are the information asymmetries lessened, but the former also lends his qualifications of technical and management expertise to the latter. Yet, such closeness increases the specialisation of the innovative investments at the expense of the firm's ability to adapt<sup>10</sup>. This phenomenon is stressed by the many studies that show the positive effect of specialised capital-venture on innovation (Dimsdale, Prevezer, 1994). Besides, the analysis of the innovation process shows that it is difficult " *to split technological investment into a series of projects likely to benefit from a separate financing through more appropriate channels* "<sup>11</sup>.

---

<sup>9</sup> Besides the fact that the cost of equity financing is higher, because the manager must mobilise a bigger amount of resources in order to make himself known by potential investors, the evolution of his situation within the enterprise becomes a term of the investment function, because the managers themselves become a party to the expansion of the financial structure by acquiring shares of the firm.

<sup>10</sup> Specialisation is an important feature of financial systems based on markets. Beside capital-ventures companies, there exists rating agencies specialised in certain activities.

<sup>11</sup> OECD (1994), p.61.

The properties of cumulative learning and tacit knowledge challenge the discontinuous nature implied by the organisation of capital-venture into different phases of the enterprise's evolution. In this view, instead of evolving within a financial network that fits the complexity of the innovation process, the capital-venture modes of financing are as many micro-ruptures within the innovation process. This results in an increase in the dynamic transaction costs for the enterprise that must try to match the (changing) structure of its real assets to the financial assets. This phenomenon is sometimes worsened by the short-termism the capital-venturers : the latter try to extricate from the innovative firm more and more quickly (the average horizon is 5 to 7 years).

If we go back over the terms of Williamson's analysis (1988), must we consider that debt financing necessarily sacrifices specialisation? The answer to such question requires that we analyse the mechanisms of incentives and control related to the various relations between banks and enterprises. Two main governance structures are usually given attention: market-oriented systems and network-oriented systems

In market-oriented systems, banks have no specific control over the quality of the information held by the enterprise<sup>12</sup>. Thus, the best mode of co-ordination for the firm is the incentive given by the short term contract, *i.e.* the threat of not renewing the financing contract if the firm does not fulfil the conditions initially set by the contract. The productive strategy of the firm is aimed at respecting the contract specification, which narrows the possibilities of financing the specific assets. Yet, the firm's ability to adapt isn't guaranteed, since the flow of information between the two actors is brought to the bare minimum. In this view, the firm confronts the difficulty of matching its organisational structure to its financing structure.

Network oriented systems<sup>13</sup> broadly correspond to the relationships between banks and enterprises in Germany and Japan. In both cases, the variety of financial services offered to the enterprise -cash management, long and short term credit, lead bank of syndicated loans, intervention procedures in the case of financial problems- entitles the main bank (Japan) and the hausbank (Germany) an on-going follow-up of the evolution of industrial activities. This access, given to the bank, to conjunctural and structural information, makes it possible for

---

<sup>12</sup> The reason why the information is not shared is that the bank bases its financing decisions on standardised procedures classic financial analysis. Consequently, the rule for this type of relation is reversibility and distrust. In other words, the actors prefer exit to commitment (*voice*) when difficulties come up.

<sup>13</sup> The network's characteristics clearly appear in these two definitions. Aoki, Patrick and Sheard (1994) characterise the Japanese system as "*a system of corporate financing and governance involving an informal set of practices, institutional arrangements, and behaviours among industrial and commercial firms, banks of various types, other financial institutions, and the regulatory authorities. At the core is the relationship between the main bank and the firm*" (p.1). Lazonick and O'Sullivan (1996) characterise the German system as "*a network of institutions that survived, or were reinstated, after the war, that includes intercompany holdings, but also the proxy voting system, company law, stock exchange regulation, and the system of taxation, ensured that industrial enterprises could maintain control over the allocation of their revenue*" (p.31).

*common knowledge*-type relations to emerge<sup>14</sup>. One of the outstanding features of this network governance structure lies in the double nature of the banks : they are shareholders and creditors at the same time. The banks intervene in the firms' Board of Directors and, as such, participate to the strategic decision making. Hence there is a close interaction between the banks' activities of financial intermediation and their credit activities. The information picked up by the banks, while acting as credit providers or as stockholders, mutually strengthen both of the banks' activities.

Yet, a more precise analysis may help us identify some significant differences, especially with regards to understanding the implications of the specialisation-adaptability dilemma.

The Japanese model of the main bank has similarities with a governance structure based on hierarchy. Its first characteristic is a heavy dependence of the firm on bank loans. The second characteristic of this system is based on the co-ordination between the bank and the firm. Such co-ordination follows the S-mode, in which there is a "*sharing of knowledge*" between the actors (Aoki, 1990). The power of the main bank expresses itself at the Board of Presidents. The bank's control is only indirectly exerted on the firm, either through its lending activity, or through the Board of Presidents. The ultimate sanction is the bank's take-over of the enterprise, if structural problems occur. It is therefore possible to refer to a "*contingent governance*" (Aoki, 1993) or, according to our previous distinctions, to a hierarchical governance structure contingent to enterprise's situation. The implications of the contingent nature of contractual relations should not be over-looked : it translates into the replacement of the managing staff and therefore questions the *promotional hierarchies of ranks* (Aoki, Dosi, 1992). It also expresses through the unilateral character of the attendance of the bank's officials to the Board of Presidents : the banks send their agents to the enterprises, yet the opposite is not true, although cross-holdings do exist (Hoshi, 1994). This governance structure somewhat intensifies the terms of the specialisation-adaptability dilemma, insofar as the mode of organisation that stands out bears routine procedures that go against the research of flexibility (OECD, 1994).

The German model of the house bank characterises a process of quasi-integration that gives rise to a partner-type relationship between the actors. Such relationship carries a commitment towards a common project, from an incomplete long term contract. A lower dependence (compared to the Japanese model) towards bank financing partly determines the structure of control that underlies the German model, and thus the specificity of its governance structure. In large enterprises, the banks' power of control is strongly based on the use of the proxy-votes of their depositors. The main difference between the Japanese and the German system is that *hausbanks* rarely intervene in the restructuring of activities (Edwards and Fisher, 1994). The supervision of the firms' behaviour is rather exercised through the system of proxy-votes.

---

<sup>14</sup> Furthermore, the information's that flow between the bank and the firm are confidential. This essential dimension of the relation was designed for the innovative investments, since the relevant information could not be publicly revealed on account of comparative advantages and the appropriation of the fruits of innovation.

The banks' influence expresses itself at the Supervisory Board, which is in charge of evaluating the evolution of the enterprise. In small and medium enterprises, bank control is supported, on the one hand by the participation of government and/or regional agencies to the financing of this type of enterprises -which contributes to reducing informational asymmetries-, and on the other by the mechanisms of reputation engaged by the firm towards fund suppliers. The main consequence is that, because of the flexible application of bank control, the enterprise is more able to redeploy its activities according to its own strategy. Moreover, the modal role played by the banks in the circulation of information between enterprises is likely to limit the chances of getting locked into over-specialised strategies.

Finally, for the enterprise that has chosen an organisational structure based on integration, it appears that although none of the governance structures that underlie the modes of financing productive activities gives a satisfying answer to the specialisation-adaptability dilemma, the contractual relations at work in the network-oriented systems still contribute to loosening the terms of this dilemma, especially via a governance structure of the quasi-integration type.

## **5. Financing and co-operation : the interaction between organisational and financial flexibility**

Co-operation between firms, when it shows in a co-ordinated behaviour of partner-enterprises over time in view of a common task and of long run objectives, is said to provide an advantageous solution to the problem of implementing the innovative investments undertaken by the firms. The following points come in support of this argument.

First of all, co-operation allows an efficient management of technological and competitive uncertainty, thanks to a permanent flow of technical and market information between the co-operating firms. Indeed, any innovating firm must take into account the fact that the investments are, at the same time, in competition with and complementary to other investments which are, have been and will be undertaken by its competitors, but also by its suppliers, subcontractors, and all the other enterprises with who it has a relationship of complementarity (Richardson, 1960). It is then important to make sure that the volume of competing investments does not exceed a critical limit, with regards to the expected demand for the concerned product, and that the volume of complementary investments reaches a minimal limit. This problem of co-ordination can *a priori* be solved by an exchange of information -technical information for complementary investments, and market information for competing investments. The existence of gestation and information transmission delays for the various investments then makes it necessary to turn to market connections (*ibid.*). In other words, a system of market relations must be set up, that enables independent enterprises, yet whose activities are related, to co-ordinate investments over time. Co-operation agreements concluded between vertically related, but also competing enterprises, are then one of the very possible embodiments of such market connections.

Co-operation is also likely to bring an answer to the problem of the appropriability of the outcomes of innovation (Teece, 1992). Indeed, co-operation creates a strong organic relation, most often strengthened by a tit-for-tat type strategy aimed at limiting opportunism between partners, especially when it comes to sharing the fruits of co-operation. Moreover, the temporal dimension of the targets aimed at through the agreement protects these very partners against the risk of appropriability of the outcomes by enterprises outside the agreement.

Finally, co-operation represents an efficient form of managing the specialisation-adaptability dilemma (Dulbecco, 1998). It is efficient in the sense that it allows the co-ordination of specific capabilities without bringing the disadvantages of integration, especially when it comes to the management of sunk costs. It is also efficient in the sense that it creates information, and therefore new productive opportunities, as a consequence of the diversity of investment sources (Loasby, 1994) and from the permanent interaction between the production decisions of the different firms grouped together within a co-operative process (Imai, Baba, 1994).

The problem of financing innovative investments must now be stated in terms diametrically opposite to those used in the case of integration. As soon as co-operation between firms brings out some kind of organisational flexibility, the appropriate forms of financing are those that do not go against, or even, those that strengthen this logic. Co-operation allows organisational flexibility, yet we do not conclude that it is based on a specific financing structure. This means that we must search the previously identified governance structures for the terms of financing that seem the most adapted to bear the relation of co-operation.

Our criterion for this matter will be the stability of co-operation, understood as the minimisation of the dynamic transaction costs (Langlois, 1992). The instability of the relation of co-operation creates sunk cost for the firm that initiated it. Such costs are indeed related to the creation of a common information, in the process of a relation established over the long run. This information is expensive and constitutes the cement of the relation and its potential efficiency. The ultimate consequence of abruptly ending the relationship, is the loss of this common information, the source of mutual gains. It thus seems proper to look for the governance structures related to financing, that are likely to produce such long term relationships.

We think that the financial flexibility of network-oriented systems favours the development of co-operative strategies. In these economies, vertical integration is less employed, because of the massive use of implicit contracts, interpersonal relationships, and strategies of commitment towards firms (Dimsdale, Prevezer, 1994).

In Japan, the insurance mechanism of the Kereitsu acts as a crucial stabilising element for the financing relations. Indeed, not only does it further the flow of capital within the group, it also allows the firms to meet financial difficulties without suffering prohibitive financing costs. The insurance stems from the absence of immediate penalty when difficulties arise. The network of cross-holdings also represents a means of accessing funds, by transferring shares within the

group. A drain of money is thus achieved through an internal market for shares. A strong match thus appears between the modes of co-ordination and of internal control within the firm and those initiated by the bank (Aoki, Dosi, 1992). Similarly, the securities houses act as intermediaries between the firms tied by over-lapping interests, which ensures solidarity between them, insofar as no firm can sell shares without informing the others (through those companies in charge of managing transactions). Both systems encourage co-operation and collective learning. However, the complexity of cross-holdings may render the management of the firms from the same group opaque. Consequently, it is the whole set of mechanisms of selection of new opportunities that is questioned as regards the free cash flow.

The existence -in the German financial system- of an indivisible network between the central and local financing actors in which the latter, rather than being placed side by side are in contact with each other in view of an industrial development project, is a decisive condition for the development of partner-type relations between the actors. This type of relations is aimed at making up for the low intensity of organic relations (in comparison to the Japanese system) within the industrial structure, as well as for the differences in the procedures of control of the enterprises' behaviour.

But if financial flexibility may favour organisational flexibility, it is important to consider the fact that organisational flexibility is likely to lead to the former. In other words, the setting-up of the relation of co-operation allows to partly compensate for the deficiencies of the governance structures linked to the running of financial markets and/or for the absence of a long-lasting and close relation between the firm and the bank. The exemplary case is that of the Third Italy. Here, the close relations of co-operation between firms are coupled with co-operation aimed at tapping financial resources. The whole set of enterprises acts as a system of mutual guarantee towards potential investors. The advantage of this type of relationship between co-operation and financial flexibility is that it allows to reach some kind of stabilisation of financing relations. Indeed, not only does co-operation between enterprises allow to create information directed towards the external environment, but the reputation effects of belonging to the group are a great incitement to follow the financial commitments<sup>15</sup>. Similarly, the relations developed by large enterprises in France and the network of their suppliers offer these small and medium-size firms possibilities of financing that would be impossible in a market-oriented system. Large enterprises use various quality control proceedings in order to tap information from the small and medium-size firms (SMEs) (Hancké, 1995). In this sense, they reduce the informational asymmetry peculiar to the SMEs. This asymmetric co-operation -in which the large enterprise's reputation serves as a moral

---

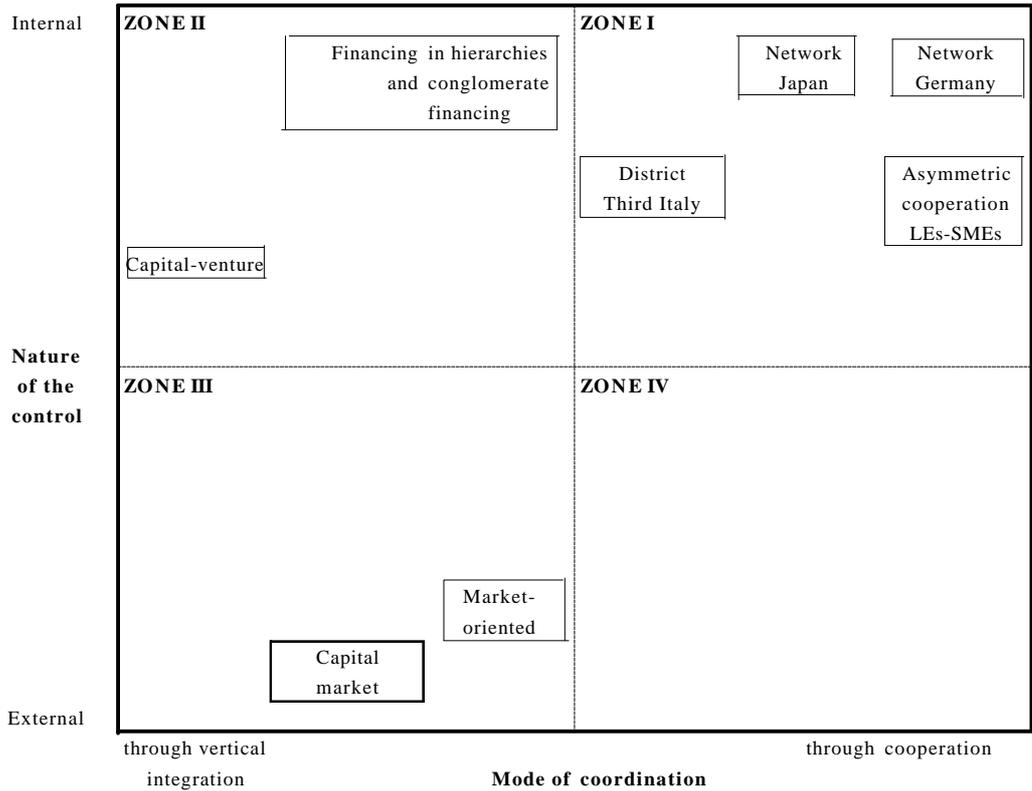
<sup>15</sup> Even if the persistence of some kind of decentralisation of financing does not make it possible to reduce the high degree of vertical and horizontal specialisation in this type of regrouping of firms.

guarantee for the contractualisation of a bank financing on the part of the SME- becomes a financial, that is likely to finance innovative investments<sup>16</sup>.

The strategy of co-operation thus enlarges -by comparison with vertical integration- the range of fundings likely to serve the dynamics of the innovative firm.

### 6. Conclusion

On the basis that no form of organisation is in itself superior to others in terms of innovation (Robertson, Langlois, 1995), we studied the nature of the relationship between the governance structure and the mode of financing, in view of implementing and managing innovative investments over time. We tried to provide a further explanation to the recent studies that deal with the financing of the innovative firm. Our analysis of the innovative firm’s behaviour thus shows four zones of interaction between the mode of co-ordination and the contractual nature of financing (Figure 1).



**Figure 1 : Mode of co-ordination and contractual nature of financing**

<sup>16</sup> Let us indeed recall that the latter are subject to two specific difficulties. First of all, the constraints of informational asymmetry born by them tend to evict them from long term bank fundings. Second, the fundings that are traditionally preferred -that is capital venture- lead the innovative SMEs to specialise, to the detriment of adaptability.

Two opposite cases must be highlighted :

- zone I is the zone of "organisational and financial flexibility". In this zone, internal control allows to share information in such a way that distrustful behaviours are limited and that co-operation is stabilised, which further enhances the firm's ability to adapt and to innovate.

- zone IV is a "no-flexibility zone". It shows that the external control, which increases the likelihood of distrustful behaviours, is incompatible with a mode of co-ordination based on co-operation. On this point, we do not share Allen's (1993) conclusion, who considers that market financing is the optimal mean -thanks to the large number of actors- for the emergence of the interactions needed for the information on these naturally complex investments.

Two intermediary zones appear :

- zone III is a zone where external control dominates at the financing level. A low sharing of information between actors does not allow to achieve a form of organisational flexibility. The fact that financing relations are not in time is an obstacle to the development of co-operative strategies.

The study of the terms of solving the specialisation-adaptability dilemma thus allows to re-examine the terms of the debate related to the modalities of financing innovation implemented through integration and co-operation. The latter seems to constitute an organisational form superior to integration, insofar as it relation between the conditions of development

This conclusion leads us to question the transformations undergone by the financial systems since the mid-1980s. One can indeed notice a convergence in their characteristics : in the Anglo-Saxon systems, some new shareholders -the institutional investors- become more active in the Boards of Directors of the firms, whereas in the network-oriented systems the banks experience a weakening of their power of control, because the firms resort more to financial markets for financing.

We may draw two important outcomes from what has been written : on the one hand, there seems to be a lower incentive for the banks -in network systems- to mobilise resources in order to supervise firms, given the weakening of the quasi-rent generated by the close relationships that prevailed in the past (Aoki, 1994). In this perspective, the financing relation is destabilised and this questions the arbitrage between specialisation and adaptability for the innovative firms. On the other hand, the growing activism of the shareholders can be viewed as a means of improving the flow of information between the various actors of innovation, and this, in the perspective of the Cadbury Report (1992), which calls for a long term relationship between shareholders and firms. However, the criteria of management born by the institutional investors -quarterly announcement of financial results, payment according to the market share (which translates into the target of maximising this share rather than the return of the portfolio, as a "classical" investor would do) and mimetic behaviour- that this type of relations between shareholders and managers could found a new limit to the capacity of the firms to elaborate a long term strategic vision nevertheless necessary for their viability.

Therefore, if the current mutations of the financial systems are not accompanied by measures aimed at inciting investors to establish long term relations with the firms, they may render the management of the constraints imposed by taking assessing the specialisation-adaptability-dilemma more difficult.

## Références

- Allen F. (1993), Stock markets and resource allocation, in C.Mayer and X.Vives (eds.), *Capital markets and financial intermediation*, Cambridge University Press.
- Amendola M., Bruno S. (1990), "The Behaviour of The Innovative Firm : Relations to The Environment", *Research Policy*, 19: 5, pp.419-433.
- Amendola M., Gaffard J.L. (1988), *The Innovative Choice : an Economic Analysis of the Dynamics of Technology*, Basil Blackwell, Oxford.
- Aoki M. (1993), "The Contingent Governance of Team Production : An Analysis of Systematic Effects", *Working Paper*, Stanford University, February.
- Aoki M. (1994), "Monitoring Characteristics of the Main Bank System : an Analytical and Developmental View", in M. Aoki et H. Patrick (eds), *The Japanese Firm*, Clarendon Press, Oxford.
- Aoki M., Dosi G. (1992), Corporate Organization, Finance and Innovation, in Vera Zamagni (ed.), *Finance and the Enterprise*, Harcourt Brace Jovanovich, London.
- Aoki M., Patrick H., Sheard P. (1994): "The Japanese Main Bank System : An Introductory Overview", in M. Aoki et H. Patrick (eds), *The Japanese Firm*, Clarendon Press, Oxford.
- Berglöf E. (1990), Capital structure as a mechanism of control: a comparison of financial systems, in M. Aoki, B. Gustafsson and O.E. Williamson (eds.), *The firm as a nexus of treaties*, Sage Publications, London.
- Cadbury Committee. (1992), Committee on the Financial Aspects of Corporate Governance, Draft Report.
- Cohendet P., Llerena P., Marengo L. (1996), *Learning and Organizational Structure in Evolutionary Models of the Firm*, Mimeo, BETA, Université Louis Pasteur, Strasbourg.
- Dimsdale N., Prevezer M. (eds.) (1994), *Capital Markets and Corporate Governance*, Clarendon Press, Oxford.
- Dosi G. (1990), Finance, innovation and industrial change, *Journal of Economic Behavior and Organization*, 13, pp.299-319.
- Dulbecco Ph. (1998), Inter-Firms Cooperative Agreements, in R. Arena, C. Longhi (eds.), *Markets and Organization*, Springer.
- Edwards J., Fischer K. (1994), *Banks, Finance and Investment in Germany*, Cambridge University Press.
- Foss N.J. (1993), "Theories of The Firm: Contractual and Competence Perspectives", *Journal of Evolutionary Economics*, 3, pp.127-144.
- Franks J. and C. Mayer (1996), Hostile takeovers and the correction of managerial failure, *Journal of Financial Economics*, 40, 163-181.
- Guerrieri P. and A. Tylecote (1997), Interindustry differences in technical change and national patterns of technological accumulation, in C. Edquist (eds.), *Systems of innovation: technologies, institutions and organisations*, Cassel, London.
- Hancké B. (1995), *Trust is Good, Control is Better*, Mimeo, Department of Political Science, M.I.T., April.
- Hoshi T. (1994), "The Economic Role of Corporate Grouping and The Main Bank System", M. Aoki et R. Dore (eds), *The Japanese Firm, The Sources of Competitive Strength*, Oxford, Oxford University Press.
- Imai K., Baba Y (1989), *Systemic Innovation and Cross-Border Networks*, Communication au Séminaire International sur la Science, la Technologie et la Croissance Economique, OCDE, Paris 5-8 juin.
- Langlois R.N. (1992), "Transaction-Cost Economics in Real Time", *Industrial and Corporate Change*, 1: 1, pp.99-127.
- Langlois R.N. (1993), *Capabilities and Coherence in Firms and Markets*, Mimeo, Department of Economics, The University of Connecticut.

- Lazonick W. (1992), *The Innovative Business Organization and the Myth of the Market Economy*, Cambridge University Press.
- Lazonick W., O' Sullivan M. (1996), "Organization, Finance and International Competition", *Industrial and Corporate Change*, 5: 1, pp.1-49.
- Loasby B.J. (1993), *The Organisation of Industry*, Mimeo, Department of Economics, University of Stirling, May.
- Loasby B.J. (1994), "Organizational Capabilities and Interfirm Relations", *Metroeconomica*, 45: 3, pp.248-265.
- Mayer C. (1996), *Corporate governance, competition and performance*, OECD, Economic Department, Working Papers, n°164.
- Moerland P.W. (1995), "Alternative Disciplinary Mechanisms in Different Corporate Systems", *Journal of Economic Behavior and Organization*, 26: 1, pp.17-34.
- Nardozzi G. (1992), National specificities and current tendencies in financial systems, in: V. Zamagni (ed.), *Finance and the enterprise*, Harcourt Brace Jovanovich, London.
- OCDE (1994), *Les systèmes nationaux de financement de l'innovation*, Mars, Paris.
- Richardson G.B. (1990): *Information and Investment*, Clarendon Press, Oxford, 2nd edition.
- Robertson P.L., Langlois R.N. (1995), "Innovation, Networks, And Vertical Integration", *Research Policy*, 24, pp.543-562.
- Steinherr A. and C. Huveneers, 1990, *Universal bank: the prototype of successful banks in the integrated European markets?, a view inspired by German experience*, Research Report, n°2, Centre for European Policy Studies, Bruxelles.
- Teece D.J. (1992), "Competition, Cooperation, And Innovation", *Journal of Economic Behavior and Organization*, 18, pp.1-25.
- Tylecote A. (1995), Financial systems and innovation, in: M. Dodgson and R. Rothwell eds., *Handbook of industrial innovation*, Edward Elgar, Aldershot.
- Williamson O.E. (1988), "Corporate Finance and Corporate Governance", *The Journal of Finance*, 43: 3, pp.567-591.