Organizations, firms and institutions in the generation of innovation

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Abstract

The purpose of this paper is to develop the innovation system analysis by bringing together the “institutional” and “organizational” dimensions of the process of innovation at the firm level. The objective is to start elaborating a “systemic” theory of innovation in firms. The paper summons up the contributions and limits of “organizational” and “institutional” approaches to innovation. This preliminary investigation leads to a series of relevant questions. In a second section, an attempt is made to overcome the dichotomy and make progress towards a more exhaustive and better-articulated representation of the innovation process considered at the firm level. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

The purpose of this paper is to start to bring together the mutual roles of the “institutional” and “organizational” dimensions of the process of innovation at the firm level. We are rather under the impression that recent studies on innovation, focusing on one or the other of these dimensions, that have indeed allowed a better knowledge and understanding of the highly complex mechanism of innovation generation, have, until now, largely remained separated and ignorant of one another.

It is our conviction that those different approaches should now be brought together in order to allow for a much more thorough understanding of these innovation phenomena. The reason being that if each one of the different approaches brings key elements to the understanding of things by posing a series of relevant questions still locked up in the limits of their specific concepts, they remain blind to some key aspects of understanding, that can only be brought to the fore if the junction that we are hoping for taking place.

To be more precise, the contributions and key limits of each approach can thus be simplified.

The main benefit of the institutional approach to innovation (whose most advanced point is the “National System of Innovation”—so-called NSI approach) is to indicate clearly the existence of national (or “social”) innovation trajectories, that are largely determined by the social context in which the various agents—and primarily firms—operate. That means that the vision inherited from standard approaches, according to which innovation is “pulled” by the sheer progress of scientific knowledge, whose origin is given as exogenous, is disparaged. On the contrary, innovation, in such institutional approaches, is starting to be analyzed...
as an endogenous process. But a limit of this approach is that when it does not suppose a "representative firm", it is largely unable to provide the right analytical tools to analyze the large variety of models of firm. Too often the firm in many institutionalist approaches remains a "passive", "black box", "acted" upon by the macro-social determinants in which it is inserted.

Conversely, the organizational approach gives pre-eminence to firms' organizational choices, and accounts for the differences in their results by adopting "organizational models" that are essentially distinct, between one kind of firm and another. Even better, judicious and innovative organizational choices are seen as determinants of the competitive advantage of firms. Yet such an approach largely ignores the contributions of institutional approaches: firms are supposed to deal with information and knowledge, develop learning processes and (sometimes) coordinate varied interests, but in most cases the types of firm described (and defined) in this organizational approach do not take into account the "legal", institutional context in which firms operate, and the way those conditions and contexts guide and limit their actions.

As can be seen, both approaches, far from opposing each other, are potentially largely complementary. Our intention is to work on this complementarity. One of the major interests of this attempt (if it succeeds) is, by crossing "organization" and "institution", to start elaborating a "systemic" theory of innovation in large firms.1

In the following we shall proceed as follows: we will first summon up the contributions and limits of each one of the two major "organizational" and "institutional" approaches of innovation. This preliminary investigation will lead to a series of relevant questions resulting from this comparison. In a second section, we will try to overcome the dichotomy and make progress towards a more exhaustive and better-articulated representation of the innovation process considered at the firm level.

2. The organizational and institutional approaches to innovation: contributions and limits

The representation of technology and technological progress in standard economics is always reduced to a quite simplified view. Technology and technical change are regarded as an exogenous factor, resulting from a given state of knowledge (supposedly available and usable by all firms), expressed in a "blueprint" and represented by production functions. Such reasoning covers not only technique in its restricted meaning, but also the organizational structures—particularly at firm level—and the institutional environment upon which the capabilities of firms and nations are based. Innovation, in such conditions, cannot but be treated as God’s gift, or as the product of exceptional individuals’ creativity, which is about the same. The attempts to explain technical progress, whether it be through the theory of induced innovation, or the more recent theory of "endogenous growth", do not in fact go much further in the understanding of the deep motives of the dynamics of innovation. Indeed, besides taking such major factors as R&D or education into account, they continue to consider the production system and all the actors and organizations which contribute to technological and organizational innovation as a huge black box.

In order to further the understanding of innovation, two major and complementary paths have been followed. The first goes inside the black box of organizational structures, with the aim of capturing the determinants of the firm’s capacity to innovate; the second emphasizes the characteristics of the global structure of economic systems and of the interactions between actors, which leads to insisting on the role of institutions.

2.1. Innovation as an organizational process …

The study of innovation as an organizational process may find its origin in Schumpeter’s theory of the "routinization" of innovation in big firms (Schumpeter, 1942). In large capitalist units, innovation takes the form of organized patterns, centered on industrial R&D, as will also be shown in subsequent studies. Chandler’s exploration of the firm constitutes a major approach, later to be completed by the
... neo-Schumpeterian empirical work more specifically focused on the conditions of technical innovation within the firm, or by the analysis of the Japanese firm. It is possible to talk about an organizational view of innovation in so far as the analysis of the process of innovation, and of the conditions of the success of innovation are treated basically by taking into account the internal organization of firms: their structural design, the modes of coordination between groups and between sub-units (for example, between R&D, manufacturing and marketing departments), the incentive mechanisms and the system of governance, the labor management (notably the conditions of internal and external mobility of workers). Two main theses appear here: (i) the (big) firm is the central agent of innovation, (ii) the organizational variable is the key factor in the capacity for a firm to innovate.

This approach to the innovation process finds a kind of completion in Kline and Rosenberg’s chain-linked model (Kline and Rosenberg, 1986), which provides a paradigmatic representation. According to this model the innovation process is structured around a set of key activities: those of the “central-chain-of-innovation” and the research activities as such; it implies the exploitation and combination of different types of knowledge.

This analytical framework leads to the consideration of the innovation process along two major dimensions: (i) the modes of distribution and circulation of information and knowledge within the firm, and (ii) the complex links existing between research activities and the innovation process. Such an approach clearly emphasizes the importance of the organizational dimension, but, as will be shown later, the full understanding of the conditions inherent in the operation of the different “feedback loops” of critical importance in the chain-linked model of innovation, implies taking into account institutional determinants which Kline and Rosenberg had not investigated.

In spite of such a limit, this framework allows us to distinguish between different models of innovation, characterized by different organizational patterns. Aoki (1988) explicitly uses this framework to highlight some key specificities of the so-called “J” firm, as regards the innovation process at the firm level, and its links with R&D activities. Organizational patterns then vary according to the followings.

1. The modes of coordination of activities, and of information diffusion conditioning both the privileged modes of conception of innovation, the relative importance of inventions and “analytic design” and the role played by the “short feedback loops” between adjacent functional units and the longer ones, linking the market and consumers to the first stage of the innovation process—and the privileged types of innovation (incremental or radical innovation).

2. The importance given to research, i.e. the favored modes of learning and knowledge creation. This may appear in the contents and structure of the firm’s R&D activities, and notably the respective roles of “R” and “D”, and the importance of central research laboratories, as well as in the ways in which and conditions under which the new knowledge created by external research is exploited. It should also be emphasized that in such an approach, a central role is attributed to the relative importance of coordination patterns centered on incentive mechanisms, compared to those that first resort to mechanisms of authority within organizations’ hierarchical structures.

Other approaches have developed a lot of reflections on the links between organization and the firm’s capacities to innovate, particularly in works concerning the new forms of product or process development (Wheelwright and Clark, 1992; Pisano, 1997), or the conditions of firm’s knowledge creation.2

This way of approaching innovation models mostly concerns the structure of the firm, but it should be noted, as we have already suggested, that such structures cannot be dissociated from institutional dimensions. For we should not forget, in the background, the characteristics of industrial relations, based on the one hand on a given social and legal framework, as well as on the form of corporate governance, and the characteristics of intellectual property rights, and the rules governing the scientific system on the other.3

These approaches lead us to view the innovation process within the firm at the crossroads between two key dimensions: (i) the conditions of a “cognitive coordination”—how the collective capacity to produce

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3 See Section 2, where these propositions are developed.
and innovate builds up—on the one hand; and (ii) the conditions of a "political coordination"—how to realize the compatibility of interests and the management of conflicts, through particular combinations of incentives and authority—on the other.4 Things can be more accurately developed as follows.

- The first dimension, cognitive coordination concerns the management of information and knowledge. It poses the problem of the conditions of organizational learning and of the building up of firms capabilities, and, more specifically capacities to innovate. This problem is tackled by the evolutionary and the competence and resource-based theories of the firm, stressing the importance of the modes of knowledge creation, storage and diffusion inside the firm, of internal learning processes and the way "dynamic capabilities" are built up and deployed.5 The articulation between static and dynamic capabilities plays a key role in the explanation of the conditions in which organizations at the same time are prisoners of irreversible processes of path dependency and also have the faculty to move into new directions. Hence, a permanent tension between organizational coherence on the one side, and the search for new routines and capabilities on the other. The pivotal question is to know what organizational patterns encourage learning processes (and which types of learning) and dynamic capabilities, and what the links are between modes of learning and modes of innovation.

- The second dimension leads to the analysis of incentives and the modes of appropriation and distribution of surplus and/or rents that firms constitute from competitive advantages resulting from innovation. This may, and should lead to the introduction of purely institutional aspects, notably through the property rights system (securing the respective rights of shareholders and managers) and the modalities of capital/labor sharing. But in fact, the analyses of the organizational conditions of innovation mainly focus on the first dimension. The problems posed by the management of conflicts are either ignored, or left aside (the "truce" hypothesis in Nelson and Winter’s routine analysis), or else assimilated to the "cognitive discrepancies" problems (cf. Coriat and Weinstein, 1996).6

Organizational approaches highlight two major questions to which any theory of innovation must give an answer:

1. First question: How can one understand both the diversity of organizational patterns and the existence of dominant modes of organization? According to the evolutionary theory, a key role should be attributed to the analysis of variety, since it largely determines technological and organizational dynamics. The diversity of organizations and firm patterns can be seen under three dimensions: firm diversity, within a same sector, linked to strategic specificities and path-dependencies that shape their trajectories and build up specific capabilities and routine systems (IBM versus Apple, for instance), sectoral diversity linked to the characteristics of innovation regimes and selective environments that may induce specific sectoral trajectories (cf. Dosi et al., 1992; Malerba and Orsenigo, 1996), national diversity, linked to the specificities of national innovation systems, specialization profiles, institutional and cultural frameworks.

Yet, beyond the diversity of organizational patterns, it seems relevant to try and identify some dominant organizational principles that will structure organizational systems. Such is the prevailing idea in the studies of Fordism or Toyotism. Acknowledging the existence of those dominant patterns leads to the questioning of the conditions in which they are selected and diffused. Why does a model become dominant and how can it be diffused? This points—mostly that of diffusion—have been largely debated in relation to Fordism and Toyotism. We should simply mention here that the reason for the dominance and generalization of a given organizational model (and for the fading out of another) cannot be reduced to the most commonly accepted explanation, that of efficiency (or of the adaptation to a more or less well-defined

4 This dual notion of coordination echoes the very way in which the theory of organizations defines organizations as a coordinated action system between individuals or groups whose information, knowledge and interests differ (cf. Coriat and Weinstein, 1996).

5 See, for example, Teece et al. (1997).

6 For a critical review of the thesis of Nelson and Winter on routines as "truce" see Mangolte (1998); and for a study of the "social dimensions" of Japanese routines, see Coriat et al. (1999).
exogenous environment). Efficiency offers multiple and changing dimensions that ought to be taken into account, if the understanding of global dynamics is to be attained. We may assume then those institutional determinants and the nature of "the rules of the game" guiding and orientating actions will play a critical role.

(2) Second question: How can organizational patterns evolve to give birth to new principles and organizational systems? One of the major aspects when dealing with the evolution of production processes is to know how organizational systems undergo transformations. A certain number of elements can be suggested here.

1. Organizational transformations are linked to technological change and to the evolution of the forms of competition. This is the most common view (cf. Chandler). But much more remains to be said on the subject.

2. The emergence of new organizational patterns always concerns a particular sector (often to be found among new or fast changing sectors). What matters then are the transformations of the sectoral structures and the emergence of new "leading" sectors, and the conditions in which the inter-sectoral diffusion of organizational innovations takes place. It is thus essential, when studying the evolution of the American system of production and innovation, as well as the transformations of the "A firm", to realize that this system, since the 1920s, was first essentially based on innovation in scale intensive industries (to use the classification proposed by Pavitt (1984)), then, since the 1960s, in science-based ones (cf. Nelson, 1992). These industries have seen the emergence of new organizational patterns, adapted to a regime of permanent innovation, radically different from the prevailing one, and of what may perhaps be called a "new A firm" (Weinstein, 1997).

3. We ought to pursue this further: new organizational patterns are implemented, at least initially by certain firms only. This is precisely the reason why one speaks of a "Fordist" organization or of "Toyotism". This fact has not been questioned enough. If we refuse a theorization in terms of a "representative firm", we must take into account the conditions of the emergence of diversified business patterns (from the standpoint of organizational structures, strategies and modes of innovation), as well as the conditions of selection and diffusion of specific patterns that may lead to new forms of organization and the constitution of a new dominant model. The dynamic of individual firms as such, and their autonomy, must then be taken into account. The answer to the second question depends on the elucidation of the first.

On the whole, two major conclusions emerge from the organizational approach.

- The first is that the strength of organizational approaches is to allow the recognition of the fact that firms "are the primary instruments in capitalist economies for the production and distribution of current goods and services and for the planning and allocation for future production and distribution" (Chandler, 1992). This implies that firms' structures and strategies are at the heart of innovation regimes.

- The second—complementary to the previous one—is that if the firm fulfills this key role in the dynamics of innovation, it is because it has the capacity to create, through its choices, "organizational capabilities", as Chandler says, which are the source of a competitive advantage, and, precisely for that reason, are destined to be diffused.

That is why, as explained by the new competence-based and evolutionary theories of the firm, it is essential to explore the process of knowledge creation by firms, and the conditions of their dynamic capabilities. A key problem is to understand how continuity and changes do combine in the evolution of a firm's capabilities (Dosi et al., 1999), and what the factors are of rigidity of organizational capabilities and the conditions for their renewal and transformation. One of the main question is to identify the conditions of high level dynamic capabilities, i.e. is the conditions of firm's capacities to successfully explore new fields of activity and to develop new competencies through new forms of organization and new routines.

The contribution of the organizational approach to the understanding of innovation dynamics is essential. But, at the same time, it can easily lead to the error of treating the firm as an almost closed system, producing the conditions of its dynamics by itself,
and of regarding technological and organizational innovation as being the result of internal relations only. The risk of insisting on the necessity to go “inside the black box” is to forget all the external determinants, and more precisely, the institutional ones. As we have tried to explain, as soon as we try to further the study of the factors of organizational efficiency and the conditions of transformation of modes of organization, we have to consider institutional determinants.  

We shall now come to that point.

2.2. And as product of institutions

The importance of the role of institutions in the dynamics of innovation is nowadays widely recognized. It has repeatedly been stressed in the works on the Japanese economy, then in the literature on NSI (cf. in particular, Freeman, 1987; Lundvall, 1992; Nelson, 1993; Edquist, 1997a). It is not our purpose to analyze here all the details of the many studies on NSI or, more generally, on social systems of innovation and production (cf. for instance, Edquist, 1997b; Amable and Pettit, 1998). We will limit ourselves to certain aspects of those approaches, useful to our purpose, and to some of the questions that they raise concerning the notion of institution and the links between institutions and organizations.

The reference to institutions is to be found in any study related to innovation systems (cf. Edquist, 1997b), but many uncertainties remain as to the real contents of the concept of institution and the scope of the specific institutions that must be taken into consideration. This problem has been very clearly approached by Edquist and Johnson (1997), as well as the question of the connections between institutions and organizations. The “conceptual vagueness”, as they said, to be found in the use of the term “institution”, implies some clarification, in particular on three points.

2.2.1. Which conception of institutions should be retained?

A precise view of what we mean by institutions is obviously a necessity, if we want to clearly identify the role of institutions in innovation dynamics. But it is also a key question, in order to grasp the role of organizations, and first of all of firms, and to understand what their degree of autonomy is in innovation systems, and how they participate in the formation and evolution of such systems. We will deal with this point later.

As explained by Edquist and Johnson (1997), the notion of institution is usually used with two different meanings. In some studies, and in particular in many studies on innovation, it refers to various bodies which are involved in the production, the diffusion and the management of scientific and technical knowledge. In that case, the term institution refers mainly to specific organizations, usually to public organizations, and organizations other than firms. In another part of the literature, the concept of institution is the one which has been developed by institutional theories.

The study of innovation and production systems is thus based on two major ideas, which have to be clearly distinguished.

The first one is that innovation must be seen as the result of the interaction between different types of organization and not as the product of the activity of firms only. The approach is thus systemic, insisting on the variety of the actors involved in the process of innovation and on the importance of the modes of interaction between them; between firms themselves and between firms and other types of organization.

The second idea refers to the importance of the role of “institutions” as such in the definition of innovation systems. This reference to institutions generally encompasses two (complementary) aspects. The first refers to the role of what may be called a certain “organizational architecture”, that may vary according to countries (or regions): the nature of the different types of organization and agencies involved in the innovation process, and of the modes of coordination between them. A reference can be made to a “network of institutions” (Freeman, 1987). The notion of “knowledge infrastructure” (Smith, 1998)—including universities, research labs, training systems, agencies managing standardization and intellectual property—encompasses a similar concept. It offers the advantage of enabling a distinction to be made with the institu-
The latter emphasizes the role played by the institutional framework as such, which defines social positions and functions of individuals and groups, and constrain their actions. We are here in the standard approach of Institutional Economics, defining institutions as a cluster of formal and informal rules that shape behaviors. According to the well-known definition by North (1990), the institutions, in this perspective, are the “rules of the game in society”. This includes the legal system, as well as the rules, habits and customs that define patterns of behavior and shape human interaction.

The problem of the definition of institutions is linked to that of the distinction between organizations and institutions, which is not always very clear in many studies on innovation. The status of institution is thus given to very different objects (the academic system, the intellectual property right system, labor market regulations, etc.). This point ought to be clarified if the role of organizations (and more particularly of firms) in the dynamics of innovation, as well as the nature of institutional factors as such is to be taken into account, in order to grasp institutional transformations and organizational/institutional co-evolution processes. It is useful here, at least as a starting point, to use the North’s distinction: if institutions are the rules of the game, organizations are the players. It allows to grasp the complex interactions between institutions and organizations: on one side, institutions are framing organizations, but, on the other side, organizations can contribute to the definition and transformation of institutional rules. We will have to come back to that question in the next part of this paper.

2.2.2. What are the relevant institutions?

A second problem is to thoroughly define the scope of the institutional components which have to be considered in order to understand innovation dynamics.

Some NSI approaches are centered on a limited group of institutions: those directly involved in the production and diffusion of scientific and technological knowledge, even if the frontier between relevant and non relevant institutions to be included is rather fluid. Some others, such as Lundvall, go further and tend to take into consideration the whole economic structure. This is undoubtedly useful, as the studies of American and Japanese systems clearly point out: the capacity to innovate of different countries, and the specific national models of innovation bring into play the basic elements of the economic structure, such as the system of industrial relations and the characteristics of labor markets, the structure of the industrial system, the nature of the relations between industry and finance.

The enlargement of the considered institutional scope induces more global institutionalist approaches, such as those of the regulation school (Aglietta, 1979; Boyer, 1989); the analyses of “Production Regimes” (Soskice, 1999), or of “Social Systems of Innovation and Production” (Amable et al., 1997) to name just a few. Those various approaches all highlight the multiplicity of possible ways to characterize institutional architectures: the definition of basic institutional sub-systems and the relations existing between them. They may include (Amable and Petit, 1998): the system of industrial relations, the financial system, the state structure, the forms of competition and the modes of inter-firm relationships, the characteristics of the legal systems and lastly, the rules, standards, customs and cultural modes inherent in each society. A major problem will then appear: the necessity to choose a principle of division of the institutional structure of the economy, which cannot be dissociated from the idea one has of the nature of institutions and of the nature of our societies.

From that perspective, one of the major questions is, in our view, the place attributed to the firm in the institutional structure and the analysis of innovation. Let us just note here that firms have to be considered as both institutions and organizations. The basic characteristics of the capitalist firm may appear as a key dimension of the institutional system (the joint-stock company, “A” and “J” firms for Aoki, the American, etc.).

8 See, for example, the survey of Hodgson (1998).
9 See the article of Edquist and Johnson (1997) for interesting developments along this line of analysis.

10 It seems that most contributors agree (explicitly or not) to include the R&D apparatus (universities, public and private labs, etc.) or the educational system. But a very unequal weight is given, for example, to the role played by the financial systems, or the national arrangements concerning industrial relations.

11 For a general presentation of these approaches, see Amable and Petit (1998).
British or German firms’ characteristics for Chandler (1990), the modes of corporate governance, etc.). Besides, each institutional system is compatible with a certain diversity in organizational patterns and types of firm. This aspect is essential to grasp organizational autonomy and its role in institutional dynamics.

2.2.3. The structure of institutional systems: coherence and hierarchy

Whatever the way chosen to describe institutional architecture, two aspects are essential to understand its properties: the coherence and hierarchy between institutions, or institutional sub-systems.

The importance given to the coherence of organizational/institutional systems is undoubtedly one of the major characteristics of all institutional approaches. It means that the system’s performances and its capacity to innovate are supposed to depend as much on the system itself as on the characteristics of the different sub-systems. This will concern the forms of organization of industrial R&D and the characteristics of the public research and training system, but also, in broad views, the structure of the whole economic system. The effectiveness of some institutional, or organizational, features cannot be assessed without taking into account the whole institutional structure. This implies in particular, the ideas of a required coherence between the society’s institutional structure and firms’ characteristics and organizational patterns, between institutional traits on the one hand and firms’ patterns of behavior on the other. For example, in some approaches, firm’s strategies and structures oriented to incremental or radical innovations are supposed to be connected to different institutional arrangements, and in particular to specific forms of labor and capital markets. But, as will later appear, if this vision of coherence is pushed too far, it may imperil the understanding of the dynamics of the system, and the understanding of the role of individual firms in the dynamics, according to the degree of autonomy opened to their initiatives by the characteristics of the institutional setting.

This way of emphasizing the complementarity of institutions and the way it operates and evolves is key (i) for the understanding of the dynamics of the system, (ii) and the understanding of the role of individual firms in the dynamics, according to the degree of autonomy opened to their initiatives by the characteristics of the institutional setting.

This way of emphasizing the complementarity of institutions and the importance given to an architecture that is often shown as excessively rigid, certainly allows a better understanding of certain dimensions of national or regional competitiveness (or loss of competitiveness). Yet, it implies the major risk of forgetting the key role of diversity within a system, and of the ways actors’ behaviors remain largely autonomous and non determined, and thus to underestimate the flexibility of a system and its possible transformations. This clearly appears when two major points are evoked: the variety of sectoral regimes on the one hand and of the modes of organizations on the other.

The relations between national and sectoral systems of innovation are essential for different reasons:

- As shown in many studies on NSI, the characteristics of a national systems and of its institutional features can be strongly linked to the specificities of certain sectors playing (or having played) a key role in the economy. Sectoral specialization can thus contribute to the shaping of the system and

12 See, for instance, Soskice (1999).

13 See Amable and Pett (1998) for developments on that point.
of some of the organizations or agencies playing a key role in innovation. Conversely, the institutional structure can orientate the sectoral specialization and the determination of the key sectors of an economy as well as the forms of innovation trajectories. Such an approach helps us understand France’s position in public demand oriented sectors, which is inseparable from certain specificities of the French public institutional system.14

- Simultaneously, a similar sector may be characterized by different modes of organization and different regimes of innovation from country to country: such is the case for semi-conductors in the US and Japan, without forgetting that within the sector itself, the regime of innovation may be linked to intra-sectoral specialization (microprocessors versus memories).

- Lastly, the transformations of innovation systems are often related to, the emergence of new sectors and the reconfiguration of existing ones. We have previously mentioned that the transformations of the American system cannot be dissociated from major changes in some strategic sectors that are essential to economic growth (information technologies, biotech, etc.). The debate on the supposed “New Economy” in the United States is precisely based on that point. One may also wonder if the basic problems of the Japanese innovation system today are not the result of its poor adjustment to the currently prevailing innovation trajectories in high tech sectors.15

The problem of the relations between institutions and the organizational model of firms is just as important. From a pure institutionalist view, the organizational dimension of individual firms is either ignored or, more frequently, the organization, and notably the firm’s structure, is subordinated to the institutional coherence. The system is thus implicitly based on organizational models of an “archetypal” kind. The firm’s representation is often reduced to a simple model of the “representative firm”. Thus, it is quite common, when comparing Japanese and American systems, to characterize a “T” versus an “A” firm (representative of Japanese and American firms, respectively). In such a view, no (or very little) room is left to fully take into account the large spectrum of organizational patterns of firms, inside any national or regional system, and the role this diversity plays in the dynamics of the system. The emphasis on systemic coherence, to be found in most of the institutional approaches, makes it difficult to understand how innovation and production systems can evolve and transform themselves. Indeed, a crucial problem today is to understand what the postwar conditions were that allowed the Japanese “model” to emerge, and its current possibilities to undergo transformation; and what have the conditions of the renewed dynamics of the American system been, and the deep organizational and institutional transformations that have supported it. The question raised by major postwar changes, as well as by today’s developments, is to understand the conditions of the emergence of new structural patterns, of extensive organizational and institutional transformations. Yet, we think that the role of firms in the evolution of innovation systems has more often been underestimated. And such is also the case, by and large, for the various individual and collective industrial, financial and public actors. The real problem is in fact to know how to reintroduce the autonomy of individual and collective actors into very “structuralist” approaches. The answer to this challenge poses the question of what an institution basically represents.

With this purpose in mind, we now intend to explore a path consisting in (re) considering the relations between organizations and institutions, as well as the role of the firm within social innovation systems. To this end, we need to bring up the very notion of institution again, to understand how different types of institutional devices guide and spur individual and collective actors’ behaviors, while giving its full importance to the role played by organizational patterns and to the autonomy which firms may (and do) enjoy.

3. Between institution and organization: new prospects for the innovation theory

3.1. Some theoretical starting points on the notion of institution

In order to provide an acceptable representation of innovation as a process both internal to the firm, and

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14 On that point, see for example, the characterization of the French NSI proposed by Chesnais (1993) in Nelson (1993).
15 On this point see Coriat et al. (1999).
also as a (“national” or “social”) system, we need to reconsider the key notion of institution. Though we do not intend to explore it in the diversity of its meanings and possible definitions, we think it is indispensable to have a few reference points. Considering the extreme variety in the nature itself of a so-called “institution” (laws, rules, contracts, customs, taboos, etc.) it is necessary both to envisage the common and shared characteristics and to distinguish between different types, so as to start articulating together those relations. We will here reconsider the problem of hierarchy among institutions.

### 3.1.1. Institutions as “rules of the game”:

Authority and “discretion”

As regards common characteristics, it seems useful to start from a “North like” notion of institutions defined as “rules of the game” according to which agents operate and coordinate themselves.16 Such “rules” are required and they are accepted by individual agents because they basically reduce uncertainties. Indeed, in a world of high labor division and high specialization based on autonomous and decentralized units, institutions reduce uncertainty and guarantee the possibility that the coordination of individual agents should be made through more or less formal protocols, while escaping the “state of nature” (Hobbes); i.e. a situation of pure confrontation between selfish desires. In this sense, institutions, in so far as they determine the rules of the game, limit the way in which interests confront one another, by setting the framework inside which the interests, and thus the agents’ strategies (we will later come back to this key aspect) may develop. It is also possible, then, to assert that institutions create regularities under which the agents can more easily and efficiently behave. To go further, the rules—or to be more precise the systems of rules—shaped by institutions are turned into “resources” and “collective goods” for the agents. They will be able to use them to develop their own strategies to achieve their goals. But before examining this crucial aspect, some principles ought to be mentioned, so as to distinguish between different types of institution.

To introduce the necessary distinctions between different types of institutions, two series of elements seem essential.

(i) We will here suggest distinguishing between (so-called) “type 1” and “type 2” institutions: although they both contribute to the definition and fixation of the “rules of the game” for the individual agents, “type 1” institutions are singular insofar as they include an explicit “enforcement” dimension, imposed on all agents. This dimension is guaranteed by a sanction system (justice, the police, etc.), calling up complex social devices that make the imposed rules of the game operational and guarantee their respect by agents. It is also the reason why those types of institution set both the limits imposed to the “autonomy” granted to agents, and the margins of initiative that they can enjoy in their particular arrangements. The double dimension of “enforcement” and of “discretion” is thus key to the understanding of the way institutions operate and shape the behaviors of the agents.

We can go one step further, if we notice that, in modern societies, “type 1” institutions are first and foremost those that organize and guarantee the property rights system, i.e. those relative to the conditions of the appropriation of goods, to the rules of heritage transfers, to the exchange of property rights in different markets, etc. Such rules apply indeed to all agents and cannot be waived, which does not necessarily mean that those rules can be assimilated to “laws” everyone should abide by. They are also different from “contracts” signed between individual agents, which bind only the contracting parties.

In this view, “type 2” institutions can then be defined as being related to the rules that individual agents decide to give themselves, the relations that bind them, the contracts they sign between themselves, the “customs” they decide to follow,16 etc. Yet, they cannot depart from the “rules” imposed by

16 At this stage of our study, the notion of agent encompasses indiscriminately individuals or collective actors, the latter being organized in formal interest groups (unions, associations, etc.) or not (the participants in a strike, the Internet users, etc.).

17 The acceptance of the idea that institutions depend on “rules of the game” does not imply that we accept all of North’s categories around his own notion of institution. As we will see, his idea may be taken up, and it seems essential to the analysis of institutions, while vesting it with contents that may implicitly or explicitly vary from North’s.
generally French Regulation Theory. A basic distinction between institutions is related to the fields and domains they contribute to shape. We then suggest differentiating between the institutions that govern interactions and exchanges, and whose duration is fixed and limited in time, as are, for instance, most contracts (we will call these “type B” institutions), and those whose duration is not fixed (“type A” institutions), and whose object is to rule the reproduction of the society as a whole, considered in the long run. It is also the reason why those “type A” institutions usually encompass areas related to products and services that can be regarded as “public” or “collective” goods. They mostly take place whenever “market failures” appear. Schools, hospitals and basic research labs are some of the typical “type A” institutions. Their particular character is due to their key role in the inter-generational dimension of social reproduction. Such (“type A”) institutions are usually fixed in “institutionalized compromises”.

The designation (typical in “type A” institutions, but to be found in a good many others) of “collective goods” built to last so as to ensure inter-generational reproduction allows the specification of another key dimension of these institutions. In fact, as collective goods, those institutions (and typically those linked to the production and reproduction of knowledge, health, security, etc.), and the rules they contribute setting up, appear as we have already suggested as resources to be used by agents. The latter will then be able to develop strategic behaviors to capture the benefits (supposed “collective”) for individual or private purposes. In the educational and research sectors, those strategies are intense, multiform and come from a large variety of actors that are often at odds, each with another. The struggle of the “have-nots” for access to free educational systems and firms’ strategies to appropriate public research are so many examples of the way actors use the rules with a view to satisfying their own interests.

We will then posit that institutions always appear under a double aspect, as “constraints” on the one side, and as “resources” and opportunities on the other. The main aspect may vary from one kind of institution to another, or for the same institution according to the actor’s nature and the “strategic” aims of his action. Thus, institutions should not be considered as being only a system of constraints (North’s approach) for they offer agents new opportunities to act. This second dimension of institutions, which is much less emphasized in the literature than the “constraint” one, is nevertheless a key feature of their role. This approach to institutions is very close to some Commons (1934) intuitions when he speaks of institutions as “Collective action in control, liberation and expansion of individual action”.

We must go still further: far from being only a system of constraints posed on the agents, some institutions give birth to entirely new fields of action or new environments where individuals will be able to develop their abilities. We can take up Searle’s distinction (Searle, 1995) between “standardizing rules” (the highway code) and “constituting rules” (the game of chess). If we follow this definition, we can say that some institutions aim to set up rules for already existing activities, whereas others seem to be cut out to create the conditions for new activities to emerge. This is true for a good many economic institutions. Such is the case for many scientific institutions which, as they get structured, offer new types of activities, new...
strategic environments and create new "patterns of behavior".

Let us also mention, for it is an essential element, that the existence of an institutional hierarchy does not imply perfect coherence of institutional rules with regard to one another. On the contrary, and even if each institution contributes in its own way to setting the rules of the game, there exist large areas of uncertainty and vagueness, not only concerning the interpretation that can be made of each rule or of a given system of rules (commercial law, for instance), for there are also permanent tensions between systems of rules (commercial law and labor legislation, for instance, or even within labor legislation itself, between "the right to work" and "the right to go on strike"). Indeed, each system of rules is the result of an accumulation, with new rules often being added to older ones, at best creating discrepancies, but often tensions and incoherencies, if not contradictions. Such is notably the case with the enforcement of systems of rules that contribute setting the rules of the game in concomitant fields.

These discrepancies and contradictions are essential to understand the dynamics and evolution, for they contribute to making the evolution itself possible. Evolution is possible because agents using systems of different rules (as resources) are in contradiction with legitimacies, which may not be of lesser importance with regard to one another. Such conflicts give rise to arbitration (litigation and jurisprudence as sources of the law: i.e. precision of the rules), being in turn at the origin of new rules, that is to say, of new resources that may be used by agents so as to develop new strategic behaviors. The agents' game thus contributes to the permanent evolution of rules. What is true for individual agents also applies to organized groups and collective actors (unions, associations, etc.). A strike, for example, even if in most cases it is the object of a codification aiming to set its own particular "rules of the game" (largely varying from one country to another), may at any time, bypass "the rule" to be found at the origin of its development. Social dynamics is then assimilated to confrontation, partly based on rules ("the right to go on strike" used as a resource), and partly outside rules ("the rules of the game" are thus bypassed). The result is then either the resolution of the conflict in a return to the rules (in its initial framework), or the formation of new rules, that will constitute so many new resources to be later used by agents in their respective behaviors. 21

3.2. Implications for the analysis of innovation systems

How does this approach to institutions allow a better understanding of innovation processes by completing (or modifying) the organizational approach?

If it is admitted, as previously said, that one of the major contributions of the organizational approach is to have highlighted the representation of the firm as system of coordination aiming at "cognitive" (management of information and knowledge), and "political" dimensions (management of interests through coalitions and alliances 22), one should admit then that two series of institutional devices play a key role. They both contribute to regulating—very differently according to social environments—the relations between key actors in the firm.

In our view, the two series of institutional dimensions (each one matching and mixing "type 1" and "type 2" institutions) playing the major role for the understanding of the functioning of the innovation system are

- the system of property rights, and more specifically the body of rules regarding the governance of the relations between shareholders and managers on the one side; the capital/labor arrangements (labor contracts and more generally the "wage relations nexus") on the other.

These two sets of institutional arrangements are here selected since they determine the way information,

21 Conflicts "within the rules" (i.e. within their vague and undetermined limits), or as the manifestation of behaviors "outside the rules" thus become the basic dynamic principle making it possible to account for the way societies evolve, as well as their systems of rules, that is to say their resources and constraints. When those conflicts are powerful enough, the rules prevailing over the top hierarchy may be modified, thus leading to a general tipping in the way agents exert their liberty. It is, thus, the occasion for redshuffling in hierarchies and "borders" between interpretation areas of whole rule subsets. It is also the reason why the societies that are founded on the denial of conflicts (totalitarian societies) do not really evolve.

22 Cyert and March in their book have given a seminal presentation of this dimension of the coordination problem inside the firm.
knowledge and interests are coordinated inside the firm, when it confronts the generation of innovation.

In order to give substance to our approach, we will now focus on these points. In each case we will try to highlight the "constraints" put on the firm by institutional settings, as well as the margin of autonomy left open and provided by the organizational choices made by the firm inside these constraints.

3.2.1. Shareholders, managers and discoverers: the role of property rights

As far as property rights are concerned, institutional determinations on organizational models must be appreciated at least under the double angle of the role of corporate governance on the one hand—which as we shall see influences the question of the financing of innovations—and intellectual property right and patents on the other.

3.2.1.1. Corporate governance, institutional coordination of interests and the financing of innovation.

(i) The role of corporate governance and shareholder/manager relations.

In what way do corporate governance systems influence firms’ behaviors in the field of innovation?

Before answering this question, let us first recall that corporate governance basically results from a double set of devices.

• On the one hand are concerned all the means relative to the “external” control exerted on firms by financial and stock regulations, whose ultimate aim is to organize the protection of shareholders interests and owners’ rights. It is thus admitted that a “good” regulation provides the market with rules ensuring transparency, security, protection and information for all the firm’s owners and shareholders.

• On the other hand, corporate governance mechanisms are related to the firm’s “internal” command modes, via the Board of Directors, its composition and the prerogatives and rights given to the different members.

The combination of those two series of devices determines the way shareholders’ interests (compared to managers’), but also employees’ or bankers’ (according to national regulations) are represented and protected, both inside and outside the Board, usually considered as the strategic place where the decision making process takes place and where the key compromises are reached on the various participants’ interests.

Two points are of paramount importance for us.

• Since Bearl and Means, and later Chandler, it has been admitted that the transformation of the firms into publicly own companies is one of the major characteristics of “modern” capitalist corporations. Indeed, the “modern” corporation could only take off (under Chandler’s conditions) with the help of external capital, in addition to the owner–founders’ own resources. The changing nature of market scale, in Chandler’s analysis, was responsible for this necessary transformation. The modern corporation, could then only take off with the creation of a new institution: the stock market issue to raise supplementary capital. This, in turn has opened the way to the necessity to install institutional protection for the new “external” capital (this was done by the institutional creation of stock and bond markets, ruled by extremely codified procedures). The firm, in its “modern” character (the famous “M form”, for publicly owned companies) was thus directly linked to new institutional creations concerning the (re) definition of property rights. Without this key institutional dimension, the intelligence of the organizational pattern itself cannot be grasped. P. Sloan or Fayol, “inventors”, each one in his own way of the modern corporation, were both confronted with the key question of the position (in the hierarchy) to give to the shareholders relative to that taken by the managers. In both cases, the design of the famous “organigramme” (a key organizational device) was largely determined by the room given to “shareholders” compared to managers.

Here, one has to remember that in practice the institutional constraints imposed by the rules organizing the implementation of the corporate governance principles vary greatly from one country to another.

23 It is, indeed, necessary to recall that these modes vary considerably from one country to another, or from one tradition to another. We can, for instance, oppose as two extremes the American style of corporate governance (which grants strong protection to shareholders) and the German style one, where the various stakeholders are represented on the Board (including the employees) in a much more balanced way.
and from one period to another. Thus, even if it has been necessary everywhere to add new rules of the game to the existing ones, there always exists a room for a wide variety of firms inside the M firm archetype. This fact leads us to go further in one of the major questions of our paper: how can one explain as the same time (in the same country or even the same industry) the variety of organizational models of firms and the existence of dominant ones, at least during certain periods. To be more concrete the challenge could be formulated as follows: how can one explain the fact that in the car industry for example some basic common traits of a typical “fordist” firm can easily be exhibited (see the Regulation Theory work in this field) whilst at the same time, the Ford Motor company neatly differs from General Motors or from Renault, etc. The same proposition can be made, if we confront the common traits of the “M form” and the “national” specificity this form takes in the USA, the UK, or Germany, in given periods.

One part of the answer to the tricky questions just raised is given if we notice that the conditions that guarantee owners’ shareholders’ rights play a key role in explaining these differences as well as the paths followed by the firms in the course of the innovation process. Taking the “balance” of powers as established by different national institutional settings, it has thus been possible to oppose British and American “short-termist” models (where shareholders hold power) and Japanese or German “long-termist” models (the famous Rhine model), and so to account for the good performances of German or Japanese firms in the 1980s, and the poor performances of American firms in the same decade. But the changes that have taken place in the 1990s: the comeback of American firms in the same decade. But the changes that have taken place in the 1990s: the comeback of American firms (notably in high tech) should lead us to moderate this approach. Other elements (but still institutional ones) are then put forward to account for the new situations.

Indeed, institutional innovations relative to the financing of innovative firms. Do these changes in the 1990s as regards the competitiveness of the US firms mean that observers got it all wrong? We do not think so. If we wish to make a thorough analysis of the empirical evidence (both in the 1980s and 1990s), it appears more relevant to put forward the hypothesis that a set of given institutional devices (as they result from a particular SNI for a given country or period: for instance Japan in the 1970s and 1980s) are at the origin of a set of particular comparative institutional advantages. By nature, those comparative institutional advantages are more or less durable and may then evolve. They may also invert themselves and become disadvantages if the key SNI institutions remain stilted and do not permit the needs of new emerging activities to be met. It is thus possible to understand that the Japanese-style corporate governance could very well be perfectly coherent and congruent with the needs of the automobile or domestic electronics industries in the 1980s, to become later an obstacle to the emergence of biotechnology in the 1990s. We will come back to this crucial point because what has been said here, relative to the institutions that organize corporate governance may be repeated for other categories of institutional devices having an effect on firms’ behaviors in the field of innovation.

3.3. Intellectual property rights, innovators and discoverers

As regards the types of role played by the IPR system(s), the available work on this point has emphasized at least the following two points.

- The fact that the legal principles (i.e. the “rules”) securing the innovation rents may greatly vary from one country or one region to another (cf.

24 To our knowledge the notion of “comparative institutional advantage” was first advanced by Soskice and Hancké in WZB working papers. In research comparing the relative performances of American and German firms, they establish (through a thorough analysis of patent deposits), that the relative domains of excellence are completely opposite (Germans are good where Americans are not and vice versa). They then provide an explanation of the evidence putting forward the idea that the two SNIs are at the source of different institutional advantage. We try here to give another and complementary ground to the same notion. For a short presentation of the German study see Hancké (1999).
in particular, the opposition “first to file/first to invent”, which characterizes the difference between the Japanese and US systems), and that those differences provide very different incentives. In this line, it has often been argued that, for instance, the US system is supposed to be very conducive to “radical” innovations, versus the Japanese system, which is more suited to the promotion “gradual” or incremental innovations (Ordover, 1991; Kotabe, 1992). Following the idea of “institutional comparative advantage”, one can here argue that the American system provides some advantages as regards the generation of “breakthrough” innovations, whilst the Japanese system is better suited to insure a more fluid diffusion of innovations.

• The fact that within a given system some very distinct firms’ strategies and trajectories can be observed. Thus, some firms encourage patent registration while others prefer to act in secret. Such differences in firm’s practices have often been noticed from one sector to another within the same “national” system of property rights.

Besides the property right system as such, we reckon that another set of institutional patterns plays a key role in the way a firms organize their relations with innovation. We mean in fact wage relations or, in other words, capital/labor relations.

3.3.1. Labor contracts and the wage relations nexus

If, as Simon (1951) stated, it is true that a “labor contract” is different from a “service contract” insomuch as the first one implies the acceptance of a relation of authority—which is one of the key contributions of organizational theory to the theory of the firm—everything still remains to be said and understood regarding the conditions under which this authority relation operates and modifies the functioning of organizations. Our hypothesis on this point is that a key way to understand the difference in the functioning of organizations depends on the way the relation of authority is constrained and embedded in the labor contract and the compromises around the “wage relations nexus”.

Indeed, if at the heart of “relation of authority” there is a right for any “n” agent (in the firm) to fix the nature of the actions that will be carried out by any “n − 1” agent (for instance in his workday), it should also be remarked that this power is limited by the institutional determinants to be found in the content of the labor contract and the wage relations arrangements.

We reckon that not enough attention has been paid to the evidence. Thus, if the “A” firm is hierarchical, it is precisely because, in the USA, the collective bargaining process, in its traditional form, includes as one of its constituting elements a detailed description of work rules, for each category of job, binding all contracting parties. The “authority relation”, though it is guaranteed by other institutional dispositions protecting owners and managers’ rights, cannot go beyond this limit, which is sanctioned and guaranteed by collective labor agreements (and specific “grievance” procedures). On the contrary, Japanese flexibility, the famous multi-functional “Toyotist” operator, or more generally the “horizontal” nature of Japanese modes of communication, could only be achieved and developed because they were first established after a series of major setbacks for the Japanese working class. Thus, Japanese labor contracts and collective bargaining processes never include the kind of restrictive arrangements that postwar US workers could impose in the building of collective bargaining in its canonical form (cf. the standard UAW-GM contract). To go further, we think the internal/external market opposition (in the “A” firm versus the “J” firm), with its important consequences (where the argument is made explicit), finds here one of its major keys, regarding both its establishment in the firm and the way the economy as a whole functions.

As for the management of knowledge and workers’ capabilities, the differences linked to the nature of labor contracts will largely condition the types of “routines”, as well as the learning processes attached to or supported by them. Individual, as well as organizational learnings and capabilities will be of a different nature and will develop along distinct trajectories, depending notably on the degree of autonomy granted to managers. On the double notion of routines as learning and “governance” devices see Coriat and Dosi (1998) and Coriat (2000). Those remarks can be formulated differently and in a complementary way. It is then possible to say that the nature of the modes of coordination, and more specifically the famous “short loops” of Kline and

25 On these differences, see Coriat (1995).
Rosenberg’s “central innovation chain” are not related to pure organizational choices. They are largely constrained by institutional determinants (in our case, wage contracts and labor relations) that govern the use of labor. In the case of the US, the setting up of these “loops” accompanying the evolution towards a model known to be more “horizontal” and “flexible” could only take place within a lengthy process, interrupted by major conflicts aiming to bring substantial changes to the traditional contents of collective bargaining.

Yet, a certain level of “discretion” is always observable and, even in given institutional constraints, some organizational choices are always still open, particularly as regards the modes of coordination of information and knowledge inside the organization. Thus, even if it is possible to characterize a highly specific, Japanese-like wage relation model, the division of labor and the concrete modes of coordination at Honda differ from Nissan’s, and Nissan’s is itself different from Toyota’s, and these differences may be fully explained in terms of organizational devices. This last remark is crucial insofar as it implies that it is possible (through processes of “imitation”, “contagion”, “invasion”, etc.) for organizational practices to evolve from one setting to another, leaving open some change in the trajectories of the firms. If the organizational trajectory is largely “path dependent”, this path dependency is not absolute: in given institutional conditions, certain organizational choices may lead to changes of direction.

Of course, these propositions have major significance and consequences as regard the way innovation processes at the firm level can be understood.

4. Conclusions and perspectives

The following propositions summarize what we have tried to establish in this paper.

1. The “formal organization” approach (typically represented by March and Simon for the firm, and by Kline and Rosenberg for the analysis of innovation), while considerably enriching the traditional approaches to the firm and the innovation processes at work within the firm, remains largely inadequate to explain not only the variety of firm patterns, but also the fact that certain patterns, at certain times, become dominant. Such a phenomenon can only be explained by looking towards the analysis of the role of institutions and the way they contribute to structure, shape and to giving changing forms to organizational patterns. So, in order to find its full efficiency, the organizational approach should be crossed with the lessons learnt from institutional approaches. Indeed, only the latter, by giving their full importance to the treatments of the coordination of interests through the enforcement devices introduced by institutions, can lead to understanding how an organization (and more particularly a firm) functions, how it can take distinct forms and how it develops. Following this intuition we have suggested in this paper that the emergence of the “M” form (considered here as the dominant form for many decades) needs to be understood taking into account the institutional changes that have taken place in history (namely the radical change in financial regulations that have given birth to the large modern stock markets). At the same time the “M” form shows different contents at GM and at Ford, as due to different organizational choices made in the two firms.

2. We thus have to admit that, if the study of “national institutions” (as they are for instance described in NSI approaches) testifies to the existence of different trajectories rooted in different institutional contexts (Japan versus the USA, for example), the weakness of this approach is that it cannot (generally speaking) provide the right analytical tools to describe the essential variety of firm models and patterns. So, because a large part of this variety cannot be entirely captured by taking into account the nature of only the institutional arrangements. The analytical framework provided by organizational theories is here a necessary bridge. Our attempt aims at reintroducing the firm as an actor, and a key actor in the innovation system, operating in given institutional constraints and opportunities (corporate governance mechanisms, IPR systems and the “collective bargaining” arrangements being here the most influential institutions).

3. Paradoxically, organizational approaches find (or rather retrieve) all their importance here. They enable us to understand why and how, within given institutional rules, some firms, according to the way they manage information and knowledge (“short”
and "long" loops, internally produced knowledge or integrated external knowledge) are more innovative than others. Given the rules of the game set by the institutional setting, organizational choices and the abilities to innovate that they generate, account for firms' different trajectories and performances.

4. The complex relations between "authority" and "discretion" that we have started to explore, emphasize the co-evolution of organizations and institutions. Co-evolution does not mean congruent and smooth evolution, but rather a dynamic form of interplay, accompanied by more or less strong and tensions. If they are part of a NSI with its given characteristics, the different organizations can, according to their type of activity, benefit from them or on the contrary regard them as limits or obstacles to the development of their initiatives.

5. Thus, the notion of institutional comparative advantage finds all its significance and importance. As with comparative advantages in traditional trade theory, institutional comparative advantages can account for the existence of different relative advantages that some firms (or countries) enjoy, compared to others, in specific sectors. In this perspective, it is key to observe that a given NSI may be at the same time at the origin of comparative advantages and disadvantages (for the same country) according to the nature of the considered activities.

The last word will be to raise two questions emerging from the research program we have started to develop here. These two questions can be formulated as follows:

- Is it possible, within a given NSI, to improve the institutional devices that penalize certain activities, without jeopardizing those at the source of organizational choices?

- Can the competitive advantages that a firm is likely to obtain by making the relevant organizational choices, compensate for the institutional comparative advantages resulting from the NSI it belongs to?

The answers to these questions require further analyses (which we intend to do later) of the relation between comparative advantage (as it results from classical international trade theories), institutional comparative advantage (that we have derived from the institutional approach to innovation) and competitive advantage (understood here as the result of a relevant use of discretion in specific organizations).

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