

Economics of the firm and economic growth: a hybrid theoretical framework of analysis

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Abstract

The main goal of this study is to achieve a critical discussion around the conceptualization of the firm and its role in the dynamic process of economic growth. By reviewing the theoretical matrix of the economics of the firm we go 'beyond' the 'mainstream' economics of the firm proposing a hybrid approach combining evolutionary and population ecology, which is likely to constitute a fruitful path for the conceptualization of the firm in the process of economic growth. Specifically, the analysis confronts the distinct theoretical perspectives around some imperative and controversial issues such as the nature of knowledge and learning and the cognitive capacities of economic agents within the firm. We argue that the economic understanding of growth and development of human societies will strongly benefit from a conceptualization of the firm capable of capturing the 'spirit' of the Knightian firm. Overcoming the shortcomings of the mainstream growth models, which conceive firms as a 'black box', the proposed hybrid approach recalls the true nature of the firm as an organization. Issues related to the organizational arrangements that sustain the feasibility of productive activities and to the incentive contracts are also taken into account. Although acknowledging some recent important contributions within mainstream economic growth theory to adopt more realistic concepts of the firm, we believe that evolutionary and organizational population perspectives include crucial pointers in developing further research aimed at the construction of economic growth models based on a micro-economic perspective that is closer to the reality of firms.

Keywords

firm
economic growth
institutionalism
evolutionary theory
contractual theory
ecology population
theory

'It is our strongly held belief, however, that modeling at an industry - or an economy - wide level ought to be guided and constrained by a plausible theory of firm capabilities and behavior that is consistent with the microcosmic evidence.'

(Nelson and Winter 1982: 52)

1. Introduction

It is widely known that economic growth theory is usually identified with neoclassical growth models that, even in the endogenous growth theory, consider the firm as an anonymous production function (Foss 1997).

The identification of inadequacies in neoclassical economic growth theory by more-or-less dissenting economists is a standard event. However, the recognition of limitations by mainstream researchers like, for example, Aghion and Howitt, is clearly a testimony that much is yet to be thought and appraised in that theoretical approach.

The main motivation behind this article is a firm belief in the idea that the characterization of individual firms is a crucial step toward the study of the behaviour of industries and other more aggregated units of economics, and thus to the analysis of economic growth. Therefore, the key goal is to achieve a critical discussion around the conceptualization of the firm and its role in the dynamic process of economic growth.

In an attempt to deal with such wide-ranging theoretical considerations and accomplish our main goal, this article is organized in the following manner. Section 2 systematizes the theoretical matrix of the economics of the firm. In Section 3 the discussion goes 'beyond' the 'mainstream' economics of the firm, analysing alternative perspectives on the nature of the firm, namely the evolutionary and population ecology of organization approaches. Additionally, some imperative and controversial issues such as the nature of knowledge and learning and the cognitive capacities of economic agents within the firm are confronted. Finally, the concluding section proposes a hybrid evolutionary population ecology theoretical framework for the conceptualization of the firm in the process of economic growth.

2. Theoretical matrix of the economics of the firm

2.1. *The two major traditions of institutionalist thought*

The purpose of our analysis, since we are dealing with the nature and role of the firm, can only be rigorously achieved if we have in mind the two major traditions of institutionalist thought. The first is the American institutionalist school that began at the turn of the twentieth century and has continued incessantly to this day, though with significant advances and regressions in popularity and prestige. The second is a more recent perspective that, to a large extent, can be seen as a revitalization and extension of the institutionalist elements to be found in classical, neoclassical, and Austrian economics (Rutherford 1994). Nowadays, the former approach is usually labelled as the 'old' institutional economics (henceforth OIE) while the latter is called the 'new' institutional economics (henceforth NIE).

The NIE (Coase 1937; Williamson 1985; North 1981, 1990) offers a conceptualization of the firm that is distinct from the neoclassical tradition. It puts the organization of the production process and the structure of contractual transactions at the core of the analysis, dealing mainly with the problem of defining the boundary between the market and the firm, and retaining the individualist assumption of neoclassical theory. In this

approach the concept of transaction costs emerges as a key variable. Indeed, while neoclassical theory usually assumes market and internal business transactions as costless, this school reminds us that the market exchange is featured by many distinct types of costs: search costs, costs of bargaining, and costs of monitoring and enforcing contractual agreements. Also, the internal business transactions have associated costs such as management costs in coordinating production, and costs in monitoring and supervising the workforce. To a certain extent, the concept of transaction costs represents a departure from the neoclassical theory. Transactions are costly because information is incomplete and there is uncertainty about the future economic environment.

Old institutionalism (OIE) in turn, stresses the role of norms and culture in understanding and explaining institutions such as the firm and markets.¹ Commons (1925, 1931) was crucial in the development of this framework, having based his work on the idea that economic activity was dependent on the fundamental legal and institutional connections, and that these evolved over time (Backhouse 2002). This school has influenced two theoretical approaches: the behavioural theories and the managerial theories. The first emphasize the idea that a firm's goals are achieved from compromises among a coalition of crucial players within the firm. The second stress the role of professional managers in defining a firm's objectives, pointing to the ongoing conflict between managers' goals (growth of sales and their own income) and those of shareholders (to maximize profits).

We should be aware of the more recent developments associated with each of the two major traditions of institutionalist thought in economics or with both at the same time. The two dominant economic approaches to the theory of the firm are arguably the competence-based and the contractual (Foss 1997). Both these perspectives took off at the beginning of the 1970s with contributions such as Nelson and Winter (1982) in the first line of thought and Alchian and Demsetz (1972) in the second one.

For the contractarian or contractual theories, the core issue is not the resources and skills developed within the firm but rather the explicit and implicit contracts between employers, employees and other contractors. 'That is, firms and other institutions are seen as alternative bundles of contracts, understood as mechanisms for creating and realigning incentives' (Langlois and Foss 1997: 5). This approach comes from the work of Coase (1937) and highlights the cost of making and monitoring transactions.

This contractual approach is featured by somewhat diverse theories. But, in spite of their differences, they all emphasize the costs of formulating, enforcing and monitoring contracts (Hodgson 1999).

Mainstream economics usually acknowledges the contractual theories. However, even the conceptualization of the firm offered by these theories has only very recently been considered in economic growth analyses. The next section overviews this issue.

1 Since the notion of 'institution' is not a coherent concept across several users of the term, it is important to clarify what definition we have in mind. We adopt the meaning proposed by Rutherford (1994). According to this author, 'institution' may be defined in terms similar to those found in Veblen (1914 (1964)) and in Schotter (1981). 'An institution is a regularity of behaviour or a rule that is generally accepted by members of a social group, that specifies behaviour in a specific situation, and that is either self-policed or policed by external authority. It is important to distinguish between general social rules (sometimes called the institutional environment) and particular organizational forms (sometimes called institutional arrangements). Although organizations can also be thought of as sets of rules, the rules apply only internally. Organizations have constitutions, are collective actors and are also subject to social rules' (Rutherford 1994: 182).

2.2. The neoclassical approach to economic growth

The most common assumption in endogenous growth models concerning the firm conceives it as a 'black box', simply transforming inputs into outputs. The true nature of the firm as an organization is completely ignored. Questions related to the organizational arrangements that sustain the feasibility of productive activities and to the incentive contracts, which support the objectives of the firm's members, are largely neglected (Martimort and Verdier 2003).

One important limitation pointed out by Aghion and Howitt (1998) is the lack of attention devoted to institutions and transaction costs, almost completely ignored by endogenous growth literature (Aghion et al. 1997). They also consider as shortcomings the representation of firms and R&D activities in endogenous growth models, strongly believing in the need to understand the financial and institutional aspects of R&D. Moreover, they stress that discarding the representative agent assumption would allow these models to 'incorporate the *political dimension* of "creative destruction"' (Aghion and Howitt 1998: 67).

The contributions offered by the NIE, typically associated to the mainstream, have been mostly neglected in growth models mainly because there are several problems concerning the mathematical construction of general equilibrium models when allowing for agency considerations. Therefore, the insights of NIE, whilst strongly contributing to a better conceptualization of the firm, have not been significantly introduced in aggregate analyses.

As an example of the important insights offered by the NIE we cite Coase (1937), whose work was strongly sensitive to historical specificity (Hodgson 1999). His main contribution in what concerns the concept of the firm is the identification of the firm in terms of organizational coordination. Such a conceptualization integrates the understanding that production processes involving human beings depend fundamentally upon spread, uncodified and tacit knowledge. Since much of this knowledge is complex and inaccessible neither worker nor manager can know entirely what is going on.

Therefore, the microfoundation present in such conceptualization - the firm seen as a cognitive entity (Foss 1997) - surely gives rise to a different understanding of structural change and economic growth relative to the concept of the firm as an anonymous production function. However, endogenous growth models have not adopted the concept proposed by Coase. Only recently has the mainstream made some efforts to introduce contractual transactions in the analysis, adopting Williamson's (1985) concept of the firm, another crucial reference within NIE. This latter conceptualization is much narrower than the one proposed by Coase. Indeed, Williamson reduces his theory to the idea that economic institutions such as the firm 'have the main purpose and effect of economizing on transaction costs' (Williamson 1985: 1).

Within growth analysis, efforts to build a theory of the firm put the organization of the production process and the structure of contractual

transactions at the core of analysis. As an example of this research programme we have the approach developed in Martimort and Verdier (2003), which deals with intrafirms' incentives and growth. This approach is particularly interested in the discussion of how agency problems influence the firm's profit, focusing on the consequences of several informational problems within the firm on its global performances. Acemoglu et al. (2003) also deals with the internal organization of firms and economic growth within neoclassical endogenous growth theory. This study is built on the trade-off associated with firms' options of outsourcing and vertical integration, following previous contributions on this theme such as Aghion and Tirole (1997) and Grossman and Hart (1986).

These contributions are very important since they show a concern within endogenous growth theory to adopt more realistic concepts of the firm in their formal models. Despite such valuable contributions, we believe that alternative theoretical approaches, namely the evolutionary and the organizational population perspectives, propose a more appropriate theory of the firm to build the microfoundation of endogenous growth. In the following section we present these contributions, and try to draw attention to the potential flaws in the mainstream-related approaches.

3. 'Beyond' the 'mainstream' economics of the firm

3.1. Alternative perspectives on the nature of the firm: the evolutionary and population ecology of organization approaches

Recently, many writers have claimed that the evolutionary perspective of the firm (a subset of the competence-based theory) is a serious alternative to the contractual approach, as the evolutionary theory seems able to address the essential investigative framework of the contractual line, namely the existence, boundaries and internal organization of the firm, making use of a fundamentally diverse explanatory argument (Foss 1997). This distance appears immediately in the reasons pointed out relative to the existence of the firm. Instead of the contractual rationalization in terms of the firms' ability to efficiently line up incentives of the diverse input-owners that participate in productive activities under certain circumstances, the evolutionary theorists claim that firms exist because they are better institutional arrangements for accumulating specific productive knowledge (Foss 1997).

The broader approach to competence-based theories advocates that the existence, structure and boundaries of the firm have as an important determinant the associated existence of individual or team competences, for example, skills and tacit knowledge, which are promoted and sustained by the organization (Hodgson 1999). This view was supported in the past by historical predecessors such as Smith and Marx who considered that the division of labour was the essential key to the enlargement of the skills. However, it is in the twentieth century that we find the major exponents of such an approach, remarkably Knight (1921), Penrose (1959), Richardson (1972), and Nelson and Winter (1982).

- 2 Of course, as Nelson and Winter (1982) point out, an important part of business behaviour cannot be embedded in the term 'routine', neither from the point of view of the firm nor the society. Within evolutionary theorizing, what is listed under the concept of 'routine' is what consists in the regular and predictable aspects of business behaviour, therefore including the relative constant dispositions and strategic heuristics that mould the way firms' deal with 'non-routine' problems.
- 3 Although the overview above seems to point to a relation of theoretical competition between the contractual and the competence perspectives, some hybrid analyses have recently emerged from the incorporation of both perspectives. Based on a taxonomy extracted from the philosophy of sciences, Foss (1997) tries to compare those approaches, aiming to provide a portrait of reasoning areas where evolutionary and contractual insights get in touch. Langlois (1992); Langlois and Robertson (1995) and Teece and Pisano (1994) are examples of such plural works. They emphasize human learning and the improvement of competences within the firm while recognizing the role of transaction costs.

As Hodgson (1999: 248) stresses 'the central idea of competences provides the basis for evolutionary and non-equilibrium theories of industrial competition and development'. Therefore, there is room here to explore the potential implications of these approaches on economic growth theory.

Regarding the modern evolutionary economics Nelson and Winter's seminal book (1982) offers a wide-ranging theory, with specific associated models that incorporate basic assumptions that differ significantly from the ones prevailing in the orthodox theory of firm and industry behaviour. The authors provide us with important insights into the concept and the nature of the firm. Their ambition is that modelling individual firm behaviour based on more detailed and realistic assumptions of the individual firm's rationality may result in the building of models of industry evolution capable of bringing new insights into the understanding of economic phenomena, for example, economic growth. The adoption of such a conceptualization of the firm within evolutionary analyses is not constrained, as occurs in neoclassical models, due to equilibrium considerations.

Evolutionary economics is strongly related to the old intuitionist vision. On the grounds of firms' behaviour, evolutionary reasoning brings up the concept of 'routine'. It captures all regular and predictable behavioural patterns of firms. The routine embodies a wide range of the firms' features going from technical specifications for production to procedures for hiring and firing, investment policies, research and development, advertising or business strategies (Nelson and Winter 1982). Routines allow a firm to deal with uncertainty thus justifying the firm's actions. Faced with uncertainty, firms are characterized by bounded rationality with their decisions being made based on rules and routines. Nelson and Winter (1982) stress the concept of routine as carrying the accumulated skill and knowledge of the firm.²

In this approach the options made by the firm are also path-dependent since the decisions made in the past determine what the firm is able to do in the future (Andersen 1994). Penrose (1959) had already emphasized that the only way to fully understand the pattern of diversification of a certain firm was in explaining that it was aware of its prior development of capabilities.

Systematizing, the evolutionary approach offers some reasoning on issues that the mainstream regards as given. One such topic consists in the maintenance of the individualistic assumption of neoclassical theory. Even if in some circumstances it is justifiable to take the individual as given, as a simplifying abstraction, individuals nevertheless remain to be explained. Moreover, such demands of explanation become crucial 'once issues such as the influence of culture, the emergence and durability of institutions, and long-term economic development become agendas of enquiry' (Hodgson 2004: 6). It is important to understand how individual interactions lead to new institutional developments.³

A rationalization around economic evolution and the role of organizations such as the firm in the evolutionary process should also take into

account the contributions brought by one thread of the literature born within the sociological theory - the 'Population Ecology of Organizations' (Hannan and Freeman 1977). This approach has many convergent points with the evolutionary theoretical framework, such as the emphasis it places on selection processes and the adoption of similar cognitive conceptions and ways of perceiving the future.

Since evolutionary models have been mainly produced at the micro level, we consider the possibility of combining such reasoning with the population ecology perspective particularly motivating. This theoretical frame is particularly relevant to aggregate analysis given its focus on the relations between the population of organizations and the environment. According to Hannan and Freeman (1989), population theory is interested in describing the variety of organizational forms and in explaining this variety. Therefore, this perspective is most relevant when understandings about industry evolution and economic growth are being investigated.

In contrast with mainstream economic theory, the ecology of organizations treats firms (or more accurately, organizations) as complex systems that have enormous limitations in terms of flexibility and speed of response, that is, systems characterized by substantial inertia (Hannan and Freeman 1989). The reformulation of the structural inertia thesis contends that selection processes favour firms with fairly static structures since these are seen as being both more reliable and more accountable than their less inert counterparts (Teixeira 2002). To sustain such a claim it starts by pointing out the existence of several obvious limitations in organizations' ability to adapt. What they mean is the presence of a number of processes responsible for structural inertia, which are strongly connected to organizations' adaptive flexibility. The authors make the point that this subject has been mainly ignored by research, except for the suggestions made by Burns and Stalker (1961) and Stinchcombe (1965).

Specifically, Hannan and Freeman (1977) point out internal structural arrangements and environmental limitations responsible for inertial pressures. As internal constraints they suggest sunk costs; constraints on the received information; internal political constraints; and constraints generated by the organizations' own history. On external pressures towards inertia they suggest legal and fiscal barriers to entry and exit from markets; external constraints upon the availability of information; and legitimacy constraints. In order to deal with inertial pressures the adaptation perspective must be complemented with a selection approach.

Within this broader analysis, two issues emerge as vital: the election of appropriate units of analysis (a focus on populations of organizations) and the applicability of population ecology models to the analysis of human social organization.⁴

A population of firms is a group of organizations sharing a common dependency on their material and social environment and on the resources they can attain (Hannan and Freeman 1984). Therefore, the firm is seen as an organization and their definition of organization has its

4 On this last issue they start with Hawley's (1950) classic statement on human ecology, then extending Hawley's work in two ways: by using explicit competition models to detail the process producing isomorphism between organizational structure and environmental demands, and by using the niche theory to expand the problem to dynamic environments.

roots in Stinchcombe's (1965: 142) proposal, which conceives organization as a 'set of stable social relations deliberately created with the explicit intention of continuously accomplishing some specific goals or purposes'. There is convergence with the concept typically embraced by the institutional perspective in economics: if organizations have 'constitutions' as Rutherford pointed out, they share 'specific goals or purposes' and if they correspond to 'collective actors', they are 'a set of social relations'. More particularly, Penrose (1959: 24) perceives the firm as 'a collection of productive resources the disposal of which between different uses and over time is determined by administrative decision'.

It is interesting to note that both the competence-based approach and the population ecology theory put selection, with heterogeneity and variation as the premises for selection, at the core of their arguments. As Freeman (1995: 222, emphasis added) points out: 'The ecological perspective focuses on the way in which *various strategies* fit in with an environment that selects for or against these strategies by encouraging foundings and discouraging failures'. Evolutionary economics, in particular, and the competence-based perspectives in general, 'place major emphasis on the *heterogeneity* of the population of business firms and on the sources of that heterogeneity in the idiosyncratic internal features of individual firms' (Winter 1995: 147, emphasis added).

The convergent items found between evolutionary and the population ecology perspectives are clearly distinguishable from other available theories. For example, the neoclassical view on survival and selection does not usually incorporate concepts such as bounded rationality, favouring rather those such as equilibrium and optimization. Radical uncertainty is mainly missing from agency theory, as is uniqueness from neo-institutionalism. Recent models of organizational and economic evolutions do not usually favour selection but rather adaptation (Durand 2001). These models list distinctive variations at the organizational level, and employ adaptation to connect organizational behaviour to the competitive and institutional environment levels (Lewin et al. 1999).

Despite convergent points, evolutionary and population ecology perspectives differ in some ways. Each approach chooses a different unit to be selected, even though they belong to connected levels of analysis. Population ecology works with populations of organizations. Evolutionary economics mainly chooses firms and routines as the units of analysis for selection. More generally, the competence-based view focuses on resources, competencies, and trajectories. Nevertheless, there is a deep affiliation between the diverse levels. Durand (2001) sees each level as a stratum of selection at which organizational units are either engaged or eliminated.

Also on selection we find a fracture between evolutionary approach and the population ecology theory. Within organizational populations there are other reasons, beyond profitability and efficiency that are important in explaining selection, namely reliability, accountability and legitimacy (Hannan and Freeman 1977, 1984). This theoretical divergence

about selection among organizations may be important to understand the role of institutional systems on economic growth.

The understanding of selection offered by each theory also diverges about the location of the selecting forces that influence organizations' routines and competencies. Internal selection concerns forces that are internal to an organization and influence its routine and competencies. Population ecology is clearly focused on external selection whereas evolutionary economics stresses the internal (Aldrich 2000).

The position of strategic management within the performance of organizations also differs between these theories. Whereas for population ecology, strategy has, at best, a reflexive role since strategic management cannot have a major impact on an organization's chance to survive (Durand 2001), the competence-based approach clearly points out an active task for strategic management by defining processes, building positions, and controlling paths and trajectories (Teece et al. 1997). Notwithstanding the differences, a hybrid approach combining evolutionary and population ecology is likely to constitute a fruitful path for the conceptualization of the firm in the economic growth.

In Figure 1 we offer a schematic representation of the distinct theoretical proposals. On the one hand we have the two main traditions of institutionalist economics and the more recent developments associated with each of them or with both at the same time. On the other, we have a schedule of the main contributions leading to the emergence of Hannan and Freeman's population ecology perspective. It is important to note the influence of contributions on organizational analysis and cognitive frames, mainly Simon (1956, 1957) and Cyert and March (1963), on the three crucial streams in the study: the competence-based perspective, the contractual approach and the population ecology approach.

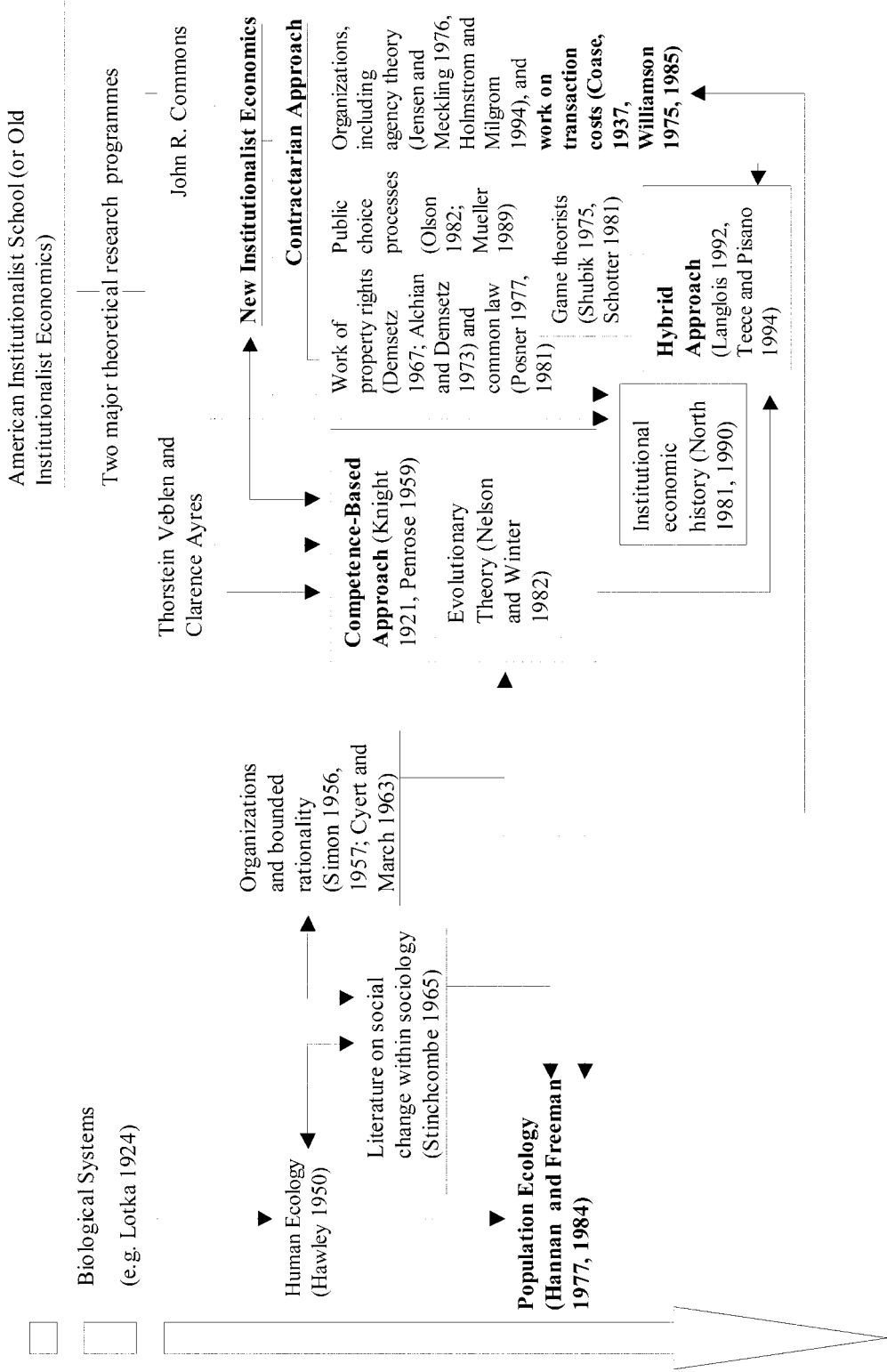
3.2. Further conceptualizing on the economics of the firm

3.2.1. *The nature of knowledge and learning*

The way knowledge and the interconnection between knowledge and the firm are conceived have significant effects in understanding economic growth. In fact, whilst the neoclassical and the NIE approaches deal with information problems, the treatment of such an object is unsatisfactory.

The neoclassical perspective of knowledge and learning is not able to capture the concept of learning as 'an instituted process of interpretation, appraisal, trial, feedback, and evaluation, involving socially-transmitted cognitive frames and routinised group practices which are often taken for granted' (Hodgson 1999: 256). Although organizational knowledge interacts with individual knowledge, it is more than the sum of the individual parts. It is context-dependent, bounded by culture, and institutionalized (Hodgson 1999). According to Dosi and Marengo (1994: 162), 'organizational knowledge is neither presupposed nor derived from the available information but rather emerges as a property of the learning system as [it] is shaped by the interaction among various learning processes that constitute the organization'. Foss (1997) also emphasizes this point, recognizing that

Figure 1 – The conceptualisation of the firm - from the Institutional Thought in Economics to the Population Ecology Perspective



knowledge about how to connect together one person's or firm's productive knowledge with that of another is imperfect, which leads to the issue of qualitative coordination. Learning itself must be understood as a developmental and reconstructive process and not as a plain input of 'facts' (Foss 1997).

In general, neoclassical economics conceives learning as the cumulative discovery of pre-existing 'blueprint' information, or Bayesian revision of subjective probability estimates in the light of incoming data. However, there are severe problems, namely that a process of Bayesian learning in search of an optimum is dependent upon the existence of accurate former knowledge (Key 1981). Besides, the Bayesian perspective is a very imperfect way of portraying the role of learning, which is to a large extent more than a process of blueprint discovery or statistical adjustment (Dosi and Egidi 1991).

On this topic of organizational knowledge the population ecology perspective is also highly convergent with the evolutionary approach. In the first place, its own rationalization around the motivation behind the creation of an organization reveals the concept of knowledge adopted. Although the creation of an organization involves the mobilization of several scarce resources, Hannan and Freeman (1984) remember that many comprehensive records of organizational processes lead to severe doubts that organizations minimize the costs of ending several sorts of transactions. They stress that 'in a world of uncertainty, potential members, investors, and clients may value reliability of performance more than efficiency [...] and [accountability, which] demand that organizations be able to account rationally for their actions' (Hannan and Freeman 1984: 153). This means that a distinctive competence of organizations is the ability to produce collective actions with rather small variance in quality.

The above competences show a convergent path with competence-based theories as 'in general, organizations attain reproducibility of structure through processes of institutionalization and by creating standardized routines' (Hannan and Freeman 1984: 154). Moreover, the institutional system has here a fundamental role in legitimating the organization since it articulates the whole organization with the broader society.

3.2.2 Accounting for the limited cognitive capacities of economic agents within the firm

Another imperative and controversial issue within the economics of the firm is the cognitive capacities of economic agents, whose discussion is likely to contribute to a clearer systematization on the nature of the firm within economic growth models.

The concept of transaction costs has been increasingly used in neoclassical models as a response to the critiques on the traditional assumptions regarding the firm. Nevertheless, many problems still remain around the clarification of that concept.⁵ A reduction of these costs to those of information could mean a precise fit in a neoclassical framework (Hodgson 1999). In fact, search and information costs could be accommodated alongside, and treated similarly to, other costs in a probabilistic framework

5 Dahlman (1979: 144) noted that the concept of transaction costs 'has become a catch-all phrase for unspecified interferences with the price mechanism'. Dahlman also criticized the emblematic formal representation of transaction costs as a proportion of the value of exchanged goods as it works mainly as a regular transport cost. He proposed a typology for these costs based on three distinct and sequential phases of the exchange process: 'search and information costs, bargaining and decision costs, policing and enforcement costs'. A common element between these three classes is that they all correspond to resource losses due to lack of information (Dahlman 1979).

(Stigler 1961). Information is in this approach treated like any other commodity, being subjected to the marginalist rule that its consumption is optimal when the marginal cost of information search and acquisition is equal to its expected marginal return. However, the fact that information is lacking means at most that expectations are unclear and ill-defined (Arrow 1962). Even the idea of rational calculus of information costs is open to objection, as there exists a problem of circularity (Hodgson 1999).

Langlois (1986) contributed to a better understanding of the rationale of the firm, making a distinction between distinct types of information problems. The argument was very close to Knight's (1921) distinction between risk and uncertainty (Hodgson 1999). According to Langlois, 'parametric uncertainty' (Knight's 'risk') cannot be used to find the cause of the transaction costs that are relevant in explaining the relative efficiency of a firm. Kay (1984) offered a similar argument, showing that the firm in a neoclassical world of perfect knowledge lacks most of its familiar structures and functions. As such there is

a close affinity between perfect knowledge and risk in terms of homogeneity and replicability of associated events. The argument leads inexorably to the consideration of true or radical uncertainty as an essential concept to understand economic institutions such as the firm.

(Hodgson 1999: 206)

Hence, this means a return to Knight's (1921) core idea that the existence of the firm in the real world is the result of the presence of uncertainty.

More recently, neoclassical economists recognizing that the assumption of full knowledge is unsatisfactory tried to deal with the fact that entrepreneurs cannot know the future with certainty (Aghion and Howitt 1992). Risk was incorporated into the neoclassical framework by assuming that firms consider the probability of all possible future results associated with its decision-making. However, it is clear that in some circumstances firms are not able to assign probabilities to possible outcomes or they may not even know all the feasible results. These situations are referred to as *uncertainty* (Silverberg and Verspagen 1997).

It is interesting to note that both the evolutionary perspective and the population ecology theory offer an option designed to shelter actors against radical uncertainty and diminish the probability of being selected out (Durand 2001). The population ecology theory supports institutionalization through accountability and reliability as a process that helps newcomers to find the appropriate organizational form that has the best probabilities of survival (Hannan and Freeman 1984). Evolutionary economics proposes the concept of routine as a device to avoid a firm's satisfactory procedures from being reconsidered at each use. More generally, the competence-based approach identifies learning as the best way to cut the level of causal ambiguity arising through the threat of inter-organizational knowledge transfer (Teece et al. 1997).

Another relevant issue concerning the cognitive capacities of economic agents is the notion of rationality adopted by the theoretical perspectives in focus.

Within neoclassical theory, firms operate following a set of decision rules that determine what they do as a function of external and internal conditions. Those rules reflect firms' maximizing behaviour.

Instead of assuming a rational maximizing behaviour, Nelson and Winter (1982), inspired by Simon (1956, 1957) and by his insights into human and organizational behaviour, proposed a theory where firms are motivated by profit and engage in a search aiming to improve their profits, but their actions are not understood as profit maximizing over exogenous and well-defined choice sets. The theory stresses the predisposition for the most profitable firms to drive the less profitable ones out of business. However, they do not centre the analysis on supposed states of industry equilibrium featured by the presence of all the profitable firms at their desired size and the absence of all the unprofitable ones. Within this frame, the modelling approach employed by Nelson and Winter (1982: 4) is such that the 'firms are modeled as simply having [...] certain capabilities and decision rules. [...] [T]hese are modified as a result of both deliberate problem-solving efforts and random events.'

Despite the recognition that some neoclassical theoretical models (e.g. models of optimal search and models of sequential decision-making) appear not to work in a 'once-and-for-all' optimization, only superficially do those modelling efforts fall outside the above critique. What they do have is a 'once-and-for-all' choice of an optimal *strategy* of response to an unfolding situation. The conclusion must be that the actors in neoclassical models are not able to deal with truly unanticipated information (Nelson and Winter 1982).

The 'once-and-for-all' neoclassical optimization is inconsistent with the assumption that the firm works at all times with a current policy, where profitability is compared in inaccurate terms, from time to time, with individual alternatives that present themselves by processes not entirely under their control, and changes policies when the comparison favours the presented alternative over the current status quo. "This latter assumption is more on the spirit of the evolutionary theory: it is an assumption of "profit seeking" or "profit-motivated striving", but certainly not of profit maximization' (Nelson and Winter 1982: 31).

The analysis of firm organization and strategy implicitly, at least, involves the acceptance of a concept of bounded rationality (Simon 1956, 1957). This concept not only recognizes that information is incomplete but also that there are important cognitive limitations on human rationality. Therefore, decisions are based on partial information because the ability of the human mind to formulate and solve complex problems is limited. This means that the decision-making process is one of satisficing (Simon 1956; Cyert and March 1963) rather than maximizing as occurs in neoclassical approach. This emphasis on bounded rationality and satisficing behaviour led the theorists within the evolutionary approach to be concerned more

with the firm's internal decision-making processes departing from the neo-classical economists' emphasis in the firm's outcomes.

The population ecologists also share the conception of bounded rationality since individuals alone are unable to recognize the real sources of success. This means that selection is only recognized *ex post* and materialized in its outcomes (Hannan and Freeman 1977).

The contractual approach, recognizing transaction costs as a concept inevitably tied up with information problems and uncertainty, also embraces bounded rationality. For Williamson (1985: 32) 'economizing in transaction costs essentially reduces to economizing on bounded rationality'. However, as Hodgson (1999: 207) remarks, 'in practice, Williamson seems to incline to rationality rather than behaviouralism'. So, the transaction cost analysis materializes the choice of administratively rational actions itself a substantively rational choice.

4. A hybrid evolutionary population ecology theoretical framework for the conceptualization of the firm in the process of economic growth

Within the mainstream economic growth theory, the existence and importance of institutions are barely recognized at all, and when they are documented, they are merely assumed as given (Olsson 1999). Therefore, it is rather important to assess whether alternative developments may bring relevant insights into industrial change and economic growth theories.

Very recent attempts (e.g. Martimort and Verdier 2003) to integrate the contractual theory of the firm in endogenous growth models have three crucial features that are rejected by our hybrid framework: (1) the assumption of given individuals, typically with given and independent preference functions; (2) the study of the firm reduced to contracts between individuals, repeatedly involving the minimization of transaction costs; and (3) the focus on comparative static rationalization, where one organizational arrangement is considered to have lower transaction costs than another.

The first key characteristic leads to a disregard for the limits of contracts and exchange and the need for non-contractual relations (mainly loyalty and trust), and also a neglect of processes of major individual transformation and development, especially an adequate concept of learning (Hodgson 1999). This individualistic perspective eliminates notions such as organizational learning and group knowledge, meaning that the types of skills and knowledge associated with teams are overlooked. The neoclassical idea of learning as a cumulative process involving the acquisition of codifiable knowledge, where learning itself appears as informational absorption, is rather reductionistic (Cohendet and Steinmueller, 2000). Learning is fundamentally a process of problem formulating and problem solving which means that it involves conjecture and error (Hodgson 1999). Consequently, an analysis in terms of economic growth based on such a conceptualization of the economic agent necessarily overlooks the impact of learning on structural change and on economic growth.

The cost-minimizing or utility-maximizing characteristic means that the interaction between individuals is reduced to the calculation of costs and the social institutions are not taken seriously enough as the organization is reduced to the position of finding a way of regulating relationships in default of market relations. The possibility that individual preference functions themselves can be shaped by culture and institutions is ignored. Institutions and culture do not affect the individuals fundamentally (Hodgson 1999). Once more, an aggregate analysis based on such a micro perception will miss part of the interconnections between individuals and culture. Such interaction between organization and environment is at the core of the argumentation in the population ecology perspective.

Moreover, contractual perspective considers the existence of a uniform technology over distinct governance modes that lead to a partition of production and technology from governance structures or transaction costs. The main analytical concern is with efforts to obtain the optimal benefit from the given resources, with the transaction costs argument assuming that production costs are given and not distinct across governance or transaction modes. Since technologies are usually associated with structures of governance and transaction modes the emphasis is put on the choice of governance structures and the efficient allocation of given resources, instead of production, accumulation and growth (Hodgson 1999).⁶

Finally, contractual perspective's focus on comparative static explanations means a poor treatment of (or even overlooking) dynamic facets of learning, innovation and technological development (Hodgson 1999). Typically, the analysis is conducted based on the comparison of transaction costs in equilibrium in two or more governance structures, whereas the structure with the lowest costs is believed to be more efficient. In the real world firms and markets are featured with different capabilities, facing dynamic and disequilibria situations and NIE has downplayed this reality (Hodgson 1999). The acceptance of an equilibrium analytical approach according to that perspective implies that the difference between *ex ante* and *ex post* forms of coordination is neglected. Therefore, the ability of the firm to promote learning, technological innovation, and research and development is not understood by such a static frame.

It is within a dynamic frame that the firm is conceived, both in evolutionary theory and in the population ecology perspective, as having a low short-run capacity for strategic reorientation. The evolutionary concept of path dependency accounts precisely for time stickiness in strategic action (Dosi and Nelson 1994). More generally, the competence-based perspective points to the difficulties and costs involved in augmenting strategies, also pointing out that it can generally only occur incrementally (Teece et al. 1997).

For the above reasoning the most feasible picture conceives an organization committing itself to long-term paths. This commitment is related with a certain idea of 'uniqueness' (Levinthal 1995: 36). Population ecology believes in niche strategy as a meticulous model of fitting into environmental circumstances. This niche strategy protects a firm against selection

6 Some recent contributions within contractual literature depict effects between production and exchange. They demonstrate that alternative organizational structures might be selected since they involve different incentives to invest in specific assets (Grossman and Hart 1986; Hart 1995). Therefore, technology and organizational structure are determined jointly (Riordan and Williamson 1985; Milgrom and Roberts 1990).

(Carroll 1985). Evolutionary economics emphasizes the power of innovation versus imitation, with innovation being a device to create uniqueness, allowing the firm to appropriate rents unattainable to competitors due to the effects of isolating mechanisms (Mahoney and Pandian 1992).

The great challenge is, based on the proposed hybrid micro conceptualization, to advance towards the construction of formal interactions between the micro and the aggregate levels. The evolutionary and the population ecology perspectives will supply the theoretical foundation for such an endeavour.

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