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Schumpeter 2008 Conference

Topic 9. The methodological foundations of evolutionary economics

Title: Inside the firm's "black box": methodological changes of evolutionary economy

Anita Kon*

Abstract

As neoclassic theory, evolutionary one is concern particularly with the behavior of business firms in a market environment and the process of decision making in short and long-run economic development. Nevertheless, while traditional neoclassic theory designs a general equilibrium theory and search for profit maximization over well-defined and exogenously given choice sets, evolutionary thinking deal mainly with some issues as the impacts of technological change on long-run development, under different decision rules and certain firm capabilities, and does not focus its analysis on the hypothetical state of industrial equilibrium. To evolutionary analysts, the conditions to develop such different economic premises, in order to include relevant new variables observed in modern competition at empirical realities, was to reconstruct the theoretical foundations of firm behavior, in criticizing the orthodox" thinking, as they call traditional neoclassic Microeconomics.

This paper aims to analyze this theoretical reconstruction of the firm behavior, which was possible through the perception of the need of a different methodological approach to explain some new situations that traditional theory could not deal with. The new method includes a shift of theoretical perspective on a wide range of issues. It discuss that while orthodox premises was based on an equilibrium structure, committed with norms and values of scientific inquiry, in a descriptive sense of intellectual ideal perspective, evolutionary premises approaches observations of economic realities and different firms behaviors.

1. Introduction

It is observed that traditional Microeconomics is particularly worried with the determination of a balance position in the firm and in economic markets. The firms operate as markets' agents, and the analysis of market equilibrium it satisfactorily

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explained in conditions of perfect competition. In this way, there is no place to arbitrary behavior on the part of the individual owners and the analysis is focused through abstract, rigorous and simplified models on the firm's behavior.

In turn, the analysis of the evolutionary economy emphasize particularly the individual behavior of firms and of markets, during growth processes, technological transformations, concentration and product diversification, where it does not apply the conditions perfect competition and where specific institutional conditions interfere in the system. In this context, the technological progress is no longer exogenous to the firm's production model and becomes endogenously incorporated to the agents' growth decisions.

These methodological differences between the two theoretical premises as to the firm behavior have historical explanations. Traditional or neoclassic Microeconomics originates from the so called English school of economic analysis, established in the XIX century and which prevailed as the only one accepted, until the beginning of the XX century, emphasizing the deductive characteristic of economic science. In contrast, the new vision on the firm's characteristics and on the decisions aptitudes was derived in the beginning of the XX century, from the institutional and historical schools originated in Germany and the United States, inheriting a tradition which emphasizes the dynamic economic behavior of the firm.

This behavior reflects the firm's different capacities and the society's institutional structure, under the influence of economic forces that cause changes in the existing institutional organization (Williamson, 1998; Arrow, 1974). Thus, it is characterized as an inductive discipline, which observes the firm's empirical behavior, to construct a general theory more connected do reality.

In this way, the paper analyzes the process of methodological transformations which based the new-Schumpeterian or evolutionary theorists that search for explanations on the insufficiency of neoclassic arguments for the analysis of the new economic reality. The theoretical context of the neo-Schumpeterian theory was developed since the beginning of the second half of XX century, as a summary of the debates that was initiated by the critics of the equilibrium approach, around the 1920's.

The first section analyzes the theoretical antecedents of the methodological reformulations that include the advent of contemporary Economics through the critics on traditional equilibrium theory. In sequence there are analyzed Coase's and Schumpeter's visions about the firm's decisions in the production process, from whom

the evolutionary thinking had originated its main concepts, on the behavior and new structure of the firm.

After that, it is analyzed the context of a new kind competition under constant technological innovation and economic development, that had resulted in reformulations in the theoretical concepts and classifications, through the ideas of Richard R. Nelson, Sidney G. Winter, Kenneth Arrow, Douglass. C. North, Giovanni Dosi, Oliver Williamson, and others. In this sense, the “black box” – as Nelson and Winter called the unknown inner context of firm’s performance, as considered by traditional economic theory – is then disclosed, to allow the analyses of evolutionary methodological transformation on the economic dynamics inside the firm.

2. Theoretical antecedents: the advent of the contemporary theory

Nevertheless the exam of industry behavior in the economic theory has been developed since the XVII century concomitantly to other economic studies, the contemporary theory of Industrial Economy as a specific new methodology of analysis was recognized in literature only in the beginning of the 1950’s. Previously to this period, a new approach to the Industry analysis was focused as a topic of traditional neo-classic Microeconomics, under different names, as Economy of the Industry, business-oriented Industry and Commerce Economy, Industrial Organization, among others, that showed a lack of consensus on the objectives and the specific methodology on the subject (Kon, 1994).

The modern study of the monopolistic competition started around 1880, when some of its established concepts had been questioned through the works of John Bates Clark, John Adams, Richard Theodore Ely e Charles J. Bullock, among others. Concomitantly in its "Principles of Economy", in the 1920’s, Marshall argued the central ideas on the field of Industrial Economy, focusing the degrees of monopoly, economies and diseconomies of scale, oligopoly, discrimination of prices, the dynamic importance of the innovation processes, fixed costs, risk and uncertainty. As one of the descriptive branches of the economy, the contemporary Industrial Economy continues to be a part of the general structure of Microeconomics, nevertheless presenting a tenuous relation with the neo-classic microeconomic theory.

Although traditional Microeconomics and the Industrial Economy have a common field of reference, there are innumerable differences between the objectives and the methodology used for the development of these outstanding two lines of

thinking. Traditional Microeconomics is worried particularly with the determination of a position of balance in the firm and the economic markets. The firms operate as agents of the market forces and the analysis of the market balance is explained in a satisfactory way in conditions of perfect competition. In this way, there is no place for an arbitrary behavior on the part of the individual proprietorships. In turn, the Industrial Economy analysis emphasizes particularly this individual behavior of the firms and markets, during processes of growth, concentration, diversification and fusing, where the balance conditions of perfect competition are not applied.

Another considerable distinction between Microeconomics and the modern Industrial Economy is the fact that the first one focuses the analyses through more abstract, rigorous and simplified models of the firm behavior, while the last one is based on detailed empirical knowledge and specific institutional conditions of the individual proprietorship. These methodological differences between the two lines of thinking have historical explanations, as already seen. Traditional Microeconomics originates from the call English school of economic analysis that was established in XIXth century and prevailed until the beginning of this century emphasizing the deductive characteristic of economic science.

As some 1960's and 1970's analysts stand out, Microeconomics has been characterized for the acceptance of certain assumptions of consumers and individual proprietorships, which were seen as of ample applicability to economic analysis, and considered as logical implications of these standards of behavior, when confronted to the resources scarcity. This form of analysis was readily directed to generalized theorization and the use of mathematic instruments and complex chains of reasoning. A high degree of abstraction about the real world events is also necessarily involved in this analysis, to make it possible to attain this generalization degree (Lee, 1974: p. 14).

In contrast, the new contemporary Industrial Economy was derived in the beginning of the XXth century, from the institutional and historical schools originated in Germany and the United States, inheriting a tradition that emphasizes the dynamic economic behavior of the firm. This behavior reflects their different capacities and the society's institutional structure, under the influence of economic forces that cause changes in the existing institutional organization. So, it is characterized as a inductive discipline, which observes the empirical behavior of the firms, to construct a general theory more connected to reality.

Florence (1964) summarizes this idea, when it stands out that a realistic approach on the firms behavior implies an analysis based on the observation and registers of real facts, however continuing beyond the mere description and empiricism, in the direction of an including measurement and a causal interpretation searching some possible underlying logic.

These analysis aim at combining economic events with theory, intending to test the theoretical relations among the economic variables, to estimate the forms and parameters of such relationship in such a way to make possible the forecast of the future behavior of the dependent economic variables. From this type of open procedure it is included the possibility of specification of new economic theories.

From this new methodological approach, the modern theories of the firm had begin with the theoretical examination of behavior different forms, confronting them with the observation of reality, and defining as relevant the critics the on "unreal" character of the previous theories, particularly in what refers to the premises of Perfect Competition and the equilibrium conditions based in the marginal analysis, as preponderant objectives of the firm. The assumption of profit maximization, as the only goal of the firm behavior, it was no more enough to explain the formation of conglomerates or the behavior of multinationals firms, or the managerial behavior directed toward other objectives than profit.

3. Critics to the equilibrium approach

Under the new approach of the empirical observation added to the theoretical deductions, the works of Piero Sraffa, Joan Robinson and Edward Chamberlin, from the middle 1920's, had brought a new vision on the firms prices determination, in criticizing the basic premises of Perfect Competition, and in questioning the existence of the only two forms of market organization ascribed since the classics. These writings had marked the advent of the theory of Industrial Economy, as evolution in relation to traditional Microeconomics (Kon, 1994).

Sraffa published in 1926 his doubts about the representation of the reality only from the two market structures described by the classics (Perfect Competition and Monopoly). According to this author, force of habit, personal knowledge, product quality, proximity of the salesman, existence of particular necessities, possibility to get credit, prestige of a plant mark and the particularity of the model or design of the product, are some of the factors that move the consumer in its acquisition, taking it to

prefer a salesman in relation to another. Therefore, if in Perfect Competition an only price and a only market would exist, in the Sraffa's described competition, each firm can sell to its proper price, even if these prices are not independent from each other. In this case there are many particular markets and not only a global market for the product.

Later on, Joan Robinson (1933) looked for better define the market, in also criticizing Perfect Competition and pointing out that the consumer has reasons to prefer a salesman to another one, in an imperfect competition. She defines the Imperfect Competition, as a situation when the market is no longer homogeneous and there are imperfections in this market and each firm is connected to a group of purchasers, by something more than that only price. Some conditions for the stimulation of these links with the consumer are, according to Robinson, in the localization of the salesman, costs of transports, quality assurance of a well-known name (mark), in the quality of the selling services and in advertising.

Chamberlin (1933), on the other hand, defined the "monopolistic competition", in pointing out an intermediate situation between the Pure Competition and the Monopoly, characterized mainly by differentiation of the product. His treatment to the subject was more global, nevertheless less intensive than Robinson's one, and also pointed out the fact of that the consumers were not indifferent to the producers, and reacted in diverse ways to firms names (marks), quality peculiarities, forms of product confection, salesman localization, efficiency, reputation or delicacy of the salesman, among others aspects. So, each firm has not only its special market due to differentiation in the price, but also in the product.

In these models of imperfect or monopolistic competition, the firms produce an inferior amount to the minimum average cost, and therefore there is inefficient productive capacity. Chamberlin stresses that we cannot speak in Industry, in the same concept of Marshall, that is, as a set of firms, because the product is not homogeneous; however there are groups of firms with sensible reciprocal product substitution capacity.

The ideas of Robinson and Chamberlin have been criticized, in what refers to the possibility to determinate the firm's equilibrium, under the argument that the changeable product quality – that it weighs in demand determination – is not a measurable factor, and therefore the mathematical determination of the purchaser's reactions to quality is not possible. Moreover, the equilibrium of the group cannot be determined because the firms do not have identical curves of cost, what allows the

entrance of new firms in the group in different conditions and, furthermore, it is seen that some reach equilibrium before others.

In that manner, a situation of permanent instability in the market of monopolistic competition occurs, with entrances and frequent exits of firms. Parallel to the critical analysis to the marginalist theory, the initial decades of this century – with bigger intensity from 1930 on – had observed the renewal of the analysis on the market organization constituted by Oligopoly, by discussing the models developed in the previous century that explained these markets functioning. This renewed interest on market structures stems from the intensification of centralization and concentration of capitals processes that was seen in the beginning of the XX century, which resulted in the firms' growth and in the creation of markets with a small number of rival salesmen, as it will be analyzed in sequence.

4. Further theoretical developments

In the 1940's and 1950's, further theoretical research about firms and markets behavior was quickly developed, discussing particularly the question of the firms dimension, competitive and anticompetitive forces, the damages of the monopolistic forces, and so on. Stocking and Watkins (1951) had at great length analyzed the cartels and the conditions of monopoly in domestic and external markets as well. Stigler (1955) compiled a series of studies in this area, while Bain (1956) published its excellent work on barriers to the entrance of new firms. These two works had been detached among a series of other influential analysts as Simon, Whirney, Kaysen and Turner, and Fritz Machlup.

In the next decade of 1960's, many econometrical studies on industries structures and performances had been spread out, with the analysis of Weiss, Scherer, Comanor, Wilson and Shepherd, besides the very important study by Oliver Williamson on the internal complexities of firms behavior. In this period, a great set of knowledge and technical evaluation instruments was accumulated, which combined theory, econometrics, cases studies and policies questions on industrial firms. Vigorous debates among schools of thought and research methodologies had emerged, prevailing non traditional ideas.

After 1970, the analyses had continued to develop in this direction, and three outstanding lines of thought gained influence in the modern Industrial Economy theory: the analyses of Chicago-UCLA, the studies purely theoreticians of strategic modeling

and the "contestability" theory, developed from 1975 to 1982 by the "contestability school" of Baumol-Bailey-Willig.

The school of Chicago-UCLA, that in the 1920's and the 1930's was strongly interested in any kind of monopoly, in the 1950's had reverted its line of thought toward a vision that favored competition, considering the monopoly as limited and weak. However, in the following decade declared the probable superiority of monopoly in what refers to efficiency, and in 1970's had confirmed an anti-structuralism vision, defending the idea of monopoly's costs minimization. They considered that the relative efficiency of each firm would be the determinant of its position in the market structure. Some analysts in this school considered the superior performance and the economies of scale as causes of the highest degree of monopolization. The market structure therefore, was a function of the firms' behavior and the performance and of their external conditions, and moreover, the market size of each firm would be a function of the profits rates.

The contestability school discusses the idea of that the internal structure is secondary in importance, in what refers to free entrance of firms in the oligopoly, and developed a new theory on entrance, considered more basic than the traditional theory of competition. They point out that the potential entrance of new competitors limited by barriers is the main force for the market structure. If barriers are weak, it does not matter that the existing firms have great parts of the market or try to behave in a collusive way, because the effective entrance or its threat, will forced them to operate in excellent, competitive levels. This approach remains in question in the present time.

5. The contributions of SCHUMPETER and COASE to evolutionary theories

The theoretical discussions pointed out in the previous sections show the first manifestations of the methodological transformations that had inspired the ideas of the scholars that had defined a new set of concepts that are part of the theoretical body of the neo-Schumpeterian or evolutionary economy. In the beginning of these discussions, since the decade of 1920, two relevant authors – Schumpeter and Coase– must be detached because of their particular contribution to the elaboration of the basic premises on this new vision about firm's behavior, markets and technology.

Schumpeter had already developed its first ideas on the economic system, in the first decade of the XX century, publishing its first book in 1908, when he was 25, *The Nature and the Essence of the Economy Politics* and in 1912 *Theory of the Economic*

Development. He later wrote a synthesis of the economic science evolution and its methods, enclosing the ideas of the physiocratic, classical and neoclassic economists. Coexisting at the same period and at the same European environment of Keynes and Bohm-Bawerk, with whom he changed debates and writings, Schumpeter stressed the need of theoretical changes in the economic concepts. He joined the post-marginalists debates in the period, in defending some of Marx's and Walras's visions. In this way, he used the historical and mathematician-econometrical analysis methods.

His main contribution to the formularization of the evolutionary premises refers to the dynamic vision of the capitalist process, which was introduced into the idea of the stationary general equilibrium model conceived by Walras that describes the circular flow of the economic life, which constantly repeats itself, in conserving the same structural conditions and normal profits. In this vision, balanced growth is due to the rhythm of demographic expansion. In this model, consumers and producers adjust themselves to the demand and offer quantities and to market prices, and there are not investments beyond the necessary ones to keep economic growth in the demographic level.

Schumpeter's dynamic vision stands out the role of the entrepreneur who possesses the capacity to visualize new chances, methods, organizations and markets, through innovations. These projects are caused to happen by the accomplishment of actions: as new combinations of existing resources, new methods, new raw material sources, new organization of the firms and markets, new products, with better quality and minor cost. These actions have as final results, relevant structural transformations in the economic system that lead not only to static growth, but to development, that is, the *per capita* production and the levels of well-being no longer just repeat period the period conditions, but the aggregate production function passes through irreversible changes which conduct to development.

The economic dynamism is kept by new firms that are created and grow through new chances, while the old firms that cannot follow them get retracted. The consumption follows growth and the economic system is led to disequilibrium until the economy passes through an adjustment process, in adapting itself to the new situation, that conduct to firms modernization, new markets expansion, and finally rationalization and reconstruction of new structures. The relation among capitalist development and cyclical fluctuations is part of this Schumpeterian vision that defines development cycles motivated by waves of innovations that succeed. These cycles are caused, among

others reasons, by the use of credit by the entrepreneur for the effectuation of new enterprises, that are followed by a interests rise (which were zero in the stationary system), that it stimulates speculative activity and monetary expansion, parallel to the explosive growth (boom) of productive activities. With the payment of loans, new waves of innovations come to loose its own force, what gives place to liquidation of firms that cannot support themselves, to auto deflation, contraction, depression, until the recovery, when a new cycle is initiated with the arising of another wave of innovations.

Thus, the essence of the economic development is molded as a dynamic, unbalanced, structure transformer and constantly in evolution one, which was adopted as a base for the further evolutionary and neo-Schumpeterian premises, where persists the Darwinian idea of survival of the firms which are more capable of adjust themselves to this dynamism.

In turn, Ronald Coase, in its classic article "*The Nature of the Firm*", establishes concepts on the firm, which are differentiated of the neo-classic vision, calling the attention to different connotations found in the traditional theory. He first stands out the need to differentiate between the situation of the firm and of the industry, in theory and in the real world. Citing Joan Robinson, he stresses the questions that would have to be formulated to this respect, that are: would the neoclassic theoretical assumptions be treatable? Do they correspond to the real world? The author agrees to Robinson's reply: "*frequently a set of assumptions will be only treatable and will be another realistic*", and adds that there will be sets where the premises can acquire both connotations.

In such a manner, Coase intends to define in the article the concept of the firm in a way that the theory would be treatable and realistic. In order to define the firm, the author stresses the usual concept of traditional theory, as expressed by Arthur Salter that the normal economic system works by itself and the current operations are not under some control or central inspection. In this direction, offer adjusts itself to demand and production to consumption, in an automatic, elastic process, that it reacts as a reply, in all the gamma of human beings activities and necessities. According to this traditional idea, the economists consider that the economic system is coordinated by the system of prices mechanism, and the society is seen as an organism.

As critical of Salter's idea, Coase stands out that this traditional vision is not adapted to reality, due to the character of the economic system which is an organization and not an organism, where exists a planning action on the part of individuals, and some choice between different alternatives of action. Therefore the system does not work only

for itself and in the reality, the allocation of resources, in the system and the in firm, not always follows the price system and planning transforms the organization to a 4th production factor. In this direction, he agrees with theoreticians as Marshall, John Bates Clark, Dennis Holme Robertson and Frank Knight, that consider very important the role of the administrator, the entrepreneur and the decision maker because if outside the firms the movements of prices direct production, in its interior the market transactions are substituted by the coordinator who directs the production.

In this way Coase, explains the idea that the various production factors are differently regulated by prices and the organization inside the firm assumes the role to vertically integrate the different elements, suppressing the mechanism of prices action in this context. Thus, this organization greatly varies from firm to firm and from industry to industry, through the form of treatment given to the prices mechanism and the relative and alternative costs.

An excellent and central contribution of this author for the introduction of the methodological change in the traditional theory, which later on was adopted by the evolutionary theory, refers to the idea that there exist many other elements involved inside the firm that affect the decision of the producer. For the resources allocation, the product production and distribution, so that the firm is lucrative, besides the price mechanism there are other relevant costs that can be reduced, however not eliminated: they are the transaction costs. In the inputs and products market changes it is necessary to minimize these business-oriented costs and to establish separate contracts for each transaction, differently from what happens in the traditional market.

The contract then is seen as the way by which the agreement between producer and the purchaser of the factor production are established, within certain limits. These contracts facilitate transactions, when the supply of a good or service faces some difficulties in the long run, when it is not possible the accurate prices forecasts and the inputs availabilities and, in this in case, the contract can be made in leaving some alternatives for further decision. Evolutionary authors later on have deepened the ideas on the costs of transaction impacts and the specific contract formularization of economic relationships, in the relations intra and extra-firm.

6. The methodological changes in the evolutionary theory of the firm

6.1 Disclosing the " black box"

To explain the aspects of the human behavior in what refers to economic action, neo-classic microeconomic theory starts from the real world abstraction, to reach a logical simplicity that will command the economic facts of the human being actions. Looking for keeping the essential characteristics of the real world problems, the theoretical analysis is processed through logical models that represent the simplified reality, to explain an economic phenomenon, using logical argument, that is, deduction, to interpret the abstract conclusions on economic real world. (Ferguson, 1980).

In the path of the critics to neo-classic theoretical thought, which were described in the previous sections, an ambiance of debates was initially developed initially in the 1950's and 1960's, which deepened the new dynamic vision of the firm, economic system and enterprises competition, that had been molding the theoretical landmarks of neo-Schumpeterian or evolutionary economic theory. These landmarks had later inspired the new ideas of New Institutional Economy and of the Theory Information. The most relevant methodological change for the elaboration of this new theoretical thought refers to observation of reality as the starting point of economic behavior observation, in order to determine the common traces and the determinative factors that compose the theoretical premises.

Nelson & Winter (2002) show that the innovation in what refers to the knowledge on firms behavior and capacities, as well as the perception of the role of the technological advances and the resultant economic growth, that molded the new evolutionary thought and language, resulted from the empirical studies and debates of a series of authors who coexisted since the 1950's¹. These ideas were articulated and congregated in the 1970's, in an innovative publication, in order to format the theoretical principles of this new vision, that have being later detailed and complemented by other authors².

This publication written by Richard R. Nelson and Sidney G. Winter, *An Evolutionary Theory of Economic Change* (1982), brings to economic literature, the basic concepts of the evolutionary theory, through which it is possible to analyze the content of the methodological changes in to the traditional microeconomic theory. It

¹ Besides Nelson & Winter, there are important contributions of Robert Solow (1957), Andrew Schmookler (1952), Moses Abramovitz (1956) e Edwin Mansfield (1968).

² Among the mentioned authors stand out Christofer Freeman (1974), Kenneth Arrow (1974), Nathan Rosenberg (1976), E.W. Constant (1980), Giovanni Dosi (1988), George Basalla (1988), Joel Mokyr (1990), Douglass North(1990), W. G. Vicenti (1990), Goce Petreski (1992), Bengt-Ake Ludvall (1992), Oliver Williamson (1995), Carlsson (1995), Keith Pavitt (1999), David C. Mowery (1999), e Geoffrey M. Hodgson (1999), among others.

congregates the debates of the previous decade by the authors and other scholars that added the premises of the critics to the neo-classical thought –which these authors called "orthodox" – to the evolutionary model of economic change, and of the firms' different capacities and behaviors. The text deepens these critics, emphasizing that the orthodox theory prioritizes the knowledge of the great systems behaviors, as industries, economic sectors, in a global and national vision, where the individual organization (firm) is treated in highly stylized and generalized terms.

The own term of "evolutionary theory" used by the authors, which gave the name to this new line of thought alternative to the orthodoxy, brings the idea of "natural election", borrowed from Malthus, that was based on Darwin (Nelson & Winter, 1982: 9). It also contains the idea of constant evolution and transformations in the economic aggregates, as a reflex of differentiated standards of firms' behavior, in searching for growth and survival, in a different way from the generalized standard decision making which is found in the traditional neo-classic thought.

For the authors, the firm in the traditional theory is a "black box", into where productive inputs are introduced and from where is extracted the foreseen production (Nelson & Winter, 1982: 51). For the evolutionists, the elements and the dynamics in the interior of the black box must be widely known and analyzed in detail, since they include the effective functioning conditions of the firm, which is observed in the economic reality and whose inputs and products canals can with be modified in accordance to the firms' different characteristics and specific capacities.

The neo-classic theory stresses that inner functioning in the black box, is carried through in accordance to a set of pre-established rules of decision that determine the actions to perform, and according to the external market and the internal capital availability. The rules are used with the objective of profit or present value maximization and there exist a specification about a set of activities and techniques to be followed, expressed in the production function (Nelson & Winter, 1982: 12),

As for the described firms' objectives of the traditional theory, the evolutionary critic calls the attention for the insufficiency of its representation through a scalar value function and the search for profit maximization. They point out that there are other institutional elements involved that intervene for the achievement of the objectives, as the number of persons involved with diversities of papers and ways of action, with a complexity of relationships. These productive agents introduce their own objectives in accordance with the operation of its activity and with its function while employee,

shareholding or executive, and with particular interests that can conflict with each other. From this way of thought the behavioral and managerial theories had been derived by authors as H. Simon and Cyert & March, among others (Kon, 1994: 76).

The set of production of a firm, according to orthodox thought, is seen as generated by a finite number of activities or techniques that the firm knows how to operate, which are codified or organized in blue prints, with characteristics as inputs fixed coefficients, constant scale returns and independence of other activities. In this context, these sets of capacities are not considered in the time, in a dynamic way and all the firms' sets of production of the firms are identical (blue prints) and are originated from information that is public and fully available to all agents.

Nelson criticizes this vision, showing that the set of production is defined by the capacities that the producer can or not have. Blue prints can be fully followed or not, according to the need to be adapted to the markets new technological conditions, as well as of other unexpected chances that occur in the productive process.

On the other hand, the neo-Schumpeterian consider that total information is not unlimited and available to all agents, but in contrast cause costs, being limited and therefore, influence the firm's decision makers, since they do not have time and conditions to accumulate, select, organize and analyze the ample information material supplied by the communication channels. Furthermore, the maximization models use a different kind of rationality than the bounded rationality (limited), praised by the evolutionist authors, wath modifies the decision making form, due to the cognitive limited capacities (Nelson & Winter, 1982: 65).

The bounded rationality results from the observation that for the decision making in the firm, the economic agents use additional valid informations that are available, and that supply more subsidies for the application of rationality into the decision about the way of action. As seen, for the neo-classics the information is limitless and equally available for all the agents, and in this case the rationality that leads to the equilibrium and to the profits maximization is the same for all the agents. However, the evolutionary theory stresses the limitation to attain and absorb all the information existing in the reality, in a way that the rationality is limited to the possibility of each specific agent (Arrow, 1974: 13).

In addition, in appraising rationality as the relation between the individual and its action in a social context, Arrow describes the implicit forces of values and possibilities which are observed in reality that define an individual or social form of

rationality, that can be in balance, or in opposition and in tension. The individual has a representative set of several types of goals that range from material consumption until more abstract and higher goals. However the possibility to achieve most of the goals is limited, because there is a set of opportunities among which the individuals must choose, in an individual or social way, in order to better reach its values.

6.2 Skills

A primordial question in the evolutionary thought is related to the premise that the rules of decision of a firm would have to be seen as resultant of its specific capacities, what it is not considered by the orthodox theory. The evolutionary theory stands out the differentiated capacities of the productive agents and of the firm as a whole that will determine the firm's specific and not homogeneous behaviors while unit of production, as well as the diversity of objectives and decisions referring to the possible alternative ways of action (Nelson & Winter, 1982: 72).

The "skills" involve a sequence of steps in a programmatic form, in a way that a previous step stimulates the following step that complements it ("path dependence"). The authors evoke the analogy with a computer program, for the definition of the concept of "skill" as a program or a sequence of behaviors that function as a effective unit. They point out that the development of the modern electronic computer influenced this theoretical thought, what once more characterizes a considerable methodological transformation in the elaboration of the evolutionary theory, in relation to the mentioned previous neo-classic vision.

Skills that determine qualified actions are based by knowledge that in part is tacit, as appraised by the philosopher Michel Polanyi, who uses this notion to explain the general scientific knowledge, while the evolutionists apply it to the organizational capacity. The tacit knowledge implies that the actor is not completely aware of the action details that he will execute and finds difficult or impossible to articulate what really means these details (Nelson & Winter, 1982:73). Thus, two distinct forms of knowledge on the part of the agents and the firm coexist as a whole that intervene in the productive process.

On one side, the public aspect of the knowledge, that can be codified, patented, registered in blue prints and negotiated among firms, that it resembles to the knowledge defined in the neoclassic thought. On the other hand, the tacit knowledge incorporated in the routines of the process, in the specialization, experience and individual

qualification, which is acquired through a process of the agents' learning and repetition experience, takes the form of a set of practical routine of the firm. This type of knowledge cannot be commercialized and is acquired by "learning by doing" ways, and is also difficult, even so possible of being transferred to blue prints.

The authors explain that to exert a skill involves to effect choices, even so great part of the options can be selected automatically, in the sense that parcels out of the details are executed by an unintentional way, without deliberated choice or conscientious notion. In this sense, they criticize the traditional theory that describes the agent's actions to realize choices among behavior options or to perform its capacities, as related to the existence of administrative and technical rules and norms which are previously determined, that also assume foreseen results. Although they do not reject the importance of the use of blue prints to perform the actions, the evolutionists stand out that the tacit character in the skill accomplishment can change the proper previously defined action, influencing the whole programmed route.

6.3 The black box endogenous variables.

Among the relevant methodological changes introduced into the black box endogenous context by the neo-Schumpeterian theory, there were important variables – which were former considered as exogenous from the neo-classic model – that are distinguished in the firm's functioning and decision making sphere. These now endogenous variables are then considered as representing a relevant role for the determination of the non balanced dynamism of the productive process.

The introduction of technological change into the productive process as an endogenous form of exerting strong impacts in the interior of the "black box", and as highly influencing the decision making and the results of production, consists in another significant methodological change of the evolutionary thought. They criticize, the traditional theory consideration of technological progress as exogenous to the model, and therefore that the equilibrium of the firm and efficiency is accomplished through known and fix technology. On the other hand the endogenous character of technological progress in the evolutionary firm has as principle the allocation of specific resources to the development of new technologies. The market structure influences technological advances, which are searched by the firm in its dynamic path to growth, with the intention to increase the monopoly power, in competitive structures, where it does not

exist market equilibrium (Dosi; 2001; Viscusi and others, 1995; Labini, 1984; Arrow, 1974).

In the new evolutionary theoretical scenery, the same ways as technological progress it is seen as an endogenous variable in the decision making process, it is also introduced the idea of the govern action role as influential in the internal dynamics of the firm, which also reflects a relevant change of analysis method in relation to traditional theoretical methodology. So, the government has as objective to regulate the dynamic structures of market and the chain of technological progress (private basic research and governmental institutions research), to minimize the disadvantageous effects for the economy and the society, that result from the firm's growing monopoly power.

The governmental regulatory measures present a different interpretation under the evolutionary theory point of view. In the same way as in the neo-classic vision, they aim to regulate the concentration degree, the competition, the positive and negative externalities (pecuniary or technological), among others elements that cause market unbalances. However, in the new context, the Schumpeterian competition and the regulation of the incessant technological innovation, mold the dynamic character of the public policies, since they must be constantly adjusted to the momentary and mutant economic conditions in the conjuncture reality, which impacts the firm's decision making (Viscusi and others, 1995; North, 1990; Williamson, 1998; Dosi, 2001).

6.4 Evolutionary growth and Schumpeterian Competition

The positivist consideration of the neo-classic theory on firm's growth is based in the long run endogenous growth and it does not incorporate in this context the relevance of technical change and institutional elements. The theoretical premises stand out only the historical changes in the factors ratio and analyze the relationship among these changes and factors prices, in a microeconomic approach. In this context firm's evolution leads to equilibrium and the situations of disequilibria are outside focus.

Regarding the firm's growth, the evolutionary theory looks for a way of conciliation of the well explained aspects in the neo-classic microeconomic theory, with macroeconomic aspects of growth. In this sense, the introduction of technological innovation and of the impacts of institutions in the productive process and in decision making, define a differentiated growth process of evolution of the firm, where competition of market prices captures only one parcel of the economic dynamics.

Growth in the neo-classic vision has the characteristic to reproduce previous structural conditions of the firm and the economy, while evolutionist growth, following the Schumpeterian thought, has the characteristic to introduce relevant structural changes that lead to economic development and to new bases of competition among the companies:

"... it is not price competition which counts, but the competition from the new commodity, the new technology, the new source of supply, the new type of organization (the large-scale unit or control will be instance), competition which commands decisive cost or quality advantage and which strikes not at margins of the profits and the outputs of the existing firms, but at to their foundations and to their very lives." (Schumpeter, 1942: 84).

Schumpeterian competition thus incorporates the new evolutionary model of growth of the firm where the dynamic analysis takes in account random elements that generate changes in the involved variables, and the decision making is done through a selection mechanism among alternatives of variation (Dosi, 2001 and Nelson and Winter, 1982). The mutation and adaptation to new conditions in the interior of the firm that lead to growth are defined through the process of learning and discovery that takes the form of attempt and error.

In this way the firms are key-actors in new technologies investments decisions and in the use of different existing technologies. Therefore, the evolutionist model of growth – that in the Schumpeterian tradition places the central role of the firm in the capitalist economic development – introduces a new method of analysis to be incorporated in the microeconomic foundations of development. The authors point out that development micro processes, which result from micro events, play a very important role for the explanation of macroeconomic aggregate processes.

In the dynamic concept of competition introduced from this vision, the competitive advantage is not based on equilibrium search, but it looks for constant changes that make possible firm's productivity maximization, which causes constant disequilibrium. The possibility of greater or minor degree of firm's technological innovation appropriation generates differences in the growth rates among firms and in the aggregate level. Thus, the behavioral approach of the evolutionists is used to explain the firm's possibilities to face the highly uncertain environment where it operates.

Schumpeterian competition is also characterized by a process that results in winners and losers, because some firms perform emergent technological changes with a greater success than others and prosper, while others decline. In an incessant way, the growth itself confers advantages that take the firm to magnify success, while stagnation brings technological obsolescence and posterior decline. Thus, there is a trend to a concentration process along the time in an industry that was initially composed by firms of equivalent size (Nelson & Winter, 1982: 215).

Concluding remarks.

Methodological changes introduced by the evolutionary economic theory, has as a base some critics to the neo-classic thought that were brought by firm's behavior analysts who verified the difficulties of traditional theoretical model to explain several aspects of firm's transformations that were seen in the economic reality. The basic methodological changes introduced by neo-Schumpeterian were initially related to the change of perspective in what refers to the definition of the theory based on an abstraction of the real world where the idea of a static economic equilibrium prevailed. This concept was replaced by a dynamic perspective where the disequilibrium and the frequent transformations in the patterns of the firm's productive process are first observed in the economic reality and then carried to the theoretical sphere on the firm's performance.

Furthermore, the introduction of technological transformations and of the relevant role of the institutions in the decision making process in the firm, consists in another important change in the analysis method, since the neo-classics considered these factors as exogenous to the decision process.

Other new relevant concepts introduced by the evolutionists were related to the diversity of capacities of the productive agents and of the firms as a whole, what it conduct to differentiated performances and diverse and non linear results in the production process. The characteristics of programmatic sequence of the productive process, the character of "path dependence" contained in this process and in technological change, as well as the new way to visualize the growth of the firm and the competition among firms, consist of differentiated vision on the methodology of analysis on the firm's behavior, as compared to the traditional method.

Finally, a stressing methodological change was the consideration of integration between micro and macroeconomics, in the analysis of the capitalist economic system,

which brought the awareness of how the diverse performance of the microeconomic units affects the macroeconomic aggregates, by conducting to the economic development and bringing the idea of the "Microeconomics of Macroeconomics" analysis.

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