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Fusari, Angelo

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The question of the firm. Organizational forms and dimensions

by Angelo **Fusari**
via Voltaire, 18 – 00137 Roma, Italy
e-mail anfusari@hotmail.it

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Abstract

The paper will dedicate some development to the theory of the firm, that is: general considerations on organization, capabilities and uncertainty, with particular reference to interactions among entrepreneurship, uncertainty and innovation. Particular attention will be paid to the idea of radical uncertainty in order to clarify frequent misconceptions as to the meaning and substance of this variable, its links with the question of competence and profit and – one of the most abstruse of questions – its measurability and the possible implications of deriving such a measure, primarily on the management of the business cycle.

The treatment of these subjects will lead into a discussion of the size of the firm, the connected organizational problems and, hence, the nature of the corporation, the question of its responsibilities, the monitoring role of the profit rate intended as an accountability (not distributive) variable, i.e. as an expression of a firm's results and hence of the success of its decision making and some considerations on optimization .

Keywords: Theories of the firm; Radical uncertainty; Dynamic competition process; The question of optimization; Size of the firm; Dimensional boundaries

1. Introduction

This paper considers the problem of the firm in the perspective of general economics much more than in that of schools of business administration and organization. In fact, it seems to us that a major shortcoming of the good deal of work performed by those schools is the lack of coordination with general economics.

Despite the incessant transformations of the economic background, which produce parallel changes in the organization of the firm, some basic features of this preserve substantial stability. But their meaning is obscured by various misunderstandings; some clarification is accordingly required.

A main feature of modern economies is the central and growing role that creativity and innovation play in the context of the process of dynamic competition. They generate radical uncertainty that makes entrepreneurship, decentralization and market institutions indispensable, being bureaucratic decision making no congenial to radical uncertainty. Therefore, the treatment of the firm requires a parallel discussion of creativity, innovation and entrepreneurship and a tight theoretical interaction amongst them.

At present economics is afflicted by a sharp division between a line that presumes perfect knowledge, also including known probability distributions, and another emphasizing true or radical uncertainty, that is, incomplete knowledge and the connected notion of bounded rationality. Unfortunately, the second and more realistic line unanimously supposes, as far as we know, that radical uncertainty is non-measurable by definition. We shall see that this assumption is wrong, both from a theoretical and empirical perspective; it deviates attention from the level of uncertainty and its variation; this condemns in a state of theoretical vagueness some important variables, such as entrepreneurship and innovation, as well as decisional criteria, and prevents a coherent formalization of the dynamic competition process, which is indispensable to encapsulate the theory of the firm in general economics.

It will also shown some way of measuring the degree of radical uncertainty and discussed the importance of such measure for the explanation of innovation, investment, the formation and use (hence the tension) in entrepreneurial capability and the theory of the firm. Moreover, it will be pointed out that the refusal of optimization because it would require the unrealistic hypothesis of perfect knowledge is the consequence of the wrong assumption of non measurability of radical uncertainty; in the presence of that measure, it is perfectly possible to arrange optimization with radical uncertainty and hence to use the consequent approach in decision making.

It is important to not forget that the firm derives its very nature of entrepreneurial agent from uncertainty. On the one side, it causes uncertainty through innovation in a more direct and insistent way than other open organizational forms; on the other side, it is obliged to meet uncertainty caused by other innovators or exogenous accidents. Profit (usually called extra profit), the main target of the firm, is the result of uncertainty, that is, of the limitations of knowledge and the connected differentials in capabilities. In the absence of exogenous shocks and innovations, the opportunities for profit will disappear.

In sum, in the perspective of general economics, the firm is the engine of the dynamic competition process, which characterizes the functioning of modern economies. For that process is the result of the entrepreneurial activity of search and discovery of profit opportunities based both on innovation and arbitrage over time and space, with the aim to extract gain from the disequilibria and darkness characterizing evolutionary processes.

2. Some significant aspects of the debate on the firm.

The perception of the fundamental role that uncertainty and the limitation of knowledge play, has progressively entered economics. A number of theoretical approach have grown on this perception, and may be unified under the denomination of ‘heterodox economics’.

In a seminal contribution of many years ago, E. Penrose reacted to the hypothesis of perfect knowledge, which erases entrepreneurial capabilities, through a “Theory of the growth of the firm” that is founded upon the availability and evolution of its managerial capabilities and knowledge and the ability to diversify production. She says: “Thus the availability of ‘inherited managers’ with such experience limits the amount of expansion that can be planned and undertaken in any period of time....Once a substantial increment of growth is completed, however, the managerial services devoted to it become available for further expansions”¹. A shortcoming of this development is the omission that such availability depends on the level of uncertainty, which markedly influences both the formation of entrepreneurship and the quantity of entrepreneurial knowledge used in ordinary activities and to manage the achieved expansion.

Penrose attributes great importance to versatility, which avoids that “the market for those products will restrict the firms opportunities of expansion”, and adds: “a versatile title of executive service is needed if expansion requires major efforts on the part of the firm to develop new markets or entail branching out into new lines of production”.² The author insists in depicting the firm as an administrative and planning organization. She does not consider that this kind of organization is mainly typical of bureaucratic-conservative firms. The lack of caution in this matter is an effect of the minor role she attributes to uncertainty. This one is considered as: “the entrepreneur’s confidence in his estimates of expectations”, that is, as a subjective and not an objective fact that influences the firm’s behaviour. She adds: “Risk, on the other hand, refers to the possible outcomes of action, specifically to the loss that may be incurred if a given action is taken”.³ These peculiar notions of risk and uncertainty are useful to Penrose’s analytical purposes, but they are deceitful if considered in a more general sense. She is concerned about the role of information in reducing subjective uncertainty and in the resources necessary to get information, and concludes that risk and uncertainty are final limiting factors only if managerial services are fully used. Again, she forgets to consider that the use and the need of managerial services depend on the level of uncertainty. This level is never considered; uncertainty is simply treated as a subjective entity, rather than an objective one influencing both demand and supply of entrepreneurship. A main shortcoming of Penrose’s theory of the firm seems to be the marginality of the role she attributes to uncertainty.

This marginalization of uncertainty persists in all the theories of the firm that attribute a central role to capabilities; the reason of that is that the usual way to intend uncertainty makes difficult to treat capabilities. In order to clarify this aspect, some considerations on the way economics

¹ See E. Penrose (1999), p. XII

² *Ibidem*, p. 37

³ *Ibidem*, p 56

considers uncertainty are required. As is well known, a pioneeristic treatment was provided by F. Knight. But his analysis is afflicted by two main errors:

First, the idea that uncertainty only implies some deviation from the Neoclassical economics of perfect knowledge but without substantial prejudice for its teaching.

Second, the idea that uncertainty is non-measurable.

Heterodox economics that, polemically with mainstream economics of perfect knowledge, underlines the importance of uncertainty, plainly overcomes the first Knight's error. But it completely shares the second one. In addition, its right perception of the qualitative jump with respect to Neoclassical economics that the introduction of true uncertainty in the analysis implies, has strongly accentuated the consequences of the second Knight's mistake.

Neo-austrian economics gives a clear expression of some misunderstanding caused by this equivocation. Its sharp criticism against Neoclassical economics is hinged on uncertainty. But the assumption of the unmeasurableness and impalpability of uncertainty has imprinted on Neo-austrian students a hostility toward organization, leading them to erase the problem of the firm from the agenda of their work. More precisely, the emphasis on unknown and unintentional events has pushed their analysis, mainly in Hayek's version, toward a prejudicial preference for spontaneous order over organization and command. These are considered as arbitrary interferences obstructing the tendency of social events towards self adjustment. According to this school of thought, general rules, mainly market laws, are enough to allow the harmonization of spontaneous actions and unintentional events. But their emphasis on individual initiative ignores the simple fact that the limitation of skills requires organization.

Another main obstacle to a neo-Austrian theory of the firm is that this school sees entrepreneurial capability as an evanescent, non-measurable entity and, as such, not liable to rational evaluation and impossible to specify. But skills do exist, and the firm has the duty to evaluate its capabilities with a reliable degree of approximation, so as to use them properly. Neo-Austrians analysis on market process, uncertainty, search and discovery could provide an important contribution to the theory of the firm, but their prejudice against organization has deprived the analysis of the firm by those neo-Austrian deepening.

J. A. Schumpeter made an opposite error: his attention for entrepreneurial capabilities disregarded uncertainty, notwithstanding this one springs out copiously from his 'creative destruction'. This omission, that confirms the difficulty to conjugate capabilities to the usual way to consider uncertainty, induced him to emphasize, in "Capitalism, socialism and democracy", the role of managerial services and to predict the end of capitalism as a consequence of bureaucratization. It is illuminating on the importance of the consideration of uncertainty the fact that the Schumpeterian

theoretical effort gives space, in the end, to bureaucratic aspect at the expense of the entrepreneurial one. As a consequence, the building of a general theory of the firm has also been deprived by the support of the branch of dynamic competition process represented by creative destruction.

The effects of these misunderstandings have partially affected *evolutionary economics*, that has accomplished an interesting analysis on the micro-foundations of innovation along Schumpeterian lines. Nelson and Winter's explanatory models of technical change, search and selection within the firm have represented an interesting starting point. But an important aspect differentiates this school of thought from Schumpeter: the remark it attributes to uncertainty, mainly under the notion of bounded rationality that however and as we shall see is an ambiguous way to call up incomplete knowledge.

In a theoretical context marked by the notion of bounded rationality, the difficulty to treat entrepreneurial capabilities appear evident as a consequence of the consideration, in such a context, of uncertainty as a non-measurable, subjective, impalpable entity. In point of fact, evolutionary economics has performed some interesting researches on capabilities that stress the power of learning and tacit knowledge for explaining the behavior, internal organization, boundaries and results of the firm. But significantly evolutionary economics insists in the identification of capabilities through the notion of decisional routine, as a partial remedy to the analytical vacuity deriving from the idea of unmeasurableness and impalpability of uncertainty. This insistence is coherent with the importance that Schumpeter attributed to managerial bureaucracy and also with Penrose's insistence on capabilities separately from uncertainty. In fact, decisional routines are concerned with the bureaucratic conservative aspect of organizations. They refer to repetition much more than to entrepreneurial decision-making since the last requires versatility and the availability of skills able to face uncertainty.

3. An ambivalence in the theory of the firm

It must be underlined that a fundamental ambivalence characterizes evolutionary social thought well reflected by evolutionary economics: on one side, this school of thought is inclined to disregard the problem of the firm, as a consequence of a tendency to exaggerate the limits in human knowledge and hence to distrust of organization at the advantage of spontaneous behaviour; but, for the other side, a branch of evolutionary social thought is greatly attracted by the evolution of institutions, not only in the sense of Menger's theory of the emergence of money as a result of unintentional events. In economics, this attraction is mainly concerned with the firm; the connected analysis was initially fertilized by Coase's seminal article on "The nature of the firm". He wrote: "The main reason why it is profitable to establish a firm would seem to be that there is a cost of using the price

mechanism.... It is true that contracts are not eliminated when there is a firm but they are greatly reduced”.⁴ Here the firm is represented as an organization that substitutes command for the price and market mechanism in the allocation of resources. This Coasian perspective has promoted useful investigations on the firm. Precisely, it has stimulated two lines of research directed towards explaining the nature and the role of the firm as an organization, at present unified as the ‘contractual perspective’. One line is due to O. Williamson, who developed Coase’s intuition on transaction costs and hence emphasized the distinction between “markets and hierarchies”; the other line is Alchian and Demsetz’s approach on the “nexus of contracts”.

Williamson writes: “The two behavioral assumptions on which transaction costs analysis relies – and without which the study of economic organization is pointless – are bounded rationality and opportunism”.⁵ The incompleteness of contracts due to the limits of human knowledge, in conjunction with assets specificity (site, physical and human specificity) is said to permit opportunism in market contracting, mainly the threat of a unilateral termination of contract that will reduce the value of specific assets. This would generate costs depending on the frequency of transactions, uncertainty and the specificity of investment. So the key role of the firm, it is held, is reducing those costs by substituting a command mechanism to contracts and the market.

The consideration of transactions costs, in addition to production expenses, permits significant analytical improvement on the boundaries of the firm and its governance structure; but these boundaries mainly depend on the availability of capabilities and uncertainty, that limits the degree of understanding and hence the potential of skills. Therefore, uncertainty limits the impact of transaction costs in stimulating the size of the firm. In fact, it requires versatility, flexibility and promptness that large firm usually lack and that only partly may be stimulated by setting up a decentralized structure. However, transaction costs are not essential for explaining the firm’s existence and nature, which can be referred to some more general consideration on organization, as we saw in the previous section.

Alchian and Demsetz considered contracts from a different point of view. Their work on the firm signaled the benefits that input owners may achieve through contractual cooperation and hence the need of monitoring of costs. Moreover, they argued that cooperation necessitates of measuring the productive contribution of each member of the ‘team’ (to avoid free riding and shirking). They accordingly focused on the consequent organizational problems, mainly concerning monitoring and incentives. Probably, the most important insight here is the acknowledgment that the monitoring of the monitor requires that the overseer has a residual claimant status. Actually, though, it seems inappropriate to treat the firm as a ‘team’ of entrepreneurs-resource owners. The firm is a unitary

⁴ See R. H. Coase (1937), p. 390

⁵ See O. E. Williamson (1981), p. 154

structure, and its results must refer to that structure as a whole. It is the task of the responsible of the firm's performance, who is therefore entitled to a control power, to monitor the productive contribution of every component of the organization, through incentives or otherwise, in order to improve efficiency. But to make accountability effective one needs a precise indicator of the firm's success. As we well know, this indicator can only be the profit rate, as all others are partial or misleading.

Some insights on the problem of incentives have been provided by the principal-agent approach. However, the strong insistence on the crucial role of property rights, and hence of private ownership⁶, as indispensable to the efficient use of resources and hence to long term economic growth, appears misplaced. Monitoring based on the last-claimer principle does not require private ownership but only a clear and precise attribution of responsibility for results (profits). True in small firms, with their serious problems of accountability, efficiency may require private ownership with its implicit automatic monitoring, reflecting an immediate interest in economic results. But in larger ones efficiency does not require property rights; all that is needed is the clear and inescapable attribution of responsibility for the results (in terms of profit rate), accompanied by appropriate powers of control. This does not necessarily require the ownership of resources.

In conclusion, contractual approach has provided important results on the internal organization of the firm. Besides, it attributes to uncertainty, or incomplete knowledge, an important role, mainly through the notions of transaction costs and residual claimant. But the computations it proposes express an evident ambiguity as long as uncertainty is considered a non-measurable entity. Another most serious limitation of contractarian theories is their disregard for the firm's competence and skills and, more precisely, the lack of an interest in one key task of firms: searching for and discovering profit opportunities, which is the principal driving force of innovation and hence development and growth. On this front the contractual theories, in both the versions sketched out here, have made no advance.

There is now a growing perception among students of the necessity to consider capabilities as a key explanatory factor of the firm's boundaries, behaviour and organization. N. J. Foss and R. N. Langlois have focused on this aspect. Against the dominant theory centered on contracts and incentives, they contend that: "the capabilities perspective is much more conscious of the production side of the firm and represents the nature of production in a way that is potentially complementary to the transaction cost approach".⁷ An important characteristic of their approach is

⁶ See, for instance, O. Hart and J. Moore (1990). The one-sidedness of this position is well stated by Holmström and Roberts, who write: "But this approach also needs to expand its horizon and recognize that power derives from other sources than asset ownership and that other incentive instruments than ownership are available to deal with the joint problems of motivation and coordination". See B. Holmström and J. Roberts (1998) p. 92

⁷ See R. N. Langlois and N. J. Foss (1999), p. 202

the insistence on the need to integrate the capability and transaction cost perspectives into a unitary approach, indispensable to the analytical revitalization of the production costs side. But the main flaw is, again, an undervaluation of uncertainty and its links with capabilities. Probably, this is mainly due to the supposed non measurability of uncertainty, implying a theoretical vacuity that makes embarrassing the reference to this variable.

Let insist that, in my own opinion, some main, most paralyzing shortcomings of the current theories of the firm are rooted in the way the key notion of uncertainty is considered and used, and mainly in the mistaken idea that by definition uncertainty does not admit of quantification but is a sort of impalpable entity. The consideration of the level of uncertainty and its variation is indispensable to may appropriately consider entrepreneurial capabilities and conjugate innovation and adaptation (as we saw), hence to the specification of dynamic competition process and, through this one, the coordination of the theory of the firm with general economics. The disregard in principle of the level of uncertainty and its variations precludes proper specification of the formation and use of entrepreneurial capabilities and hence the enunciation of the important notion of excess (or tension in the use) of entrepreneurial skills as well as the explanation of innovation and investment.

4. Optimization in the presence of true uncertainty

The controversy on optimization is important for our topic, in that can help clarify the rather similar notions of: bounded rationality, true uncertainty, limits of knowledge and other aspects of heterodox economics. As is well known, the success of the notion of bounded rationality is mainly due to its help to the criticism to the principle of rational behaviour and optimization. But this critique may result misleading. Man is limited by nature; a variety of bounds are always inherent in any kind of decision; under this respect, the notion of bounded rationality is little more than a truism. Within the boundaries of his knowledge, though, man is obliged, mainly by competition, to do his best to implement the efficiency of decisions. Man and society need to act rationally; a task of science is to stimulate rationality in decision making. The critique of the postulate of rational behaviour, and in particular of the optimization principle, does not take this need fully into account.

Probably the terms ‘uncertainty’ and ‘incomplete knowledge’ would be preferable to ‘bounded rationality’. But this terminological change does not provide decisive clarification: in fact, the growing hostility to optimization and some major impediments to stringent formalization of an alternative to the Neoclassical theory of the firm spring from ambiguities in the notion of uncertainty that have precluded, as previously seen, a more satisfactory elaboration on capabilities and other theoretical advances.

The exposition of some of the main objections to the optimum principle may illuminate this subject. Kirzner writes: “The decision, in the framework of the human-action approach, is not arrived at merely by mechanical computation of the solution to the maximization problem implicit in the configuration of the given ends and means”. Later he adds: “In other words, where the circumstances of a decision are believed to be certainly known to the decision-maker, we can ‘predict’ what form that decision will take merely by identifying the optimum course of action relevant to the known circumstances. Now this ‘mechanical’ interpretation of decision-making would be entirely acceptable for a world of perfect knowledge and prediction”.⁸

Kirzner’s reasoning is referable to Neoclassic approach, which excludes uncertainty; but it cannot be generalized. The optimum principle is a mathematical tool that may be applied to various theoretical contexts. It is mistaken to presume that it is not applicable in the presence of limited knowledge; such a mistake derives from the presumption that uncertainty cannot be measured by definition. But we shall see soon that the distinction of uncertainty from measurable probability does not imply the non measurability of the degree of uncertainty. As a consequence of the absence of a measure of that degree, various authors have pretended to place uncertainty in the optimization approaches in the form of some known distribution of probabilities, which as such do not express uncertainty; however, this defect has strengthened the propensity of heterodox economists to refuse optimization.

A different and more cautious critique to the application of the optimization principle has been expressed by Nelson and Winter. They write: “Orthodoxy treats the skilful behaviour of the businessman as maximizing *choice*, and ‘choice’ carries connotation of ‘deliberation’. We, on the other hand, emphasize the *automaticity* of skillful behaviour and the suppression of choice that this involves”. And later: “Formal orthodox theory, on the other hand, does not rate solutions as maximizing because they are better than some other observed solutions, but because they are the best feasible solutions. It thus premises a standard of performance that is independent of the characteristics of the performers; the attribution ‘skilled driver’ involves no such premises”.⁹ This critique does not express a radical refusal of optimization in economics; simply maintains that decision making is based on tacit knowledge and automaticity instead of deliberate choice. Nelson and Winter’s reprimand to Neoclassical pretension to define the best feasible solution ignoring the skills of performers is by itself unexceptionable; and it is strongly influenced by the evolutionary economics refusal of optimization.

In our opinion, even though many decisions are based on non-optimizing methods, it is mistaken and excessively limiting to exclude optimization as a tool for improving decision-making and

⁸ See I. Kirzner (1973), pp. 33 and 35

⁹ See R. R. Nelson and S. G. Winter (1982), p. 94

theoretical formalization. However, the appropriate use of optimization requires a joint specification of the degree of true uncertainty and the associated entrepreneurial skill, as in the absence of uncertainty entrepreneurial skill is inconceivable. Such a specification would allow us to express entrepreneurial capabilities and the related notion of incomplete knowledge as the constraints of optimization approach, thus removing the bounded rationality criticism to optimization. This seems to be a major challenge for the theory of the firm. But it is crucial, for that specification, to define some indicator of the lack of knowledge and to express it in quantitative terms.

At the end of a review on optimization and evolution, G. Hodgson writes: “Usefully, modern evolutionary theory immediately suggests a variety of circumstances in which the validity of the maximization idea is under strain. Only further detailed theoretical investigations can tell us more.”¹⁰ In this stage, it may be said that the perceived strain is, for a large part, a result of misunderstandings. However, and as far as we know, nobody has pointed out the great importance of a measure of the degree of true uncertainty that can be broken down according to firm, sector, area, at global level and over time. A central purpose of this essay is to demonstrate the importance, both theoretically and empirically, of such measure. Among other things, it would enable us to formalize optimization in a realistic non-orthodox way and to represent the natural inclination and interest of the firm to choose the best among different opportunities.

It can be useful to set out a formal example of optimization. The prominent importance of profit both in private and public firms, as an indicator of their degree of success, suggests deriving investment from profit optimization of firms. This use of optimization intends to underline, among other things, that the hostility of limited knowledge and bounded rationality economics towards optimization (M. I. Kirzner 1973 and H. A. Simon 1997) is not justified, being simply due to the wrong denial of the measurability of uncertainty. Our optimization is intended as follows:

$$\text{Max}_{(U_t)} \sum_{j=1}^{\infty} \int_{t=0}^T [\omega_j \varepsilon_j e^{-\rho s - \lambda_{ij} s} r_j(t,s) I_j(t,s) + \omega_2 \bar{E}(t,s)] d_s$$

\bar{E} (the part of entrepreneurial skill depending on the firm’s policy) acts as control variable in the above objective function, while the letter I stays for gross investment and r for profit rate. The integral over the life period of investment $\int_{s=t}^T [\omega_j \varepsilon_j e^{-\rho s - \lambda_{ij} s} r_j(t,s) I_j(t,s) + \omega_2 \bar{E}(t,s)] d_s$ expresses expected profits as discounted by uncertainty indicated by u (that in this case may consist in a subjective evaluation operated by the firm plus an objective sectoral indicator determined, for instance, through the elaboration of the answers to a monthly survey of business conditions for a sample of firms representative of all industrial sectors and Italian geographical areas by ISAE¹¹; ρ is a nominal

¹⁰ See G. M. Hodgson (1999), p. 195

¹¹ The late Institute of Studies and Economic Analyses

interest rate and ε indicates the impact of other factors influencing expected profitability; ω represents weight and j industry.

This objective function assumes that the firm distributes its skills and resources among sectors with the aim of exploiting at the best the market opportunities of profit. The specification of an indicator of uncertainty allows us to overcome the present vacuous stage of the analysis of entrepreneurial capabilities. More precisely, it permits to make endogenous both the formation and use of the firm's skills, as tightly linked to uncertainty. As is well known, these skills constitute, for the major part, a kind of tacit knowledge (in the sense of M. Polanyi), resulting from learning by doing, by watching, using, etc.

It is not correct to counter that the existence of a measure of the degree of uncertainty would imply the possibility of taking out an insurance policy against bad economic results, and hence the negation of entrepreneurship. In fact, that measure is not an estimation of risk, giving a probabilistic certainty, but just a measure of the lack of knowledge, i.e. of one's distance from a state of complete knowledge. On the other hand, uncertainty implies the strong influence of entrepreneurial skills on results, and it is impossible for insurance companies to measure those skills and results from outside. Moreover, the insurance of entrepreneurial results would stimulate inconsiderate entrepreneurial decision-making, thus increasing insurance costs and jeopardizing entrepreneurial role.

Many authors have pointed out that firms' decisions follow much simpler rules than profit optimization (see the pioneeristic study of R. M. Cyert and S. C. March, 1963). M. Polanyi's teaching on tacit knowledge has added some powerful weapons to this argument. Nevertheless, the hypothesis that the firm optimizes the distribution of its initiative among different profit opportunities seems to express a rigorous and general interpretation of its behaviour, irrespectively from the various decisional routines characterizing each firm organization. In fact, it is quite natural for the firm to use its limited skills and other resources in such a way to get the maximum benefit, even more than a similar attitude is natural in consumer's spending. In point of fact, consumers that do not like worldly delights will disregard such maximization; instead, the firm is obliged to maximize by competition and uncertainty on the potentialities of its rivals, otherwise it will be defeated by optimizing firms.¹²

¹² I agree with Hodgson's criticism to the idea that evolution implies maximization and to some other aspects of the optimization principle, but this author probably would not deny that, for instance, the participants to an examination for, say, a limited number of grants are induced by their ignorance of the worth of rivals to do their best to pass the examination.

5. On the size of the firm. From individual firms to large scale managerial firms: stimulants and boundaries to their dimensional growth

1. Now we consider the topic of the size of the firm, which has a great analytical importance mainly in regard to the problem of the organizational form of the firm. In this matter, economics long accepted Cournot's solution. But it was then perceived that the hypothesis of the U costs curve, on which such a solution is based, cannot be extended to the medium term, to which the problem of the dimension of the firm refers. Consequently, a number of further hypotheses have arisen concerning the factors on which depends the size of the firm.

Some authors, following Kalecki,¹³ have indicated risk (intended as uncertainty) as a limiting factor on the size of the firm, adding that the way to remove this bottleneck to the growth of the firm should be represented by 'inner capital', that is, self-financing plus shareholders' saving on dividends, which depend on the dimension of profit.

A careful meditation on the nature of profit shows that such a thesis is internally contradictory. Kalecki based his analysis on an aggregate notion of profit deduced from his theory of effective demand. However, we know that, for the entrepreneur, uncertainty is an opportunity since it allows the deriving of profit from entrepreneurial skills. This means that, in the presence of entrepreneurial skills, uncertainty does not act as a limitation to the firm's expansion but instead can stimulate expansion. With regard to the role of risk, we must also take into account the thesis of Galbraith and others, according to which the dimensional increase of the firm and the connected productive diversification would imply the reduction (instead of the increase) of risk, as a result of the tendency to compensation, in the Gaussian sense, of the effects of random events.

Another boundary identified as limiting the size of the firm is the width of the market (i.e. of the demand) of each good. It was Sraffa who initially underlined this boundary, and related it to the growing sale expenditures necessary to overcome it.¹⁴ But it is now well known that the diversification of production allows the firm to eliminate such a boundary. Other authors have emphasized the growing complexity that growth in size of the firm entails for its internal processes of coordination, control and communication. These same authors (primarily Kaldor) have underlined the limitation of the skills of direction, on the hypothesis that the entrepreneurial function is indivisible by definition. But the use of computers allows an easy solution to the problems of control, coordination and communication. Moreover, Kaldor's boundary on direction makes sense only in relation to the traditional notion of entrepreneur, not to the kind of entrepreneurship typical of the large firm. In fact, in this latter case, ability to judge the content and implications of the decisions to be taken does not depend on individual skills but rather on the

¹³ See M. Kalecky, *Entrepreneurial capital and investments* (1975).

¹⁴ See P. Sraffa (1937).

quality and quantity of the organizational and managerial resources that the firm has at its disposal. This last point is central to the discussion of the size of the firm and hence deserves much attention.

In the modern large firm, the major part of entrepreneurial decision-making is based on information owned by many people. J. K. Galbraith wrote: “The real achievement of modern science and technology is represented by the possibility to take normal persons, educate them accurately in a specific field and hence coordinate, through an appropriate organization, their competence with those of other specialized ordinary people.”¹⁵ This makes possible to meet the exigencies generated by technological development and reach decisions on very complex questions by using skills that are easy to find and instruct; with the only condition that the people endowed with the required knowledge are able to collaborate and express collective decisions. So, in the modern large firm, the entrepreneurial function is not unique and indivisible (as Kaldor supposed), but is expressed by a plurality of levels that vary according to the decisions taken over the course of time, since only he who possesses the requisite knowledge can be charged with decision. As a consequence, the limitation of the size of the firm cannot come from this side, at least not if there is the will and ability to make the qualitative jump from traditional to managerial organization. This has been clarified in the managerial literature that takes its origin from the work of E. Penrose.¹⁶

2. If the reason why the firm exists is correctly treated, the true limit on the growth of its size becomes evident. For the reason for the existence of the firm also contains the boundary on its growth; this reason being the necessity of committing economic and productive decisions to the competence and the knowledge of people in close contact with the changing events to which decisions refer. Such a necessity conflicts, not only with centralization *tout court*, but also with an unlimited enlargement of the size of the firm, whatever its organizational form. The boundary on size resulting from the above need of decentralization can only be shifted, through appropriate organizational forms; it cannot be eliminated. This topic deserves attention.

We have seen in the previous paragraph that an efficacious use of knowledge, in the presence of increasing technological complexity, often suggests and sometimes imposes the widening of the entrepreneurial function by entrusting managerial groups with it. *Well, such an organizational form implies a remarkable increase of the minimal size of the firm; besides, it makes it possible to considerably increase dimension without this entailing a considerable centralization of decision-making.* The multidivisional organization provides further degrees of freedom in conjugating decentralization with large size, thus further amplifying the dimensional boundary. It follows that a real problem is the verification of the possibility of amplification of such a boundary through the

¹⁵ See J. K. Galbraith (1968) pp. 55-56.

¹⁶ See E. T. Penrose (1995)

adoption of a managerial organization. Such verification might start by considering the managerial organization that implies the maximum degree of internal decentralization, that is, group organization (but we can also refer to a unitary juridical form of multidivisional type). As is well known, at the top of the group we find a holding that controls the various operational unities constituting the group. Two cases can be differentiated:

- a) The board of directors driving each unity enjoys *full administrative autonomy*, while the holding limits itself to the perception of profits. In this case, the group cannot be considered a single firm; it is a *group of firms*. In fact, the definition of the firm is based on the notion of ‘autonomous’ decision-making, while such a definition does not give importance to the problem of the attribution of profits.
- b) The holding has a unitary executive committee that resolves the conflicts among the various sub-groups, bringing them back into the orbit of the general strategies of the group. In this case the group is a single firm, due to the subordination of each operational unity to the decisional powers that the holding exercises.¹⁷

Only the second case (b) is of interest for our analysis of the space that the managerial organization of group (or multidivisional organization) offers to the amplification of the size of the firm. Such an analysis is facilitated by the fact that the field of decision-making committed to the holding competence is usually very large, including within it all strategic choices.

Usually, the great multinational and multidivisional firms entitle the parent society to the financial management, technological research and formative services, while the branch offices administer choices of tactical character and must supply to the parent society periodical reports, must analyze the results achieved in collegial meetings of the group, and are submitted to the control visits of central inspectors.¹⁸ This notwithstanding the fact that the large multidivisional firms are in general the group organizations most decentralized and articulated.

It is immediately evident that the links of subordination of each operative unity to the holding described above remove decisional power on crucial questions from people operating on the spot. Such negative effects of this centralization of decision-making grow with the dimensions of the group and the number of operative unities controlled by the holding and productive diversification, and can be reduced only through a reduction of the decision power of the central board and top

¹⁷ It is extremely difficult to give an empirical content to the distinctions between (a) and (b). Case (a) has an eminently theoretical character; while case (b) represents, with various degrees, the prevailing situation.

¹⁸ Often a deeper internal decentralization corresponds to the initial phase of the international expansion of the firm; but in the phase that follows a consolidation of the authority of the mother society will be practiced. In fact, the collection of financing and the use of resources are planned by the central power and the use of corporate planning is extended and strengthened, which implies the reinforcement of the interdependence among the various productive, financial and commercial administrations in the context of the global control and development strategy elaborated by the staff of the multinational firm according to a unitary logic. The adoption of refined methods to condition and train the directors warrants their behavioral uniformity, thus making easy the coordination of the activity of associated firms.

management; but such a reduction attenuates the characterization of the group as a unitary firm, ultimately tending to the complete suppression of such a character and the reduction of the parent society to the first case described above (a).

It must be added that the operation of a unitary group strategy does not cause only decisional inefficiency, it also causes organizational inefficiency. Let us briefly explore the reason for this inconvenience. It is well known that, in the holding situation described in (b), the types of investment are decided by the central direction of each society. This deprives such societies of an important component of their autonomy and generates enormous difficulties in defining the criteria of evaluation of the results achieved by them and, hence, a sharp-sighted subdivision among them of the capital to be invested. In fact, the natural parameter for such evaluation, the profit rate of the firm, becomes useless since: (a) profit is conditioned in a decisive way by the general strategy of the group, which is defined outside the operative unities; (b) it is very difficult to define, with regard to the considered group, the firm's profits, both due to the arbitrariness of the attribution to each unity (or division) of the general costs concerning centralized services, and the arbitrariness of the definition of unity prices of the goods exchanged inside the group (or inside the multidivisional firm).

We can see, therefore, that the groups of firms (or the big multidivisional firm) encounter problems of decisional and organizational efficiency identical to those that, on a larger scale, are typical of centralized economies. This is not casual. In fact, we have seen that an enormous growth of dimensions determines administrative structures more similar to centralized than decentralized economic orders and also implies a substantial undermining of the main reasons for both the firm and decentralization.

3. *It is surprising that the drawbacks caused in big firms by the need for the centralization of strategic decision-making described above have been disregarded by important students of managerial organization.* E. Penrose wrote: “we have rejected the proposition that there is for every firm some *optimum* size beyond which it will run into diseconomies. Only for firms incapable of adapting their managerial structure to the requirements of larger operations can one postulate *an optimum*”¹⁹

According to Penrose, the adjustment of staff would allow, among other things, an increase and improvement in the quantity of available information and, hence, the skill to make decisions. But the adjustment of the staff is unable to solve either the organizational problem considered above or to eliminate the negative implications for the efficiency of decision-making that, in the presence of

¹⁹ See E. Penrose (1995) page 98.

very large dimensions, are caused by the centralization of strategic decisions. The great distance, in the case of large dimensions, between he who takes decisions and everyday events inevitably causes some substantial extraneousness with respect to the specificity of events.

Some pages later, Penrose says: “In spite of the opportunities and pressures which lead firms into the production of a wider range of products, it seems likely that most firms still derive the bulk of their income from a relatively few closely related products.”²⁰ Well, this circumstance that Penrose rightly underlines must be primarily attributed to the fact that the losses in decisional and organizational efficiency due to the centralization of strategic decision-making are modest if goods are not numerous and, therefore, the decisions concerning them have many affinities. While a firm is expanding, its organization must change. But, until certain dimensional levels (which vary in each case), and if the output of the firm is less diversified, these changes cause neither inefficiencies due to centralization nor substantial qualitative jumps. Some new directional powers are created, but the entrepreneurial function does not suffer dispersion.

The situation becomes more complicated if dimensions continue to grow. In this case, it becomes necessary to establish some sublevel of entrepreneurship. But these sublevels must be coordinated according to a unitary logic. As a consequence, a conflict inside the organizational managerial logics takes place; the inevitable interference of the top management within the decisional role belonging to the new sublevels of entrepreneurship causes a loss of entrepreneurial efficiency. The situation is worsened by the fact that, beyond some dimensions, a further expansion of the firm requires an increase in productive diversification; but such greater diversification raises the necessity of coordination, thus determining a further limitation on the possibility of decisional decentralization and, hence, further reducing the knowledge of problems on the part of he who decides.

On the other hand, the dispersion of entrepreneurship throughout a variety of decisional sublevels (that operate notwithstanding the centralization of strategic decision-making considered above), is not without its inconveniences. In particular, by determining a multiplicity of subjective points of view that decision making is obliged to confront, such dispersion causes limitations in both the agility of decision-making and the versatility of entrepreneurial imagination. For sure, the above decisional technique is characterized by a greater accuracy, reflexivity and “propensity to prepare the ground” than is the traditional entrepreneurship. But this represents an advantage only if the firm encounters an external environment that is easy to dominate and foresee. In sum, managerial organization, being well endowed with reflexivity and the power of persuasion, is more qualified to shape and influence the external world than to suffer its influence and adapt itself to it.

²⁰ See E. Penrose (1995), page 150

It encounters difficulties if it needs to adapt itself more than it needs to adapt others to its exigencies, that is, if the boundaries deriving from the external environment are strong and persistent. The theorists of the giant firm have dedicated inadequate attention to the role of external boundaries. They were living in a world in which the managerial firm seemed able to subsume all by its logic; and so they judged reality and theorized this process while comfortably sitting in the large stomach of the big firm. Consequently, their view is limited and one-sided. *In the life of the firm with a higher incidence of external than internal boundaries, there corresponds a greater necessity to decentralize decision-making; as a consequence, the obstacles that obstruct the growth of the firm rise.*

From the above considerations derives, among other things, an important explanation of the reason of the existence of the small firm, in addition to those set out by the interstitial theory (Penrose, Sylos Labini) and by the theory that underlines the importance of the innovative role of the little firm (G. Berardi). The space available to the small and medium-sized firm seems due to a more general reason than those considered by these authors: these firms are, first of all, an expression of the physiological exigency of decentralization that we have underlined. This implies that their presence should be more frequent in the sectors where the necessity to decide on the spot is higher, since those sectors do not like the centralization of strategic decision-making, which instead is typical of diversified large firms.

6. Some details on the factors counteracting the boundaries on the dimensions: their objective or institutional nature

We discussed, hitherto, the boundaries on the dimensions of the firm and underlined that they are much larger in managerial than traditional firms. But we have not discussed the dimension that the firm can concretely reach before the boundaries here considered become active. Now we come to do this.

The size of the firm depends on the force of the factors that counteract the above boundaries, thus promoting the enlargement of the firm. These factors are: (a) scale economies of technical, financial and managerial-organizational character; (b) growth economies. As is well known, these economies are numerous and variegated. The problem is to see how far they are able to overcome opposition to the reduction of size deriving from the inefficiency in decision-making caused by centralization, and when the contrary occurs. Such verification can be performed only with reference to concrete cases. However, some general considerations can be stated.

The size of scale and growth economies is frequently so large as to justify the conclusion that *large dimensions are obstructed for the most part by the qualitative jump in organization that they*

need, much more so than by the boundaries we are discussing. Nevertheless, critical students will perceive that the theoretical relevance of such a boundary is great. Let us see. If we consider the problem from the point of view of a general theory of decentralization, i.e. abstracting from specific institutional forms, we must ask ourselves what part of both scale and growth economies derives from the institutional content of the existing forms of decentralization, and what part has instead an objective character , this *intended in the sense that it abstracts from the existing institutional forms.* This consideration allows understanding that the boundary to the size of the firm previously underlined has a character much more restrictive and relevant (from an analytical point of view) than appears at first sight. This point deserves further consideration.

Without any doubt, the push on the growth of size is largely due to financial factors, especially if the growth takes a conglomerate form. This happens because the organization of the group causes an increase (both through financial conjunctions and the multiplication of the levels of vertical participation) of the quantity of risk capital (present in the patrimonial estate of each firm of the group) far beyond the effective amount of capital, thus favoring both the preservation of control positions and the collection of funds in the market. But these advantages operate only if the market for capital and the financing of the firm are organized in a capitalist way.

The same can be said with regard to the economies of dimension dependent on the activity of R&D. These economies may exist only if R&D operates inside the firm. But we can suppose a decentralized economic system where such activity is largely performed outside the firm, through appropriate institutions, and where the firm only decides which of the scientific results achieved by those research institutions to utilize, as well as when and the way in which to utilize them.²¹ Also market research, engineering, computation and information, as well as the assistance services needed by firms operating abroad, could be supplied, at the request of users, by specialized centers. For their part, scale economies concerning advertisement expenditures represent in the main a peculiarity of capitalist decentralization. The same is valid with regard to the dimensional growth hastened by reasons of prestige; in fact, it is possible to create a system of financing of production able to exclude those reasons from the leading criteria of distribution, among firms, of the national fund of investment.

Indeed, only a modest number of scale economies have an objective character, that is, *are independent of the considered institutional system.* Among them are those that arise due to the possibility of using, with the growth of production, superior techniques and/or from using more rationally the existing installations by specializing the phases of production. Furthermore, there are

²¹ Something analogous is witnessed by the fact that a lot of innovations have been produced by small and medium-sized firms, while only excessively large firms, well endowed with financial capital and an efficient commercial organization, intervene to give full value to these innovations.

economies that arise from the fact that purchase costs, and the cost of the functioning of installations are less than proportional to their dimension. Finally, there are economies determined by the possibility of introducing, in case of larger dimensions, less expensive control systems, and the possibility of reducing the unsold stocks (as an effect of the Gaussian law of larger numbers).

Further incentives to the growth of size of an objective character may depend on the tendency to consolidate, through entrance into a secondary market, the position in the main market of production; moreover, these incentives can derive from the reduction of the degree of radical uncertainty that growth allows as an effect of the connected higher control of markets and major productive diversification. For their part, growth economies that are not scale economies²² stimulate indefinitely the dimension of the firm only if unit costs in the medium and long run remain constant; they do not do so if those costs start to rise sooner or later, due to the presence of the boundary here discussed.

On the whole, the dimension of the scale and growth economies with objective character (and that are, as such, unavoidable) does not seem to explain the conglomerations and industrial gigantism that we observe. After all, these economies rarely operate together so as to generate strong counter tendencies with respect to the dimensional boundary deriving from the centralization of the entrepreneur's decision-making accompanying gigantism.

The analysis developed in this section shows the erroneousness of Galbraith's prediction²³ of a continuous expansion, in modern societies, of economic planning to the detriment of the market, consequent on the continuous growth of the dimensions of the firm. This means also that Galbraith's derivative prediction of the tendency of capitalism and socialism to converge towards social planning is groundless.

Our analysis also shows that in current decentralized economic systems the firm as an institution achieves a rationalization of productive processes far below its potential; this being a consequence of the fact that gigantism proliferates well beyond objective necessities. Of course, large dimensions have (and always will have) an important role – sometimes even in stimulating 'dynamic competition' – both through their activity in the international market and also because they imply a reduction of market imperfections due to lack of information and the possible presence of a large number of separate little firms. But it does not appear that the existence and imperialism of giant firms is justified by objective reasons. Immanent and unrestrainable tendencies towards growing industrial and productive concentration do not exist.

²² That is, the economies deriving from existing non utilization of managerial resources (the services of which cannot be sold in the market) that E. Penrose has emphasized. These economies may cease with the end of the expansion that generated them; therefore, they do not imply economies of dimension.

²³ See J. K. Galbraith (1968).

Conclusion

It is our belief that a major deepening of the coordination between the theory of the firm and general economics is indispensable to make heterodox economics more attractive. In fact, a main reason of the survival of the Neoclassic theory of the firm and its large number of followers (notwithstanding its inability to consider some crucial aspects of the economy such as innovation, entrepreneurship and uncertainty) is its perfect coordination with general economics.

The current idea of true (or radical) uncertainty as a non-measurable entity represents a main obstacle to the coordination of the heterodox theories of the firm with general economics, a coordination that, in fact, requires a specification of the notion of *dynamic competition* as representing economic process with entrepreneurship, innovation and radical uncertainty.

This paper has presented a formulation on the firm showing some difference, with respect to usual formulations, on the explanation of capital accumulation, the role of the profit rate and technical progress. In particular, it points out the close relation between entrepreneurship, innovation, uncertainty, their crucial influence on growth and development, and the importance of a measure of the degree of radical uncertainty, which allows a representation of dynamic competition process and its cyclical behaviour.

Our developments have much to do with the organizational aspect. In particular, the two final sections on the dimension of the firm lead to consider important organizational forms and the relative problems, mainly with regard to holdings: organization of group, managerial and multidivisional forms, centralization versus decentralization.

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