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MARKETS AS INSTRUMENTS OF EVOLUTION OF STRUCTURES

by

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1 Introduction

The social function of markets has preoccupied economic theories for more than two centuries. The central question has been whether or not markets are the best coordination devices in promoting social welfare and economic development. Contrary to what is often believed, the answer of modern Western economics is not positive. To be sure, markets have been formally proved, by what I define below as "modern orthodoxy", to be efficient instruments of resource-allocation, but only under certain stringent conditions. If these conditons are not met - and they rarely are - markets have been shown to suffer from a wide variety of failures. Moreover, certain kinds of socialist planning - in particular of the informationally decentralized varieties - have been shown equally efficient under less stringent conditions. The surprising implication is - and this is what I will refer to as "the pro-planning bias of modern orthodoxy" - that suitably designed planning can successfully replace any alternative set of markets.[1]

There is, of course, a possibility which cannot a priori be excluded that the implication is correct and no pro-planning bias thus exists. And although all real planned economies now provide rich empirical evidence against this possibility, the conclusiveness of this evidence may still be put in doubt; one can rightfully point out that none of the real planning has been "suitably designed". To test the implication and the existence of

the bias in a more conclusive manner, it is thus necessary to turn to logical deductions. To do so is the purpose of this paper. Based on my research in comparative evolutionary economics (Pelikan 1985, 1987, 1988, 1989), the paper will argue, first, that markets fulfill an important social function which modern orthodoxy cannot see, and, second, that it is precisely in this unseen function that markets cannot sucessfully be replaced by planning.

Let me use the term "modern orthodoxy" to denote all economic theories which make the following simplifications:

(1) to assume that the economy's organizational structure with all its agents - be it a set of markets or a hierarchy of planning - is initially given and constant; under this assumption, markets are only instruments of resource-allocation among once for all given agents;

(2) to assume that at least some of the agents are perfect optimizers; although the structure may admittedly fail to supply them with perfect information, at least their ways of using imperfect information are always optimal;

(3) to study the existence of resource-allocation equilibria, but not the processes which may lead to them.

Simplification 2 is an alleviated version of the neoclassical optimization postulate, which originally assumed all agents to be fully informed optimizers. The alleviation expresses the progress achieved by two strains of relatively recent analysis. One is about search markets, where market participants must engage in costly search for price information. But all of them still perfectly optimize in choosing their search strategy and in using the information obtained. The other strain

involves several topics which have in common the recognition that not all agents are equally perfect - such as optimal job-assignment to unequally competent workers, or optimal allocation of unequally talented managers to firms of different sizes. But there are always some agents who do perfectly optimize - such as the job-assigner, or the owners of firms who observe the stock market and shop on the market for managers.

The two strains must clearly be included in any serious criticism of modern orthodoxy. Undeniably, they depict markets with more "realism" than the thirty year old Arrow-Debreu model. Surprisingly enough, however, they must be suspected of an even stronger pro-planning bias. Clearly, suitably designed planning is an even more promising alternative to search markets, where prices are costly to know and subsisting price dispersions or monopolistic prices cause important social losses, than it was to the Arrow-Debreu markets, with all prices socially optimal and costlessly available. Similarly, if some, but not all agents are perfect optimizers, a planning hierarchy with the optimizing agents at the top appears particularly difficult to surpass. Thus, if there is an important function which markets perform better than planning, modern orthodoxy is not any closer to seeing it than was the old one. A journey outside orthodoxy is thus the only chance left.[2)]

To dispel the fear which many economists seem to have of leaving the known for the unknown, let me first remark that the territory outside orthodoxy is by now far from unknown. It contains a growing number of economic theories, of which a useful map can be obtained by noting which of the above simplifications they do not make. To take a few important examples, theories of bounded rationality abandon (2); Day (1978) models the functioning of a given market without (2) and (3); Lucas (1978) admits an unequal distribution of managerial talents and examines the

corresponding static optimum in the size distribution of firms, thus implicitly abandoning (1) and (2);[3] neo-austrian economics emphasizes its distance from (3), but is less clear about (1) and (2) (although some form of bounded rationality seems to be assumed); Schumpeter (1934, 1942) is most outspoken about his refusal of (1) and (3), and somewhat less clear about (2); the evolutionary theories of market selection following Alchian (1950), Winter (1971), and Nelson and Winter (1982) make it clear that, in the context of a single product market, they refuse all three simplifications.

The present journey begins with a partly empirical and partly deductive discovery of an important scarce resource, termed economic competence (EC). Surprisingly, although EC is a resource whose social allocation proves crucial for the efficiency of allocation of all other resources, its scarcity cannot fully be comprehended within the axiomatic building of modern orthodoxy. To be consistent, this building requires that at least some EC be assumed abundant - even if this means to ignore a crucial constraint of all real economies. The first simplification which must be abandoned to expose the scarcity of EC in full is (2), which can be done in the company of bounded rationality theories. In contrast to bounded rationality, however, EC is an agent-specific scarce resource in need of efficient social allocation, which leads the journey beyond these theories. As it will be found out that EC-allocation can only be achieved by means of evolving structures, (1) and (3) will have to be abandoned as well. In doing this the Schumpeter-Alchian-Winter-Nelson kind of evolutionary economics proves most helpful. Some unknown territory will have to be entered only in the last stage, when evolutionary reasoning is extended from product markets to capital markets, and further, to allow for the necessary comparison, to their non-market alternatives.

2 Economic competence as a scarce resource

Let me define EC as a resource with the following properties:

1a) EC is an information capital which tells its owner how to understand and use other information to solve economic problems, take economic decisions, and learn more EC;

1b) hence EC is a determinant of economic behavior and an internal constraint of the kind "bounded rationality" or "limited optimization abilities"; given an agent's preferences (or objective function) and the complexity of his decision task, his EC determines how close to, or far from, a theoretically attainable optimum his decisions will actually lead him;

2a) EC is agent-specific and tacit;[4] it determines what information agents can, or can learn to, communicate to each other, but cannot be communicated itself;

2b) hence, for each agent, some EC must be given initially and more may be acquired only by internal learning, under the constraint of the initially given EC (learning abilities, or "talents");

3) EC may be distributed asymmetrically; different agents, even of the same category (e.g., individuals of the same profession, or firms within the same industry), may own different stocks of EC;

4) the stocks of EC are difficult to measure and compare with each other, even by the owners themselves; only indirect methods can be used: ex post, correlating EC with the results actually obtained, and ex ante, based on subjective guesses of observing agents; the accuracy of the guesses depends in turn on the EC employed in making them.

The evidence that such a resource must exist is both empirical and theoretical. Empirically, there are numerous examples of people using available data in suboptimal ways, thus taking suboptimal decisions. There are also examples of people with similar preferences in similar situations, who systematically take differently successful decisions. The frequent cases of overestimation or underestimation of one's own abilities also convincingly suggest that the underlying resource is indeed difficult to observe and measure even by its owners themselves.

To find such examples, we need not even turn to the still controversial bounded rationality literature, which, moreover, would not help us very much here, because of its neglect of individual differences. For this purpose, the famous defence of the profit-maximizing assumption by Friedman (1953), opposing that literature, is more helpful. It fully admits that initially, not all firms may be able to maximize profit, and justifies the profit-maximizing assumption only ex post, by referring to market selection, claimed to eliminate, in the long run, all non-maximizing firms. Other helpful references are the studies admitting unequally distributed managerial talents - such as Manne (1965) and Lucas (1978).

To recognize EC as a scarce resource can also be seen as a natural development of the economics of information pioneered by Marschak (1954) and Stigler (1961). After a long history of economic thought which considered only tangible resouces, but not information, to be scarce, they showed how important it was to count with scarcity of information as well. But this was only information that today's computer users would call "data" - e.g., about the prices, quantities, and qualities of the goods to be bought or sold. Now it is only natural to admit that other kinds of information - akin to the software and hardware without which no data could be handled - are not abundant either.

A theoretical justification of why EC must exist can be deduced from the universal principle that all information-processing systems - and therefore also all economic agents - to be able to receive, understand, and use any new information, need some pre-existing information telling them how to do so. While some of this information may consist of instructions received in the past (cf. "software"), much of it must initially reside with each such agent (cf. "hardware"), so that the first instructions can be understood, and the possibly multi-stage process of receiving and using information can be started.

It is this principle that explains why some of the information used by an agent must be specific to him and determine his abilities to use other information, thus corresponding to the above definition of EC. This also explains why such information is tacit in the sense that it cannot directly be communicated to another agent - whatever incentives and communication costs one might be willing to pay. Namely, this principle makes it clear that information can be communicated only with the help of another information which is not communicated (e.g., common languages and common points of reference), and if that information were to be communicated, the help of yet another non-communicated information would again be required (e.g., common logic and a universal grammar), etc. Although the precise borderline between the communicable and the tacit information may not be absolute, but may move according to the problem studied and the time perspective adopted, some tacit information must always exist, for any problem and in any perspective.

This principle also explains why all agents must be endowed with some EC initially - meaning of course the beginning of the period studied or the entry of the agent considered into the system studied, whichever comes last, but usually not the birth of individuals. As the roles of economic

agents are usually reserved to adults, such initially given EC is much more than inborn talents; most of it has likely been learned from education or earlier experience, although inborn talents still act as a crucial constraint on what could have possibly been learned.

Note the subtle relationship between EC and initial information endowments: not all of such endowments need be EC, nor all EC need be given initially. Of an initial endowment, EC is only the agent-specific (tacit) information which says how to use other information in solving economic problems. Neither data, which do not tell how to use other information, nor explicit instructions and routines which can be communicated to other agents, are thus counted as EC, although they may be an important part of an initial information endowment as well.

On the other hand, if the period studied is sufficiently long, it is necessary to admit that agents can increase their initially given EC by learning. However, as learning cannot do without pre-existing information either, the initially given EC must in this case include the corresponding learning competence ("talents"), determining the abilities of each agent to learn (or to learn to learn) more EC. Hence the initial information endowment of an agent, although it need not contain all the agent's actual EC, sets the upper limits which the actual EC can attain in an ideal learning environment.

An important distinction is between economic competence, determining the quality of people and organizations as economic decision-makers, and what can analogously be defined as technological competence, determining the quality of people and organizations as factors of production. For economic analysis, scarcity of the latter competence is a relatively easy topic; for instance, the entire human capital literature can be said to deal

with it. It is only scarcity of EC that is so troublesome that it cannot entirely be comprehended by usual analytical means.

Why the usual theory of human capital cannot deal with scarcity of EC is instructive to note (cf. Pelikan 1989). To recall, this theory is about investment in costly education, by which a person, postulated to be a perfect economic optimizer, is to improve her technological competence, thereby increasing her value as a factor of production. But, if the scarce competence were economic, needed for optimal investing itself, the optimization postulate would be contradicted and a paradox would result. To see this, imagine a poorly competent investor who is to optimize his investment in studies of the economics of investment. His problem is on a par with Catch 22: he cannot optimize, with all the necessary data about the costs and the future benefits of such studies available, before having invested much - and possibly too much! - in them.

If several kinds of competence are considered, it should be made clear that the competence to learn more EC ("economic talents") is also defined as EC - although it need not be entirely specialized in learning only EC, but may in part correspond to a more general "intelligence", allowing for learning other kinds of competence as well. Significant specialization seems nevertheless to take place. Much like the talents to become a top musician, a great chess master, a tennis champion, or a top mathematician do not seem to be highly correlated among themselves, the talents for organizing and managing business operations and being rational in complex economic decisions do not seem to be highly correlated with other talents either.

The problem of EC-allocation involving several economic agents - on which the rest of this paper will focus - constitutes an even more serious paradox for modern orthodoxy than the one of individual human capital. The

reason is that two properties of EC - to be a determinant of economic behavior and a scarce resource - are mutually incompatible within the orthodox framework. They imply that EC is an element of the economic calculus by which scarce resources are allocated, and at the same time one of the resources to be allocated. In other words, it is by means of EC that EC is allocated. EC is thus to play two roles which the axiomatic building of orthodox analysis needs to keep separated - to be a tool as well as an object of the social allocation process.

The resource-allocation structure which runs this process - be it a set of markets or a hierarchy of planning - can thus no longer be studied as a constant mechanism, itself elevated above the problem of scarcity. Its own parts - in particular competent economic agents and suitably designed market or hierarchical relationships between agents - must now also be recognized as scarce, in need of efficient allocation as well. Much like an organism rather than mechanism, the structure must thus also assume the task of allocating these parts, and thus keep building and rebuilding itself. Simplification 1 can thus no longer be maintained.

To see the difficulty with EC-allocation on a concrete example, recall the problem of management of firms. Old orthodoxy, including theories of optimal planning, assumes that the EC of all managers is abundant, able to find an efficient allocation of all factors of production under their control. If it is more realistically admitted - as Manne (1965) and Lucas (1978) do - that this EC may be scarce and that different managers may be of different managerial talents, orthodox analysis requires another EC to be assumed abundant. This is the EC of the owners of firms, who should be able to recognize and hire the right managers, or, alternatively, elect the right board of directors who would be able to do so. As neither this task is easy, however, and the adequate EC of owners and directors may be just

as scarce, this would raise the problem of efficient allocation of this EC. To continue in the orthodox logic, it would now be necessary to assume that this allocation is conducted by some agents of a yet higher level - "superowners" or "superplanners"? - and that their EC is abundant.

This makes it clear why orthodoxy cannot comprehend EC-allocation in its entirety. If some EC is admitted to be scarce, another EC must be assumed abundant, to provide for an orderly allocation of the scarce EC by identifiable optimizing agents - the only kind of resource-allocation which orthodoxy can study. And although there is no specific EC whose scarcity could not, in principle, be admitted, what cannot be admitted is that all EC may be scarce at the same time. But this is precisely what must be admitted, if EC is a full-fledged scarce resource, and if important constraints of real economies are not to be assumed away by wishful thinking.

I can now make my argument more precise. The rest of this paper is to show that it is precisely when no one's EC is abundant that markets perform an important function which no planning could perform as well.

3 Selection by product markets

A central point in my argument is that EC must be allocated by means of evolution of structures (S-evolution), with market selection playing an important role.[5] To introduce this point, consider the special case known from literature - the evolution by a product market selection - first studied by Alchian (1950), summarily treated by Friedman (1953), and more recently examined by Winter (1971) and Nelson and Winter (1982). For the present purposes, this case can be described as follows.

There is a resource-allocation structure consisting of a single product market ("industry") with given consumers and a variable number of

producers. The consumers need not be specified and their EC is not a binding constraint. They are simply assumed capable of judging according to their own preferences - which is likely to require more technical than economic competence - the price-quality relations for the products on this market. Together they determine the demand to be met by the producers, and pronounce their verdicts on how well, or how poorly, different producers fulfil this task.

It is the scarcity of the producers' EC which is crucial. The producers try to fulfil their task with different, more or less adequate EC - which means that they have different, more or less limited abilities to find out what the consumers may demand, and to combine available production factors (including known technologies and human capital) in the right way and at the right scale, in order to meet profitably that demand. The problem of efficient EC-allocation is here how to allocate the best relevant EC to the control over production, or at least - as a second best whose social importance cannot be overestimated! - how to keep this control away from inadequate EC. The product market is seen to solve this problem by a kind of natural selection, which allows profitable producers to expand and eliminates all non-profitable producers by forcing them, sooner or later, into bankruptcy.

While the market continues to play the traditional role of a resource-allocation mechanism, mediating transactions between the producers and the consumers, it now moreover plays the role of an evolutionary device, which makes its structure evolve by changing the number and the size distribution of the producers. It does so - and this clearly exposes the close kinship between the evolution of structures and EC-allocation - by selecting for profit-maximizing EC, which is precisely how this gets allocated to the control over production.

To expose product markets as evolutionary devices drives home one half of my argument. This shows that these markets play indeed an important role which cannot be studied under the orthodox assumptions. But it is still far from clear that planning could not play this role at least as well. On the contrary, there are good reasons to believe that the product market selection is a rather inefficient way of S-evolution and EC-allocation. It gets a good mark only for its ability to prevent inadequate EC from remaining lastingly allocated to the control over production - which makes it socially valuable as a safety valve of last resort. But as a means for finding out the best available EC and allocating it fast and cheaply to that control, it does not appear to perform very well.

A serious drawback of a product market selection follows from the fact, carefully pointed out by Alchian, that any selection can only work on the set of actually tried alternatives. This makes its results strongly depend on how many and how competent candidates will have the opportunity and actually take the initiative to enter the contest. For instance - and this is a point which Friedman seems to forget - if there are no profit-maximizers among the contestants, there will be no profit-maximizers among the winners either.

The seriousness of this drawback appears with particular clarity when we consider that some agents with high relevant EC may not initially have enough financial capital to enter the market. Since product market selection measures and compares EC only ex post, by correlating it with the actually achieved results, such EC would remain cut off from EC-allocation, to the detriment of social efficiency, for the lack of opportunity to show achievement. This indicates that there are social gains to be made if EC-allocation could benefit from measuring and comparing EC also ex ante, by

qualified guesses of agents who could supply the missing capital - such as private capital owners, or managers of social investment funds.

Social efficiency may need such agents also for other reasons. As EC is correlated with actual results only probabilistically, producers with high EC may occasionally get into difficulties because of bad luck. If product market selection were the only EC-allocation device, they would then be mercilessly eliminated, causing society to lose valuable future winners. Symmetrically, producers with inadequate EC may be helped by good luck, which would only make their inevitable exit even slower and socially costlier. Agents controlling financial capital could again provide important help by supporting the future winners and accelerating the exit of future losers - provided, of course, that they can make reasonably accurate ex ante guesses about the EC of the producers involved.

There is yet another way in which social efficiency may be promoted by intervention in a product market selection. A firm which begins to decline because of its no longer adequate EC may have other valuable assets, for which it may be worth rescuing by a supply of superior EC. But this can be achieved only by allowing agents with such superior EC to come in, which again requires that the product market be supplemented by yet another EC-allocation device. Clearly, this cannot be quite the same device as the one for allocation of financial capital, because of the above-mentioned possibility that the owners of superior EC may not a priori be endowed with much of financial capital, nor vice versa.

4 Some hierarchies can do better, but which ones?

All the promising supplements to product markets selection converge from a new vantage-point towards the old idea - known from Coase (1937), Alchian and Demsetz (1972), and Williamson (1975, 1985) - that hierarchical control

arrangements may, under certain suitable conditions, outperform the alternative market arrangements. The crucial question is, of course, what are the suitable conditions. If they obtained too easily, the orthodox conclusion that planning can do at least as well as markets would be supported, rather than refuted. All production could then be organized in one large firm under a unique group of government or private capital owners. Careful attention must therefore be paid to what these conditions are and when they obtain.

At first, it was technologically given production costs and returns to scale that were believed to be the most important determinants of the efficient size of firms. With the more recent attention to transaction costs and multidivisional firms (M-firms), however, technological factors have lost much of their importance, seen to determine at most the efficient size of a production line or a plant. It has become clear that an efficient M-firm can grow much larger, possibly containing many plants in the same market, and many divisions in different markets, provided it can minimize the combination of production and transaction costs by a suitably designed internal governance structure. As Williamson (1975) suggests, the main function of the headquarters in a successful M-firm is the allocation of capital, rather than the management of current production - which, to recall, is also one of the functions by which product market selection needs to be supplemented.

What neither production nor transaction costs can explain is why some firms succeed where other fail. The same cost conditions can obviously be exploited in different ways and with different success, which indicates that yet other factors determining the optimal size of firms must be at work. According to the present argument about the scarcity of EC - and also in agreement with the arguments by Manne (1965) and Lucas (1978) about the

importance of managerial talents - one of these factors is the EC of each firm, determining how ingeniously, or clumsily, the prevailing costs conditions will actually be exploited.

As I explain in more detail elsewhere (Pelikan 1989), the EC of a firm depends on the EC of its individual members and on the organizational arrangement which determines their respective roles and mutual relations. Although the actual form of the arrangement is the result of a self-organizing process with contributions from all members, some members will usually contribute more than others. In a first approximation - which also agrees with Manne's and Lucas's assumptions - the EC of a firm mostly depends on the EC of its manager (chief of executive). It is usually he or she who appoints the most important collaborators and determines their key tasks, together with the main organizational, informational, and incentive principles within the firm. He or she is thus at least indirectly responsible for how the rest of the firm's self-organization will unfold, and what EC the firm as a whole will consequently acquire.

Now there are good reasons to believe - and this is also what Lucas in fact assumes - that the difficulty of the management task increases with the size of the firm. Hence the larger the firm, the higher EC its manager must have to make and keep it efficient. As high EC is scarce - and the higher, the scarcer - the implication is that even very large planning hierarchies can be efficient and succcessfully replace complex market arrangements, but such hierarchies are the scarcer, the larger they are.

How large efficient hierarchies can exist in an economy thus depends on two things: the EC ("managerial talents") available within the society, and the efficiency of EC-allocation. For instance, if the society contains some managerial geniuses, and if the prevailing way of EC-allocation can recognize them and actually select them for management of hierarchies,

these may be both large and efficient. In the extreme, the entire production of an economy might conceivably be concentrated within a single efficient M-firm (highly decentralized system of planning), if it were possible to find for it a manager-planner with correspondingly high EC.

On the other hand, however, if EC-allocation were inefficient, selecting managers according to criteria without strong correlation to the relevant EC - such as a lottery or, sometimes even worse, political merits - hierarchies could not be expected to be both large and efficient. For any given hierarchy, the larger it would be, the less probable its efficiency would become.

This throws some new light on the market vs. large-scale planning issue (cf. also the so-called Great Socialist Controversy), in which orthodox analysis is here suspected of a pro-planning bias. To recall, two main answers have opposed each other so far. One asserts, quoting numerous informational and motivational obstacles from the neo-austrian and public choice literatures, that no large-scale planning can ever be as efficient as markets. But this answer runs into both theoretical and empirical objections.

The main theoretical objections are put forward by the second answer. It formally proves, under the orthodox assumptions, that both the informational and motivational obstacles can be overcome, or at least need not afflict planning more than markets. How to overcome the informational obstacles was first outlined by Taylor (1929) and Lange (1936-7), and under the name "informationally decentralized planning" rigorously elaborated by Arrow, Hurwicz, Malinvaud, Kornai, Heal, and others (see Heal 1972 for a survey). How to overcome the motivational obstacles was first shown, in a slightly differet context, by the incentive-compatible scheme due to Groves (1973), later adapted to the problem of socialist planning by Loeb and

Magat (1978). Orthododox analysis thus made it possible to prove that large-scale planning can be as efficient as markets, and under less restrictive conditions on the top of everything else.

Intuitively, of course, this answer has been subject to many doubts, even by some of its authors. Lange and Kornai, who differ from the other authors by their intimate experience with real planning, later joined its most vigorous critics. Yet most of these doubts and criticism concerned the orthodox simplifications, particularly doubtful in the context of planning, rather than the idea that some more pragmatic form of large-scale planning might nevertheless be efficient. This idea appears in fact supported - and this is what constitutes the main empirical objection to the first answer - by the fact that efficient large-scale planning does exist in large capitalist firms, some even larger and not much less diversified than some small socialist economies. Whether orthodox analysis is right or wrong, these firms are simply the living proofs that all the informational and motivational obstacles quoted by the first answer can reasonably be overcome in practice, allowing even a very large and complex economic organization to be centrally planned and managed in an efficient manner.

When the S-evolution-cum-EC-allocation process is taken into consideration, an interesting third answer emerges (cf. Pelikan 1989). This answer fully acknowledges the existence of efficient large-scale planning as an empirical fact, and yet shows that there is an important social role in which markets cannot successfully be replaced by planning. Its main line is that efficient large-scale planning is possible, but a priori extremely unlikely - much like complex living organisms are also both possible and a priori unlikely.

More precisely, what makes such planning so unlikely is that the EC required to make it and keep it efficient is extremely scarce, difficult to find and actually allocate for this purpose. The insufficiency of the second, orthodox answer thus immediately appears. Instead of recognizing the scarcity of this EC and the difficulty of its allocation, this answer heroically assumes that this EC is abundant, or at least already efficiently allocated: according to the orthodox optimization assumption, all firms and planning agencies are assumed abundantly competent to optimize in all the tasks, however sophisticated, which an optimal planning arrangement may assign to them. This means, among other things, that all firms are assumed to be of the right sizes, efficiently organized, and competently managed. The allocation problem thus includes all other resources, but not EC. In contrast, the present argument points out, corroborated by ample empirical evidence from the USSR and Eastern Europe, that a crucial obstacle to the success of any socialist economic reformit is precisely the scarcity of efficiently organized and competently managed firms.[6]

Why no a priori established large-scale planning can efficiently handle EC-allocation stems from the fact that no one's EC can be assumed abundant. If large-scale planning is needed for social efficiency - e.g., to cope with external economies and take advantage of increasing returns - the allocation problem can no longer begin by assuming an ideal planner, but it must include the fundamental question of who is to plan, and, more generally, how to find out and allocate adequate EC for this purpose. Any initially given planning is likely to misallocate EC in the design of its tasks as well as in their assignment to specific individuals. The economy may contain more talented managers and/or planners than some of the initially appointed ones. Some firms may be wrongly dimensioned and/or wrongly organized. Social efficiency then requires an allocation process by which the more

talented individuals can replace the less talented ones, and the errors in the sizes and structures of firms can be corrected. And if one were tempted to think of some "superplanners" to plan this process, their EC would also have to be put in question, and the design as well as the assignment of their tasks again included in the allocation problem.

The third answer can now be stated as follows. Efficienct large-scale planning can exist, but only if it is provided with adequate EC. As this EC is scarce - the larger the scale of planning, the scarcer the EC becomes - and, as it is by definition tacit and difficult to measure, scarce EC is also needed to measure and allocate this EC. As neither can be assumed a priori efficiently allocated, efficient large-scale planning can exist, but cannot be initially given, nor established outside the allocation process in which it is to participate.

This leaves open the question of how efficient planning hierarchies can be established and kept efficient.

5 The irreplaceable markets for capital, management, and control

The main line of the answer should now be clear. Efficient planning hierarchies, which can successfully replace markets in the allocation of scarce resources (with the exception of EC), can appear only as the outcomes of endogenous S-evolution-cum-EC-allocation processes. By considering these processes in more detail I now wish to find out what role markets play in them, and whether or not planning can sucessfully replace markets also in this role.

At first sight, this might seem again possible. Many large efficient firms and conglomerates are also efficient in planning their further expansion, contraction, or reorganization, thus solving many of the the S-evolution-cum-EC-allocation problems faster and cheaper then what the

apparently clumsy ex post selection by product markets could achieve. The crucial question is, however, how do such efficient firms originate, and how is it guaranteed that they will remain efficient also in the future.

The basic fact is here the generalized scarcity of EC, including the scarcity of EC to see correctly this scarcity, which excludes all orderly beginnings and many orderly continuations. Instead - as I argue in more detail elsewhere (Pelikan 1985, 1987, 1988) - the S-evolution-cum-EC-allocation cannot avoid trials and errors.[7] Social efficiency requires that trials be not too restricted, in order not to waste some high but yet untested EC by denying it the opportunity to show achievement. Then, because of the lack of EC for reliable ex ante selection, many trials with inadequate EC will have to be admitted as well, making a high proportion of errors inevitable. This has two important implications.

First, whatever large-scale planning social efficiency might require, such planning, if feasible at all, can emerge only gradually, as a result of some exceptionally successful trials, at a later stage of S-evolution. It cannot be assumed to exist from the beginning, nor trusted to the end. No planning is above suspicion of itself being, or becoming, a costly S-error which should be dissolved into a set of markets, or replaced by a different planning, conducted by different persons. Inefficient planning which is allowed to survive and plan its further expansion is a particularly harmful case of a cumulative, path-dependent evolutionary process, which may cause the entire structure of production to evolve towards increasing inefficiency.

Second, as S-errors are inevitable, social efficiency will strongly depend on the speed, the costs, and the reliability with which they will be discovered and corrected. This means, for large-scale planning hierarchies, that if trials are made to run them with inadequate EC - and such trials

must always be expected - social efficieny requires relatively fast, cheap, and reliable means to make their EC adequate to their scale, by allocation of higher EC, or contraction to a smaller scale, or both.

I can now drive home the second half of my argument by showing that one role in which markets cannot successfully be replaced by planning is precisely in the correcting of S-errors. Let me first make clear that efficient S-error-correcting calls for complex solutions, in which several parallel ways must cooperate, to achieve a good mixture of high speed, low costs, and high reliability. We have already seen that selection by product markets is reliable, but slow and costly, whereas selection within hierarchies may be fast and cheap, but not reliable. The central problem of efficient error-correcting is, therefore, how to obtain the best of the two ways.

The main points of the solution can be outlined as follows. As product markets selection, because of its ex post nature, can hardly be made faster and cheaper, it is in making hierarchical selection more reliable that most social gains can be expected. But this can be achieved only by making sure that such hierarchical selection will not be conducted with inadequate EC. The problem then is - if no one's EC is above suspicion - that this cannot be guaranteed without turning back to markets and letting market selection have the last word.

If product markets were the only markets to turn to, however, this would hardly help. Their slowness would make it possible for inadequate EC to control hierarchical selection for long periods, during which important social losses in terms of misallocated EC and wasted (other) resources may keep accumulating - e.g., as it might happen within large but no longer competent firms which product markets alone might take long time to eliminate. But there are also other markets to turn to - in particular the

ones for capital, management, and control - which is precisely what allows for superior solutions.

To show the invaluable contribution of these markets to S-error-correcting, let me draw the following picture of a modern corporation. Recall that its eventual approval or disapproval by product markets strongly depends on its EC, which in turn strongly depends on the EC of its management. Consider further that the management is directly or indirectly selected by its owners. Whether they directly appoint the management, or elect a Board of Directors which does so, or show their confidence in the management only by buying or selling stocks, it is the owners who bear the ultimate responsibility for the management. This implies that the management's EC, and therefore also the overall EC of the corporation, significantly depends on the EC of its owners - at least in the sense that competent owners would not tolerate incompetent management, even though incompetent owners may occasionally have good luck and select competent managers by chance. Consider also that the survival of the corporation depends not only on its success on product markets, but also on the willingness of investors to provide it with capital.

This picture makes it possible to note several additional channels by which combinations of hierarchical selection and selection by markets for capital, management, and control can improve upon the ex post selection by product markets among monolithic firms with once for all given management (cf. section 3). Note first that even such firms can learn more EC by internal adaptation and reorganization, but the extent of such learning is constrained by their given learning abilities (cf. section 2), and in particular by the learning abilities of their given management. Now the EC of a firm can be increased beyond that constraint thanks to two additional channels. First, its management can be changed by hiring or promoting

managers with higher EC. The new constraint then is the EC of the owners, on which the possibilities to recognize and select such managers depend. Second, the EC of a firm can be increased even beyond this constraint, if the incumbent owners can be replaced by new owners with higher relevant EC.

Both of these channels point to the great importance of efficient allocation of EC to ownership of firms - a problem which orthodox analysis does not properly notice. The success of the first channel depends on how efficient this allocation actually is, whereas the second channel raises the fundamental question of how this allocation can be conducted and made efficient. The difficulty with this allocation is, as noted in section 2, that its orthodox analysis leads, if no one's EC can be assumed abundant, to infinite regress. It is for this allocation that market selection proves necessary for social efficiency, whereas planning leads to inferior outcomes.

The key role in this selection is not played by product markets - although they do remain important as the most reliable way of S-error-correcting of last resort - but by the market for corporate control. The feat of this market is to avoid infinite regress by interconnecting two crucial kinds of EC-allocation into a single feed-back loop. More concretely, this market provides for a <u>double selection of both managers and owners</u>: it is the owners who more or less directly select the managers, and it is the performance of the selected managers by which the owners stand or fall.

The markets for managers and financial capital then appeaar as important complements of the market for corporate control in the following sense. The market for managers is clearly needed as the place where the owners can select and hire their managers. The functions of the markets

for financial capital - the stock market and the credit market - are more subtle. First of all, an essential function of the stock market is precisely to be the market for corporate control, by providing for trading in voting stocks, and thus allowing for mergers and acquisitions. Moreover, both these markets have two additional functions to fulfil: (1) to produce early signals, in the form of stock prices and credit ratings, about the performance of firms and their managers; and (2) to select for higher relevant EC among the owners of financial capital. The purpose of the second function is to improve the quality of the signals produced as well as the reliability of the ex ante intervention by which these owners try to accelerate and cheapen the otherwise slow and costly product markets selection. Clearly, both the quality of the signals and the reliability of the intervention strongly depends on the EC of these owners.

The efficiency of S-evolution-cum-EC-allocation is thus shown to require participation of several layers of market selection. The third answer to the issue of large-scale planning can now be elaborated by saying that planning can efficently replace markets in the allocation of other resources than EC, but it needs markets for acquiring and maintaining the EC on which its efficency essentially depends.

It is thus mostly within sucessful capitalist firms that efficient large-scale planning can be expected to appear. Whereas the usual static view of advanced capitalist economies takes such firms for granted, the present view exposes them as very rare successes of a complex evolutionary process, where they constitute only a tiny visible minority among all the unsuccessful and no longer visible trials.

On this point, not even the evolutionary view of Schumpeter (1942) is right. Contrary to what he believed, such successful firms can be neither copied nor transplanted outside the framework of capitalist markets,

without losing much of their abilities to become and remain efficient. Without many independent trials, for which only pluralistic ownership of capital can allow, such scarce planning would unlikely be found. And without the selective pressure of capitalist markets - including the ones for capital, management, and control - even an initially efficient planning would likely grow inefficient. It is, then, the much lower variety of trials and the absence of market selection that constitute the main reason why efficient large-scale planning is so unlikely to be found in politico-administratively formed government agencies - in spite of its empirically documented success in market-evolved, possibly even larger capitalist firms.

There is, of course, no guarantee that socially efficient outcomes will always obtain even with all the markets for capital, management, and control at work. Let me therefore emphasize that my argument is only that these markets are necessary for social efficiency - in the sense that their replacement by non-market arrangements would lead to inferior outcomes - but not that they are sufficient.

To learn more about social efficiency in the present evolutionary perspective, it would be necessary to address several difficult questions. First of all, it would be necessary to revisit the very definition of social efficiency, making it more tolerant to waste. The reason is that in contrast to pre-programmed automata, no evolution can work without errors, and therefore waste. Much waste - but the important question is, of course, how much? - must be considered the necessary price to pay for the increasing competence of evolving structures, if no pre-existing perfect competence can be assumed to create them.

Much attention would also have to go to details of the institutional rules by which these markets are shaped - such as the rules constraining the use of insider information, or requiring periods of signalling before

acquiring. Such details may be of great importance for how well, or how poorly, markets will perform in the S-evolution-cum-EC-allocation processes, and thus also for how competent, or incompetent structures will evolve to conduct the social allocation of all other scarce resources.

While these are the main questions which I am currently trying to understand, to say more about them here would be to go beyond the permissible scope of a paper for this Conference.

Notes

1. That standard analysis does not provide strong support for markets and is favorable to planning is also noted by Nelson (1981).

2. Let me emphasize that I criticize orthodoxy only for failing to comprehend one scarcity problem and the function of markets in solving this problem. Although I consider this failure crucial, because of its seriously misleading policy implications, I fully recognize the usefulness of orthodox analysis in many other problems. The purpose of the suggested journey is to extend, and not to reject, orthodox economics.

3. As Lucas does not study how firms are formed and managers appointed, he need not consider any other economic agents besides the more or less talented managers. In particular, he does not assume any perfectly optimizing agent to participate, which is what makes his paper, according to the present definition, unorthodox.

4. To denote information (knowledge) which cannot be communicated as "tacit" was first done by Polanyi (1962), and after him by Nelson and Winter (1982) and Williamson (1985). Note, however, that all of them have mostly in mind the tacitness of technological know-how, whereas the present focus is on what may be called "economic know-how".

5. As I argue in detail elsewhere (cf. Pelikan 1985, 1987, 1988, 1989), evolutionary economics should distinguish between the evolution of structures - such as different mixtures of markets and hierarchies - and the evolution of institutional rules (R-evolution) which channel the evolution of structures - such as the forms of property rights. The reason is similar to why in biology the development of bodies ("ontogeny") is distinguished from the evolution of genes which govern the development of bodies ("phylogeny"). The present paper, as well as the entire Schumpeter-Alchian-Nelson-Winter evolutionary economics, is limited to S-evolution.

6. That all proofs of the existence of efficient socialist planning require perfectly optimizing producers deserves emphasis. This suggests that, ironically enough, Friedman (1953) subverts his favorite cause of capitalist market economy by defending the optimization postulate as a generally valid methodological principle, rather than an approximation of a particular result of market selection. What may well be the greatest specific advatage of capitalist markets and the greatest obstacle to socialist planning is thus obscured. For empirical observations of how scarce and unequally distributed EC may be, and how inefficient its allocation may become when market selection is put out of work, Czechoslovakia as a socialist country with old industrial traditions appears ideal. Although a systematic inquiry is methodologically difficult and politically unfeasible, there is a wide-spread conviction that to allow economic incompetence to prosper even at the level of the most important organizational, managerial, and investment decisions was by far the greatest economic disaster caused by socialisation.

7. To express a similar idea, Eliasson (1987) coins the term "experimentally organized economy".

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