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The Theory of the Firm and the Theory of Economic Growth: An essay on the economics of institutions, competition and the capacity of the political system to cope with unexpected change

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**THE THEORY OF THE FIRM AND THE  
THEORY OF ECONOMIC GROWTH – an  
essay on the economics of institutions,  
competition and the capacity of the political  
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by

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**THE THEORY OF THE FIRM  
AND THE THEORY OF ECONOMIC GROWTH**  
- an essay on the economics of institutions, competition and the capacity  
of the political system to cope with unexpected change

by Gunnar Eliasson<sup>1</sup>

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<sup>1</sup> This paper summarizes the results of a number of recent studies of mine, notably Eliasson (1987, 1988a, 1989a, 1990a, b, c, 1991a, c).

## 1. Introduction and Summary

The nature of the firm, as we understand the firm, is totally conditioned by the market environment in which the firm is operating. This is true for the real firm as well as for the theoretical firm. In attempting to link the behavior of the firm to the growth process of a national economy it thus becomes important to present a theoretical firm that is as close as possible to a real firm of a capitalistically organized market economy. As we will see, this will force us to discuss also economic growth in terms of a realistic model representation of the dynamics of firm behavior in markets, in fact making aggregation endogenous and explicit.

What I have just said may sound trivial to some. But anyone familiar with the logic of mainstream neoclassical theory will understand that we are touching on a deep intellectual problem. Standard neoclassical theory has no place for the entity called a firm. The problem lies in its focus on static equilibrium modeling, and its failure to redefine the equilibrium such that the dynamics of a profoundly imperfect competition process can be captured. Some notion of equilibrium, or self coordination is of course necessary in a relevant theory of a dynamic economy. But the same theory also has to allow play room for its most important actors, the business firms. I will attempt here to move theory in this direction, and perhaps not surprisingly the result will be fundamentally different from the classical model.

The existence of a firm, based on its *competence* to generate organizational synergies needed to earn a rent above production and financing costs is central to this theoretical economy. To explain *how* this firm captures its rent both a theory of the firm and a theory of the market environment in which the firm is supposed to operate are required. The deep problem in economics is that the characteristics of the market needed to explain firm behavior is dependent of the dynamics of all business agents. Mainstream economic theory offers very little in the form of a useful theory of dynamic markets to accommodate the dynamics of firm behavior. Micro-Macro theory is needed, embodying an explicit representation of competition as a dynamic

process. This process does not necessarily converge to an equilibrium determined outside the economic system. The direction of change of the macro economy depends on the path micro structures takes along the way, and on how competing agents react to and change it. This is the theory of the market.

The *intensity of competition* depends on the spread in the capacities of business organizations to generate synergies, or scale economies, or rents, or productivity. A ranking of such capacities, sometimes called Salter (1960) curves (see Figure 1), is made up, not only of existing firms, but also of what every firm expects existing firms to be capable of doing, like the consequences for market competition of investment, of exit and of not yet existing firms, that may come into existence (entry). The combined "carrots and whips" of markets make up the incentives and the dynamics of the macro economy.

This paper will be about how the performance of the macroeconomy depends on how firms build and exploit their organizational competence. This is not an analytical piece, but a story about ongoing selfcoordinated economic activities, moved by live agents. My story will be about micro firm behavior, but with particular attention being paid to how firms stay in business in a competitive landscape that they themselves create and change. My notion (1987, 1990b, c, 1991c) of the *experimentally organized economy* (EOE) will be fundamental for my explanation of how firms create and maintain the competence they need to do that. It determines the nature of firm behavior as "experimental learning machines" that operate in the imperfect intersection of the product, labor and financial markets, making up a *path dependent* economic system. In order to understand firm behavior guided by competence in dynamic markets I need this "picture" of the dynamic market organization of an economy, as an alternative to the classical economic model. And it can be obtained by a few seemingly innocent modifications of the standard economic model. The constant competitive struggle of agents to beat each other, induced by the incentives of the economic system and enforced by competition, moves the macroeconomy. The means of the firm to stay competitive is their efficiency in upgrading their competence through organizational learning (Eliasson 1990a, 1992a). The theory of the firm, to be

relevant for my analysis, has to incorporate such organizational learning. This paper is about how this competence is learned and put to use in competition and what firm dynamics means for macro economic performance. This means that the firm organization of human embodied knowledge in the hierarchies of the firm, becomes one theoretical focus of this essay on macroeconomic growth. The second focus is the nature of competition among such competence organizations in markets and the possible diffusion of competence through the dissolution and recombination of such competent teams in the financial and labor markets.

The logic of the paper is as follows. I first introduce the experimental nature of economic activity among the advanced industrial economies that make up the environment of modern firms (Section 2). Technical change becomes synonymous with change in information technology, which is again synonymous with structural change in the organizational memory that controls the information processing activity of markets and hierarchies. We will find that the changing mix between markets and hierarchies, between large and small firms etc. will prove to be important determinants of technical change at the macro level. The foundations of this experimentally organized economy (EOE) are established in Section 3. Section 4 identifies the *nature of the firm* in the EOE. In Section 5 I make the accumulation of firm-based knowledge (*organizational learning*) the source of business competence and the driving force behind macroeconomic growth (the aggregation problem). The nature of learning in the EOE is explored. Learning in the EOE is always imperfect and fraught with mistakes. *Business failure* becomes a natural element in a viable economic growth process, in fact it becomes *a standard cost of economic growth*, and success will turn up in the most unexpected places. In Section 6 I put all the pieces together, addressing the problem of radical *economic reorganization* of an economy and the ability of firms to learn and the economy to self coordinate under such circumstances. There are, in fact quite a few cases of such fundamental reorganization forced by rent generating technological change, the most well researched case being the industrial revolution and a very imminent example being the current restructuring of the Eastern European economies.

Human competence dominates economic performance at all levels. Its hallmark is heterogeneity to the extent that – in each agent – certain dimensions of it are unique and not (directly) imitable or communicable. Each of us walks through life with strong opinions of what is the best, whether it be our views about how to run a firm, which economic theory to use, or on how to organize family life.

We all need a theory to be able to make decisions and to feel reasonably comfortable (Eliasson 1992a), and whether good or bad we have to believe in the theory we have chosen to use. We need a theory to restrict our vision to make it possible to organize the facts we think we know and our thoughts, to get a coherent picture of the whole, without getting lost in the complexities of our entire economic environment. Theory is just another name for the "bounded rationality" of Simon (1955) and others. There are many possible "theories" to guide firm behavior, which means that although some of them will be right, most of them will be more or less wrong. This is the essence of what I call the *experimentally organized economy* (Eliasson 1987, 1991c).

## **2. The Experimental Nature of Economic Activity**

Adam Smith (1776) laid down the principal design of a decentralized market economy in which division of labor made economies of scale "in the small" possible and the realization of large macro productivity effects feasible. This benefit, however, came at a significant cost, a fact that "modern" mathematical representations of the invisible hand have missed. The organization of the division of labor is an instance of innovative behavior. It evolved gradually in the market. Once realized, economic activity had to be *coordinated* physically (transports) and through communication.

Once an innovative design, whether being technical, organizational, or commercial has been accomplished, competitors will be "on your door lock" to learn (imitate). If your organization is large enough you will want to diffuse the new knowledge throughout your organization. You may also want to sell

your knowledge at a profit ("consulting"). *Learning*, hence, becomes a general and resource – using economic activity.

Even very simple and tiny tasks (you soon learn) can normally be solved in a large number of ways. The higher up, the more complex the decision problem and the larger the number of possible solutions. Some of these solutions are better than others. The problem, however, is that *you will never know until you have tried them. This is the essence of the experimentally organized economy.* The number of solutions defines the large *business opportunity set* that faces each agent, who has to search his way, into the opportunity set by trial and error, being directed by a limited vision ("theory") of all possibilities ("bounded rationality"). Since each agent has his or her particular vision as guidance, there will be strong limitations on communication because of limited and differently composed *receiver competence* (Eliasson 1990a p. 17, 1990b). The result will be, at each point in time, a heterogeneous structure of competence, defined by the organization of people in the economy.

Much of the knowledge put to use in a firm, especially high level knowledge, vested in the top competent team of a firm is difficult, or impossible to communicate on coded form, as information. It is *tacit*. Tacit knowledge is acquired through on-the-job learning and filters through the economy (selection) through the acquisition of the whole of, or parts of firms in the M&A market or through the mobility of people or teams of people with competence in the labor market (Eliasson 1991e).

I have now introduced four general, knowledge-based information activities; coordination, innovation, learning and selection (see Table 1, and Eliasson 1990a). Together they can be defined to cover all economic activity<sup>2</sup> representing the intellectual superstructure (the memory) of economic activity that controls all other activities.

A reasonable modification of the traditional economic measurement system is sufficient to demonstrate the economic importance of knowledge

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<sup>2</sup> See Eliasson (1990a, p. 57) on automation of factory production.



based information activities. We can establish that most of what we call technical change, as observed through macro production function analysis really is composed of changes in the technology of economic information processing, which in turn originates in *innovative organizational change*, including innovative change in the organization of learning to accumulate new competence (Eliasson 1992a). This observation demands a very broadly based definition of innovation. Innovation is not restricted to hardware equipment in factories. Innovation occurs throughout business organizations. It is particularly important at the level of the top competent team in the form of *innovative organizational change* exercising strong leverage effects on the entire firm (Eliasson 1990c). Innovative organizational change is also associated with the organization of the entire economic system, and its capacity to efficiently coordinate economic activities. Particularly important is the balancing of the reliance on coordination through free markets on the one hand and through the central regulation by Government. Another equally important problem refers to the trade offs between the short and the long run.

On this score we can learn three important things from research carried out by Bo Carlsson. *First*, in an early IUI study Carlsson (et al. 1979, p. 34, 1980) demonstrated that when stripped down to the level of a division, or an establishment more than 50 percent of total factor productivity change at the manufacturing industry level originated in structural adjustment between existing establishments, most of it being due to the exit of low performing units, and the transfer of resources to high performance units. *Second*, Carlsson (1989a) reports that technological change in manufacturing is generally making smaller scale production more economically viable than earlier, this being reflected in a general reduction in the average size of both plants and firms among the industrialized countries. This observation is strengthened by the relatively faster advance of private service production observed above. Carlsson notes that Sweden was the only important exception to this development during the 80s, but that also this deviant trend among Swedish manufacturing firms appears to have slowed towards the end of the 80s (Carlsson 1992). Smaller scale, service-oriented and competence-intensive production will increase the importance for macro performance of structural

adjustment at the plant and establishment levels. It is also interesting in this context, to recall Pratten's (1976) results from an analysis of comparable Swedish and U.K. manufacturing firms. While the U.K. firms were generally larger (by a financial definition) than their Swedish counterparts, the Swedish production plants were generally much larger and much more productive than the corresponding U.K. units. The predominant concern with process cost efficiency in Swedish firms was also obvious from a comparison between Swedish and U.S. budgeting practices in the early 70s (Eliasson 1976, p. 227). Apparently the Swedes have continued to enjoy increasing such economies of scale through the 80s, in contrast to a contrary development in the rest of the world. This time, however, the base for such economies has been broadened to include also financial (group) size, meaning that R&D, product development and global marketing has come into play in a relatively more important way (Eliasson 1985b).

*Third*, Carlsson (1991) observes that in a 20-year perspective total factor productivity growth is almost all a matter of reallocation of resources within and between existing plants. This tallies nicely with my own results on entry and exit (1991a). Beyond the 20 year horizon the introduction of new technology through entry and through new investment begins to exhibit sizable macroeconomic effects. I will return to this conclusion below.

The deviant pattern of development in Swedish industry structure during the 80s raises a number of interesting and worrying questions. A particular instance of high level organizational knowledge is the competence to build, to efficiently operate and to reorganize large business firms on which many advanced economies, that cannot fall back on generous raw material sources, base their economic wealth. The Swedish economy currently very much bases its economic prosperity on a small number of giant international firms (see Table 2) that in turn base their performance on the organization of metal manufacturing around a collection of machine tools originally developed during the industrial revolution. The critical question for the future has a competence and a policy side. The competence question is to what extent mature industrial countries like Sweden, to stay ahead, can continue to base their economic wealth on this manufacturing technology as the rest of the

advancing industrialized world learns to do the same thing, and maybe better while the frontier industrial nations or regions rapidly move into a new type of smaller scale, competence intensive production, to a large extent based in the private service sector. Another, equally pertinent question (the policy question) is whether a particular high wage nation, like Sweden, will be able to enjoy the presence in Sweden, of the highly mobile, international firms operating in global markets. There is a critical competence problem at the top national level. How much of promised economic growth is the political system capable of delivering? We can observe that while policy makers all over the world are concerned with promoting ("industrial policy") new techniques in industries based on old technologies ("robots", "factory automation"), new technologies are learned and introduced through competition with the best actors in markets.

### **3. An Open Economic System Bounded by Local Competence**

Having come this far we can conclude that the engine of the macro-economic growth machinery has to be looked for in the individual, rent seeking behavior of firms that are more or less competent in organizing themselves to exploit the vast number of commercial and technological opportunities of the global business opportunity set. The question is how such dynamic competition occurs in the experimentally organized economy and to what extent particular industry structures mean better preparedness than others for the future.

Karl Marx, observing the impressive economic performance of the industrial revolution did what economists have always done; he extrapolated what he saw and, hence, saw no end to the production potential of the "modern" industrial (factory) organization of work. The problem was that his mind, like the minds of economists in general, was shaped in terms of the firm as a factory, producing increasing tonnage of a homogeneous product ("steel"). Marx, then, of course had to explain why production was not unlimited, and, hence, borrowed an old idea from Adam Smith, again restated by Stigler in 1951, about the market as the limiting factor. What Marx and Stigler missed

was the *quality dimension* of output. Quality removed the market restriction to economic growth. There may be a limit to how much "quantity" ("steel") you can consume, but not to how much quality you *can* consume (French village wine vs. Chateau Margaux), only a *competence limit* to how much you can enjoy the quality. This revised notion of output changes the unlimited productivity potential of Marx into an for all practical purposes *unlimited set of business opportunities*, where unlimited quality differentiation constitutes the important expansionary element.

The Smithian market limit is now replaced (Eliasson 1988a, 1990b) by a *local, competence limit on the supply side*, namely the local competence of the firm

- to create new qualities, including new technology (*innovation*) and
- to receive and implement new technology (*learning*).

Also this competence is characterized by extreme heterogeneity, making its quality dimension virtually incommunicable on coded form, i.e., as *marketable information* (type "instruction books").<sup>3</sup> This introduction of competence, rather than the market, as the limiting factor, is more compatible with facts. It allows me to keep an open economic system very much as the pre-marginalist economists did (see Loasby 1991), but still bounding the economy by local competence and known technology.<sup>4</sup>

Having come this far we can summarize the fundamental assumptions of the experimentally organized economy as follows (Eliasson 1991c):

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<sup>3</sup> Please, note that this is the only type of knowledge recognized by classical theory, including so-called "efficient market theory".

<sup>4</sup> This is also the design of the Swedish Micro-to-Macro model on which much of my reasoning is based (Eliasson 1991c). The reader should note that with the marginalists since the late 19th century the business opportunity set has been defined such that local agents operate on its frontiers (fully informed agents). This takes all dynamics out of the economy, except the exogenous shifting of the opportunity set, or the production frontier.

- I *State space*, or the (international) opportunity set, is for all practical purposes unlimited.<sup>5</sup>
- II *Behavior* of agents is characterized by
  - bounded rationality
  - tacit knowledge

add to this (remember my introduction).

- III *Free access* to State space or the set of business opportunities (Free competitive entry),

and the model of the experimentally organized economy emerges. The free entry clause is imperative. It allows anyone who feels competitive to enter the market and take on incumbents. This *deregulation* of markets, was exactly what happened in Europe just about the time the industrial revolution started, which it did only in those economies where the lid was taken off (Eliasson 1991a). This deregulation is currently being enacted in the previously planned economies of Eastern Europe. It is currently also being reluctantly enacted in some financially more or less defunct welfare economies of Western Europe in an attempt to create new incentives for economic growth. The problems are the same in principle, but different in scope.

In the experimentally organized economy a large number of *locally competent* firms search into (or compete their way into) a vast space of opportunities. The individual outcome of such *technological competition* depends on their initial competence endowment and *how* they search.

The competitive situation is such that the firms are always more or less mistaken, *business mistakes* being the important cost to society to make room for business successes ("creative destruction"), needed to achieve economic growth. In addition, mistakes are part of the on-the-job (economic) learning

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<sup>5</sup> For a discussion, see Eliasson, (1987, 1988a, 1990b, 1991c).

process of firms, and of society contributing to the updating of the *organizational memory* of firms and the economy at large. In this competitive market environment no firm, no (small) economy, not even IBM is safe.

The experimentally organized economy is born out by statistics. Jagrén (1988) demonstrates how even the largest firms, when observed over a sufficiently long time, disappear from the "Fortune list", and even altogether as independent firms. He selected a random sample of some 150 Swedish firms from a register in the 20s and followed them into the 80s. By the mid 80s only 21 independent firms remained and most of them (19) had not grown very much in terms of employment during the period. Despite this, total employment of the remaining firms each year had grown faster than aggregate manufacturing employment (and output). The reason – of course – is that two firms, that Jagrén had selected by chance - Electrolux and Bofors - had grown extremely fast. We would, however, on the basis of the theory of the experimentally organized economy (EOE), expect total employment or output of a randomly selected sample of some 100 to 500 firms some 50 to 100 years ago to grow somewhat more slowly than the corresponding total of all manufacturing, the difference being accounted for by entry. The theory of the EOE, however, predicts that most of the incumbents at the time of the random selection some 50 to 100 years ago would no longer remain as independent firms. Some would have been shut down, some would have been acquired by other firms. The bulk of output would be accounted for by new firms and by a small group of remaining firms (Eliasson 1991a). In addition to this, I have to add (Eliasson 1990d, 1991c, 1992a) that the growth of the total industry aggregate is not independent of the "business mistakes" occurring along the way.

The point of my argument is that no individual firm can feel comfortable and safe in the creative destruction process of the experimentally organized economy. An economy in which the majority of firms remains after a 50 to 100-year period is not a viable growth economy. The ultimate aim of policy-making has to be to organize the economy such that no agent can escape the competitive pressure of the EOE, and to design a commercially minded culture that makes people capable of coping with its dynamic environment.

This is the exact opposite to the classical, static model of economics and its materialization in the form of a centrally planned command economy.

#### **4. The Firm in the Experimentally Organized Economy**

The managing director of each firm would prefer to look forward to a long and successful business life, without the hazards of the EOE. Even though his horizon is considerably shorter than the life already realized by STORA (see Figure 2, the world's oldest joint stock company), survival and growth (for ever) as a portfolio of wealth is, and has to be, the goal of a firm. Management, however, prefers a pace of competition that is comfortable and not unduly risky. Hence, it doesn't feel at ease in a viable, experimentally organized economy. In the classical model firms can plan (in principle) to achieve the state of full information, and this theoretical possibility of the classical economic model exerted significant influence on business administration literature of the 60s and early 70s, which abounded with treatises on "business planning" (see Eliasson 1976), until reality struck back in the form of the series of macroeconomic crises of the 70s. This literature, and its promotion of formal, long range, business planning is now gone.

In the experimentally organized economy, and in reality, each firm has to reckon with the presence of many competitors aiming for its market niche through technological product competition (Eliasson 1987). The set of business opportunities is huge and mostly non-transparent to the individual firm. A firm that wants to survive, cannot wait to compute its fully informed plan of what to do. Such a plan is unfeasible by definition (in the experimentally organized economy). More to the point, however, if the firm does not act prematurely on a very incomplete information base, it can be sure that one of its many competitors will score a success, because he happened to approach the opportunity set from the right angle.

So top firm management had better be equipped with a good *sense of direction*, which is the first, dominant competence requisite for success (see

items in Table 2). If it doesn't, it will fail anyway. Hence, a firm will have to demonstrate itself to outsiders as a gambler, taking on seemingly large risks. With a good "sense of direction", however, the true risk exposure to the insider management is very much smaller. It should in fact be normal to define the competence of the firm in terms of its ability to transfer uncertainty in Knight's (1921) sense, into (for its own management) computable risks.

There are nevertheless learnable, administrative techniques to minimize the costs of mistakes. Techniques can be developed that make it possible to take on (reduce the risk of taking on) large risks, i.e., a technique to manage in situations when the first competitive requisite (intuition) has failed. This management technique consists of two elements; to *identify* mistakes early, and to *correct* mistakes immediately (Eliasson 1990b,c). Once these tests (elements 3 and 4) have been passed and the firm can set out to sea, another and quite different element of competence has to be clicked on; the ability to *operate* the firm *efficiently* on a day-to-day basis and to feed experience back to the top (*learning*). Different groups of people are normally responsible for managing these different tasks. This orientation of administrative techniques is apparent from an ongoing study of business information systems in practice (Eliasson 1990c). This organizational technique dominates when firms have found themselves in the right market for a long time and in high volume activities. The large Swedish multinationals have been very successful in this field in the 80s. The problem is that too much success in routine volume management is normally detrimental to the earlier "innovative" tasks, and even very large firms are at peril in the EOE.

## **5. Market Dynamics and Macro Economic Performance**

We have been made to believe that "perfect markets" or the fully informed "competitive market" represent the invisible hand of the market economy (see for instance the motivation for giving the "Nobel" price in economics to Debreu in 1983). This is wrong. The competitive market of mainstream



economic theory is nothing but a set of conditions describing the resting point of, the equilibrium of, or the solution to an equation system, representing an economy with exogenously given structures in which no innovative behavior occurs. This is not Adam Smith's idea of the invisible hand. But it has gradually become the idea of the invisible hand among economists after Walras. Even Schumpeter embraced the market representation of Walras. He liked to start his analysis with a disturbance (by the entrepreneur) of a Walrasian equilibrium. His worried conclusion was the non-survival of a competitive market economy because of the ever increasing concentration that would come out of its successful performance. This dismal prediction has so far been refuted by reality. With the notion of the experimentally organized economy (EOE) in the background, it can be safely concluded that Schumpeter's notion of for ever successful, routinized or planned innovation is not of this world.

Market rivalry à la Smith (1776) and Schumpeter (1942) through innovative product development, i.e., through innovative *entry*, contrasts clearly with the classical Ricardian idea of markets, where prices are set at the margin where the worst performer earns no profit. In the experimentally organized economy the best performers raise product quality through innovation or lower prices such that the worst performers have to leave the market. Since this is an ongoing process and innovations cannot be predicted by definition, there is no well defined equilibrium in the EOE. I will use the Swedish Micro-to-Macro model to illustrate the incentive and competitive push mechanisms that keep a sufficient number of agents all the time on tip toe, competing for improved wealth positions in markets, and why they cannot lay back and relax, or in short, to understand the process of economic growth (Eliasson 1991c).

## 5.1 A Generalized Salter Curve Analysis of Innovative Learning and Competition

A market, or the entire economy can at each point in time be represented by a distribution of potential performance characteristics, like the rates of return over the interest rate ( $\bar{e}$ ) in Figure 1.A. These types of distributions – especially if presented as productivity rankings of establishments (Figure 1.B) – are often referred to as Salter (1960) curves. Each firm is represented in this curve by a ranking on the vertical axis (the columns in Figures 1), the width of the column measuring the size of the firm in percent of all other firms. Figure 1.A shows that even though the firm in the model has increased its rate of return between 1982 and 1991 it has lost in ranking. Figure 1.B shows the same firms' labor productivity and wage cost positions. Finally, each firm is operating underneath its productivity frontier, to position itself on the productivity and rate of return rankings (see Eliasson 1991c figure 1). This is still actual ex post performance 1982 and (simulated) 1991. The dynamics of markets, on the other hand, is controlled by the potential ex ante set of distributions, that capture the planned action of all other firms, including new entry.

There is a third set of Salter curves that tell how *each firm sees itself positioned relative to other firms*. The real world of the experimentally organized economy, as well as its model approximation, the Swedish Micro-to-Macro model shows large divergences between actual and perceived positions.

The ex ante distributions tell the potential for the firm to outbid all other firms in wages, or in paying a higher interest rate.

Learning about ones competitive situation – in reality or in theory – occurs in different dimensions. Prices offered in the market tell something about how other firms – notably the best firms – view their competitive situation. Competition, production, hiring, etc. can also be directly observed. The firm, finally, learns directly itself, when it enters the market. The critical learning experience to observe in this context occurs when firms observe that competitors can do better. Firm management then knows that this *can be done*

and that it had better improve in order not to be pushed down, right along the Salter distribution, and, perhaps, out.

Similarly, when the firm finds itself at the top, or close to the top, it knows that a whole lot of "closely inferior" firms feel threatened, and are taking action to better their positions through innovation or imitative learning.

The conclusion is that if potential Salter distributions are sufficiently steep and if all firms know it, firms – and especially the top left-hand group – will feel sufficiently threatened to actively aim for improving their positions on the Salter curve through innovation. If such innovative activity, notably through innovative entry in markets, is freely allowed, necessary conditions for maintaining sufficiently steep Salter distributions to move the entire economy through a self-perpetuated competitive process have been established (Eliasson 1985a, 1991a, c). These conditions become both necessary and sufficient if the opportunity set (Eliasson 1987) is sufficiently large. This also establishes the link between dynamic competition through the Schumpeterian (1912) entrepreneur and innovative entry, argued by Smith (1776) to be the critical mover of macro economic growth, that perpetuates a disequilibrium economic process type Wicksell (1898). A sufficiently large and heterogeneous state space, boundedly rational behavior on the part of agents, and sufficiently free innovative entry are the small modifications of the classical model that create the experimentally organized economy.

The Swedish Micro-to-Macro (M-M) model exhibits these features. Dynamic competition as described above determines entry and exit and hence the selective process that creates a path-dependent evolution, and non-stationary behavior that prevents classical learning (see Lindh 1993. This is so, even though the M-M model for all practical purposes is deterministic.). If you have the code of the M-M model, you can of course predict through a deterministic simulation. The question was, however, whether you would be able to learn the structure of the model (to perform that prediction) without access to this code, from observing the output from a large number of simulations, and with such precision that it would predict over a chosen future period, barring a predetermined and limited stochastic error. This question reduces to the problems; (1) to find an acceptable, estimable approximation

of the M-M model and (2) to obtain unbiased estimates of the parameters of that approximate model. If (3) the error terms between the M-M simulation ("reality") and the corresponding computed model values do not pass a test for randomness over any chosen simulation period, classical learning is not feasible and the particular behavioral characteristics of the firm of the EOE should exhibit themselves. The seemingly erratic behavior exhibited by the model economy, like major macro collapses that occur out of the blue (Eliasson 1983, 1984, 1991c) all originate in the endogenous changes of the Salter distributions, characteristics that are impossible to reproduce in a predictable way by known estimable modeling techniques. This is sufficient to rule out classical learning in the experimental setting of the M-M model (I could also add the amusing experience we have had over the many years of modeling work. If you sit down at the computer and attempt to correct unexpected, disruptive and "socially undesirable macro behavior" by using its almost full assortment of traditional policy parameters, you tend to create more and stronger disruptive macro behavior of the same kind at some later period (Eliasson 1985a, pp. 78 ff. Eliasson-Taymaz 1992)).

The M-M model is an approximate dynamical systems representation of the real market economy. Even though individual mechanisms are traditional and can be understood partially, the dynamics of the evolving system prevents classical learning. Reality, of course, requires that much more complexity be coped with.

## **5.2 Innovative Entry and Creative Destruction is the Key to Macro Dynamics**

The critical understanding of markets, hence, comes with understanding the nature of competitive, innovative entry and the dynamic market process that innovative entry keeps in motion. This understanding requires a broad definition of entry, from the launching of a new product, via the establishment of a new company to the merger of two large companies, with the purpose of improving long-run profit performance. Experience would suggest that small

firms are superior to large firms as innovators, even though the consensus is not 100 percent (cf Holmström 1989 with Granstrand-Sjölander 1990). The large firms, however, together spend significantly more on R&D than do small firms. New entry is not always in the form of new firm entry. It can occur through the establishment of a new business activity within a large firm, or through the introduction of a new product. As I said, the merger of two large firms exercises market effects similar to that of new entry (Eliasson 1991a).

The role of small firms and new entry should be seen in the context of the following three observations:

- 1) The direct macroeconomic effects will be very slow in coming (Eliasson 1991). Empirical evidence shows very small effects within a 10 year period. Simulations on the Swedish Micro-to-Macro model show a significant direct macroeconomic influence only after some 20 years.
- 2) New innovative entry in a broad sense, however, serves as a competitive force to shake up incumbents and move the market from Ricardian to Schumpeterian type competition. This influence on the macro economy is immediate, when incumbents realize the long run competitive threat.
- 3) New entry preserves structural diversity, making faster growth feasible (Eliasson 1984, 1991a). Even if entrants are on the average no better than incumbents, the spread in performance among them is larger. Since only the best survive in the long run, viable entry and exit preserve diversity of structure.

Hence, understanding competition requires understanding the forces that drive new entry, how this entry affects industry structure (the Salter Curves) and potential competition as well as actual competition. This is not easy. First, the economic importance of exit as a consequence of competitive entry (creative destruction) has to be understood. If bad firms are not forced to leave the market, scarce factors will be locked up in the wrong production units, raising the level of factor costs. Simulation experiments on the Swedish micro-to-

macro model (Eliasson-Lindberg 1981) demonstrate that the macro economy could relatively easily cope with sizable investment mistakes, as long as the mistaken investments were forced, through competition, to be closed down fast. The socially most costly thing to do was to carry on production in plants, that did not, and could not produce positive economic values above what the same factors would have created elsewhere in more profitable firms. The main reason for the negative growth effects in the macro economy was the increase in factor costs (notably wages) caused by the large locking in effects in large and inefficient firms, due to the distorted rent perception associated with the corporate income tax system. The extreme subsidy program in the 70s to save the high wage Swedish shipyards and mines from immediate bankruptcy and shut down had even larger, negative macro effects on the Swedish economy (see Carlsson-Bergholm 1981, Carlsson 1983a, b). Devaluation of the currency to "save jobs" will have the same negative long run effects through saving badly managed firms and temporarily creating more unemployment in the long run. This observation on locking in effects generalizes nicely to the entry and exit phenomenon. With the average new entrant being rather somewhat inferior to the average incumbent – if performance is measured by labor productivity or the rate of return (Granstrand 1986) – but the spread in performance being much wider, most new entrants will soon fail and exit. Good macro economic performance requires that they are allowed to fail, and even pushed to exit faster. The Swedish Micro-to-Macro model (Eliasson 1977, 1978, 1990c) embodies this competition through new entry and exit typical of competition in the EOE. It occurs in the "broad-based Salter (1960) landscape of firms" described above, depicting the distribution of productivities or rates of return over the firm population. Entering firms are represented by a "smaller such Salter distribution" with a much wider spread, disrupting the balance on the margin in the tail end of incumbent firms, where the marginally worst producer just covers wage costs. Marginal incumbents exit and new product and factor prices are established at levels where most of the new entrants will soon perish and exit.

Many large incumbents will, however, be shaken by the remaining supreme entrants and be forced to shape up their competitive performance in

order not to lose market shares, which presumably correspond to the size of their invested capacity to produce. In the very long run the remaining, superior "new" entrants will begin to exercise a direct influence at the macro level. Performance characteristics after a 30-year simulation show the upper left, "supreme" corner of the Salter distribution to be occupied by the new, now old entrants (Eliasson 1991a). As most analytical results, this one is, however, obvious from the assumptions made. The critical issue is to understand *why* firms enter the market in large numbers, despite being inferior, and do it repeatedly.

Such phenomena cannot be explained within the static, full information general equilibrium model, and not within an asymmetric information version of the efficient market theory, so popular in financial economics. It fits, however, nicely into the EOE. Under the assumptions of the EOE the entrants perform an experiment the outcome of which cannot be assessed until it has been tested. There has to be a sufficiently large number of such potentially competent and optimistic entrants willing to perform business experiments for growth to occur.

At first sight it is tempting to approach this problem as a lottery with known, or exogenously given odds. This is the standard procedure in R&D rivalry games which address similarly formulated problems. This is unacceptable for two reasons. *First*, the inclination of actors to play the lottery has to be explained. *Second*, the business lottery is a game where you can learn to improve your odds, and this learning will affect the willingness to participate in the game. The standard lottery of economics (R&D rivalry and efficient market theory) has no learning of that kind. It is a stationary process, that is unaffected by the ongoing business. Once learning to improve your competence to participate in business is introduced, a path dependent, non-stationary process emerges. Hence, competitive entry in the experimentally organized economy can only be explained if the theory clearly distinguishes between ex ante and ex post. The new entrant exhibits strong risk willingness to the outsider based on a strong belief in its own competence (item 1, table 3). The ex ante ex post realization process (competition) filters out those entrants that were really good (Eliasson 1991a). Hence, the ex post outcomes

are also influenced by the competitive filter, that can not, as we have shown, be characterized as a stationary process. What matters, however, besides this filter, is the entrepreneurial mentality, the culture that breeds these optimistic and bold entrants.

Third, and important, innovations are not well defined events. Much of the ongoing upgrading of the capacities of an economic system can only be seen at very high levels of resolution, partly through piecemeal improvements of existing economic activities, partly through the introduction of new solutions and the phasing out of old solutions. The large, very visible (ex post) inventions of the steam engine, or more subtle generic electronics technologies have been generating waves of higher and lower frequencies of innovations through increasing the immediately available business opportunity set, but the actual moving of the economy takes place in the small, at the implementation level.

Once this empirical fact has been recognized it follows that one also has to recognize the conditions, the institutions and organizational circumstances, that allow the structural change process to occur. Economic growth or productivity change is a matter of institutional and organizational change. Hence sustained economic growth can only be understood when studied over a sufficiently long historic period to allow also the economic organization of the economy to change.

## **6. The Institutions of Economic Growth - the Case of Industrial Revolutions**

The analyses of the previous sections can now be generalized to include not only the incentives moving rent seeking innovators and entrepreneurs, but also their influence on economic structures and on the organization of the institutions of the economy that determine the distribution of rents. Apparently, and this is something we are relearning from the East European deregulation experience (Eliasson 1991d, 1992d), as long as the problem is to



introduce new technology into existing distribution schemes, we have only small political problems to cope with. But when new technology involves the renegotiation of existing distributional principles, the political process becomes immensely complex, and slows down (cf Bloch's (1966) pp 124ff) interesting discussion of medieval crop rotation). Among the many reasons for this can be mentioned risk avert people that have no way of assessing the final outcome of the total adjustment, a circumstance that effectively blocks the reorganization of mature welfare economies towards something that has a chance for survival (Eliasson 1986a).

### 6.1 Property Rights Made an Efficient Market Economy Possible

In their well recognized book North–Thomas (1973) observed that by the end of the 18th century, the necessary institutions for the organization of a functioning market economy were in place in Great Britain and North America, notably the property rights system. The property rights system made it possible to define the rights to manage, to access the value of and to trade in goods and land. Such trade is the essence of a market economy. The introduction of the property rights institution of course fundamentally changed the principles of income distribution. Economic growth rapidly changed speed in England and in the U.S.

The property rights system includes not only the legal possibilities of defining the goods to be traded but also the right to do so and the unrestricted right to enter into competition with existing producers. Hence, the property right system is instrumental in defining the firm of a viable market economy and its existence as a tradable entity in financial markets (Eliasson 1992d). One could therefore say that the *institutional foundation of the industrial revolution gave the modern firm a role to play in the dynamic markets of the experimentally organized economy, releasing an enormous growth potential.*

Few restrictions on entry existed in England and North America at the time. In other countries the craft system restricted access to markets, and the industrial revolution did not begin until these restrictions had been taken off

(Eliasson 1991a). In those countries, where the lid was not taken off, the industrial revolution did not occur, and they remained in a relatively non-industrial state.

## 6.2 Four Scenarios of Fundamental Institutional Change

The industrial revolution meant a dramatic change in the economic organization of the country, forced by a new technology that both radically altered the production potential of the nation but also the principles for distributing its rents. Such dramatic changes are rare but merit very close study. In fact, three dramatic scenarios of similar consequences are currently, but slowly evolving around us. Besides (a) the *industrial revolution* of the 19th century I will therefore briefly discuss three similar and currently ongoing dramatic reorganizations of the production and distribution systems of nations; (b) the *new small scale, competence intensive production technology* gradually emerging (c) the forced *dismantling of the welfare* system of some mature industrial nations and (d) the economic *reorganization of Eastern Europe*.

### a) *The industrial revolution*

The industrial revolution forced a dramatic economic reorganization from a handicraft oriented industry and an economy dominated by agriculture, to an industrial organization based on specialization around the machine tools of mechanical engineering industries. The growth potential of this reorganization was immense, but so were also the disruptive social consequences. Countries that were late to reorganize around those industrial technologies or could not cope with the social and political consequences never made it into the industrial age. Those who were early were those nations who gave up protection of the craft system early. An interesting observation to make is that the mature industrial nations are still to a large extent basing their industrial performance on the same organization around the same set of (now only more sophisticated) machine tools. One wonders what this means for the future?

*b) The new, small scale, competence intensive industries*

In fact, the world is facing several similar situations of potentially dramatic reorganization right now. Mechanical engineering industries and other mature industries are no longer the potential growth generators. The future may be shaped by some other, smaller scale but much more competence intensive production technology with dramatically different consequences for distribution (Eliasson 1986b, pp 18ff, pp 72ff, 1990a, pp 41-44, pp 55ff). We can observe that some countries, some regions and some firms are rapidly pushing themselves into this new organization around potentially very rewarding technologies. If rapidly catching on these changes may be socially and politically very disruptive, however, probably not for the innovative firms and industries but for the old firms and economies based on the old industrial organization, being unable to change.

Western European industry and North American industry are based on the same principal organization of production around a collection of machine tools developed during the industrial revolution. That industrial technology is rapidly being learnt by other, earlier not as advanced nations, forcing change on the high wage European and North American industries. It is instructive to observe that the competence that still keeps Western firms ahead in the race is organizational, and not based on the actual manufacturing of goods (see Eliasson 1985b, 1990a). The giant multinationals that dominate western markets base their competitive performance on product development, global marketing and manufacturing in combination, and the actual making of the goods may largely take place outside the mature industrial economies. The distress of automotive manufacturing is a case in point. And the interesting thing to consider is to what extent the mature industrial countries will be able to successfully enter the new production organization of the service based, highly competence intensive production structures now evolving around new information technology and science based production (pharmaceuticals, fine chemicals etc). The entrepreneurial competence needed, and the incentives may not be around and the political system may not be willing to accommodate the necessary social adjustment.

The socio-economic situation of the industrial revolution, i.e radical change of the organization of an economy and the difficulties of coping with it politically is not all that unusual. During the industrial revolution modern democratic Government was unknown and organizational change was reasonably slow. Political power could not be mobilized to stop the process. Currently such radical reorganization processes, forcing drastic change on people can be countered and slowed through the political process (Eliasson 1986a).

c) *Dismantling the welfare state*

A similar problem is associated with the dismantling of the state operated welfare economies all over Europe, but in particular its most extreme versions in Scandinavia. There are several sides to this dismantling. Costs for maintaining the redistributinal transfer systems are outrunning economic growth, and politicians are slowly recognizing that incentives and economic growth have been affected negatively. Governments are also realizing that large parts of so called public services can be produced more efficiently privately, Government restricting its responsibilities to the financing of some of this service production. Thus, even education and health care, are being privatized. This deregulation of formerly protected public production activities amounting in some countries to significantly more than half of GNP is similar in principle to the deregulation of the relatively much smaller manufacturing production during the industrial revolution and to the deregulation of Eastern European economies. The serious problem with deregulating the welfare states is that the consequences are very complex to figure out and affect the voters directly. Such changes are thus politically resisted even though most would benefit (Eliasson 1986a). Hence, in the long run the welfare states might not make the transition, and be overcome by some East European nations that succeed in reorganizing their manufacturing sectors.

d) *From plan to markets*

The big difference to the welfare state is that the formerly planned economies have destroyed their manufacturing sectors as well as other production sectors. With the engine room of the economy in a mess the crisis of the formerly planned economies is immensely larger than that of the mismanaged welfare economies. On the other hand the potential for growth in the long run is much larger in the East European economies, if they can make it. The conflicts between distributional principles and rent creating capacity are, however, manifest. Their solutions hinge on the time dimension of the adjustment process and the uncertainties associated with the transformation. The long run potential outcome of transforming a planned economy into a market economy is clearly very much superior to the initial, current situation. But the distributional consequences along the transition process are very negative and impossible, both to comprehend and to control. Politicians have a very reduced role to play in that process and hence tend to slow it down, rather than promote it. The time dimension pushes the fruits of the transformation outside reach for the older part of the population. The transformation furthermore moves previously privileged persons down the relative welfare scales. And above all, whether justified or not people fear the unknown consequences. Thus, the political counter action operates on the adjustment of the institutions that control the distributional consequences. Hence, the privatization process, that should have come first (Eliasson 1991d) is slowed down.

### **6.3 Can an Orderly Transition from Plan to Market be Planned?**

The rents created in the new, open organization are, however, so large that new activities are, nevertheless, all the time created, but not on the scale needed to rapidly exploit the potential. The Eastern European nations are thus facing a difficult dilemma.

Can they wait for prosperity as long as it takes for newly entering firms and entrepreneurs to become large enough to move the macro economy, and just let the old actors slowly die; i.e. a generation or so. Or is the presence of obsolete production structures from the past an obstacle for new innovative entry?

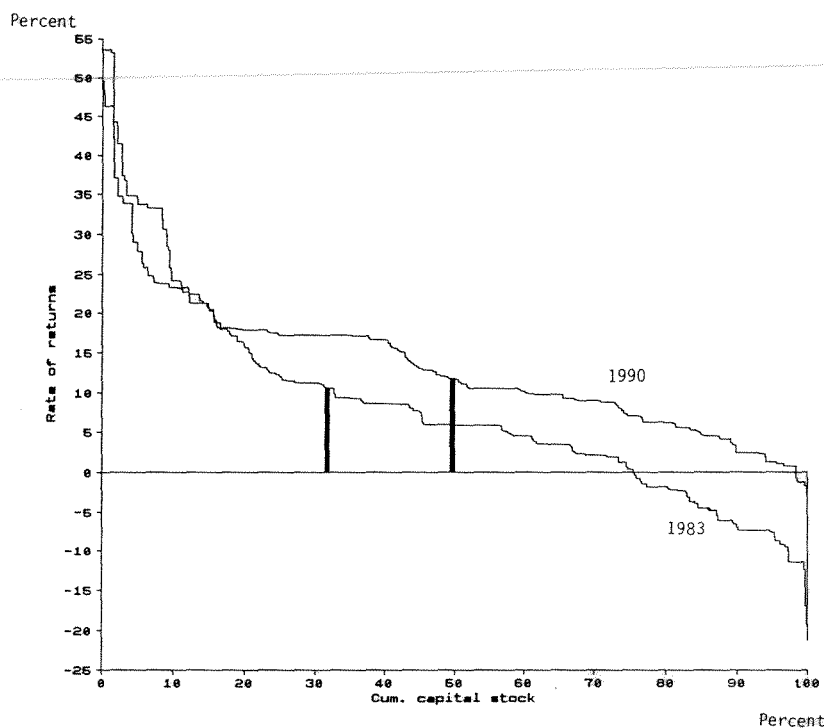
The question arises: Can an orderly transition from plan to market be planned? Is it possible, for instance, to speed up transformation significantly and without disrupting the country socially, through inviting foreign investment? Is it necessary - in order to get economic growth moving - to reorganize or dismantle the old production structures with all the social turmoil that would follow.

The answer is no and yes. First of all a planned transition from plan to market is a contradiction. The transition requires a fundamental reorganization of the entire economy towards an experimental organization, the best outcome of which only the market can determine. Significant unexpected adjustments at the micro level will be necessary. There exists no competent political process to engineer that transition.

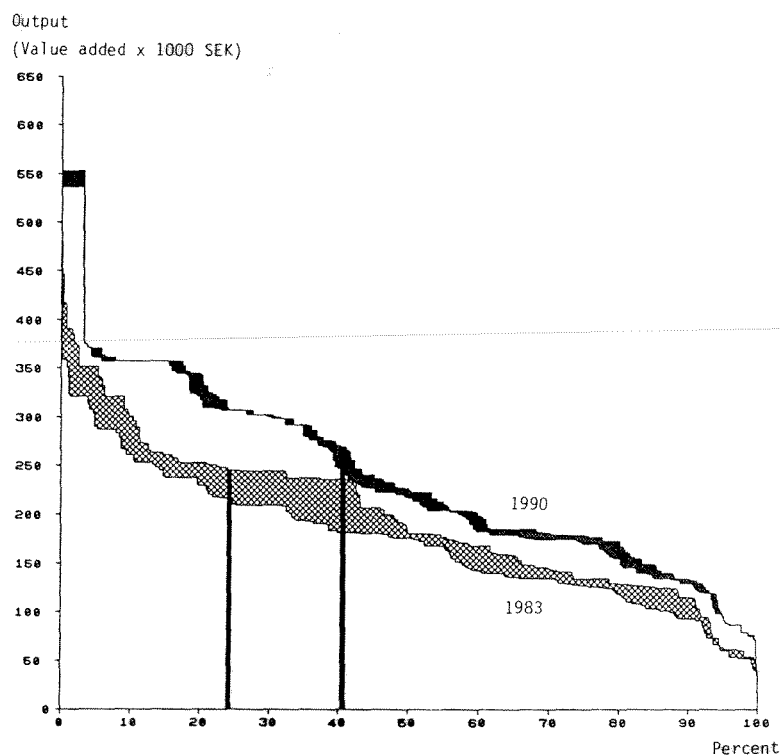
But there is also a yes. The efficiency of the micro transition depends on the existing institutions, to a large extent embodied in the political system. This is so in both welfare and the planned economies. These institutions are in a large measure detrimental, both to the transition process itself and to the functioning of the market economy (Eliasson 1986a, 1992d). Hence, the task of the political system is to reorganize itself such that institutional impediments it has itself created be changed or removed! In both the welfare and the formerly planned economies the desired outcome is to relieve the productive powers of agents in the markets (firms and individuals) of the institutional restrictions imposed from above. Hence, creative destruction, to use Schumpeter's theory is needed not only to reallocate resources for growth where they are most productively employed and at factor prices that do not discourage growth through new investment and new entry. Creative destruction is as important among the institutions that control the rent creating and reallocation processes. This political change process, paradoxically, appears to be even more difficult than the reorganization of

physical production structures. Perhaps this difficulty reflects the fact (Eliasson 1990b, p. 285, footnote) that political institutions are not organized for effective corrective action. Their guiding principle is to make the right decisions from the beginning. Since, this is in general not possible in the experimentally organized economy, such behavior is irrational. It should be taken as evidence that the political element in economic decisions should be minimized.

**Figure 1**      **Salter curve structures illustrating the dynamics of the Swedish Micro-to-Macro model**



**Fig. 1a** Excess rates of return ( $= \bar{e}$ ) distributions 1983 and 1990.



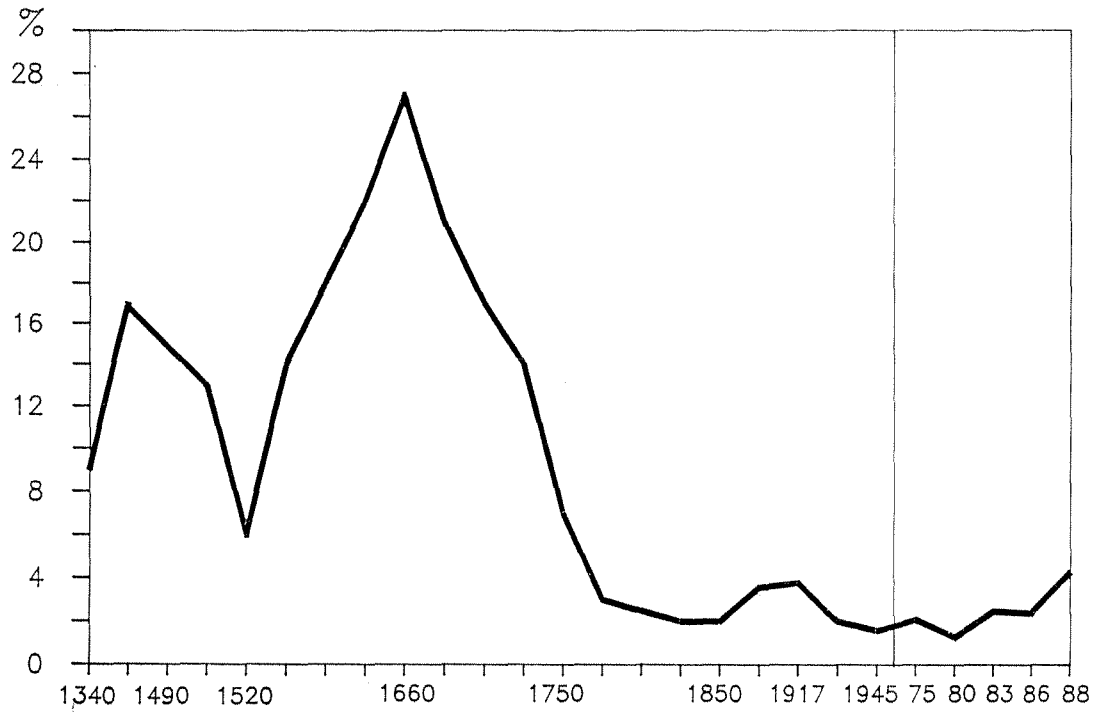
**Fig. 1b** Actual and potential labor productivity distributions 1983 and 1990  
(Shaded areas denote unused labor capacity (labor hoarding))

Source: Eliasson (1991c)



**Figure 2**      **Share of total Swedish manufacturing employment of STORA  
1340-1988**

— Company turn-over in percent of total  
manufacturing and mining production.



*Source:* See Introduction by Gunnar Eliasson to Day-Eliasson-Wihlborg (eds.), *The Markets for Innovation, Ownership and Control*, IUI and North-Holland, 1993.

**Table 1      The four basic economic activities in the knowledge based information economy**

1. COORDINATION (organizational structure)	The invisible and visible hands at work - competition (in markets, Smith 1776) - management (of hierarchies, Chandler 1977)
2. INNOVATION (exploring state space)	Creation and exploitation of new business opportunities (Schumpeter 1912) - innovation - entrepreneurship - technical development
3. SELECTION (organizational change)	Incentives for change - entry - exit - mobility
4. LEARNING	Knowledge transfer (Mill 1848) - education - imitation - diffusion

*Source: The Knowledge Based Information Economy, IUI, Stockholm, 1990, p. 73.*

**Table 2     Dominance of the 10 largest Swedish corporations**

	1965	1978	1986
Swedish goods export	23	27	29
Foreign Swedish employment	80	72	76
Manufacturing employment in Sweden	13	21	25
including also indirect employment with subcontractors	-	ca 28	-
Total manufacturing	42	ca 45	61

*Source:* Eliasson (1988d).

**Table 3      Competence specification of the experimentally organized firm**

1. Sense of direction (intuition)
2. Risk willing
3. Efficient identification of mistakes
4. Effective correction of mistakes
-----
5. Efficient coordination
6. Efficient learning feedback to (1)

*Source:* Eliasson (1990a).

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