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INFORMATION IN ECONOMIC THEORY: AN AUSTRIAN APPROACH

by

Michael Lundholm

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UPPSALA UNIVERSITY
Department of economics
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1. Introduction

A general problem in economics is how order on an aggregated level can rise from, what in the first sight seems to be, disorder on an individual level in the economic system. To solve the problem economic theorists in some way have to cope with the fact that different individuals have different qualities and different knowing. The easy way out is to assume the problem away, which is done in the theory of general equilibrium and associated theories.

However, the purpose of general equilibrium theories is not to construct an accurate description of how real economic life develops, but rather to generate hypotheses or predictions which can be tested. This method is, at least, unsatisfactory in the sense that it can generate highly unrealistic theories, which therefore in many ways lack the property that they contribute to our understanding of economic life, although they fulfill the purpose of creating hypotheses which can be tested.

The first purpose of this paper is to state why the question of economic methodology is important when the starting points for all theorizing about how order emerge (the phenomena of ignorance, uncertainty and knowing) are in focus. The second purpose is to compare a number of theories which set out to ex-

plain how order emerge in terms of communication, creation and transfer of knowing. This comparison is not complete, but will focus on the main properties of the theories.

2. Criteria for comparison and outline of ivestigation

A main objection against the class of equilibrium theories is that they assume what is to be explained; assumptions are made to ensure a state equilibrium, and not to ensure a process which tend to lead to equilibrium. This is to say that equilibrium theories state that, given the set of opportunities, the economy is in equilibrium under the common assumptions of perfect information and rational agents. But from this statement also rises the objection that the class of equilibrium theories do not explain how changes in the set of opportunities arise; i.e. they do not explain economic development.

Hence, the crucial assumptions of equilibrium theories are (1) a given set of opportunities and (2) perfect information (i.e. full information about the opportunities). Accordingly agents in equilibrium theories adapt ("economizing") to data rather than create ("action") data. During the last decades however, a number of attempts in the equilibrium tradition have been made to incorporate "the creation of data" (i.e. uncertainty) into equilibrium theory, and still keep the equilibrium properties of the theories.

An important criteria to compare theories is how the set of opportunities is defined. A first class of theories can be defined as theories which assume this set to be given (and known), like the theory of general equilibrium. Many theories in this class, however, "only" assume the set to be given; a given set means that institutions, preferences, the number of goods etc do not change. Among these "given-opportunity-set"-theories different assumptions are made about the degree and kind of ignorance of agents about the set of opportunities. The theories then set out to "explain" how this ignorance is reduced and by what means agents do this. Some theories also assume that this ignorance cannot be completely reduced.

Consequently a second class of theories is defined by the assumption that the set of opportunities is endogenously changing as a result of the activities of agents. But agents also are assumed to try to reduce their ignorance, although commonly there is a restriction to which extent this can be done. This restriction is however categorically different from the restriction of the "given-opportunity-set"-theories.

It is already clear that the theories by definition set out to explain different kinds of phenomena; a world with a given set of opportunities is categorically different from one where the set is changing.

To the first class of theories belong theories which try to incorporate incomplete knowing, as probabilistic theories (measurable and unmeasurable probability introduced by Knight, personalistic or subjective probability introduced by Savage and theories which build on this concept), expectations (adaptive expectations developed by Arrow and Nerlove, rational expectations developed by Muth), adaptive economizing (introduced by Day) and micro-macro process models. In these theories agents adapt to data rather than create data. The claim of these theories is in many cases, however to explain the same kind of world like in the "not-given-opportunity-set"-theories, while they keep the inherent equilibrium properties of the theories. This first class of theories will be discussed in this paper. Also a number of attempts which try to explain how knowing arises and is communicated will be discussed.

It is in perspective of the properties of the Schumpeterian-Misesian-Kirznerian theory of entrepreneurship, as a theory belonging to the second class of theories,will be discussed. This theory regards the agents as acting men. Their actions change the set of opportunities absolutely and relatively; absolutely in the sense that some agents are entrepreneurs who are carrying out new combinations (i.e. innovations) of factors of production which increases the set of opportunities and relatively in the sense that some agents are entrepreneurs who perform arbitrage which give agents who are not entrepreneurs a more accurate and complete knowing about a gi-

ven set of opportunities. This double-sided entrepreneurship assures that there are tendencies towards as well as from equilibrium, but not necessarily a persistent state of equilibrium.

The starting point for the discussion is of course the theory of perfectly competitive markets. This is done in section 4. In section 5 a number of theories concerned with the question what it means to be to some extent ignorant. The question is reversed in section 6 where definitions of knowing is discussed in terms of if knowing i possible to communicate. The assumption of rationality is discussed in section 7. The two following sections are concerned with entrepreneurial theories; The Austrians in section 8 and Schumpeter in section 9. However first, in section 3, a methodological problem will be discussed.

3. A methodological dilemma

In post-war economic theory Milton Friedmans "The Methodology of Positive Economics" has had an enormous impact on economic methodology. The view of Friedman can be summarized and simplified as follows: (1) the goal of economics as a positive science is to develop hypotheses that "yield(s) valid and meaningful (i.e. not truistic) predictions about phenomena not yet observed" and (2) the realism of assumptions that generate a hypothesis has nothing to do with the validity of the hypothesis.[1]

The purpose of Friedman is to make a distinction between positive and normative economics, but he also wants positive economics, as a social science about "what is", to be more than a structure of tautologies, if it is to describe something more than the consequences of action![2] The problem with Friedmans essay is that he never discusses what relevance "a structure of tautologies" can have for economic theory.

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1. Friedman 1953, pp. 7, 14f. Although Friedmans view have had a great impact it has not passed undisputed. Below the view of James Buchanan is presented. Also at the annual meeting of AEA 1962 Friedmans view was debated. The question concerned was the "irrelevance-of-assumptions-thesis" (or as it was called by P.A.samuelsson, the "F-twist"). An overview is found in Blaug (1980), pp.94-128.

2. Friedman (1953), pp. 7, 11f.

This relevance is however some decades later discussed by James Buchanan, who tries to make a distinction between "predictive science" (positive economics) and "subjective economics"[3] (i.e. Friedmans "structure of tautologies"). Buchanans argument for this mutually exclusive duality is that, that:

> "which can be predicted (conceptually) can be explained with an objective or scientific theory. That which cannot be predicted can be explained (understood) only by a subjective theory."[4]

Mainly, according to Buchanan, the dimension of subjective economics draws attention to the fact that choices are made under uncertainty and can add to our understanding of economic processes[5].

If Buchanan is correct we must either build theories with the purpose of making predictions, or theories which try to explain and will help us understand what cannot be predicted. If we try to use the methodologies of predictive science and subjective economics simultaneously, it is possible to save a theory, which have been refuted in the domain of predictive science, with explanations from the domain of subjective economics.[6]

This methodological dilemma is clearly illustrated, but not really discussed, in Arrow (1959). Arrow discussed behavioral assumptions consistent with the "law of supply and demand" and based on individual decision making, which could explain how the equity between supply and demand can arise.[7]

The behavioral assumptions of perfect competition (i.e. all agents are price takers) do not explain how equilibrium prices

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3. Subjective economics is built on the axiom (or hypothesis) that human beings choose. Choice imply valuations (preferences) and uncertainty; if the world was certain, choice and action would be meaningless, but if that is not the case we choose and act in order to make the state of the world more preferable to us than it would have been without our intervention. The differences between "predictive science" and "subjective economics" with respect to "costs" are discussed in Buchanan (1969).

4. Buchanan 1982, p.10.

5. Op cit, pp.16,18.

6. Op cit, p.19 (note 12).

7. Arrow (1959), pp.41-43. See also Clark (1981), p.284 and Boland (1986) pp.101-117. A similar statement of the problem, but with an explicit reference to Friedmans methodology, is found in Hahn (1987).

will come to exist. This was stated by Arrow, but is really beside the point in the domain of positive economics. In this domain the predictive properties of a theory, or rather if the theory is not falsified, determine if the theory is a good theory. However, the predictive properties does not legitimate the view that the behavioral assumptions properly describe how people behave; the theory really never says anything about this.[8] At least if predictive/positive economics is stated as in Friedman (1953).

Therefore the problem that the behavioral assumptions not realistically describe peoples behavior and the discussion about which assumptions instead should be made, belong to the domain of subjective economics. The legitimate methodology in positive economics is to change theory and/or assumptions when the original theory is falsified.

The differences between the two domains are, however, not fully realized and appreciated by modern economists. This is not done since no difference is made between predictive and non-predictive human behavior.

This problem becomes crucial when the phenomena of ignorance and uncertainty are studied. If agents face uncertainty they cannot predict the future correctly (or rather be sure ex ante that their expectations are correct), but the methodology of positive economics axiomatically assume that all human behavior in such situations show regularities and hence can be predicted[9].

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8. According to Friedman agents behave as if the behavioral assumptions were correct. (Friedman (1953), p.21; See also Nagel (1963), p.218)

9. The question if there are regularities in human behavior i very important, and connected with the problem of reduction in the social sciences (and also in the sciences). If human behavior is strictly dependent on external stimuli there is no room for the freedom of will. Then human behavior can be explained by the stimuli, since human behavior will show regularities as all other natural phenomena; there will be no ultimate cause for human behavior.

   But if the freedom of will exists, there will be an ultimate cause for human action; not all human behavior is action, but the main point is the the freedom of will make it methodological impossible to explain all human behavior in terms of external stimuli. Hence the claim of Karl Popper that all theoretical sciences should use the same method (methodological monism) cannot be correct.

The purpose here was only to state the methodological problem and its connection to the theoretical problems which are discussed in this paper.[10]

4. Perfect competition

Of all assumptions concerning information, the assumption of perfect knowledge is probably the most influential. The assumption of perfect knowledge is essential to the theories of perfect competition and general equilibrium. Despite its prevalence, its actual content is unclear. The information assumptions in the theory of perfect competition and in the theory of monopoly are very different, although the knowing possessed by the agents in both theories is assumed to be "perfect"[11]. The meaning of the assumption appears to vary, depending on the aim of the theory[12]. A useful summary of perfect knowledge, using a marshallian terminology, is to say that the agents concerned have "sufficient knowledge": the agents have the knowing they need[13]! Only perfect knowledge in the simple model of perfect competition and well known attempts to explain how agents develop perfect knowledge in the same model, will be discussed here.

The meaning of perfect competition is that all agents are perfectly informed about market circumstances and production possibilities, i.e. all agents possess all relevant knowing about the set of opportunities. The agents are price takers and meet perfectly elastic supply and demand curves. All they need to know about market circumstances is the price of each good[14]. The price is also the only means of competition (homogeneous goods). No agent possess unique knowing about production oppor-

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10. The methodology of subjective economics is not discussed here. For a deep discussion see hayek (1952) and Mises (1962). A summary of the methodology of subjective economics is found in Lundholm (1986).

11. Cf. Hayek 1949, p.94n.

12. Stigler 1957, p.14.

13. Different terminology has been used in the history of economic thought to describe this assumption: "tolerable knowledge" (A.Smith); "full information" (N.Senior); "perfect knowledge" (W.S.Jevons and F.Knight); "sufficient knowledge" (A.Marshall); "complete knowledge" (F.A von Hayek). (Stigler 1957, p.2ff; Hayek 1949, p.95)

14. For a single market this gives D=D(P), S=S(P) and the condition for equilibrium D=S.

tunities, which means that there is no ground for monopoly[15]. An important, but often implicit, assumption is zero transaction and adjustment costs.[16]

The most simple way to describe perfect competition is to look at it as a state were all plans are successfully realized as planned. Not only are the plans perfectly matched with reality. Perfectly matched plans also mean that all agents have an extraordinary computational ability, possess perfect knowledge about current conditions and also have expectations about future conditions which are perfect (i.e. the forecast error is zero). In a world like this all mistakes are by definition excluded, both in the process of aiming at ends chosen, i.e. economic error or error of will, as well as in the process of judging means directed to reach the chosen ends, i.e. technological error, or error of knowing[17]! But how can such a state come into existence[18]? In which specific way do agents inform themselves fully about market conditions and production opportunities, assumed in theory? The largest problem is of course how prices can adapt so that the supply-demand-identity will come to hold, while all agents only act on given prices[19]?

The traditional escape out of this problem is to introduce a tatonnement-process. An auctioneer is assumed to announce all prices to the agents, who react by informing the auctioneer of all the quantities that they want to sell or buy at the announced prices. The auctioneer sums up all quantities, and revise the price vector so that prices, when they are announced the

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15. The case of monopolies because of economics of scale is of course of no interest here.

16. Transactions cost will not be a main concern here although reference will be made to transaction costs occasionally. hence the extensive literature which discuss transaction costs, externalities, institutions etc is not taken into account here. However, it is important to realize that transaction costs, i.e. costs related to information, empirically is the dominant cost factor (See Eliasson 1986d, pp.42-43).

17. Cf. Croce 1900, p.177.

18. Classical economists regarded competition as a process which tend to bring prices down to a level where excess profits and unsatisfied demand are eliminated, while neoclassical economists regard "perfect competition" as a situation where the effects of competition are studied (McNulty 1967, pp.396,398). Here perfect competition is recognized as if all transactions and adaptations take place instantaneously; i.e. perfect competition describes a state of affairs in which time does not exists. This is consistent with zero transaction and adaptation costs.

19. Arrow 1959, p.43; Kirzner 1962, p. 353; 1976, p.115f; see also McNulty 1967, p.397 and Boland (1986), (e.g) p.6.

next time, get higher at excess-demand and lower at excess-supply'[20]

The conditions for the tatonnement is that it is costless and that no trade takes place until the auctioneer has found the equilibrating price vector. The tatonnement means that a state of incomplete knowing is made the starting-point of an explanation of how perfect knowledge comes about.

5. Incomplete knowing and expectations

In this section a number of theories which are concerned with the problem of partial ignorance will be discussed. The implicit question asked is: "what does it mean not to know?". the theories in this section will be described in terms of how they define the opportunity set. However, since most theories here assume the opportunity set to be given, the focus is on the agents degree and kind of ignorance about given opportunities.

One fundamental development of modern general equilibrium theorists is the attempt to incorporate incomplete knowing or partial ignorance as "uncertainty" into the theory. However, among these theorists different views have been suggested, with a given opportunity set, how to understand the probability concept. These views of the probability concept are not totally independent of how one can view the opportunity set, even if the set is given. The main views in these traditions are found in Knight (1921) and Savage (1954). Knight (1921) introduced the difference between measurable and unmeasurable probability; i.e. risk and uncertainty. The standard view of probability, however, is found in Savage (1954); personalistic probability. The distinction of Knight focuses on probability but leads directly to the view of the opportunity set as at least partially unknown and impossible to know completely. On the other hand does the concept of personalistic probability, as it has been used in the economics of uncertainty, search theory etc (i.e. focus is on the probability concept and not on the cha-

20. Morishima 1977, pp.28-32. The auctioneer is assumed to act according to the rule $dP/dt=f(D-S)$ where $f'>0$ and $f'(0)=0$.

racteristics of the opportunity set) imply that the opportunity set is almost possible to know completely and given.

Theories of expectations are closely related to this problem and will also be discussed below, together with the concept of adaptive economizing. However there is also a theoretical tradition with its roots in classical economics, which consequently regards the opportunity set as partially unknown and changing; the austrian tradition in economic theory, which will be discussed in the end of this section.

5.1. Measurability, risk and uncertainty

Frank Knight considered measurability to be the quality that separated risk from uncertainty. Knight assumed that our knowing about certain classes of phenomena is systematic; i.e. it is possible through rational thinking, experimentation or systematic observations to learn the frequency distributions of these classes of phenomena. This means that we do not have knowing about any specific phenomenon belonging to that class, but that it is a member of the class. A number of phenomena are assigned to each class, and the law of large numbers applies. This kind of probability, or state of incomplete knowing or partial ignorance, was defined as "risk" by Knight[21].

According to Knight all phenomena cannot be investigated in a systematic way. Sometimes the only possible estimations of probabilities concerning phenomena at hand are agents non-quantitative estimates. This kind of probability, or incomplete knowing, was defined by Knight as "uncertainty"[f22]. But "uncertainty" does not mean complete ignorance of how to judge phenomena but only partial knowing[23], because if we do not have any knowing which gives us a reason to hold one alternative as more probable than other alternatives, these alternatives have equal probability and are therefore calculable[24].

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21. Knight 1921, p.232.

22. Op cit.

23. Op cit, p.199.

24. Keynes 1921, pp.41-42.

In Eliasson (1985) the criterion of risk as measurable, or rather predictable, is used in a simulation model. Eliasson also concludes that knightian uncertainty is not compatible with equilibrium. Uncertainty occurs when "equilibrium does not obtain for the forecast period"[25,26]. Also in Faxén (1986) the knightian dichotomy is discussed, but with the purpose to make unmeasurable uncertainty theoretically measurable as the discrepancy between real and perceived theories. Faxén emphasizes the forward looking element in uncertainty; uncertainty is different from risk in the sense that it can be eliminated through trading in future markets, but not be reduced by further observations[27]. However it is important to notice that trading in future markets, when trading is not pure speculation, eliminates losses as well as profits.

The knightian distinction only gives a specific way in which probabilities of known events are formed under specific conditions. The agents operating in a knightian world know less under ideal conditions than their "perfect-competition"-counterparts: (1) it is not possible to know which specific event will occur and (2) it is sometimes not possible to get a quantitative estimate of the probability that a specific event will occur. Limited knowing is due to restrictions on the agents' ability to deal with complex problems[28]. The agents are also, according to Knight, not always aware of that their judgments sometimes are erroneous; the extent to which they are aware of this is dependent on their experience of past judgments[29].

5.2. Rational and adaptive expectations

Price theory, however, includes another debate concerning incomplete knowing. It started in the late 30's and continued until the beginning of the 60's. Without equilibrium prices, it

25. Eliasson 1985, pp.315-316; Cf. Kirzner 1982, p.49.

26. This would mean that uncertainty can only be stated ex post. Later in this paper, however, the ex ante element of uncertainty will be emphasized.

27. Faxén 1986, p.449ff.

28. Knight 1921, p.210; cf. with adaptive economizing and bounded rationality below.

29. Op cit, p.229.

was argued, agents have to make decisions on expected prices. Although this debate concerned itself with separate markets, the results today are mainly used in macroeconomic applications. Above we described perfect competition as if these expectations were perfect and without any forecast error. If we loosen this assumption we introduce rational expectations.

Rational expectations are closely related to the knightian risk-concept, and are defined as expectations, about a phenomenon, which are distributed around the prediction of the relevant economic theory concerning the same phenomenon[30,31]. Rational expectations imply that agents have knowing of all systematic phenomena. However, in the fashion that rational expectations have been used by economists in reality, learning by mistakes have been ruled out; there is really nothing to learn when the mistakes are uncorrelated with all other phenomena by assumption. Expectations do not become rational, they are. Deviations from equilibrium prices are just stochastic disturbances. Walras, who first introduced the tatonnenment, considered prices of reality as oscillating around the equilibrium prices[32]. Such a stable oscillation, without any convergence, does not differ very much from the original assumption of zero forecast error.

Rational expectations imply limited knowing in the sense that it is not possible to know as much as under perfect competition, but by assumption all agents always know everything which is possible to know; i.e. efficient markets.

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30. Muth 1961, p.316. Myrdal used the term "rational expectations" in a similar way when he discussed Marshall's treatment of the rationality of economic behavior: "...föreligger uppenbarligen ett antagande, att företagarens förväntningar äro rationella i den meningen , att de i stort sett förverkligas" (Myrdal 1927, p.112).

31. Given the information set, the "subjective" probability distributions of outcomes of businessmen tend to be identical to the "objective" probability distribution of economic theory. With the same denotation as above: $D=D(P)$, $S=S({}_eP_t)+u$ and $D=S$ where ${}_eP_t$ is the price expected by the suppliers on the basis of the information they possessed at the previous period, and u is a stochastic process with $E(u_t|I_{t-1})=0$. The prediction made by theory is $E(P_t|I_{t-1})$. The assumption of rationality implies that $E(e_t|I_{t-1})=E({}_eP_t-E(P_t|I_{t-1})|I_{t-1})=0$. Observe that the expressions "subjective" and "objective" probability have nothing to do with the use of the same expressions in the context of measurable or personalistic probability.

32. Schumpeter 1954, p.999.

Among "measurement"-theories we also find theories which include adaptive expectations in some way. Adaptive expectations emerged out of the cobweb-theorem where the preceding price is believed to persist[33]. A price change, according to the cobweb theorem, will change expectations but the agents do not learn from their error[34]. Convergence toward equilibrium prices will only depend on the relation between the elasticities of supply and demand respectively. If expectations are formed on the basis of historical prices, and not all weight is given to a particular price, they are called "adaptive expectations"[35]. Adaptive expectations implies that agents change their expectations. In a sense this can be called learning; it is possible for agents to investigate a given and unchanging opportunity set so that equilibrium can be reached[36]. The principal character of the cobweb and adaptive expectations is the same, but the latter is an extension of the former; the range of the relation between the elasticities of supply and demand compatible with equilibrium is extended with adaptive expectations[37].

However, if the price system experiences successive external shocks, and its agents on the average use adaptive expectations, the system will never experience equilibrium prices. The reason is that adaptive expectations incorporate "time and place"-dependent knowing, knowing which is a result of the historical structure of the opportunity set, and excludes theory, which has a general application; what is outside the given opportunity set can not be learned. This is also the difference between rational and adaptive expectations. Individuals using adaptive expectations change their expectations within a given opportunity set in contrast to individuals using rational expectations, who always have a non-erroneous conception about the opportunity set. However, this only relates to the systema-

33. This means that ${}_eP_t=P_{t-1}$.

34. Nerlove 1958, pp.227-228.

35. Arrow & Nerlove 1958, pp.298-300; Nerlove 1958, pp.231-233. The usual way to formulate adaptive expectations is ${}_eP_t={}_eP_{t-1}+g(P_{t-1}-{}_eP_{t-1})$ where $0<g<1$.

36. This means that $E(e_t|I_{t-1})$ and $E(e_tI_{t-1}|I_{t-1})$ are nonzero (Sheffrin 1983, p.3).

37. Nerlove 1958, p.239. The condition for stability for the cobweb is that $|dD/dP|/|dS/dP|$ must be smaller than unity and for adaptive expectations that $(dD/dP)/(dS/dP)$ must be smaller than unity.

tic part, the regularities of the opportunity set. The unsystematical parts shows up in the model as stochastic noise.

Hence, under adaptive expectations the restriction of what is possible to know is narrower than under rational expectations. But the agents are ex post aware of that they did not know everything which is possible to know. Only when the forecast error is zero is the agents' behavior adapted to existing conditions, but this can also only be stated ex post.

The problem with theories of expectations, in the form the are usually presented, is that they are mechanical in their character. Where knightian risk is more like a classification, rational expectations actually assumes the existence of systematic knowing and do not bother with the problem how this knowing arises.[38] The problem with adaptive expectations is quite opposite; expectations change and agents learn, but their behavior is restricted to the given opportunity set. So, either agents are assumed to have learned everything that i possible to learn or they are assumed not to be able to learn all relevant facts.

5.3. Adaptive economizing

In this context a comment on adaptive economizing is instructive. Adaptive economizing is the optimizing of a sequence of choice problems under constraints. When the constraints change a new step of economizing takes place. When compared to

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38. The problem is discussed by Boland (1986). The implicit assumption behind the rational expectations hypothesis is that there exists a reliable method of inductive learning (given that all agents use and the same set of information). Since the processing of information is costly, all individuals will not use the same information set and their expectations will be distributed around the prediction of theory. But the reliance of inductive learning is a problem, since no such method exists; hence the predictions of theory will not tend to be better the the expectations of businessmen. (Boland 1986, pp.120f)

    One possible solution could be Bayesian learning; individuals form an a priori distribution of probabilities which depend on the individuals interpretation of facts. This distribution is the changed when the individual learn the earlier interpretation of facts was wrong (Boland 1986, pp.124-126). However, the objection is that this violates the demand of methodological individualism, that the phenomena shall be explained in terms of individual action (Boland 1986, p.128).

    On the problem of how rational expectations become rational see Frydman (1982). Frydmans conclusion is that agents cannot acquire the proper knowledge of the parameters of the equilibrium price distribution on the basis of a correct specification of the model. Instead agents are facing knightian uncertainty. (Frydman 1982, pp.653f).

rational expectations an important property of adaptive economizing must be noticed. In adaptive economizing, a new economizing procedure take place when an exogenous or endogenous change i constraints take place. An exogenous change is a change of the opportunity set and an endogenous change is a result of the agents experience. But the agent in adaptive economizing never notice this distinction. All behavior is strictly dependent on experience; an exogenous change in the opportunity set which results in error cannot be separated from from an error depending on that the "learning" procedure was not well chosen. The problems with adaptive economizing are that changes in the opportunity set are exogenous and that the learning procedure is mechanical in character.[39]

But this view is not necessary. If we consider the economy as an experimental process where agents and firms through piecemeal advances learn about existing economic opportunities, as well as to create new opportunities, this view does neither explicitly exclude or include agents' changing conception of how the economic system works.[40]

With adaptive behavior the opportunity set is regarded as given (in the sense that individual behavior do not change it) and in principle possible to know and also approximately known to the agents. Eliasson's "experimental economy" on the other hand, regard the opportunity set as partially unknown and changing. To the extent that agents are not aware of this and regards the opportunity set as given and known error can occur.

5.4. Personalistic probability and economics of information

Mainstream theories are opposed to views based on measurability, objectivity etc. Instead probability is viewed as a result of judgments of individuals. It is in this sense that the modern literature uses the term "personalistic probability"[41]; probability is the belief an individual has in the truth of a

39. Day & Hansson 1985, p.11; Day 1986a, p.61; Day 1986b, pp.153-155, 168f; see also Schumpeter 1934, pp.79-81.

40. Eliasson 1986b, p.18f; Eliasson 1986c, p.9-11.

41. Savage 1954, pp.3, 27-30. Also the expression "subjective probability" is commonly used as a synonym.

proposition in quantitative terms, irrespective of whether a frequency distribution exists or not. Of course, given the same knowing two individuals can have different degrees of confidence of the truth of the same proposition[42].

"Risk" (or "uncertainty") according to this opinion is the individual's distribution of quantitative weights on known outcomes (the result is the inherent equilibrium properties of theories using personalistic probability). "Risk" and "uncertainty" are used as synonyms in this branch of literature, and they both mean that there are more then one outcome and no outcome has been assigned unit probability; there is no incomplete knowledge concerning possible outcomes. Hence, the opportunity set is regarded as given and known; agents just do not know which event will occur.[43]. This does not mean that measurement cannot be a part in the process of forming personalistic probabilities, but only that individuals form probabilities in a way of which we are ignorant; we cannot exclude the use of "objective" frequency distributions.

Also, this concept of probability has brought together the "economics of uncertainty" and theories about adaptation to incomplete knowing, and the "economics of information" on theories about the elimination of incomplete knowing. Expected-utility, risk-sharing and insurance etc belongs to the former and search-theory, creation of knowing and the analysis of future markets etc to the latter.[44,45]

The first step in the adaptation to risk is the agent's calculation of the expected utility of different actions. The action which yields the largest expected utility is chosen[46].

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42. Savage 1954, p.3.

43. This view is also used by Debreu (1959). Contracts is a central property of this theory and Debreu used conditional contracts, contracts which is made valid only if a certain event will obtain, to "obtain a theory of uncertainty free from any probability concept" (Debreu 1959, p.98).

44. In a recent overview, "The Economics of Uncertainty" (McKenna 1986), the distinction between " economics of uncertainty" and "economics of information" is not explicitly used. However McKenna (1986) makes a difference between adaptation to and elimination of incomplete knowing, but only when discussing search theory (McKenna 1986, p.109).

45. Hirschleifer & Riley 1979, p.1377.

46. The underlying assumptions are (1) each agent is aware of the suitable actions; a=(1,...,A), (2) each agent is aware of all relevant future states of the world; s=(1,...,S), (3) each agent has a belief

Under the assumption that a pair of contractors attitudes risk averters, it can be shown that they will share risks; i.e. make a mutual insurance. In fact all insurance can be considered as mutual and insurance companies as intermediaries.[47]

A classical problem with risk-sharing is when only the average probability of loss, and not the probability of loss for specific risk-groups, is identifiable: "adverse selection". This problem is not only a problem of insurance and the general result can be shown to be that high quality is not fully rewarded when only average quality is observable. So far risks have just been assumed to be traded, but it is also possible to reduce or to modify risks. A general problem ("moral hazard"), which take us into the area of the elimination of risk, is the question if individuals are, when taking an insurance, inclined to reduce scale or chance of loss?[48]

5.5. Action and uncertainty

Austrian theories are typically opposed to the conception that the opportunity set is known and given. They take into account creative human action. These phenomena, the phenomena of human action, determine the character of probabilities and expectations, and put a restriction of what it is possible to know. The austrians regard human action as an ultimate given fact from which theories can be deduced. However, the establishment of the fact of human action is the same as to say that the future is not certain. Otherwise agents did not have to act[49]. Uncertainty then is a partially unknown opportunity set, to which the sources are found in two spheres:

> "... insufficiently known natural phenomena and that of human act of choice."[50]

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as to the likelihood of different states of the world (and the certainty is reflected by the tightness of the probability distribution); P_s, (4) a full definition of the consequences of every action under each state of affairs; $c_a(s)$, and (5) a cardinal utility function defined over all consequences; $v(c_a(s))$. Then the expected utility for an action is $u(a)= P_1v(c_a(1))+...+P_sv(c_a(s))$. (Hirschleifer & Riley 1979, pp.1377-1380)

47. Hirschleifer & Riley 1979, pp.1384-1386.

48. Op cit, pp.1389-1391.

49. Mises 1949, p.105.

50. Op cit.

Another suggested origin of uncertainty suggested is that the passage of time alters conditions in an unpredictable way[51]. Time:

> "... is a dynamically continuous flow of novel experience. This flow is not in time ... it is or constitutes time".[52]

This would imply the inherent unlistability of all possible outcomes under uncertainty, which is opposed to the assumptions of standard theory[53].

Mises introduced the terminology of class and case probability, which in its content is similar to the knightian distinction[54]. The law of large numbers is applicable to class probability (risk) but not to case probability (uncertainty). Of course there exists a number of solitary phenomena which in principle are repeatable, but the difference is not the number of the studied phenomena. The phenomena of human action, are because of their nature unique and in principle not repeatable; regularities do not exists when human action is concerned[55]. These phenomena are always classes in themselves. So there is a distinction between Mises, who wants to separate between different categories of phenomena about which judgments of probabilities are formed, and Knight, who wants to separate between different ways to form judgments about probabilities of phenomena.[56]

6. Creation and communication of knowing

We have discussed different states of incomplete knowing but very little has been said about knowing as such. The ques-

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51. O'Driscoll & Rizzo 1985, p.62.

52. Op cit, p.60.

53. Op cit, p.71.

54. Mises 1949, pp.107-111.

55. Mises 1962, pp.49f.

56. Op cit, p.111. Although Knight assigned the impossibility of calculating distributions of outcomes to the uniqueness of the phenomena at hand (Knight 1921, p.233), this uniqueness is not thoroughly investigated. It seems to me that the uniqueness considered by Knight more is a result of that phenomena not have been put into groups by agents, rather than uniqueness by virtue of their nature (Knight 1921, pp.238-239).

tion asked in the preceding section was what it means not to know. If we instead ask what i means to know, even if we do not know everything, the answer to this question can help us to understand what the opportunity set of reality looks like. The fundamental problem with perfect competition was earlier concluded to be that theory does not explain how perfect knowledge arises. This is the question which need an answer. It is fruitful to begin by asking to what extent knowing can be communicated.

6.1. Knowing; information and knowledge

When risk exists our knowing is limited to classes of phenomena. In this respect our knowing is general, because we expect the classification to be stable in time and room[57]. We also concluded that this knowing was systematic due to rational thinking, experimentation or systematic observations. We have what Hayek called general (of time an place independent), or scientific, information[58].

But if uncertainty[59] is at hand our knowing is not extended to classes of phenomena, but limited to certain phenomena or to certain parts of certain phenomena. This knowing, limited in time and room, is what Hayek denominated "particular information"[60].

The main argument made by Hayek was however that knowledge by its nature can not enter into statistics (and therefore cannot be conveyed to central planning authorities in this form). This argument rests on the assumption that some knowing is dependent of time and room (particular) and some is not (general)[61]. Now, there is no exact symmetry between a high "time-and-room" dependency and the possibility to communicate knowing, because we cannot exclude knowing which is impossible or

57. Knight 1921, pp.205.

58. Hayek 1945, p.521.

59. Uncertainty in the sense that the opportunity set is open-ended.

60. Hayek 1945, p.521; 1978, p.182.

61. The dichotomy between general and particular knowing has been discussed in the literature. (Cf. Machlup 1962, pp.17-18)

hard to communicate, but has a general application, or vice versa.

So, the hayekian meaning of information and knowledge is not useful and an extension of Hayek's argument is necessary. A difference between information and knowledge will be made, but henceforth no necessary connection to the knightian or the hayekian dichotomy will be assumed. We henceforth define information as non-tacit knowing and knowledge as tacit knowing.[62,63]

Information is disembodied knowing. It is explicit in the sense that we are aware of what we know. It is not tacit! Information can be coded and communicated without connection to the use of it[64]. Tacit knowing means that what is known is not explicitly known, and hence, cannot be (easily) communicated. This difference is probably a difference in degree; even if we argued that it is a principal difference we have to state that this difference probably can be overcome through certain means. The tacit character of knowledge implies that

> "...the aim of skillful performance is achieved by the observance of a set of rules which are not known as such to the person following them.".[65]

and

> "...we can know more than we can tell."[66]

If tacit, our knowing is not explicit, and we rely on implicit knowing to perform a certain activity; our attention is

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62. Earlier in this paper the distinction between information and knowledge have not been used, but the two expressions have rather been used as synonyms (Cf. Eliasson 1986a, p.22). From here the expression "knowing" will be used as a concept which contains both information and knowledge (Cf. Polanyi 1967, p.7; Eliasson 1986d, p.24). Different ways to make use of the information/knowledge dichotomy have been tried. Although discussing these different uses, Machlup suggests that no difference should be made between the meaning of the two expressions. If any difference, one could talk about an "act of informing" and a "state of knowing". This meaning is not used here, although it is close to the distinction introduced above. (Machlup 1962, pp.8,15)

63. See appendix.

64. Eliasson 1986d, p.24; Pelikan 1987, p.15.

65. Polanyi 1958, p.49.

66. Polanyi 1967, p.4.

directed from the implicit knowing to the explicit performance.[67]

6.2. The attainment of knowing

The important thing with the attainment of all knowing is that it has to be seen as a component for solving a specific problem for an specific agent; i.e. as a means to reach certain goals or as a goal in itself[68]. This means that it is possible to apply two perspectives on the problem. We can apply an individual, i.e. subjective, as well as a market, i.e. social, perspective. Knowing can be subjectively new (i.e. an individual get to know something which someone else already know) or socially new (i.e. an individual get to know something which no one has already know)[69]. Of course, socially new knowing is always subjectively new. As a result of this it has to be realized that, since different agents are facing different problems, the division and asymmetric character of knowing is the result[70]. The subjective perspective of one individual is not necessarily the same as for others.[71]

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67. Op cit, p.10.

68. Arrow 1962a, p.155; O'Driscoll & Rizzo 1985, pp.37-38; Papachristodoulou 1986, pp.11-12.

69. Machlup 1962, pp.7, 28.

70. O'Driscoll & Rizzo 1985, p.38; Pelikan 1987, p.10. There is a connection between the asymmetrical character of knowing and adverse selection, e.g. the division of knowing between a buyer and a seller where the buyer in many cases do not possess the same amount or kind of knowing, about the quality of the good for sale, as the seller.

71. Among theories operating with a known opportunity set, i.e. individuals are maximizing expected utility, one important example of asymmetric information (adverse selection) is the "lemons"-market described by Akerlof (1970). In a theoretical analysis Akerlof discusses the consequences of situations where buyers know less than sellers, and where buyers only have information about the average quality of goods in the market. The result is that bad products will drive out good from the market, and that, in an extreme, markets will not exist. Akerlof also discusses counteracting institutions as brand names, guarantees, licensing etc (Akerlof 1970, p.499f). However, the assumptions made by Akerlof to ensure asymmetric information are peculiar: (1) owner of cars can learn the quality of their cars, (2) this learning procedure does not help then if they want to buy another car since by assumption the only information available for buyers is the average quality of cars (or, everything that can be learned from owning a car is only applicable to that specific car), (3) buyers cannot learn from participation in the market process (Akerlof 1970, p.489).

    These assumptions can of course be disputed and more realistic assumption of the nature of the market process can be identified; (i) what one learns from owning a car can be of help when judging the quality other cars one wants to bye, (ii) potential buyer can learn from the study of or the participation in the market process, (iii) that high quality cars cannot be sold but to the price of inferior quality cars means that a profit can be made by implementing institutions by which buyers can identify proper quality (i.e. a scope for entrepreneurial activity); in fact the counteracting in-

Now, in the process of attaining knowing there exists a paradox:

> "...Plato has pointed out this contradiction in the Meno. He says that to search for the solution of a problem is an absurdity; for either you know what you are looking for, and then there is no problem; or you do not know what you are looking for, and then you cannot expect to find anything."[72]

The solution of the paradox is that not all knowing is explicit; i.e. some knowing is tacit. The relation between knowing and costs, to attain knowing, is also related to the paradox of knowing. There is no additional cost of using knowing, once it has been achieved, but there may be cost of acquiring knowing, especially knowledge[73]. Particularly the process of discovering knowledge is time-consuming and may be unsuccessful and knowledge may never be successfully communicated to others[74]. This means that we cannot predict what will come out of such a process[75].

The solution of the paradox put forward by Polanyi means that there exists pieces of knowing of which agents know they do not possess; an agent may have a conception of a problem and can assign a value or at least an expected value to the attainment of the knowing necessary to solve this problem. But there also exists knowing of which we do not have any conception. We can not even assign an expected value to knowing of which we do not have any conception at all. The paradox of knowing, and the solution with implicit knowing, is parallel to uncertainty; not all outcomes are known and the set of opportunities is at least not completely known to all agents.[76]

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stitutions suggested by Akerlof belongs to this class of phenomena. These assumptions makes Akerlof's list of counteracting institutions more complete.

72. Polanyi 1967, p.22.

73. Cf. Machlup 1984, p.159f.

74. O'Driscoll & Rizzo 1985, pp.104-105.

75. Arrow 1962b, p.615.

76. Cf. Polanyi 1967, p.23-24.

We have of course different means of attaining different kinds of knowing. One way to get information is through search among existing information[77]: something which is already known to someone else is communicated to us. We can also create new information through research, by inventing etc. On the other hand knowledge is either an initial endowment embodied in an individual (e.g. talents) or is the result of experience; learning by doing[78]. Through practice we get to "know" how to swim, to use a bicycle or to use a tool etc[79].

6.3. The attainment of information - search

Search theory began with Stigler (1961). Stigler started out from the empirical observation of price dispersion, which violated Jevons' "law" of one price in equilibrium. Stigler considered price dispersion as to some extent dependent on non-homogeneous goods, but also dependent on buyers' ignorance of prices offered by sellers. To solve this problem buyers search for prices (i.e. information[80]). Stigler determined the optimum search as when the cost of additional search is equated with the expected marginal return of search.[81]

The problem is that an agent can never know the value of a piece of information until he gets it. So agents do not purchase a certain piece of information but an information service, which generates a probability distribution of messages. Given this distribution the agent can calculate the expected value of a message[82]. Search goes on until a predetermined "cut-

77. Although information is communicable this does not mean that transfer of information is unlimited. The first problem arises out of the assymteric character of knowing; how can a buyer know that a seller is telling the truth. This is the problem of authenticity. The second problem arises when unauthorized resale occurs. This is a problem especially for legally unprotected knowing. (Hirschleifer 1973, p.35)

78. Arrow 1962a, p.155.

79. Pelikan 1985, p.7; Pelikan 1986a, p.14.

80. Information is called messages; m=(1,...M), which change the agent's belief that a state will occur to $P_{s,m}$, which is the conditional probability of Ps given message m. (Hirschleifer & Riley 1979, p.1394)

81. Stigler 1961, p.216.

82. Hirschleifer & Riley 1979, p.1397.

off cost", "reservation wage" etc is reached[83]. Information services experience increasing returns of scale; i.e. that the trade-off increases with the number of searchers and traders[84].

However, there are great similarities between search theory (ST) and general equilibrium (GE) with regard to informational assumptions. In a recent critique High (1983-84) formulates these similarities: (1) in both models consumers knows all the goods available and the utility attached to them, (2) in GE consumer know the equilibrium price and in ST the price distribution, (3) in both models consumers know they can implement their plans, (4) in GE consumers know where to acquire goods and in ST where to search for goods[85]. High concludes that there is only a "wafer-thin" distance between search theory and general equilibrium:

> "In fact, search theory models are inherently equilibrium models in which the auctioneer's kin calls out a price distribution rather than a single clearing price."[86]

6.4. The attainment of knowledge - learning and entrepreneurship

A typical example of knowledge in an economic context is market participation in different forms: i.e. the knowledge of how to behave in a market. Learning by doing can be exemplified by experimentation through market participation[87], adaptive economizing etc. These activities are not costless, because at least they require time. On the other hand, when there exists an initial endowment of knowing of how to behave in a market, we call this entrepreneurship because it is costless; it does not require any sacrifice from the entrepreneur to "get to know" how to behave as an entrepreneur.

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83. Axell 1976, p.60; Diamond 1984, p.15.

84. Hirschleifer & Riley 1979, p.1397; Diamond 1984, pp.3-4.

85. High 1983-84, p.255.

86. Op cit.

87. Cf. Eliasson, 1986b and 1986c; Pelikan 1987, p.14.

But if experimentation will result in knowledge, and it is costless to use this knowledge, why is this not entrepreneurship? The answer is that only if the experimentation in the market will result in knowledge which has a general application of how to behave in the market, we can call this entrepreneurship[88]. But the process of learning in the market itself is not costless, and hence not itself entrepreneurship. The reason is that entrepreneurship is deeply connected with the creative act of choosing the right framework, or to have a correct conception about the opportunity set, and knowing of these things cannot be dependent of time and place only. So here we have an example of knowledge which is hard to communicate but has a general application (i.e. entrepreneurial knowledge) and also an indication that the hayekian dichotomy is not satisfactory.

If learning by experience is the way to obtain knowledge, a general problem of communicating knowledge exists; how is it possible to transfer knowledge which is embodied in a person, or in process where more than one individual is involved, and the individuals involved are not explicitly aware of that knowledge[89]? Instead of acquiring the knowledge itself it is possible to acquire the effects of the knowledge; i.e. to hire a person, to buy a company etc. These acts are means to transfer the effects of knowing, when knowing is not itself communicable[90]. But institutions (i.e. markets) necessarily requires human efforts; the knowing of how to produce and to communicate knowing requires innovative activity.

6.5. Innovative activity

The creation of knowing which was previously non-existing is called an invention[91]. In a problem-solving context inven-

88. If it is possible to learn to behave like an entrepreneur we would be inclined to say that the older Schumpeter was correct and the younger Schumpeter incorrect. See section 7 below.

89. Cf. Pelikan 1986b, pp.12-13.

90. Cf. Ross 1973, p.138.

91. Papachristodoulou 1986, p.11; Eliasson 1986, p.31. Inventions are changes of technology, in a broad sense, and innovations are inventions which are commercially successful, although the two expres-

tions continually change the set of economic opportunities[92]. This holds for "socially" new knowing as well as for "subjectively" new knowing; i.e. the communication of knowing is also changing the sets of opportunities for individual agents and is hence the creation of what was previously not existing, even though the market value of such opportunities will probably decrease with the number of agents knowing about the opportunities.[93],[94]

7. Computational ability

The model of perfect competition assumes "economic man" to make rational decisions. It exist no limits to the individual's capacity to process information, to make up plans, calculate consequences and to make decisions; all agents are assumed to have a perfect computional ability[95].

If we loosen this assumption it means that the agents' computional capacity is less then perfect: mistakes are possible, not only, as we have noted earlier, due to incomplete knowing but also, because it is possible for the agent to miscalculate. Bounded rationality, opposed to global rationality, give the agents a capacity to apply simplified models to deal with complicated problems.[96]

When Simon delivered his Nobel lecture, he used a more complex definition of bounded rationality: (1) failure of knowing all alternatives, (2) "uncertainty" about exogenous events, and (3) inability to calculate consequences[97]. But the knowing of

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sions often are used as synonyms. A recent summary of endogeneous innovations is found in Witteloostuijn (1986).

92. Shackle 1938, p.88.

93. Although the social opportunity set is increasing and in principal unlimited, our tacit knowing, the "local competence", prevent us from using the opportunity set completely (Eliasson 1986b, pp.20-21; 1986c, p.8)

94. The first modern rules for patents in England regarded "novelty to the realm" as important and not if the person who first got the patent was the original inventor or not; "whether learned by travel or study, is the same thing" did a court state in 1693 (Machlup 1968, p.463).

95. Simon 1955, p.99.

96. Op cit, p.113; 1972, p.162. However, in Simon (1955) was the expression "limited rationality" used.

97. Simon 1979, p.502.

alternatives and exogenous events is rather incomplete knowing than a less the than perfect computational ability. Bounded rationality will be regarded here as the absence of the capacity of calculating global consequences, but the presence of the capacity of calculating consequences of a bounded problem. The result of bounded rationality in the real world is satisficing instead of optimizing behavior, and replacement of abstract global goals for tangible subgoals[98]. When individuals reach a predetermined aspiration level, instead of the optimum, they are satisfied[99].

The problem with bounded rationality is that it is does not imply a specific definition of the computational ability of agents, but that it is limited in the calculation of consequences. Even if we go from global to bounded rationality, we still have a situation where means and ends are given to the agent; i.e. an ex ante given set of subjective opportunities. The problem for the agent is to behave "rationally" given the opportunities[100]. A more fruitful way can be not to explain the problem i terms of reason, because rationality only serves the purposes chosen, it does not select them. The misesian concept of "human action" ("homo agens" rather than "homo oeconomicus") implies that agents have to decide which model or "means-ends" framework to use (or even to choose ends never chosen before and create the means to reach these ends); the opportunity set is then a result of, rather then an exogenous limitation to human behavior and consequently open-ended[101].

A similar problem has been pointed out by Pelikan (1987). Pelikan argues that optimal allocation of factors of production can be made only when economic competence (i.e. the competence to make allocative decisions) is symmetrically distributed and not rationed. But since economic competence is likely to be

98. Op cit, p.501.

99. Simon 1955, p.111.

100. Simon 1955, p.112. The view of "limited rationality" in Simon (1955) is almost identical to R.H. Day's concept of "adaptive economizing". (Cf. Simon 1955, p.100f, 110f; Day 1986a, p.61; Day 1986b, p.153-155, 168f)

101. Kirzner 1982, pp.46-47; cf. Croce 1900, p.176f. Simon and Day also considers self-imposed limitations, but these are strictly dependent on experience and has nothing to do with choice of framework or the identification of a problem (Simon 1955, p.113; Day 1986a, p.61; Day 1986b, p.169).

scarce and assymteric a decision to allocate economic competence is needed; the entrepreneurial decision.[102]

This is the same view as stated by Kirzner (1980), but from the opposite perspective:

> "Entrepreneurial alertness is not an ingredient to be deployed in decision making; it is rather something in which the decision itself is embedded and without it would be unthinkable."[103]

8. Entrepreneurship and arbitrage - the Austrians[104]

As an economic tradition the Austrian school of economics has always emphasized subjective judgment based on incomplete knowing. The connection between this kind of decision making and entrepreneurial activities have been acknowledged by the austrians since Carl Menger[105]. Menger, as well as Knight (who is not considered to be a member of the Austrian school of economics) emphasized entrepreneurship as an activity which is characteristic of uncertainty; entrepreneurial activity was rewarded by the residual (the profit, which was distinguished from capital rent)[106]. But the focus here is on Ludvig von Mises, Friedrich A. von Hayek and Israel M. Kirzner. Mises (1949) continued the mengerian tradition, Hayek (1937, 1945 and 1949) developed a view of the price-system, and these two components were later used by Kirzner (1973, 1974, 1980, 1982, 1984a and 1984b) to develop the theory of entrepreneurship in a market context.

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102. Pelikan 1987, pp.10,13.

103. Kirzner 1980, p.22.

104. It is probably an interesting question in the history of economic thought if Schumpeter is to be considered as a member of the Austrian school of economics or not. Some economists considers him to be austrian not only of origin, while others hesitate in this judgment. On the view that Schumpeter was a member of the austrian school see Simpson (1983).

105. Kirzner 1978, pp.32ff; Martin 1979, p.279.

106. Schumpeter 1954, p.894; Martin 1979, pp.276,282.

8.1. Ludvig von Mises

Mises argues that the "entrepreneur" as an economic concept must be separated from the kinds of persons which the concept has been associated with in the study of economic history as well as from the legal term "entrepreneur"[107]. The economic concept "entrepreneur" is a function in the economy which living men can combine with other functions (to be consumers, resource owners etc)[108]. Mises connects the entrepreneurial function with uncertainty. But he also connects action with uncertainty; action is implied by uncertainty and vice versa:

> "If man knew the future he would not have to choose and would not act".[109]

But action has many implications and entrepreneurship is therefore defined as action[110]:

> "...exclusively seen from the aspect of uncertainty inherent in every action".[111]

So, the main property of functional entrepreneurship is to deal with and carry uncertainty; in fact Mises defines entrepreneurship in terms of uncertainty and focuses on the forward looking character of entrepreneurship[112]. The success or failure of entrepreneurship depends on whether the expectations of the entrepreneur are correct or not. Since entrepreneurship is explicitly separated from other functions in the economy, the correctness of expectations of entrepreneurs is the only source of entrepreneurial profit.[113]

Two important things about the misesian view of entrepreneurship must be observed. First, entreprenurship is ex-

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107. Mises 1949, p.61.

108. Op cit, p.253.

109. Op cit, p.105.

110. Carl Menger did not emphasize functional entrepreneurship, but but he concluded that entrepreneurship must include "the act of will". (Menger 1871, p.160)

111. Op cit, p.254.

112. High 1982, p.161: cf. Faxén as cited above.

113. Mises 1949, p.288.

plicitly seen as an equilibrating force on the market[114]. The activities of the entrepreneurs represent a competitive process which tend to bring prices down to a state of unreachable equilibrium prices[115]. Second, entrepreneurship is explicitly separated from innovative activity; i.e. the creation of innovations. The latter is recognized as "promotership" by Mises:

> "The driving force on the market, the element tending toward unceasing innovation and improvement, is provided by the restlessness of the promoter and his eagerness to make profit as large as possible".[116]

However, later on Mises discusses "...promoting and speculating entrepreneurs" as the driving force of the market process, and the difference between promoters and entrepreneurs therefore seems to be that "entrepreneurship" is a wider concenpt than "promotership".[117] Hence from the beginning in the austrian tradition. the focus is how equilibrium emerge; the opportunity set is in the perspective of entrepreneurship assumed to be socially given.

8.2. Friedrich A. von Hayek

Hayek is mainly interested in the ability of the economic system to communicate knowing, but does also make explicit references to entrepreneurship as such. In his article "Economics and Knowledge"[118] Hayek started with a discussion about what kind of judgments economic theory really can make. Hayek argued that equilibrium can only exist when agents' anticipations of

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114. Op cit, p.335.

115. Mises is using the concept "evenly rotating economy" (ERE) instead of equilibrium. Cowen & Fink (1985) is a critique towards the ERE. They summarize the important properties of the ERE as (1) it is a result of a convergence process initiated by a freeze of tastes, technology, and resources, (2) the events of a single market day continually repeat themselves (Cowen & Fink 1985, p.866).

116. Mises 1949, p.256.

117. Op cit, p.325. Rothbard (1962) contains a view similar to Mises'. Rothbard argues that innovations is only a part of entrepreneurial activities, but that most entrepreneurs are not innovators. But innovative activities can be seen also as adjusting market conditions to the greater satisfaction of consumers since the entrepreneur "is adjusting the discrepancies of the market as they present themselves in the potential of a new method or product". (Rothbard 1962, p.494f).

118. Hayek uses the expressions "information" and "knowledge" as synonyms.

the world ("subjective data") are consistent with reality ("objective data")[119]. But neither theoretical or real equilibrium processes starts from "objective data", but from the anticipations of individual agents. Hayek defines an equilibrium process as when:

> "...the expectations of the people and particularly of the entrepreneurs will become more and more correct."[120]

Hayek's problem is now to define (1) the circumstances under which a process like that can exist, and (2) how such a process will change the expectations of the agents to become more and more correct. Hayek did not develop his argument further in this article but concluded that it was a paradox that the process he was looking for must, from a situation where the knowing is dispersed on individuals, end in an equilibrium, which according to standard theory only could exist as a result of deliberate action, of the total knowing of all agents, of one agent[121].

Not until eight years later Hayek continues. Hayek starts with the claim that all knowing in a society never is given to an individual agent. Knowing never exists in a concentrated or integrated form, but only dispersed, incomplete and contradictory[122]. Hayek also define the two categories of knowing (general and particular) which are already mentioned. One qualification only; Hayek is talking about knowing of market circumstances rather than knowing of production opportunities, which means that Hayek has essentially the same perspective as Mises; the opportunity set is socially given[123].

Hayek then tries to deal with the problem he did not solve in 1937. It is not reasonable to expect, Hayek says, that equilibrium is reached by communicating all knowing to a central

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119. Hayek 1937, p.41f.

120. Op cit, p.44; Cf. Hayek 1949, p.93. Hayek does not conceive this equilibrium concept as timeless. Since equilibrium is defined in terms of plans and expectations and not in prices and quantities, it is not necessary (Littlechild 1982, p.88).

121. Hayek 1937, p.49.

122. Hayek 1945, p.519.

123. Op cit, p.524.

planner, who systematizes the knowing and issues orders. The reason is the uncommunicable character of knowledge (Hayek 1945, p.524). The alternative is decentralized decision making, but the paradox is that each individual do not have enough knowing to make decisions. Hayek's solution is that the price system will communicate the dispersed knowing:

> "The whole acts as one market, not because any of its members survey the whole field, but because their limited individual fields of vision sufficiently overlap so that through many intermediaries the relevant information is communicated to all."[124]

However, the idea of Hayek suffers from a substantial weakness: he never explicitly defines how prices will be communicated![125] In a later article Hayek offered as the only solution of this problem, market participation as a learning process; i.e.:

> "...trial and error in the market, with the individual market participants gradually learning the relevant circumstances."[126]

Competition, which is a process where agents compete, is essentially a way of communicating knowing[127]. Later Hayek described competition as a process of discovery[128]. This hayekian view of competition as a process of trial and error was however later thoroughly developed by Kirzner[129].

However, commenting on Hayek (1937, 1945, 1949 and 1978), Kirzner makes clear what is the crucial point in Hayek's idea of competition as a process. Equilibrium prices only convey what is already discovered, they coordinate only:

> "...because they are <u>already</u> so adjusted ... that decisions that take these

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124. Op cit, p.526.

125. Cf.Loasby 1982b, p.115.

126. Hayek 1949, p.100.

127. Op cit, p.106.

128. Hayek 1978, pp.181f, 184, 188ff. The difference between Mises and Hayek in their views of tendencies to equilibrium is that Mises regard it as following logically from the activities of enterprising men and Hayek regards it as an empirical matter (Littlechild 1982, p.88f).

129. Cf. Loasby 1982b, p.115.

> prices into account turn out to be mutually reinforcing."[130]

However, disequilibrium prices are only coordinating in the sense that they reveal how a pure entrepreneurial profit can be made if the decisions of market participants are changed[131]. In equilibrium agents adapt to prices (i.e. they are price takers in a given opportunity set), but in disequilibrium the opportunity set is discovered by the use of entrepreneurial ability.

8.3. Israel M. Kirzner

According to Kirzner, traditional price theory is working within a framework of given means and ends; i.e. economizing, the allocation of limited resources on given ends, is only possible because of the assumption of perfect knowledge[132]. But in reality knowing is dispersed and tacit, and therefore the identification of means and ends is necessary. This is done by:

> "...the pure entrepreneur, that is a decision-maker whose entire role arises out of his alertness to hitherto unnoticed opportunities."[133]

All decision makers could be endowed with an entrepreneurial element, but as noted above entrepreneurship is scarce. Kirzner is limiting entrepreneurship to a function in the economy, for the sake of argument: pure entrepreneurship[134]. Entrepreneurship as such, is not connected to the possession of land, labor or capital, but on the contrary decision making without resources[135]. Entrepreneurship is not connected to knowing about production opportunities but only to market opportunities (i.e. a socially given opportunity set). The entrepreneur is doing something which in fact could be done by anyone; the exploitation of an opportunity to buy cheap an sell

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130. Kirzner 1985, p.200.

131. Op cit, pp.200, 205.

132. Kirzner 1973, p.39.

133. Op cit.

134. Op cit, pp.15,43.

135. Op cit, p.40; 1974, p.259.

expensive[136]. There always exists the possibility to imitate the entrepreneur ex post, but ex ante is the opportunity which the entrepreneur is aware of, non-existing to other agents. The entrepreneur can exploit the opportunity but is never protected against competition. Kirznerian entrepreneurship is consequently separated from the exploitation of the possession of unique resources (e.g. knowing about new means of production or about new products), which always implies a certain protection against competition[137].

One can of course ask what substance kirznerian entrepreneurship has, if it is completely separated from the owning of resources? Kirzner vindicates:

> "...entrepreneurship is not much substantive knowledge of market data as alertness, the "knowledge" of where to find market data."[138]

It is important to notice that the entrepreneurial alertness is alertness to available, but yet unnoticed opportunities[139]. Entrepreneurship is alertness to, rather than possession of knowing; hence, the entrepreneurial decision is the ultimate hiring decision. Agents who are aware of market opportunities but do not exploit these opportunities themselves are not entrepreneurs; but they might be hired by an entrepreneur who is aware about their knowing of market opportunities. Another way to describe this is that the entrepreneurial ability is never considered as a means of production; i.e. when the means to produce a specific product are considered, the decision to produce that product is not considered as a means of production.[140]

However a change in which aspects of entrepreneurship are emphasized can be found in Kirzner's recent writings. In Kirz-

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136. Loasby 1982a, p.242.

137. Kirzner 1973, p.16.

138. Op cit, p.67; Cf. Polanyi 1967, p.22. See also Hayek (1978): "...the capacity to find particular circumstances, which become effective only if possessors of this knowledge are informed by the market which kinds of things or services are wanted..." (Hayek 1978, p.182).

139. Kirzner 1984b, p.3.

140. Kirzner 1973, pp.68-69; 1974, pp.247f.

ner (1973) the arbitrage character of entrepreneurship was the main point[141]. The reason was probably that this aspect was explicitly ruled out from Schumpeter's theory of entrepreneurship. However later Kirzner argues that "alertness to opportunities" is a broad concept also including speculative and innovative activities; i.e. he is not only incorporating his own and Mises's perceptions of entrepreneurship, but he also defines promotership according to Mises as a part of entrepreneurship[142].

It is also important to realize that kirznerian entrepreneurship is not an aspect of search. Search is an activity which is consuming resources and consequently stops when a predetermined cost limit is reached. But kirznerian entrepreneurship is not connected to the possession of unique resources, or any resource, and therefore not a resource consuming activity; entrepreneurship is costless as such.[143]

Kirzner considers his entrepreneur as a function creating equilibrium[144]; the flesh an blood of hayekian competition which replaces the walrasian auctioneer[145]. The perceptions of agents is set to agreement with the "objective" data of the market, trough the the communication of the necessary knowing by the entrepreneurs[146]. Hence, the entrepreneur, of the early Kirzner, is creating "subjectively" but not "socially" new knowing.[147]

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141. This, and that the arbitrage character of kirznerian entrepreneurship means that uncertainty does not have a proper role in kirznerian entrepreneurship until Kirzner (1982), is pointed out by Loasby (1982b, p.119) and High (1982, p.161). The arbitrage character of the early version of kirznerian entrepreneurship is modeled in Littlechild & Owen (1980). The model consists of a number of separate markets which are linked together by entrepreneurs. The probability that entrepreneurs will detect a price difference between two markets depends on his own entrepreneurial ability and the attractiveness of the price difference. However all markets are known and the agents are price takers.The model therefore is essentially belonging to the class of equilibrium models.

142. Kirzner 1984a, pp.84-86.

143. Kirzner 1980, p.24.

144. Equilibrium is used in both an individual and in a market perspective (socially); individually that the the envisaged future will be the realized one and socially the mutually consistency of plans (Kirzner 1982, pp.58, 61).

145. Cf. Loasby 1982a, p.242.

146. Cf. Martin 1979, p.281.

147. Kirzner 1973, pp.13-15.

9. Entrepreneurship and speculation - Joseph A. Schumpeter[148]

The common view is, that while the kirznerian entrepreneur occupies himself with the coordination of market knowing, the concern of the schumpeterian entrepreneur is mainly knowing about production opportunities. Schumpeter considers the entrepreneurial activity as extraordinary, since most agents employ routines to handle ordinary problems ("adaptive response"). This is the economy in equilibrium, i.e. "the circular flow of economic life"[149]. Other agents, the entrepreneurs, solve problems in a fashion which is not routinized ("creative response"). The characteristics of creative response is, that other agents than the performing agent seldom realizes the positive effect of the performance ex ante, but possibly ex post; creative response direct the economy onto a new track, but the specific formation of that track depends on the relative qualities and decisions of individual agents.[150]

The agents performing this extraordinary activity, the entrepreneurs:

> "...reform or revolutionize the pattern of production by exploiting an invention or more generally, an untried technological possibility for producing a new commodity or an old one in a new way..."[151]

Also in Schumpeter's writings it is the entrepreneurial function in the economy which is considered. An entrepreneur is an individual who is carrying out a new combination of existing factors of production[152]. For the individual this is not a lasting condition, since when the new combination is carried out and has been established, it enters the circular flow and the former entrepreneur becomes a manager of an ordinary firm; i.e.

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148. Here is only recognized Schumpeters view of entrepreneurship "as such", and not entrepreneurship in the broader sociological context or as a part of a theory of business cycles, in which Schumpeter applied it.

149. Schumpeter 1934, chapter I.

150. Schumpeter 1947, p.217.

151. Schumpeter 1942, p.132.

152. Schumpeter 1934, pp.74-75.

only the carrying out of a new combination is constituting entrepreneurship[153].

A new combination is to open up a new source of supply of a factor of production, to start the production of substitutes, to produce a new good which more adequately satisfy existing preferences, to open up an new market etc[154]. But these combinations are not "found" or "created" by the entrepreneur; they are always present[155]. The entrepreneur is not an inventor but an innovator; his activity, to carry out a new combination, makes the "invention" economically relevant[156].

The entrepreneurial function is not a matter of coping with uncertainty, since it does not include the function to supply factors of production[157]. The uncertainty falls only on the owners of the means of production. The profit of the entrepreneur hence, is not a residual due to uncertainty but the reward for the entrepreneurial function:

> "What have the individuals under consideration contributed to this? Only the will and the action: no concrete goods, for they bought these - either from others or from themselves; not the purchasing power, for they borrowed this - from others or ... from themselves. And what have they done? ... They have 'carried out new combinations'. They are entrepreneurs and their profit, the surplus, to which no liability corresponds, is an entrepreneurial profit."[158]

So the schumpeterian entrepreneur is operating outside the routine part of the economy and, as a part of this activity, he

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153. Op cit, p.78.

154. Op cit, pp.133-135.

155. Op cit, p.88.

156. Op cit.

157. Op cit, pp.75,137. The argument implies that the entrepreneur never ends up worse than his initial position (i.e. zero wealth). Kanbur (1980) argues that Schumpeter did not take into account the opportunity cost of entrepreneurship; i.e. the safe return of alternative occupations (Kanbur 1980, pp.492ff). However Kanbur discusses individuals exercising entrepreneurship and not what Schumpeter discussed, the entrepreneurial function.

158. Schumpeter 1934, p.132.

creates a situation of disequilibrium[159]. The activities of the entrepreneur breaks existing structures, but also creates new ones: "creative destruction"[160]. This activity increases the social opportunity set, and also the uncertainty for other agents.

In his later writings Schumpeter however discussed if the activity of making inventions commercially successful, and even if the act of inventing, could be routinized. The main question is if the creation of knowing is predictable, which Schumpeter seemed to be inclined to believe[161]. However, the early Schumpeter argues that it is the intuition of the entrepreneur, i.e:

> "the capacity of seeing things in a way which afterwards proves to be true."[162]

which makes is possible for the entrepreneur to act. Only if we can learn to know the world, if we more perfectly control facts and more simply can calculate things, the entrepreneurial function will decrease in importance.[163]!

10. Conclusions

The starting-point in this paper was that the model of perfect competition assumes what is going to be explained, when the question of how order can emerge out of disorder is under concern; i.e. with the assumption perfect knowledge the theory of perfect competition does not, and can not, explain how

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159. Loasby 1982a, p.240.

160. Schumpeter 1942, p.83f; cf. 1934, p.92.

161. Schumpeter 1942, p.132ff; 1947, p.224.

162. Schumpeter 1934, p.85.

163. Op cit, pp.85-86. In Futia (1980) schumpeterian entrepreneurship is modeled. The incentive for R&D activities by individual firms is the prospective to change the market structure. However, the perspective in Futia (1980) is mainly that of Schumpeter (1942, 1947). First, firms and not individual entrepreneurs undertake innovations. The reason given, is lack of empirical data for extra-industrial innovative efforts. Second, a known opportunity set is implicitly assumed since it is assumed that at least reasonable expectations are possible to form about the outcome of the R&D process. Hence, no difference is made between inventions and innovations (See also Papachristodoulou 1986, p.104). Third, the R&D process depend on the expenditure and no qualitative difference between different R&D project is recognized. The focus on expenditures also makes the innovative process resource consuming. The creative element of the entrepreneur emphasized by Schumpeter is therefore non-existent in the model. Also, empirical extensions of the model do not capture all innovations which are not a result of R&D. (Futia 1980, pp. 678, 683, 685)

agents get the knowing they are assumed to have. First the discussion concerned the character of incomplete knowing. Two kinds of incomplete knowing was recognized: (1) if the opportunity set is given but complete knowing regarding which event will occur does not exist and (2) if the opportunity set is not given. Different views on how probability of events in an known opportunity set were presented.

The theories discussed in section 5 are not concerned with the nature of knowing, thus avoiding the paradox of knowing. My conclusion is that standard theories in the economics of information and uncertainty regard knowing as simply "information"; it is possible to communicate out of context of the use of it and has hence no tacit character.

Also these theories use a "global rationality"-approach; there are no limitations in the hypothetical individuals capacity to deal with complex problems. This means that these theories avoid the criticism of Herbert Simon ("bounded rationality") as well as of Ludwig von Mises et al ("human action"). Consequently they cannot provide any solution to the problem and at the same time hold the methodological restrictions stated in Arrow (1959), i.e. the explanation must be consistent with action of individual agents (methodological individualism). Also the more general problem of the relation between prediction (the methodology of positive economics) and the behavioral assumptions that generate hypotheses is not clarified by these theories.

A first interpretation of these theories is that they only can predict human behavior to the extent that human behavior shows regularities (i.e. behavior governed by customary rules, habits etc), and only if we assume that the falsification-test mean that also assumptions are tested. A second interpretation is that these theories only serve as an instrument for prediction and policy-making; i.e. theories generate predictions but can never explain what kind of human behavior caused the values of the predicted variables (methodological instrumentalism).

If policy-making is concerned it does not matter which interpretation we choose. The conclusion whether industrial po-

licy-making can be effective is the same; policy-making is effective. However, if human behavior at least to some extent depends on the force of will (human action or equivalently the creativeness of the agent), both theories and methodology are not well chosen. Of course we can choose the rather defensive position of methodological instrumentalism, but that is not very fruitful if we want to get explanations.

Another way to attack the problem is then to discuss the nature of knowing, which was done in the next section. Also different ways to reduce incomplete knowing was discussed. A distinction was made between different categories of knowing; information which is possible to communicate and knowledge which has a tacit character. We concluded that the ways to reduce incomplete knowing was either (1) that information which someone else already possessed was communicated to us, (2) that we got knowledge through learning or (3) that we created knowing that no one knew before. The distinguishing feature of these three possibilities is that they imply a not given set of opportunities. All these possibilities to communicate, to transfer and to create knowing can be seen as entrepreneurial activities.

According to Kirzner entrepreneurial activity is alertness to available but hitherto unnoticed market opportunities. Entrepreneurship implies communication of knowing, and is therefore an equilibrating process; entrepreneurs eliminates uncertainty and is expanding the horizons for other agents. Schumpeter argued that the entrepreneur is the agent who commercially exploits an invention; he is the creator of uncertainty and hence his activities are narrowing other agent's horizons.

The kirznerian entrepreneur is the creator of subjectively, but not socially, new knowing. Through the activities of the kirznerian entrepreneur is that part of the socially available opportunity set which was previously unknown to a certain agent, made available; that part of the opportunity set which is subjectively unknown is successively decreasing. Since the early Kirzner emphasizes the arbitrage character of the en-

trepreneur the focus is on the assymteric character of information rather than on uncertainty. The kirznerian entrepreneur works in a given opportunity set in which knowing is assymetrically distributed. Kirznerian entrepreneurship implies a tendency towards perfect knowledge and equilibrium. On the other hand is the schumpeterian entrepreneur the creator of socially, and therefore also subjectively, new knowing. This activity is increasing the socially available opportunity set; that part of the opportunity set which is subjectively unknown, to others than the entrepreneur, is successively increasing. Schumpeterian entreprenurship implies an tendency away from equilibrium to conditions of imperfect knowing and disequilibrium; i.e. uncertainty.

Now, the early versions of the theories of entrepreneurship according to Kirzner and Schumpeter do not differ as much as is usually argued; both emphasize that (1) opportunities and combinations are already existing and not created or found by the entrepreneur; (2) the entrepreneurial profit is not a lasting phenomenon since everybody can compete with the entrepreneur[164]. This means that it is useless to separate between "market conditions" and "production opportunities", because the fruitful distinction is between what is socially or subjectively new. After Kirzner's reformulation of his theory of entrepreneurship the synthesis between his and Schumpeter's theories is in many respects a fact; however the relation to uncertainty is still a difference between them. Another main difference is that Kirzner's analysis starts in disequilibrium and and that of Schumpeter's in equilibrium.

When an opportunity or a new combination is carried out other producers, traders etc are facing a new situation, and it does not matter whether this situation is a result of arbitrage and speculation or of the introduction of a new process of production. These other market participants will face a problem of how to value the situation; their horizons becomes narrower.

164. The origin of profit is the entrepreneurial activity. When profit cease to exist the entrepreneur is no longer active. This does not mean that the entrepreneurial ability is "consumed" and profit is not a reward for a factor of production. The entrepreneurial activity is "comparable to the role of catalysts in the formation of chemical compounds" (Pelikan 1987, p.10).

They are the agents who are facing uncertainty, because they cannot valuate the situation correctly! But the problem is which the relation is between the entrepreneurs themselves and uncertainty. However, Kirzner argues that the important thing is not if entrepreneurs suffers losses or not, but that they receive the profits[165].

The first step of the entrepreneurial activity is the cause to assymteric knowing; i.e. to uncertainty. As long as nobody is aware of an opportunity or an new combination it has no effect on the problem. So, uncertainty is not result of not knowing all opportunities, but of not knowing opportunities known to other agents. The second step of entrepreneurial activity is the elimination of the assymteric knowing, which is the parallel to the elimination of the entrepreneurial profit. Both steps are present in Schumpeter's and Kirzner's writings, but the former emphasize the first step and the latter the second step. This means that it is not possible to make Kirzner to a "subset" of Schumpeter or vice versa, because they try to answer different questions and hence also includes and excludes different things; e.g. Schumpeter rules out responses to changes in consumer preferences as entrepreneurial activities but Kirzner considers this to be an important aspect of entrepreneurship[166], Kirzner excludes technological knowing from the entrepreneurial arena but Schumpeter's entrepreneur is mainly associated with this type of knowing etc.[167,168]

This integrated view of entrepreneurship, "dynamic entrepreneurship", implies that economic activities are the creation ("action") of data rather than adaptation ("economizing"), the characteristic of perfect competition, to data. Dy-

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165. Kirzner 1982, p.65f.

166. From the austrian point of view is the main criticism against Schumpeter his ruling out of changes in consumer tastes as an important factor in the understanding of entrepreneurship (Rothbard 1963, pp70-71; see also Kirzner 1973, p.129).

167. Simpson (1983) argues that the difference between Schumpeter and the older members of the Austrian school of economics (i.e. Menger and Mises) on the view of markets processes is one of semantics only (Simpson 1983, p.20).

168. On the common interpretation of Kirzner and Schumpeter, see Loasby (1982, pp.240, 242) and Shand (1984, p.85).

namic entreprenurship is the consequence of the fact that man is not omniscient, and have to deal with an unknown future.

In the economic world of Kirznerian-Schumpeterian entrepreneurs the opportunity set is contingently changing. The theory of entrepreneurs cannot predict the exact patterns economic life will take as the result of entrepreneurial activities; unless the economists themselves are successful entrepreneurs. In fact they have to be meta-entrepreneurs since the must not only predict a subset of the changes in the opportunity set, but predict all changes. Hence the conclusion concerning industrial policy making is simple; it cannot experience systematic success.

Appendix

	Non-Contextual Application	Contextual Application
Non-Contextual Communication	1. General, Non-Tacit, knowing	2. Particular, Non-Tacit, Knowing
Contextual Communication	3. General, Tacit, Knowing	4. Particular, Tacit, Knowing

Examples for these four categories of knowing can be given: (1) General, Non-Tacit Knowing; scientific theories, (2) Particular, Non-Tacit Knowing; statistical data of markets, (3) General, Tacit Knowing; entrepreneurial ability, (4) Particular, Tacit Knowing; business managing in equilibrium.

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