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INFORMATION, EXPECTATIONS AND ECONOMIC PLANNING

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SUMMARY

Information - understood as items of and in particular accretions to knowledge which act over subjective probabilities attached by economic agents to uncertain events - is a commodity whose production, exchange and use presents special problems of measurement, private and social evaluation of its effects, classification.

Treatment of these problems in recent literature on information economics is recalled in order to discuss the formation of expectations - precisely as subjective probabilities modified by information - on the basis of which necessarily economic agents operate in any sequential economy, i.e. an economy where markets - even if generalised to include markets for future and contingent commodities - open and shut repeatedly or are continuously open, making impossible a general equilibrium allocation based on a single price system at a point in time.

The informational efficiency of markets, postulated by the theory of so-called "rational" expectations - which would be better defined as "successful" instead - is rejected because i) it is contradicted by the paradox of worthlessness of information which can be derived from it; ii) it implies innate knowedge instead of learning processes; iii) it neglects the possible self-fulfilment of expectations. The informational inadequacy of markets remains at the root of inefficiency, disequilibrium and instability which visibly characterises market economies.

Attempts at ex-ante coordination of decisions of economic agents have been attempted with both French-type indicative planning and Soviet-type command planning. Both however come up against not only practical difficulties - which might be reduced by technical progress in information processing and communication - but also the non-cooperative strategies of participants in the planning exercise, though for different reasons and with different implications in the two systems. The alternative remains of delegating to markets detailed decisions about inputs and outputs, limiting policy to macroeconomic variables; this however requires the development of new instruments of control and information (above all about the costs and benefits of such control).

INFORMATION, EXPECTATIONS AND ECONOMIC PLANNING

I. INFORMATION

It is often said that ignorance is bliss but economists treat information - understood to be items of knowledge and mostly accretions to a stock of knowledge - as unquestionably useful. As a good not freely available in nature information is a commodity, continuously produced and exchanged for direct use, storage and further processing. Yet information, as a commodity, has elusive and uncomfortable properties.

The characteristic of information is that it causes a change of subjective probabilities (= beliefs) attached to events by individual agents. Sometimes it is postulated that information always reduces uncertainty, i.e. generates less dispersed probability distributions; this notion derives from the theory of statistics (e.g. measurements; sampling) and of communications (e.g. noise) but it is not a necessary connotation of information. Unless it produces absolute certainty, information might very well induce individuals to realise that events are more widely dispersed than they originally believed (Hirshleifer, 1973).

The quantity of information cannot be defined and measured in general other than in the trivial sense of capacity required for its storage (e.g. number of bytes) or transmission; moreover, if cost is proportional to such capacity, a measurement of required capacity indicates not information quantity but its supply price (Marshak, 1959; Arrow, 1971). The cost and value of specific items of information, instead of a homogeneous commodity, must be considered.

There is no direct utility attached to information as such, except in the limited sense of satisfaction derived from being well informed or better informed than others. The value of information to an individual therefore has to be derived from the consequences of actions based on that information. Benefits from information derive from changes in the pattern of consumption and of asset holdings; changes in production pattern, including investment; re-sale; revaluations of owned assets deriving from the diffusion of information (Hirshleifer, 1971 and Fama-Laffer, 1971).

In order to exist, be transferred or stored, information needs a carrier. Its value is independent of the carrier's value but it may have to be embodied in expensive hardware before it can be put to some of its uses (e.g. the technical information embodied in machines).

Since the value of information depends upon the scale on which it can be used, such value is an increasing function of wealth (Arrow, 1986); this may set in motion cumulative processes making the rich richer. In general the value of information cannot be assessed before a purchase has taken place: it is unknown until the information content is fully known, but once the content is known the value is zero (Arrow, 1971). Therefore for information to be valuable at all there must be additional signals indicating the credibility of an information seller, or reliance on reputation and trust generated by the experience of successive transactions, or a system of guarantees.

The value of information to an individual may, or may not, be affected by the further transfer of information to others; there may be cases when transfers do not reduce the value of information to the seller or when they even increase it, as in the diffusion of information about favourable characteristics of one's goods or assets (as in informative - as opposed to manipulative - advertising). More often than not, however, the value of information is reduced by its diffusion

because it leads to competitive activities; as they say in the Abruzzi, "Were I to tell you I would forget it myself". There is a tendence towards monopoly in the production of any given item of information because competitive producers can gain from merging "since by producing the information only once their costs are lowered, though their combined output is unaffected" (Fama-Laffer, 1971), but potential entry keeps a check on monopoly profits. Once information is no longer a monopoly possession there is potential competition in its diffusion ("coding", as in Pethig 1983, does not protect the producer); as a result the price of information is brought down towards the cost of its reproduction, except for legal restrictions to diffusion, often hard to monitor and enforce. The extension of conventional general equilibrium approaches to information production requires the neglect of this feature of information, as in Gonedes (1975) who assumes that produced information is only made available to those who have entered a prior contract. The very use of information may reveal - if not some of its content - at least something of the actions to be undertaken as a result of its possession, through visible changes of production or consumption patterns and primarily through changes in market biddings and prices. Information which is "common knowledge", in the strict sense of being universally known and known to be known, and so on, may still have high total utility but has zero marginal utility and therefore no economic value. Economic agents however may persist, in spite of information diffusion, in holding non-homogeneous beliefs (i.e. subjective probabilities). Persistent differences in information and beliefs, together with and possibly more than different attitude to risk, affect "speculative" and "hedging" activities (Hirshleifer, 1975).

Like for other commodities, the private value of information may differ from its social value. Private benefits from consumption reallocation or revaluation of assets cancel out in the economy as a whole thus leading to potential overvaluation of information benefits and therefore overproduction from a social viewpoint. Difficulties in

appropriating all production benefits have the opposite effect, although speculative benefits derivable from discovery of information are at least partly appropriable in lieu of production benefits. The net effect of these factors is indeterminate (Hirshleifer, 1971).

Types of information can be as many as types of uncertainty which they affect. Traditionally the following distinctions are made: i) risk, i.e. uncertainty with known probability distributions and therefore insurable, and uncertainty in a strict sense, as unknown probability distributions (Knight, 1921); ii) environmental uncertainty about broadly defined "states of the world" and market uncertainty about supply and demand offers of other agents (Arrow-Debreu, 1954; Debreu, 1956), i.e. their strategy and behaviour; iii) market uncertainty and technological uncertainty (Hirshleifer, 1971); iv) events which in the course of time become known regardless (e.g. the weather), in which case information is foreknowledge, and events which would not become known without specific activities in which case information is generated by discovery (Hirshleifer, 1971).

In the last twenty years the economics of information has emerged and grown from a relatively neglected area (Machlup, 1962) to a vast body of literature encompassing topics as diverse as bargaining and game theory, macroeconomic disequilibrium (especially in the field of labour unemployment, in view of possible specialisation in search for better employment opportunities), money, learning models, relations of trust (between principal and agent), possible adverse selection (due to uniform pricing for goods whose characteristics are costly to ascertain), transaction costs, etcetera. In the following sections the information aspects of coordination of intertemporal decisions, i.e. market uncertainty about the future, and the consequent role of expectations, is considered with a view to discuss the relative merits of markets and planning and the difficulties facing government management of the economy.

II. EXPECTATIONS

In the general equilibrium approach initially put forward by Walras (1874) and developed by modern economic theory (e.g. Arrow-Hahn, 1971) the allocation of resources and the determination of prices, incomes, quantities produced and exchanged are the simultaneous results of the market transactions of utility-maximising consumers and profit-maximising firms, for given tastes, technology and initial "endowments". Information is initially distributed, as it were, on a "need to know" basis; Hayek specifically talks of "division of knowedge" in society (Hayek, 1937) which is as important as division of labour and is essential for a "tendency towards equilibrium" to assert itself, enabling economics to turn from an "exercise in pure logic" into "an empirical science". The market processes that information and operates as an analogue computer, solving the millions of equations involved in resource allocation through the iterative tatônnements of economic agents reacting to alternative price systems (Lange, 1967).

Appropriate assumptions about tastes and technology (concerning substitutability; divisibilities; returns to scale; externalities such as pollution, benevolence, envy; etcetera) are required to show the existence, uniqueness, efficiency (in the Paretian sense that nobody can be made better off without making somebody else worse off) and stability (local and global) of an equilibrium. There is persistent ambiguity in the literature whether the model is to be viewed as an abstract construction for the determination of the exacting conditions under which such an equilibrium would prevail, or an empirical statement à la Hayek about "tendencies" in the real world. The stringency of the required conditions has been the ground for countless criticisms of the plausibility of the model (for instance, Ingrao-Israel 1985): misguidedly, it would appear, since on the contrary one should be surprised if, for instance, a unique and stable equilibrium position was shown to be easy to attain. The lack of realism of some of the assumptions, especially about behaviour

of individuals and firms is a more successful ground for rejecting some of the model's inferences about the efficiency and stability of the market economy, but by its nature is not a conclusive argument for rejecting the model.

The weakest point of the model is its treatment of time. The approach has been extended to dated commodities, simply by multiplying the number of physically distinct commodities by the number of dates at which they are available and, to handle "environmental" uncertainty, by the number of the alternative states of the world which might prevail at each date (Debreu, 1959; Arrow-Hahn, 1971). The generalisation has been accomplished by postulating markets for future commodities and insurance (or rather betting) markets in which prices for future commodities contingent on a specific state of the world would be determined. It is true that forward markets for the future delivery of commodities are rare (usually only for primary products and for money) and (with the exception of money) span a short time period measured in months, but the objection can be handled by reference to the increasing costs - mostly informational - of organising such markets, so that their widespread inexistence is yet another aspect of wise management of scarse resources. What is devastating for this model is the incontrovertible fact that forward markets, even when they do exist, are not exclusive, in the sense that a future commodity does not have to be transacted in those markets but can be obtained in future spot markets: Keynes knew it well and noted that "if saving consisted not merely in abstaining from present consumption but in placing simultaneously a specific order for future consumption, the effect might indeed be quite different" (1936, p. 210). It is not just a question of a missing Walrasian auctioneer, as understood by Leijonhufvud (1967), but of repeated auctions: markets do not open and shut once and for all but reopen over and over again. This sequential character of the market economy makes economic agents act not only on the basis of actual prices, but also on their expectations of future prices including future forward prices.

This single aspect of the real world is sufficient to destroy conventional claims about equilibrium, efficiency and stability; it also brings back to the forefront of economic investigation the production and diffusion of information as a factor shaping and modifying the subjective probability distributions (i.e. expectations and beliefs) of future prices and other economic variables on which decisions are made.

The sequential nature of economic life requires a distinction between temporary equilibrium in the limited sense of market clearing in current (spot and forward) markets, and equilibrium over time in the stricter sense of markets clearing at the prices previously expected to rule at that date (this distinction is already in Hicks, 1939). While a market system is virtually always in temporary equilibrium, disequilibrium in the stricter sense is bound to occur almost invariably because people's price expectations are inconsistent, or their plans may be inconsistent though their price expectations are not, or wrong estimates are made about the results of technical processes, or people do not have confidence in their own foresight even when they are correct (Hicks, 1939, p. 134). Diverse expectations cause diverse rates of intertemporal substitution, i.e. Paretian inefficiency, in both consumption and production. Consumers' sovereignty is extended from preferences, which are respectable, to expectations which are not necessarily worthy of respect. The delegation of production decisions to specialised agents alters the allocation of resources by shifting the weight of expectations from consumers to producers. Investment plans have to be assessed on the basis of financiers' own expectations before credit can be obtained by producers. There is no ex-ante coordination of investment decisions, nor any reason why expectations embedded in investment strategies and decisions should be consistent with their collective results (see for instance Richardson, 1961). Individual agents end up acting on the basis of conjectures about other agents' expectations and perceptions, and so on to any degree, instead of acting on their own expectations (Keynes, 1936).

These problems have been avoided, in much economic literature, by various postulates such as perfect foresight, partial equilibrium, one-period markets, one-good worlds (with homogeneous and malleable capital, which permits a costless correction of possible mistakes) and steady states. The latest avoidance device is the postulate of "rational expectations" pioneered by Muth (1961) and developed by Lucas and Sargent (for instance, 1981) and others (see Minford and Peel, 1983). In this literature expectations are assumed to be "rational" in the very strict sense that utility- and profit-maximising rational agents produce and exchange information efficiently to the point that a 'typical' individual (i.e. the aggregate of individuals) perceives a subjective probability distribution of future outcomes, conditional on the available information, which coincides with the actual probability distribution conditional on that information. In other words, markets are informationally efficient.

Rational expectations, like the earlier simplifying hypotheses, can be a useful analytical device as long as they are not used to solve the very problem which is being assumed away, namely whether expectations do or do not matter or whether markets are or are not informationally efficient. Rationality of agents and efficiency in the acquisition of information do not imply at all, necessarily, that the aggregate behaviour of individuals is as if they knew the actual conditional probability of events; for individuals to know it they would have to be not only rational and efficient but also successful at guessing the collective result of individual expectations, conjectures and strategies, which is precisely what is being questioned. "Rational" here is a gross misnomer: it would be more appropriate to talk of "successful", or "accurate", or "fortunate" expectations.

A major paradox has been raised against the internal consistency of the rational expectations hypothesis. Namely, if individuals collectively perceive the actual conditional probability of outcomes, "at any

time prices fully reflect all available information" (Fama, 1970, p. 383; Latham, 1986) and therefore there is no incentive to purchase information. "Hence, the only possible equilibrium is one with no information. But if everyone is uninformed, it clearly pays some individual to become informed. Thus, there does not exist a competitive equilibrium" - unless information is costless (Grossman S.J. and Stiglitz, 1980). The very sight of information being produced and traded (not to speak of inside information being used) justifies the rejection of the "rational expectations" hypothesis.

Other paradoxical features of the hypothesis can be put forward. Individual learning is the foundation of rational expectations; yet learning is implicitly postulated to be instantaneous (otherwise a lag or a learning process would have to be introduced, which would prevent expectations from being always successful); thus innate knowledge is really required, which is the negation of learning. In real life, while some learn what there is to be learned from market prices, others have already turned their information into cash.

Some expectations can be self-fulfilling (Joan Robinson was fond of quoting Shakespeare's "Thinking makes it so"); when they are they fulfil the specifications of rational expectations; yet there is hardly anything rational or efficient about self-fulfilment, which might well be improved upon by some government act of coordination regardless of the customary "rational expectations" inference that "predictable" economic policy is ineffective by definition.

The recognition that genuine mistakes can occur in the collective formulation of expectations rehabilitates the economic theories of those - like Marx, Kalecki and Keynes - who looked at the market economy as an imperfect homeostatic mechanism capable of inefficiency and disequilibrium (most notably involuntary unemployment of labour) and economic fluctuations. Indeed the more recent formulations of general equilibrium

in the European tradition - like Drèze, Hahn and Malinvaud - have a distinctive keynesian and sometimes even marxian flavour. Such approaches also leave much greater possible role for the production and exchange of information, though there appears to be no reason to expect that technological progress in information communication and processing facilities available to individuals might reduce the frequency or the size of the inefficiencies, imablances and fluctuations of the market economy.

III. ECONOMIC PLANNING

Governments' attempts at controlling the market economy's proclivity to inefficiency, imbalance and cycles have taken the form of current economic policy, indicative planning and central (command or imperative) planning. Current economic policy uses policy instruments to steer the economy; sometimes it may attempt the fulfilment of targets according to a general design or plan but we distinguish it from both indicative and imperative planning because they have distinctive informational features.

In principle neither French-type indicative planning nor Soviet-type command planning apply specific policy instruments to control the economy. Both rely on the production and publication of information about a detailed picture of the economy which is regarded as consistent and efficient and is preferred by the government to any alternative consistent and efficient picture. Thus similar procedures for the construction of plans are used: in both cases tentative aggregate macroeconomic magnitudes are transmitted from the centre down to producers, functional agencies and representatives of regions and other groups, which transmit back to the centre data about outputs and inputs which are then aggregated and retransmitted downwards, and so on until a required minimum degree of consistency is obtained between macroeconomic,

sectoral and (at least for larger units or groups) microeconomic data. The differences between the two types of planning are in systemic environment, mode of implementation and microeconomic behaviour generated by the explicit or implicit incentives involved in the implementation process.

The environment of indicative planning is a market economy with private property and free enterprise. Implementation relies - in the intentions of indicative planning promoters - on the very publication of the plan, as a giant market forecast drafted by state offices in consultation with economic agents (industries, households, regions, etcetera) so as to check the internal consistency of their plans and formulate a "common view" to which they are then expected to conform out of self-interest, because if individual agents do not act according to the plan their expectations are bound to be disappointed. In indicative planning literature the coordination of individual plans is treated specifically as a substitute for missing forward markets; the plan is expected to reduce market uncertainty and give transparency to the economic system; the expression "information planning" is also widely used. For instance, according to one of the founding fathers of French indicative planning, P. Massé, "The first reason for success of the plan is its coherence. The very methods by which the forecasts are drawn up means that they prefigure a general equilibrium of exchanges and services at the end of the plan. This prospective equilibrium does not become a reality unless all the economic agents conform to the recommendations of the plan, but it is obviously a powerful factor inducing them to move in this direction" (quoted by V. Lutz, 1969).

There are three main objections to the contention that indicative planning can be a substitute for exclusive and complete forward markets. First, economic agents have an incentive not to disclose their actual plans and expectations in order to affect the "common view" to their own advantage, for instance publicly understating the growth potential of a

market which they wish to penetrate and their plans to do so. Second, even if economic agents taking part in plan preparations were truthful, it may be impossible for them to formulate a genuine "common view" about the future development of the economy to be reflected in the plan, because the subjective probabilities attached to expectations of different individuals are not additive. Third, even if economic agents were truthful and unanimous in formulating a common view for the output of each industry, there is no stipulation in the plan of what should be the share of any firm in the output of a given industry (or in the supply of the inputs it requires); this lack of necessary infra-sectoral consistency is enough to undermine inter-sectoral consistency of output flows even if its was reached. Hence market uncertainty is not reduced, and it is no accident that specific policy instruments and short term stabilisation plans should have repeatedly replaced indicative planning in France (see Estrin-Holmes, 1983. This does not mean that French economic policy has been always ineffective: as Voltaire says, a bit of magic can kill a flock of sheep if it is accompanied by a sufficient amount of arsenic).

The environment of Soviet-type planning is an economy where markets are limited to consumption and are instruments of distribution and not of allocation, where state property prevails and enterprises are administrative units executing central commands. Plan implementation relies on central commands (which are simply another type of information) addressed to specific enterprises and agencies responsible for their implementation and subject to a system of rewards and penalties according to the degree of plan implementation. A visible fist replaces the invisible hand of market transactions.

The objections raised above against indicative planning do not apply to the command economy. The dominant role of an élite leads somehow or other to the formulation of a common view; barring mistakes, infra- as well as inter-sectoral balance can be obtained; an incentive for economic

agents to cheat in the preparation of plans, in a different form and for different reasons with respect to indicative planning, however remains. Enterprises, given the emphasis on degree of command implementation, have as incentive to conceal capacity and to overestimate input requirements; to hoard labour and materials which might be redeployed more productively elsewhere and to maintain obsolete equipment as an insurance; to underestimate costs for new plants (which make planned tasks easier) to encourage their inclusion in the plan, only to escalate costs later once the investment has been accepted. Emphasis on physical instead of value indices leads producers to be literally minded and respond to the weights used in the construction of indices instead of economic requirements no matter how visible they might be; waste - sometimes deliberate waste, as when output performance is inferred from the level of costs - ensues, arguably on no less a scale than in a market economy, especially since plan coordination is imperfect, some spontaneous phenomena escape planners' control and unwanted effects ensue from planners' overambition. It is no accident that for the last quarter century the economies of so-called "realised socialism" have attempted, over and over again, economic reforms which might broaden the scope of markets, and introduce economic agents' autonomy subject to market discipline(see Nove, 1983).

Can progress in information production and communication improve the prospects of indicative or of command planning? Hayek stressed the difficulties of conveying "knowledge of particular circumstances of time and place" to decision makers in a planned economy, as opposed to more general types of information such as scientific knowledge (Hayek, 1945). Oskar Lange had stressed the informational limitations to central planning, due to the impoverishment of information flows as they move upwards from enterprises to the centre, the processing capacity limitations of the centre and the enrichment of information (i.e. the more detailed nature of commands) flowing from the centre to enterprises (Lange,1962) but in the end put forward a vision of computers directly

solving the millions of equations indirectly and slowly solved by markets (1967). However, these are only one group of the difficulties of planning, whether indicative or imperative. The problems deriving from false reporting and uncooperative strategies on the part of economic agents participating in the preparation and implementation of plans cannot be eliminated by information progress - just like a long distance chess match is not made any less complex and open-ended by progress in information processing and communications.

If neither free markets nor detailed central plans (whether indicative or imperative) are capable of preventing failures, perhaps the best course is the delegation of detailed inputs and output levels to markets, the enforcement of cooperative strategies by larger units and groups through a social contract, and direct government intervention on the achievement of major macroeconomic targets through markets (see Nuti, 1985). This could be done by endowing specialised state agencies so that they might pursue the desired targets (such as additional labour employment, or investment, or net exports) directly through market transactions; the likely loss being imputed to the state budget. At the present time, when so many alternative ends already compete for state budgetary resources and there is pressure to reduce the share of national income passing through the budget as well as existing anti-cyclical deficits, this alternative may seem unattractive. Yet direct targeting through state expenditure could be done on any scale, monitored and revised to suit government preferences according to the relative costs of macroeconomic targets and of alternative ends of government policy. Current economic policy employing the usual instruments, with the addition of those direct budgetary instruments, might enable governments both to reap the informational advantages of markets and to retain a degree of control over macroeconomic processes, commensurate to the resource cost that such control is bound to require.

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