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Information and Coordination:
a view from the south

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Information and coordination: A View from the South

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This is a special occasion for those of us who had the privilege of learning directly from Axel Leijonhufvud. Leijonhufvud is more than a standard teacher: he transmits an attitude towards economic research. Both in his writings and in his talks, he makes one well aware that economists must remain curious and prepared for (constructive) puzzlement. Leijonhufvud makes it clear that the search for precise arguments can, and should, be combined with an open-minded approach, and with respect for intellectual diversity. He insists that one should learn and use the tools of the craft, and that it is essential to keep in mind the practical applications of economic analysis; but he does not dwell on technical details, nor offers universal policy recipes. This, no doubt, may bother some people. But for many of us, Leijonhufvud's work continues to provide a non-dogmatic guide for thought and an incentive to keep on exploring the field.

Interest in macroeconomics is often motivated by particular experiences of large-scale economic disturbances. From the perspective of a Southern Cone analyst, many immediate concerns are related to the ability of economic systems to absorb large shocks,

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and to the way in which they adapt to frequent changes in policies and in their institutional setting. These have been recurrent themes in Leijonhufvud's contributions.

What I propose here is to play some variations on such themes. Although I have borrowed freely from Leijonhufvud's ideas, and some of the following notes are based on joint work, they do not pretend to represent his views. Knowing Leijonhufvud, I trust that he will not object in principle to this exercise, and that he will tolerate its idiosyncracies.

1. Economic coordination with recognizable agents

A quick glance from a window overlooking a commercial district is enough to reveal a striking variety of economic activities. Trucks load and unload goods, shopkeepers arrange merchandises in their stores, people look around, they enter shops and sometimes leave with packages. Even in this minute section of the economy, trades involve a large set of goods; making a full list would probably use many pages of paper. One also realizes that much happens behind the scene: merchants set prices (although in very high inflations, tags and menus are changed before one's very eyes), they review the flow of sales of particular goods, they place orders from various suppliers, they make financial deals with banks or other firms. And this is just the surface of a huge web of decisions and transactions. An enormous number of persons, each acting with some purpose, have participated to make possible the exchanges that we observe from our window (cf. Leijonhufvud (1989)).

This seems too trivial to mention, were it not that we are in the business of making sense of how people conduct their economic life, and that even the systems that support commonplace, everyday transactions do break down once in a while. Sometimes, we find many people walking idly, without the means to get goods from the shops; in other instances, they carry money around, but are confronted with signs stating that the stores are "closed for the lack of prices". We have good reasons to be concerned with the extreme cases of economic depressions and hyperinflations, for their own sake, and for their informative value regarding the conditions under which economies may or may not perform reasonably well. But, as Leijonhufvud often indicates, the very fact that in "normal times" the activities of vast numbers of agents do fit together producing and distributing goods, in a way that at first sight seems almost natural, ought to deserve attention.

Looking down again from the window, one can recognize signs of the "market process" at work. Customers go from one shop to the next comparing prices and quantities. Shopkeepers presumably keep a close eye to find out which goods sell well and leave good profit margins, and which do not. The messages they receive are transmitted to producers through their orders. Sometimes, one may find vivid evidence of adaptations to economy-wide impulses: a store that sold locally-produced textiles, for instance, now shows stacks of imported electronic goods after tariffs have been brought down. And, once more, at certain moments the mechanism seems to go wrong. On occasions, one sees merchants standing by waiting for customers who do not come; sometimes, people rush to buy without

even trying to check prices two blocks away.

These "microscopic" impressions drawn from an infinitesimal piece of the economic system may help one to remind that the objective of economic modelling is to represent concrete actions by hosts of people. At the same time, one is also struck by how intricate the picture soon becomes if one tries to describe in detail the decisions and interactions that take place in the street below. A model built up from actual "microeconomic" elements seems hopelessly complicated. Suppose that we are offered information regarding all the trades made by all agents in the economy during a certain period, specifying each transaction in every potentially relevant dimension: the data would identify the trading partners, the location of the exchange, the moment in which it happened, and characterize precisely the goods and assets which changed hands. It is likely that we would not be willing to pay much for that mass of information or, at least, that we would not consider analyzing each particular piece of data. Even assuming that we could store and process numerically the data for free, it seems probable that we would ask questions of a "statistical" nature. For example, in a high inflation, one may want to know what proportion of sales -- perhaps classified into broad categories-- are done in domestic money, or find out the average interval between price changes in various "industries", but would not try to look at, or to explain, each transaction individually.

So, maybe, one chooses to start from the other end: take a set of aggregate figures, try to find some patterns in their movements over time, and make up a model on the basis of those regularities,

within an accounting framework that incorporates what one knows to be solid "conservation principles": goods produced must be put to some use, purchases must be financed somehow, and so on. This leads to a mode of analysis that relies much on phenomenological "constants": nominal prices or mark-ups, propensities to consume, and the like. However, one knows that those are not "physical constants": they have the habit of moving without warning. And, once one tries to rationalize the arguments or the equations of the model, the "micro" language creeps back again: one is not surprised to find that, in a more or less stable economy investment is negatively related to interest rates, for example, because individual firms can be expected to act in that way.

The tension is apparent. A well-developed micro-based description of the economy as a whole does not seem at all feasible. But neither can one easily accept to rely on models composed of "functions" that make no clear reference to the behavior of agents. Moreover, in order to study the way in which individual activities are matched together, there must be some representation of how people decide their trading plans and how they interact in the market.

Now, this can sound too abstract and far from the problems of an applied economist. However, in the quite commonplace work of doing macroeconomic analysis of specific economies, one is recurrently confronted with the choice of a basic "approach". Consider for instance an economy which is just coming out of hyperinflation. One suspects that disinflation will have sizeable effects on the supply of goods and that, especially if the

stabilization program uses an exchange rate anchor, it is likely that aggregate demand will shoot up; in past episodes that may (or not) bear some analogy with the present one, the inflation rate dropped suddenly, but did not go rapidly to a near-zero value, so that the currency appreciated substantially in real terms. This, clearly, is a language based on "aggregate variables"; starting from such observations, one may build a small model (whether formalized or not is beside the point here) leading, for example, to the proposition that if fiscal and exchange rate policies hold, there will be initially an economic expansion, followed by a recession as the inflation rate eventually converges to a low value. But: will people necessarily react in the manner predicted by the aggregate functions one postulates? To what extent may firms revise their price-setting practices depending on the "credibility" they assign to policy announcements and how can one find out what their beliefs actually are? If one observes that people increase their spending at a fast rate, should one be worried that they may be misjudging their future income opportunities? And so forth. These are not uncommon questions for applied macroeconomists. They are still posed in aggregate terms: they refer to broad trends and to the "average" behavior of whole groups of agents; but they force one to consider how people choose their actions and how they they look ahead. And, for this, one has to be guided by some sort of theory.

The literature has consecrated a particular way of modelling behavior; it is applied to study matters that go from, say, the interaction of duopolists in a given market to the aggregate

response to an economy-wide shock, or to the analysis of policy decisions. Each specific model defines a setting where agents, knowing what they want, make optimal choices given "external" constraints. Individuals may lack data about the values of relevant variables, but they are assumed to process the information they do have available in an optimal way: their "knowledge" of their economic environment, so to speak, is unrestricted. Except when sunspot phenomena arise, the results of the model then appear to depend only on "deep" parameters representing preferences, technologies (including those used for gathering data), "institutions" that define the rules of interaction between individuals and, perhaps, the impulses caused by some outside agent such as the government.

This modelling strategy has produced a large mass of applicable work; whether this is explicit or not, many of the arguments one utilizes in describing the evolution of particular economies trace back from, or can be reduced to, this line of analysis. After all, optimization plus rational expectations is a conceptually simple form of depicting purposeful agents who are alert to changes in the environment. However, the common claim that those assumptions have a universal range of applicability and, even more, that they define the only sensible way of doing economic analysis seems, at least, a gross exaggeration (cf. Leijonhufvud (1992)).

Models are built to be solved, and not every problem is tractable. So, the analyst must cut down his problem to size. The art, of course, is to simplify the environment that is modelled so

as to be able to arrive at a solution and get interesting results. This is an art indeed: there is no "objective" way of making the "cut". When we assume that agents optimize in the context of the given model, we are not only assuming that they use at least the same problem-solving abilities that we do (and, often, specialists have to struggle hard to make the model give an answer), but also that they share the "frame" that is implicit in the model. It seems possible that some actual economic actors may find that a number of auxiliary hypotheses in a model are "ad-hoc", and that these individuals carry out their business using other assumptions. Moreover, each model -and for good reasons- leaves under the ceteris paribus umbrella what may be the core of another one. Thus, again, the problems are "uncoupled" in order to make them solvable, one at a time.

The implicit assumption of optimizing models seems to be that agents do likewise: they "focus" on one particular decision problem -for which optimization is feasible- while "holding constant" variables which will result from another calculation, and which may well interact with the first ones. When seen in this way, optimization appears as an heuristic procedure (rather than a universal device), more or less useful according to the circumstances.

In some instances we are confronted -both as analysts and agents- with sudden changes in the economic environment. For example, we can have a disinflation package, a tax reform and a tariff reform all at once. These may or may not be the "right" policies in the given situation. But, in any case, people must

simultaneously re-consider their plans in a large variety of dimensions: pricing practices, portfolio choices and consumption and investment programs are all thrown down to the table for revision, and each agent knows that others are also busily making up their minds on how to react. Sorting out the "best" response in those conditions would probably require agents to perform near-endless computations, and to have at hand a full-scale model with which to form expectations. The argument that individuals have trained themselves to act "as if" optimally loses its weight when the changes in the economic context are "without precedent". One may still choose to stick to the optimizing framework of analysis, but it seems to take a leap of faith to disregard the possibility that the representation may be inaccurate. And, again, the issue is not mainly one of methodology: it bears on how one analyzes real-life experiments.

In normal economic times, people can rely upon routine procedures for most of their activities. Important decisions are spaced over time. The economy evolves but, on the whole, each state does not differ much from the previous ones. The "continuity" of the environment allows agents to concentrate on solving the problems that look more relevant at each moment: they can change some aspects of their behavior by "taking a good look" at them. For the system as a whole, this continuity also makes coordination much easier: commonplace exchanges are carried out more or less as a matter of course. The quality of individual decision-making and the overall performance of the system are put to test when the economy faces turbulent conditions or is subject to a sudden change.

Leijonhufvud has long insisted that episodes of this type should be given close consideration. We will briefly refer to them in what follows.

2. Emerging markets and vanishing markets

Perhaps the most elementary feature of an economy with a developed division of labor and decentralized decisions is that people meet and exchange. We know that the states that the economy can attain depend on the set of markets in which agents participate. When an economy has "incomplete" markets, some trades are restricted. A case with strong macroeconomic implications is that of liquidity constraints (cf. Clower (1965), Leijonhufvud (1973)). Market transactions also have a "public good" element to the extent that they disseminate information to third parties (although, if the rational expectations hypothesis is taken literally, those parties would not need to observe what they anyway know has to take place).

But markets are not created from nothing. They have evolved in history. And, from an analytical perspective, it must be recognized that markets are "made" by economic agents. Clower and Leijonhufvud have often stressed this point (see, for example, their (1975)). If we could get a "constructive" model, showing how markets arise and what form they take we would probably get a much better understanding of issues like pricing and the "functions" of money. However, such thing is not available. Instead, what we find are arguments starting from the other end, trying to explain why markets that "should" be there are not actually observed.

The explanations are of several types. One group points to physical conditions that may prevent trade, as is the case of (literally interpreted) overlapping generations models. Another set of reasons may be institutional: people will refrain from making contractual arrangements if there are no means of enforcing them, and will not consider making an exchange when they are not confident that the other party has the right to deliver what is offered as quid pro quo. The informational arguments, on their side, are typically based on the existence of variables which are observed by one agent and not by others (as in the "market for lemons" models); this asymmetry can be viewed in a way like another type of physical constraint.

We can find in recent history striking episodes in which to study the creation and destruction of markets at the scale of whole economies. It would be quite tempting to consider at the same time the two (not disjoint) sets of cases of the Eastern countries and of those that have undergone high or hyperinflation. However, for obvious reasons of comparative advantage, the following comments will focus on the second group of cases, with a few and tentative references to the economies in transition.

With all their specificities, unstable economies and those in transition seem to have one feature in common: in both, people face strong uncertainties about the performance of institutions that will govern the ownership and the availability of resources. Modern literature has brought back the old theme that economic behavior depends on the policy regime. But what defines a regime? On the one hand, institutions and policy patterns themselves can be considered

as the result of an underlying process -and so on. The reasoning easily leads to a multiple regress (cf. Sargent (1982)); once more, the problem is not merely one for the analyst, but concerns agents in their daily business. On the other hand, written codes are not equivalent to concrete policy actions: people must learn from experience what to expect from governments. Given those expectations, moreover, agents have to develop behavior patterns adapted to the policy framework. In some conditions, this adaptation may be rapid : for example, it is striking to see in the accounts of the European hyperinflations of the twenties how closely some reactions resemble what was observed in similar Latin American episodes, despite the different experiences people had had. However, these are relatively simple responses -e.g. getting rid of heavily taxed money or restricting trades- to strong and clear signals. It is likely that building up a system of market exchanges requires a more difficult learning. Seen from this far away, the behavior of Eastern economies seem to be indicating that.

The hyperinflationary episodes show vivid evidences of how systems already organized on a market basis react to large disturbances . Economic analysis has had trouble in pointing out precisely "what may be wrong" with high inflation. At the same time, people often wonder how economies still seem to function without collapsing under, say, double-digit monthly inflations. In fact, day-to-day trades, involving the use of domestic money, do show a noticeable resilience, even in the face of a very high inflation. However, they can be disrupted in "true" hyperinflations and, in milder cases, a closer look reveals serious damages to

economic performance. To a large extent, these derive from the shortening of planning horizons and from the disappearance of markets.

In a certain way, inflation and instability are logically different phenomena. But they are associated in practice. This can be understood by considering how inflations originate: governments which can execute systematic policies do not rely on the inflation tax; this is typically an expedient to accommodate pressures from various sides. The high inflation scenario, then, is one where not only prices rise at a fast speed, but also the future moves of the authorities are highly uncertain, and this is combined with a matching volatility of private behavior.

Until not so long ago, the effects of inflation were analyzed almost exclusively in terms of the substitution between money and real capital. This generated the prediction that higher inflation rates would be associated with more capital accumulation. In fact, the opposite seems to be the case. Recent models have started to explore the possibility that the inflation tax may have more subtle effects: for example, that inflation could aggravate adverse selection problems in credit markets, thus leading to less investment financing (cf. Azariadis and Smith (1993)), or bias the bargaining position of buyers and sellers in the favor of the latter, which would reduce output (cf. Cassella and Feinstein (1990)). However, such models still do not account for the turbulence that characterizes high inflations.

The shortening of decision horizons manifests itself even in the way people choose to refer to the inflation rate. The use of

monthly figures -and, in hyperinflations, the demand for higher frequency indices- does not come from a reluctance to manage with "large" figures: after all, the same agents routinely deal with prices quoted in millions or billions of monetary units. The fact is that annual data are irrelevant: the "memory" of the system does not extend that far back, and no one would venture to make a forecast of the price level a whole year ahead.

This makes sense for two reasons. First, it is practically impossible to predict the cumulative effect of policies. Just trying to map the government's "decision tree" from one short-run move to another quickly leads to an explosion of possibilities. Some months ahead, a major stabilization program may have started, but also, a high inflation may have degenerated into a hyper. Second, the economy loses its buffers, so that the response to impulses is fast and strong. In particular, prices are revised at short intervals. And it is not as if nominal prices changed while remaining fixed in some other "standard" : the reference to past price increases in high inflations or to the exchange rate in hyperinflations does not preclude wide movements in terms of those variables. The pace of price decisions accelerates. Consequently, although inflation may show a degree of inertia, imparted by surviving backward-looking adjustment practices, individual prices react to high-frequency signals, as processed by each agent. If people realize that this will happen, they also know that they themselves must move at a similar speed, and that aggregate will soon show up in the markets in which they participate. But predictions can only be made a few moves ahead, and that means a

short time span.

The difference between stable and unstable economies seems not so much that in the latter the inflation rate is higher: one could say that the (relevant) rate of price growth may be similar, but the time frame has shrunk. This clearly shows in the reluctance of agents to make commitments extending over relatively long periods of time. Inflation does stimulate the appearance of contractual instruments with sundry adjustment clauses. On the whole, however, high inflation economies end up with a poor menu of financial assets, most of which have a very short maturity. In fact, the recovery of credit and the emergence of longer-run contracts and of more sophisticated instruments is one of the characteristic features of economies in the stabilization phase. From a certain perspective, this behavior looks paradoxical: one may expect instability to provide incentives for the development of new contingent markets. But simple contracts do not provide a good protection against the type of uncertainty that agents face (e.g. people may not want to enter into backward-looking indexed contracts extending beyond the period for which they can be reasonably confident that the inflation rate will remain near the current levels) and considering in detail the possible shocks that may significantly influence the outcome of agreements does not appear feasible. When the range of contingencies which agents should contemplate grows large, they seem to take the simple option of quitting the game. A similar attitude prevails regarding physical investments: firms will only buy new equipment if they can expect quick and large returns.

This preference for flexibility (which is often associated with capital flight) reflects people's uncertainty, especially about outcomes further in the future. The scarcity of reliable information is not of a "technological" nature. It is not that informational asymmetries in the usual sense have become more intense, or that agents have less access to data. People in high inflations handle much more "macro" data for the purpose of their routine decisions than their counterparts in stable economies. What is lacking is the capacity to interpret the signals that the agents receive in quick succession. When agents perceive that they cannot make sense of those signals, they refuse to trade. The length of the period over which information "loses meaning" depends of course on the type of inflationary process. In comparatively mild forms of high inflation, people can still plan ahead for intervals of some months although, even there, market decisions may incorporate sizeable differences of opinion regarding the future evolution of the economy. In hyperinflations, the time horizon shrinks to almost nothing: even selling goods over the counter becomes a sort of gambling activity.

One of the facts for which there is more or less ample empirical evidence is the positive association between inflation and the variability of relative prices, both over time and across locations. Although many prices are dollarized in hyperinflations, this association seems to be also valid in such episodes. What the evidence suggests is that "local" markets become more and more segmented as the degree of aggregate price instability increases: in the language of the traditional metaphor, the activities in the

different "islands" that constitute the economy tend to lose coherence (cf. Palerm (1990), Dabús (1993)).

This can be rationalized as a consequence of the system's "loss of memory" (cf. Tommasi (1992)). When prices in individual shops are revised very frequently, and embody either specific cost shocks or idiosyncratic expectations, consumers who observe that a certain price is low, relatively to what other firms are presumed to charge, cannot rely on this being also true in the future. The information that they gather through search quickly becomes obsolete. Since investments in search depreciate at a fast rate, people will be less informed about prices: even if they choose to "visit" more stores (and thus increase their expenditures in looking for information), they will not know precisely which firm sells cheap and which does not. So, competition through prices becomes a less effective way of attracting customers. In turn, this implies that prices quoted by individual firms will be less homogeneous. Moreover, price instability allows high-cost firms to retain "captive" customers, and it tends to increase average mark-ups.

An image that may come to mind is that of prices being kept in line by the activity of consumers, as with particles in a magnet: the "law of one price" would correspond to a state where all the particles point in the same direction. Inflation, in this picture, would act in the way of "thermal noise", weakening the effect of the interactions that tend to hold together the orientations of the particles. As the noise grows stronger, long-range coherence first gets lost; after a certain point, the system goes to a state of

complete "macroscopic" disorder. The analogy of a phase transition, it may be pointed by the way, seems to correspond to the observation that in some instances the passage from high to hyperinflation takes place suddenly -prices accelerate in a discrete step, many become dollarized, and reference to past inflation is erased in the lapse of few weeks- as if there was a discontinuity between one type of inflationary regime and the other.

In any case, the main point here is that the coordination of economic activities accross space and time does not occur automatically. Hyperinflations place agents in a context where their ability to plan is very much impaired. In the limit, they just refuse to exchange. Though in a much less dramatic form, "better times" can also put to test people's capacity to make consistent decisions.

3. Real business cycles

Current "real business cycle" models have shown that the equilibrium paths of aggregate quantities and prices need not be steady. The use of an explicit intertemporal framework, in addition, has served as a reminder that present outcomes depend on how agents perceive future conditions, and that decisions over time are linked together, especially through the intertemporal budget constraints. What these models take for granted is that, no matter what shock the economy receives, agents will be able to estimate "rationally" its present and future consequences, and will act correspondingly. There is another tradition which, by contrast,

suggests that economies may have trouble making the "traverse" between a growth (or non-growth) path and another, because there is no direct mechanism that reconciles intertemporal plans, and these may be based on inconsistent expectations (cf., for example, Leijonhufvud (1968, chapt. IV), (1981)). Such inconsistencies may give rise to "real", but not equilibrium, business cycles. Here, too, the difference in analytical perspective is relevant for the way one interprets concrete data, especially in economies undergoing rapid change.

In a very high inflation, people's reactions are mostly defensive: place assets in liquid form and in safe place, beware of selling hastily, be cautious about making irreversible capital investments, and so on. The implicit rates of time discount are high, and agents's wealth perceptions are probably low. (Some, of course, are made worse off than others; in particular, the inflation tax hits mostly those with low incomes, who are the last to abandon the domestic money). If a viable stabilization program can be put in place, the habits that people have developed during the inflation will not disappear at once. Nevertheless, the economy's performance will improve through a variety of effects: a supply-induced recovery, as firms cut precautionary mark-ups and are better able to "mind their own business" and look for ways to reduce costs, a revival of credit and a return of flight capital, among others. At the same time, in order for the stabilization to be sustained, fiscal policies will have to be reformed, so that the configuration of taxes and public spending is likely to be modified substantially. All these are major changes, which can be expected

to have strong effects on relative prices and the real incomes of different groups of agents.

Consider a stylized post-disinflation scenario, in an open economy which has just gone through a period of inflationary turbulence. In order to focus on the "real" aspects of the case, assume that the transitional problems associated with bringing about the disinflation have already been solved, and that the government has put together a fiscal and monetary program such that the public trusts that the authorities will no longer use the inflation tax to finance expenditures. Therefore, neither inflationary inertia, nor policy "credibility", nor "expectations of expectations" about the aggregate price level (cf. Phelps (1983)) are relevant issues under these assumptions.

In such circumstances, one can expect aggregate spending to increase at first at a probably fast rate. A smaller perceived risk in keeping assets within the country is likely to induce capital inflows; the authorities can monetize those flows so as to satisfy a larger demand for real balances while, at the same time, real interest rates fall. Even if explicit taxes are raised, the removal of the inflation tax increases the purchasing power of a large group of consumers. Many households who had found themselves liquidity-constrained will now be able to access to goods on credit, since stabilization removes strong disincentives for lending. Enterprises may start considering investment projects which they had shelved waiting for less uncertain conditions to develop. From the supply side, firms will probably try to increase sales, and will realize that market competition is to become more

intense; they may count on receiving trade credit on a much larger scale than before.

These are all ingredients for a quick economic recovery. A stabilization will always have distributive consequences but, on average, agents can reasonably feel wealthier. They realize that their real incomes are increasing, and future receipts are discounted less heavily. Moreover, aggregate output can be expected to keep growing if investment recovers and businesses can remove the sundry inefficiencies in their operation which are likely to have developed during the inflation. Optimism about future prospects will make people more disposed to borrow in order to finance current spending, and foreign credit (or funds earlier sent abroad) will be available: the balance of trade may rapidly shift from a surplus (to accommodate capital flight) to a deficit. Assuming that the effects on supply are not too biased towards the production of non-traded goods, the increase in aggregate demand will tend to raise the prices of those goods relative to the prices of articles which can be bought or sold abroad; thus, some real appreciation can be expected. Qualitatively, all this fits with the changes that the economy has undergone. But: by how much has average wealth actually risen?

Stabilization will cause people throughout the economy to re-evaluate their estimates of "permanent income". Take the case, for example, of a producer of a certain non-traded good. He observes that demand has gone up, and is quite sure that he can raise the prices he charges and still make a larger volume of sales. In case he expects such conditions to last, or perhaps even to improve

further, he may confidently increase his own spending right away, and make investments in his business, counting on good returns. If our agent does not simply base his forecasts on the extrapolation of current trends, but applies a more sophisticated reasoning, he may realize that competitors are also going to increase their production capacity, and that he must try to anticipate the behavior of aggregate demand, since it will have an effect on the sales of the industry. The agent can see around him that real activity is moving up, and that people are spending more in a wide variety of goods; many are financing their purchases out of borrowing or (he reckons) out of foreign exchange previously hoarded. In the papers, he may read warnings of some analysts about the danger of an excessive real appreciation and about the emergence of a trade deficit. But he can also find replies from other specialists insisting that those concerns are out of proportion, and that large-scale capital inflows simply reflect a well-founded trust on the economy's growth prospects, since firms (including those producing internationally traded goods) will now be able to make substantial productivity gains by re-organizing their plants and improving their commercial strategies.

These are somewhat ambiguous signals. The agent's future income clearly depends on the plans that other people are devising at the same time, based on their own reading of the information they get in the markets in which they participate and guided by their own guesses on where the system as a whole is headed. Our "typical" agent has to imagine a future scenario where the behavior of several variables is of critical importance. Some of these

variables -like the probable supply by competitors- are relatively "close" to his range of personal experience, but may still not be easy to forecast. Other features of the future environment -such as whether the production of traded goods will be sufficient to sustain a growing domestic demand- depend on decisions which are widely distributed accross the economy, and are quite removed from his areas of direct observation.

So, everyone makes his bet, in order to program current and (we may assume) future actions. Now, these plans may or may not be compatible with one another. The non-traded-goods producer can well predict a growing market and high prices for his goods (maybe because he anticipates a large output effect in the traded goods sector due to the removal of "X-inefficiencies") while at the same time a "typical" producer of traded goods is acting under the assumption that the real appreciation will be sharply reversed sooner or later. Both types cannot be right simultaneously; their beliefs are inconsistent with one another. But, if they hold such beliefs, agents would in the aggregate over-estimate their wealth. And current information may not be sufficient to make people change their perceptions: an observed fall in the savings rate, for example, can be interpreted either as a symptom of over-spending, or as a sign that agents are rightly discounting that their incomes will grow.

The previous example of inconsistent beliefs (cf. Heymann (1984)) is just that: one possibility among others. But the question remains whether agents will be able to make correct inferences from the information that they have at hand. Now, the

problem of forming expectations comes both from the very fact that (as RBC models stress) the "equilibrium" of the economy is a shifting one -because, otherwise, people may use past observations to make more or less accurate forecasts- and from lack of precise knowledge about the direction and, especially, the size of those shifts. It is not enough to realize, for instance, that the economic recovery will very likely be associated with a larger current account deficit; agents (and analysts) must judge whether a deficit of a given amount indicates or not a state of excessive aggregate spending. After a big shock, the parameters whose value would be required to pass such judgments are deeply hidden.

In circumstances where "fundamentals" are undergoing a non-recurrent change and people are engaged in a complicated task of guessing about each other's plans and expectations (e.g. what do I think they are thinking when they decide to spend more and do I think they are right in thinking so?), it is likely that beliefs will be heterogenous. That heterogeneity itself means that a good number of individual plans are not going to be fulfilled, and that many agents may end up in the future with balance sheets that, with hindsight, they will regret having chosen. It seems also possible that the expectations of agents have an aggregate bias. If, for example, people tend to over-estimate their own future incomes, this would induce a cycle in spending, with an initial boom followed by a period of adjustment, which would be more or less traumatic according to the size of the debts that have been accumulated in the process and the response of lenders.

Now, of course, we know that in every economy people make

mistakes of one type or another, and yet the performance of the system as a whole need not be significantly disturbed. What we are interested in finding out is whether individual errors will be corrected in good time and, if not, whether they add up in such a way as to produce observable "macroeconomic" consequences. However, in some moments of rapid change, the observer is in a not much better position than the agents he is watching in action: there are no compelling reasons to believe that the economy will behave "as if" the assumption of individual foresight was valid and, at the same time, it may well be that the optimists are right in this particular case, and the transition takes place smoothly. As in Leijonhufvud's version of Keynes's argument, intertemporal coordination appears neither automatic nor impossible. Clearly, this leaves the analyst in a somewhat uncomfortable situation where he is unable to offer a solid prediction, and must adapt his opinions on the basis of indicators that often show ambiguous evidence. But, after all, recognizing the limitations of one's ability to predict seems a form of rationality.

4. Rules of the game and chess playing

The evolution of economic and, especially, monetary institutions, seems to have cycles. Often, the turns are motivated by a crisis of some type. After hyperinflations, for example, there is a general call for restricting the margins for "discretionary" policy-making, while financial crashes or depressions typically produce the opposite reaction. The changes in mood are reflected in the language itself: what was once named policy flexibility is now

termed arbitrary activism, or what was referred before as rule-bound behavior becomes mentioned derogatively as a straightjacket that prevents desirable interventions.

This tension is also present in the analysis of public policies. The relationship between policy-makers and their constituency can easily give rise to principal-agent problems, and (as a mass of recent literature shows) there are many instances where the game between even benevolent policy authorities and private agents has far from desirable outcomes. At the same time, except in very simple cases, there is no analytical presumption that simple, non-contingent rules are the best alternative for policy design.

Perhaps the most definite conclusion that can be drawn from the analysis based on the time-inconsistency argument is that the old concern about the nature of institutions was well founded. The consequences of policies cannot be understood without reference to the institutions (or the lack of them) that govern the incentives of the authorities and provide frame for private expectations. Therefore, it makes sense to investigate what kinds of policy decision rules will do best to improve the economy's performance. And it is probably natural to approach this problem as if equivalent to the design of an "optimal contract" to which the authorities would be committed.

But even in the case of transactions between private parties we observe either simple contracts or informal, "handshake" agreements. Writing an optimal policy rule would at least require knowledge about (present and future) "social preferences" over the

relevant dimensions, about the set of contingencies to which policies will have potentially to react and about the way in which, given the shocks and the nature of the rule, government actions would influence the variables of social concern. This is "clockwork" decision-making (as Leijonhufvud has called it) on a grand scale: once the "book of instructions" for policy-making has been printed, an automaton can pick the appropriate action at every date in each possible circumstance. Such a system for setting policies once-and-for-all clearly appears difficult to conceive. At the same time, while a complete, contingent clockwork rule would in principle pre-determine fully the actions of the government, it would do so in such a fashion that simple mortals trying to find out what to expect from the authorities may have a hard time doing so. From the point of view of the "typical" agent, the rule would look very much like an exercise in policy "discretion" -and that, in turn, would change the problem itself.

Policy rules can be seen not only as devices to modify the government's incentives but also as means to simplify people's decisions: they help to establish "what kind of game" is being played and, therefore, they make economic coordination easier to achieve. In order to serve to this effect, the government's behavior in matters of everyday business must be understandable without much effort: it is precisely the lack of such guidelines which makes policy instability so harmful, as seen dramatically in hyperinflations. But simple rules cannot be applied for every instrument: policies would then be overdetermined. In any case, there has to be a choice on what to fix and what to leave free to

adjust. Moreover, simple rules, like any other heuristic decision method, will not always produce good results: it is practically sure that they will occasionally break down but, almost by definition, the nature of the "emergencies" in which that would happen cannot be precisely stated in advance. Also, it is difficult to imagine a policy rule which will be useful and, at the same time, free of ambiguity in its definition, so as not to demand to be "interpreted" once in a while.

This is a fuzzy field of rules with unspecified escape clauses, of "policy independence" within not exactly defined limits and of policy statements which are always somehow vague. There seems to be an "art" of institution design, as there is an art of managing institutions -even those as metal-hard as the gold standard (cf. Bordo (1992)). Policy-makers, like everyone else, are engaged in a learning process, and there is no way of pre-codifying the decisions that they will face. The use of judgment seems unavoidable in running policies; what appears to be needed is a framework of rules to bound behavior and guide expectations while allowing "competent discretion" to be exercised.

The choice of basic monetary and fiscal institutions has a general logic. One may reasonably ask why some countries cannot apply more or less systematic budget procedures to determine fiscal policies, or why central banks sometimes act as mere providers of funds to undisciplined government treasuries -and the question leads to the tricky matter of identifying what are actually the degrees of freedom in the design of policy regimes. Nevertheless, the experience clearly shows that economies without elementary

rules for policy-making are plagued with time-inconsistency problems (as private groups and government authorities find it expedient to engage in "opportunistic" behavior) and suffer from the impossibility for individuals to form accurate expectations. And, often, governments that operate in a setting where they are apparently unrestricted in their choices end up acting simply in response to the pressures applied on them by various interest groups.

Policy games thus have general patterns which make it desirable to set some type of rules in order to avoid perverse outcomes. However, history matters too. Both the people who administer policies and those that react to them have concrete experiences that determine their perceptions and influence their modes of behavior. Monetary institutions are seen quite differently, for example, in a country with a tradition of stability and in one that just comes out of hyperinflation. Central bankers with a reputation for solid management can count (maybe not always, but often) on the public to respond "cooperatively" to their actions and announcements. Such confidence permits the exercise of discretion within perhaps implicit but more or less well understood limits. When that reputation is lacking, it is likely that the choice leans toward strict rules, for fear that anything else would open the door for a return to the old habits.

The attitude then tilts towards strengthening private expectations, against keeping flexibility to meet contingencies. This seems quite natural when the public will not easily put much faith in loose promises that monetary stability will be the main

objective of the authorities, and adverse "real" shocks appear as a vague and distant possibility while, at the same time, the troubles of policy mismanagement are vivid in people's minds. In the midst of a high inflation, governments have no effective power to run policies; on the way back, they will probably have to make explicit surrender of the use of (especially monetary) instruments. Adherence to a simple, rigid monetary rule helps to solve the crucial, immediate problem of re-establishing some degree of confidence in the value of the currency; the possible future costs of the choice, even if perceived as such, are likely to be heavily discounted.

But, at any rate, the establishment of a definite monetary rule does not eliminate the need for policy management. This is quite apparent in stabilization processes: they do not seem to take place as the unfolding of a sequence of actions pre-conceived from the start, but as a succession of policy decisions adapted to the circumstances of each moment, even if they follow an overall pattern.

The analogy of chess playing is often used to describe the behavior of policy-makers when executing a program. The image fits the case, and other decision-making scenarios as well. Here too, we have agents with a definite purpose and a (possibly well conceived) view of how the game should be played, but no exact knowledge of where they will find themselves more than a few steps ahead, and no chance of devising an "optimal" strategy for every conceivable state. Without a game plan, the opponent is almost sure to win, and some situations call for well studied, standard responses. The

players will use their technical skill, and will take advantage of the analogies they may recognize with other instances of the game which they have in memory. But at some point or another, they will have to "invent" a move. And, sometimes, they will surprise the analyst.

5. Some concluding remarks

Macroeconomics remains a lively topic. The behavior of actual economies constantly presents problems for consideration; old ones may fade out of sight, but are likely to reappear later on, maybe somewhere else or under a somewhat different guise. This is also a field where intellectual nihilism leads to no place, but where unquestioning complacency seems particularly hazardous: we have seen several once-well-established orthodoxies become theoretical relics. The all-encompassing macro theory seems out of sight; the applied economist should probably prepare himself (especially here in the South) for many rounds of substantive learning which will not converge to certainties. But economic agents are in the same predicament. This rapid excursion to a variety of subjects has tried to suggest that the limits to people's ability to make informed choices do have consequences in concrete, practical circumstances. It is perhaps time, as Leijonhufvud has been pointing out, for theory to consider alternative techniques to model economic decisions.

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