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Address to the Round Table Session of the 5th Polish-Italian Symposium on Applications of Systems Theory to Economics, Management and Technology*

by

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Systems theory can have manifold applications in economics. Four lines of development can be singled out, all of them emerging from the papers we have discussed during the conference.

The *first* is the *building of models to be used for descriptive and predictive purposes.*

One of the common places in the methodology of sciences is the conception of prediction as an application of a descriptive model translated in the time dimension. For that we shall appreciate Sadowski's contribution [1] to the solution of methodological problems entailed by the application of systems theory along the first line we are mentioning: in the paper presented at the meeting he has clarified how the rules defining the *rational* use of forecasting models are different from those that have to be used in building descriptive models for forecasting purposes. Paradoxically a model may fail in forecasting future developments just because it was successful in describing the actual behaviour, for, in such a case, the operators, becoming conscious of their behaviour and of its effects after the model, may be induced to change it. Let us make an example. When macroeconomic models are applied to solve problems of economic policy, one of the variables we want to forecast is the rate of increase in prices. Let us assume that the model is capable of visualizing the rate of inflation that the actual behaviour of the various operators tend to produce. If, as it occurs in many cases, the expected rate of inflation is different from that entailed by the actual bahaviour, the knowledge of the latter may change expectations; the change in expectations may change the actual behaviour; forecasting is thus invalidated. Also for this reason, in time of accelerated inflation,

*) Prof. Siro Lombardini opened the discussion during the Round Table Session of the Polish–Italian Symposium. Unfortunately, due to some delay in obtaining the complete version of his address, the editors were unable to include it into the Proceedings [1]. The volume [1] contains the other addresses to the Round Table Session, as well as a shortening of the address of Prof. Lombardini, elaborated by Prof. Władysław Findeisen.

official forecastings of the rate of increase in prices prove ex post to have been underestimated.

The aporia we have pointed out does not a rise for *model aiming at solving technical problem* well defined in the context in which they are felt and faced. This is the *second line* of possible applications of systems theory to economic problems. Górecki's paper [1] offers an interesting contribution along this line. The analysis of hypothetical processes by technical models may make people conscious of some possibilities that they do not visualize, and therefore induce changes in the actual behaviour. I hope that such a situation can occur for Bertele's and Brioschi's model [1].

A theoretical problem has to be faced when dealing with technical models: the congruence of the optimization of a subsystem with the optimization of the whole system. Such a theoretical problem can be dealt with by organization models we shall recall later on. Such a consideration can help us in understanding how the various lines of applications of systems theory to economics are related to one another: all contribute to the understanding and improvement of the economic system.

The failures of descriptive models in forecasting are due not only to the above recalled aporia but also to the following reasons:

1) statistical data are inadequate; some of the systematic biases in the estimates are due to the technical difficulties in detecting some economic phenomena (of the so called submersed economy for instance);

2) the theories, on which the models are built, are also inadequate as Parinello has proved in his contribution [1].

The analysis of the failures of the descriptive-forecasting models could contribute to a better assessment of the shortcomings of the theories on which they are based. Unfortunately such an analysis had not been carried out, at least for Italy. The models are continuously adapted not after critical assessment of the underlying theories, but in some empirical way, for the only purpose of fitting theoretical data to empirical data. As a result:

— empirical models are produced that can scarcely contribute to improve our understanding of the economic system,

— systems theory is mostly applied to solve *technical* problems in model building and in statistical inference,

— the eventual success of empirical models in predicting future events cannot be interpreted as the fulfillment of an expectation rationally based on a scientific interpretation of the latent structure of the economic system, but as a successful move in a game played by a pragmatic operator and an unknown nature, that the operator wants to defeat not to understand (economics seems to drive away from the Copernicus revolution).

The more clear the novelty of the crisis of the modern economies becomes, the more apparent the deficiency of such a pragmatic empirical approach to economics.

We must ask ourselves whether a historical critical method that can take advantage of a looser statistical analysis of relevant facts (the relevance being decided on the basis of very weak theories) should not be prefered to the sophisticated econometric methods, for the purpose of understanding the structural changes that have occured in the economy, and of making reasonable prognoses. From some Italian experiences (the research directed by Fuà for instance) encouragements come for a positive answer to the question.

Quite insufficient has been the discussion on the shortcomings of statistical data. Some may have the feeling that most econometricians want to remove the problem being afraid that its discussion can damage the profession. On the contrary we believe that an open discussion can lead to a most efficient data collection and thereby to more extensive applications of statistical and econometric methods in the analysis of the performance of the economy and of its perspectives.

The evaluation of concrete situations and of their perspectives can be improved by a cybernetic process between econometric analysis and human evaluation of the results thereby obtained. Such a process is justified not only by the deficiency of the theories underlying the models, but also by the processes by which goals are formed and rules are determined. By evaluating the implications of pursuing certain goals we can induce changes in the goals. The rules can be improved after the knowledge of the results they can lead to. Arguments supporting such a view have been offered by the interesting papers presented by Kulikowski and Straszak et al. [1].

The cybernetic approach just mentioned may by fruitful not only at an empirical level, but also at a scientific one. The inadequacy of formalized theories to describe concrete processes is not only due to historical contingent reasons but also due to more profound methodological reasons, as I have outlined in [2]. Scientists must be aware that theories and models are always partial, in the sense that they can explain only those aspects of the actual processes that are compatible with the assumptions a priori made on the structure of the system, for the completeness and the invariability of the assumptions can never be empirically ascertained. (This is particularly true for the economic system because of its particular features). All scientific models are *simulation models* and they must be accepted as such. We must then be ready to accept the coexistence of various theories, each of them being able to offer a partial interpretation. The critical evaluation of the partial interpretations — that can be fostered by a critical historical analysis of the actual processes — may open the way to new less partial scientific models.

Such is the *third line* of possible applications of systems theory to economics. The research I am pursuing in co-operation with Donati — of which a progress report has been presented — is conceived along this line. I wish to recall the main features of our research that can open the way to a set of *models for theoretical simulation*: the structural assumptions that make it possible an analysis of the process that is not constrained by the a priori hypothesis of equilibrium; the search of the conditions, if they exist, that make it possible for the system to move along an equilibrium path.

Padoan's paper [1] is essentially a simulation model as it is. The processes that they visualize are ideal processes that would occur, should the assumptions made on the structure of the system be verified. In applying such models to assess concrete processes one must be aware of such limitations: in particular he must take account of the possibility that disequilibria induce changes in some of the data and relations upon which the equilibrium structure of growth has been defined.

A *fourth line* of fruitful applications of systems theory to economics is represented by the *organization models*. In this field Findeisen [1] has made an important contribution to the discussion of decentralization. Decentralization models can clarify under what conditions a certain organization can produce the set of results that are deemed desirable. I want to emphasize that what the application of these models allow us to establish are only logical possibilities. Let us assume that the model tells us that the set of desirable results can be pursued by some organizational structure (and by a set of appropriate rules): that does not mean that by setting up the organization thus conceived we can obtain the expected results. Some of the remarks made on the descriptive models are valid also for the organization models. Reaction of social groups, that cannot be dealt with by the *economic* model, can affect the actual socio-economic process and cause divergencies between the actual results and those visualized by means of the model. Therefore also the results of an organization model must be discussed by experts (possibly by experts not only in economics but also in other social sciences). Should arguments denying the validity of the results be put forth that cannot be proved or falsified in the logical and semantic contexts of the model, a revision of the structural hypotheses (in particular of some organization features or of some rules) may be deemed convenient. Alternatively we may feel satisfied of being able to pursue results less desirable than those expected, being confident that some social counter reaction can be found that can improve them.

Economists feel often dissatisfied because of the scarce success that their models have in contributing to the decision of economic policy. The remarks we have just made may, to some extent, explain the scarce attention effectively paid by politicians to the economists' suggestions. Economists are seldom aware that their models are partial models: they are rarely aware of social phenomena that can exert remarkable influence on the results of economic processes. Politicians having some intuition of such phenomena are rather sceptical on the suggestions made by economists. Often the scepticism is not shown: economists are considered useless in solving concrete problems but useful in orienting public opinion. Such a situation impedes those assessments of the various alternatives open to the politicians that would improve their decisions and that are possible, provided a proper utilization of the economists' contribution is made. New relationship must be established between politicians and economists: that will eventually occur -- provided some historical conditions are verified — if the politicians' sensitiveness for the technical aspects of the problems is increased as well as the economists' for the political aspects.

In order to understand what are the historical (political) conditions that must be fulfilled for that to occur, some limitations of the economic models and some problems concerning goals and decisions in politics must be adequately explored. On the first point I shall outline the limitation entailed by the continuity assumption. Discontinuities are allowed for only in the analysis of problems of economic policy. Discontinuities are produced in this field because of the assumption that the Government is a Deux ex machina that can affect, by his autonomous decisions, the economic process: such an assumption does not allow to consider those social processes leading to the Government decisions that result from the activity of economic operators and are relevant in understanding such decisions.

Efficient relations between economists and politicians are difficult to be established also because the goals pursued by the latter are manifold. The need to keep and strenghten the power may lead politicians to give more weight to those goals that economists tend to consider as secondary (or auxiliary goals). One example if offered by the law on rent which has been passed by the Italian Parliament in 1978. The goal explicitly stated by the parties that were in favour of the law was to help poor people who have difficulties in finding an apartment. After the law was passed, since only the rent market is controlled (apartment can be sold freely at the price established by the market) the price of a vacant apartment is much higher than the price of the same apartment already occupied by a tenant: the consequence is that the apartments that become vacant are offered for sale and not for rent. The young people can find an apartment only if their family is sufficiently wealthy to afford to buy it. The law that was supposed to help poor people in fact discriminate against them. In fact it was not difficult to foresee such a result. Yet the law was supported by the big parties (included large sectors of the Christian Democrats) because the main goal was in fact to gain the consent of people that have been convinced that the house problem was substantially the problem of the level of rents. On the other hand the goal pursued by the opponents was the defence of the landowners' interests.

Shall economists become politicians or have we to wish politicians more acquainted with economic problems and more willing to co-operate with technicians? Such a question may be of some interest only when another question has been answered. What are the conditions for the economic system to be congruent with the political one? To answer this question we must find a solution for the present crisis that — for different reasons — is a structural crisis for both the capitalist economies and the collectivistic ones.

References

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[2] Lombardini S. Economics: past and future, to appear soon.