1. Methodological Foundations and the Building of Economic Theories

For a number of years the present writers have been concerned with the relationship between structures of inquiry and economic theory (see Baranzini and Scazzieri, 1986). In this connection, it was pointed out that alternative lines of research in economics may be considered as shortcuts which economists have been tracing in order to formulate theories for specific purposes. Following this research program, in Baranzini and Scazzieri (1990) attention has been drawn upon the specification of economic structure as a critical feature in economic theorizing.

We may link the conception of economic theory that emerges from the above research program with the reconstruction of scientific investigation recently put forward by the mathematician René Thom: "If a science is more than just naive description, this is due to the fact that it has constructed a set of "virtual" (i.e. imaginary) processes among which it is capable of selecting the real, observable ones. Hence the criterion for true scienticity lies not in the veracity of observation or in its accuracy, nor in the use of instruments to help increase the set of observable facts, but in the building of a virtuality of phenomena from which the real ones can be selected by a well defined logical or mathematical procedure". (Thom, 1989, p.40)

It is worth emphasizing that an early recognition of the importance of virtual phenomena in theoretical scientific research is due to the Bologna mathematician Federigo Enriques, according to whom 'the scientific fact takes on the form of a simplified fact, a type of a series of possible facts' (Enriques, 1914, p.81).

Such a perspective about empirical work shows important roots in the Aristotelian methodological tradition and may also be linked with the particular emphasis upon the role of free conceptual building in inductive research due to William Whewell, the Master of Trinity College, Cambridge: 'A new concepting [is] applied in order to bind together observed facts, and though the conjunction of the observed facts [is] in each case an example of logical Induction, it [is] not the induction process merely, but novelty of the result in each case which [gives] its peculiar character to [the history of inductive sciences]' (Whewell, 1860, p.v.).

Such an approach implies emphasis upon the so-called "theory dependence of data" and hence upon the link between descriptive and theoretical frameworks. In our discipline this issue emerges by considering that description is associated with a certain degree of simplification of the economic system being considered. As a matter of fact, a number of characteristic features of such a system may be overlooked when carrying out theoretical investigation. In particular, a description based upon analytical simplification (a sort of theoretical shortcut) generates a conception of economic structure which may be defined as a mapping of the set of characteristic features of an economic system into a set of relatively simple features common to a number of distinct economic systems (see Landesmann and Scazzieri, 1990, p.95-6).

2. Alternative Uses of Structural Concepts

The above methodological framework has recently led us to consider the relationship between economic theorizing and representation of economic structure in The Economic Theory of Structure and Change, edited by M. Baranzini and Scazzieri, Cambridge University Press, 1990, with contributions of L. Ornaghi, T. Negishi, H. Boris, M.A. Landesmann, J. Magnan de Bornier, H. Hagemann, M. Morishima and N. Georgescu-Roegen, as well as the two editors. The starting point of our investigation has been the recognition that our discipline is characterized by a plurality of ways in which it is possible to describe events as elements of a particular structure. An examination of economic literature suggests a fundamental distinction.

On the one hand, 'structure' may be conceived as the network of interpersonal relationships on which the economic fabric of
society is founded. Such relationships describe the social rules and personal and collective beliefs that provide the framework for the way in which this notion of structure can be used in economic analysis. (This notion of structure provides the backbones of Adam Smith’s, Alfred Marshall’s, and John Maynard Keynes’s works on the working of market society.)

On the other hand, ‘structure’ may be conceived as a set of relationships among economic magnitudes such as sectoral outputs, population and technology. Such relationships describe in the first instance the outcome, not the motivations, of agents’ aggregate behavior, thereby expounding the mutual compatibility among global components of economic activity. For instance, a particular structure could be described by the association of a given technique, the consumption-saving ratio and the rate of growth of the system. (This notion of structure appears in the writings of Charles Davenant, William Petty, Francois Quesnay, Wassily Leontief, and Richard Stone.)

3. The ‘Fabric’ of Economic Society

The emergence of the notion of economic society presupposes the identification of a network of interpersonal obligations and mutually compatible beliefs within a specialized sphere of social life. In the absence of such a precise network the descriptions of various aspects of economic life belong to the fields of (i) moral philosophy, as in the case of Aristotle’s Nichomachean Ethics or St. Thomas Aquinas’ Summa Theologiae; (ii) practical philosophy, as in the case of Xenophon’s Oeconomics or Niphus’s writings; (iii) treatises on commercial and banking practices.

The emergence of ‘market laws’ provides an important instance of the process by which the notion of economic society was born in European thought. It also provides an instance of the interaction between obligations and beliefs and of the resulting rise of a specialized and institutionalized sphere of social life, which comes to be regulated by a specific set of legal rules (commercial law). This process marks the development of trade in the towns of medieval Europe. There the ius mercatorum (‘the law of the merchants’) takes shape as a specialized set of legal arrangements that regulated the relationships of the merchants among themselves as well as the relationships between merchants and non-merchants. This latter set of relationships substituted the general rules with a specialized set of norms to which non-merchants were obliged to abide: this is the so-called privilegium mercaturae (‘privilege of trade’). (An early discussion of these bonds is to be found in Bartolus’s Commentaria (first half of the fourteenth century); see also Scazzeri, 1988, p.151.)

Slowly this process led to a sophisticated and institutionalized system of rules of behavior that came to be regarded as a natural framework for economic actions. This lengthy process provided the backbones of the notion of ‘civil society’, the economic structure of which was considered in Smith’s Wealth of Nations. For Smith, civil society is seen as a stage in the evolution of humankind characterized by the ethical rules considered in the Theory of Moral Sentiments. In the Wealth of Nations Smith considers the specification of this social structure in the field of economic relationships.

Smith’s general set-up was taken up in David Ricardo’s view of modern society, in particular for what concerns the existence of entitlements of different social classes to a particular share of the product. Later on Smith’s general view of economic structure was replaced by John Stuart Mill’s and Karl Marx’s conception that more than one set of social arrangements is possible in modern society. This point of view was taken up in Marshall’s idea that the working of the market may be supplemented by the introduction of explicit ethical rules; and in Keynes’s view that the ‘market laws’ may in given cases be replaced by direct economic policy. From this point of view economic structure no longer provides a self-contained system of laws that completely regulate economic activities.

4. Structure as the Set of Relationships among Economic Magnitudes

A different notion of economic structure emerges from the work of seventeenth-century writers in the field of ‘political arithmetics’, such as Charles Devenant, William Petty, Gregory King, John Graunt. Such writers stress that it is possible to describe the economic system in quantitative terms by measuring magnitudes such as wealth, revenue, population and capital stock. From what appears to be a work in the field of national accounting, there slowly emerges a definite theory of the fundamental relationships among these economic magnitudes. An important instance is that of Petty’s economic writings, in which the notion of net product is explicitly identified as the difference between the measure
of national product and that of the resources employed to produce it.

The same concept of economic structure is used by Leontief in his *Structure of the American Economy 1919-1939* (1941), in which the production process at the national level is described in terms of a flow of inter-industry relationships. Attention is focused on the commodities that each sector of productive activities receives from the other sectors as well as on the commodities that it in turn provides for the other sector. This type of approach has often led to particular ways of representing the technology of a productive system by means of the unit requirements of each particular input that may be computed directly from intersectoral relations. However, as L.V. Kantorovich points out, although this method of describing technology is of special interest, this approach may be considered sufficiently satisfactory for calculating valuations of products. Indeed, instead of actual methods of production, broad averages are used here and the results obtained depend essentially on the methods chosen for aggregation. (Kantorovich, 1965, p.281)

Leontief’s notion of economic structure is basically a ‘production-oriented’ one. Its scope appears to be widened by subsequent works and in particular by Richard Stone’s idea that final consumption can be related to income levels by means of a definite structural relationship (Stone’s linear expenditure system).

5. Structure, Change and Economic Theory

It has been the purpose of our inquiry to contribute to the identification of the scope of structural methods in economic inquiry by:

(i) outlining the ‘common core’ of structural analysis;

(ii) examining the conditions under which particular specifications of economic structure can be useful for different purposes;

(iii) considering alternative ways in which such structural specifications have to be dealt with when examining the framework for dynamic analysis.

It is the editors’ opinion that this field of inquiry deserves a thorough investigation both from the point of view of the different methods of structural analysis and from that of their application to specific problems of economic dynamics.

The relationship between the concept of economic structure and the analysis of economic change is of critical importance for the study of economic dynamics, but it has seldom been explicitly evaluated in a comprehensive way by economic theorists. Economic structure is the most fundamental set of relationships among economic units providing the basic framework for economic life. As a matter of fact, most economic events are both the result and the cause of the underlying economic structure. Interdependence among economic units brings about results that may vary according to the type of structure being considered; on the other hand, the structure itself can often be seen as the background against which a certain class of economic outcomes is to be expected.

Within a certain framework, the relationships associated with any type of structure constrain interactions among economic agents and tend to bring about a determinate pattern of aggregate behavior.

There are a number of ways in which the analytical device of economic structure has been used by economic theory. In particular one may refer to the utilization of economic structure in both the research line dealing primarily with allocation and ‘rational’ decisions of individuals (theories based on the pure exchange model) and the research line dealing primarily with the objective stock-flow network and wealth and income distribution among classes of individuals (theories based on the pure production model—see Baranzini and Scanzieri, 1986). The former type of theory is based on the identification of the interaction and communication scheme among economic agents and draws attention to the role of the structural framework in providing suitable restrictions on the behavior of individuals, thus leading to determinate social outcomes. (On this point see Allais, 1986; Hildenbrand, 1983; Kirman, 1989.) On the other hand, the theories of the pure production type focus upon interdependence among the objective conditions moulding the 'system of events' to which human actions belong; here the role of the structural set-up is to provide a framework in which the mutual compatibility of objective conditions may be assessed quite independently of individual or collective objective functions.

6. ‘Horizontal’ and ‘Vertical’ Integration of Economic Activities

Economic theory may be seen as a
representation of the relationships among elementary economic units such as production processes and consumption activities. Such a representation might take a different form depending on the criteria by means of which such processes and activities are linked to each other. In a number of cases this integration takes the form of a circular interdependence in which the consumption activities are considered as necessary prerequisites of the production process itself; here the notion of 'productive consumption' is relevant: corn produced in the current year has to be partly used or has to be partly re-employed for the production of corn in order to ensure that next year's output of corn will be at least as great as this year's. In this way the productive consumption of corn is in fact a requirement for future production, so that a link is established between successive time periods. What is feasible in the current period is largely determined by what has been inherited from the previous periods. This framework provides an insight into the reasons why the economic system may find itself in a stationary state (as rigorously defined in Pigou, 1935) or on an expansion path. In this picture the production of commodities is often a prerequisite for the production of other commodities, and all commodities appear to be dependent on each other's production; we could therefore say that a pattern of 'horizontal' integration has been introduced.

Yet in other cases this integration takes the form of a 'one-way' or 'vertical' relationship in which consumption of commodities appears to be the ultimate goal of the production process. Here the notion of 'productive allocation' is relevant: corn produced in the current year is the outcome of a process in which a certain number of original inputs are employed. Its level of output depends, in each time period, on the quantities of such inputs that are made available at the beginning of the period. However there is no immediate connection between subsequent time periods: for any given technique of production the output level in each period depends on the amount of available resources that are not themselves produced in the economic system. In this perspective, future production is disjointed from current production, and the reasons for the dynamic behavior of the economic system are closely connected with the availability of the productive resources at each period. (Note that resources do not depend on the productive process under consideration.) In this picture, the production of commodities depends, in terms of 'one-way' causality, on the availability of resources that are independent of the productive processes. Indeed here the notion of productive consumption is void of sense: we could argue that a pattern of 'vertical integration' has been established between production and consumption.

The above argument shows that there exists a fundamental dichotomy between the two alternatives, even if not mutually exclusive, notions of economic structure considered as the set of relationships among economic magnitudes (such as sectoral outputs and productive resources). The two alternatives lead to what may be called 'horizontally integrated' and 'vertically integrated' models of economic structure. At this point we may inquire into the relationship between the above dichotomy and the vision of the network of the interpersonal relationships on which the economic system is based. The use of the horizontal model has often been associated with a vision of interpersonal relationships in which the existence of functional links among social groups or classes is a prominent feature; such links are based on the mutual interdependence of production processes, a concept that is stressed in this framework. For instance, the fundamental relationships among distinct groups of income earners are grafted to production technology in models such as those of John von Neumann, Wassily Leontief and Piero Sraffa.

On the other hand, the use of the vertically integrated model has often been associated with the idea that the economic fabric of society is based on relationships among individuals rather than social groups. An explanation for this feature could be that the use of vertical integration draws attention away from the issue of the reproduction of the economic system and focuses upon the relationship between productive resources and their allocation. As a result individuals come to the foreground in their dual role as resources owners and consumers. Along this line we find the contributions of authors connected with the Lausanne School, such as the classical achievements of Leon Walras and Vilfredo Pareto, and the modern works of Maurice Allais and Gerard Debreu.

7. Epilogue

The above considerations suggest a reassessment of the complex relationship between two different strands of economic theorizing, which have characterized the history
of our discipline since pre-classical and classical times. One based upon consideration of the objective framework of economic interaction; the other emphasizing motives of behavior and outcomes of interrelationship among individual units.

Our contribution suggests that actual economic systems may be described and analyzed by using two different representations of economic structure, which may be used to clarify distinct features. The anatomy of an economic system may first be assessed by referring to the objective concept of economic structure, while certain features of the 'physiology' of the same economic system may be explained in terms of a more behavioristic approach. Symmetrically, the above distinction might also suggest a possible interplay between material (natural) and institutional factors in determining the actual course of economic evolution through time.

References