literature of the 1920s, when the distinction was advanced between 'merely temporary influences' and changes producing permanent alterations in the fundamental relationships of the economic system, or 'structural changes' (Harms, 1926). Interest in the concept of 'economic structure' led to applied and theoretical work in the 1930s by economists such as Leontief (1936, 1941) and Perroux (1939); and again later by Tinbergen (1952). In particular, Perroux defined economic structure as those 'proportions and relationships that characterize ... an economic setting in space and in time' (1939, vol. I, p. 194). It was this definition that happened to be taken up subsequently by a number of other writers, and became particularly influential amongst a group of economists in Latin America who called themselves 'structuralist' and channelled their elaborations into a descriptive-historical-institutional approach (see Furtado, 1967). The development of these ideas in the strict field of economic theory, however, on which we shall concentrate in this survey, were much slower to emerge.

In the period between the two world wars, the revival of interest in economic growth did not lead immediately to a revival of interest in the economic theory of structural dynamics. This can be seen by considering the two most important dynamic theories formulated in this period: that of von Neumann and that of Harrod. Von Neumann (1937) studied the dynamic properties of a multisectoral economic system which undergoes a proportional expansion of all the sectors of the economy (thus maintaining an unchanged structure). For his part Harrod (1939) and, after him Evsey Domar (1946), studied the relationships among certain macroeconomic magnitudes (investments, savings, employment, national income), as well as the relationships among their rates of change. They both defined that economic growth might take place through a periodic succession of booms and depressions; but they remained unable to deal with the problems of change in the composition of macroeconomic magnitudes.

This aspect of the literature on long-term economic dynamics is openly at variance with the historical development of all actual economic systems, which exhibit profound changes in composition. Inevitably, the problems of structural change were therefore bound to emerge.

In the recent economic literature, attempts to formulate a theory of the structural dynamics of an economic system in the long run were made in the 1960s (Pasinetti, 1962 and 1965; Leon, 1967). These works insist on a link between structural change and (1) the increases of labour productivity in the technological sphere and (2) the increase of average incomes which consumers can spend on goods and services – a link which is established by making use of an empirical generalization known as Engel’s Law (Engel, 1857), according to which the share of personal income which an average consumer allocates to the purchase of a given good is continually changing, as his or her income is increasing. The causal chain is very simple. The growth of per capita disposable income brought about by technical progress affects the composition of global demand, and this causes adjustments in the composition of total production. One may add that technical progress is not uniform throughout the various branches of an economy either quantitatively or qualitatively, and that this also brings about a series of structural changes in the price system.

All the above-mentioned structural changes, concerning Engel’s Law, technical progress, non-uniform productivity increases and changes in the consumption structure, have recently been brought together in a general theory of the structural dynamics of an economic system, to which we now turn.

POPULATION, PRODUCTIVITY AND EVOLUTION OF CONSUMER DEMAND. Consider an industrial economy in which industrialization and specialization of labour is well advanced. The economy is supposed to produce a wide range of different goods and services. As time goes on, three basic sources of change may be seen to be at work.

A first source of change is population growth (either by natural growth or by migration), accompanied by variations in the ratio of the working to total population. A second source of change is represented by the application to productive processes of scientific research and technical progress, which causes increases of productivity in each industrial branch; that is, increases in the quantity of output per unit of inputs 'absorbed'. For the sake of simplicity, we shall consider the economic system as a set of vertically integrated sectors. In each vertically integrated sector only one final consumption good is produced, while all means of production will be considered as consolidated into one global factor of production, which we shall call 'labour'. This simplification does not affect the conclusions following from our analysis of the structural dynamics of the economic system. At the same time, the process of vertical integration permits us to consider not only all straight quantitative changes but also the quantitative aspects of the qualitative changes in production methods. The changes in the quantity of each final output per unit of 'labour' absorbed will normally be positive, though some changes might be negative. In any case, all changes will generally be different from sector to sector. If we denote by 1, 2, ... , m, the different productive sectors, and therefore the corresponding goods and services, we may say that productivity is increasing in sector 1 at the annual percentage growth rate \( r_1 \) (e.g. 20 per cent per year), in sector 2 at the annual percentage rate \( r_2 \), ... , in sector \( m \) at the annual percentage rate \( r_m \). Suppose that productive sectors have been numbered in a decreasing order of productivity so that \( r_1 > r_2 > \cdots > r_m \). Since we are supposing, for the sake of simplicity, that each productive sector produces only a single good or service, there is a one-to-one correspondence between productive sectors and goods or services.

There is a third source of economic changes, which is a straightforward consequence of Engel’s Law. Technical progress brings about a continuous increase in average per capita real incomes, and thus it brings about increases in the demand for the various goods and services. Such demand increases will generally be different for different goods and services, and, as a consequence, also for different sectors. We shall denote by \( r_1 \) the annual percentage growth rate of per capita demand for good 1, by \( r_2 \) the annual percentage growth rate of per capita demand for good 2, and so on, until \( r_m \). Obviously, there is no reason whatsoever why one should expect a particular order in the sequence \( r_1, r_2, \ldots, r_m \). The growth rate \( r_m \) will generally be positive, as a consequence of increasing real per capita incomes, even though some \( r_m \) might be negative (in the case of 'inferior' goods, demand for which is declining as real income is rising).

It should be noted that all the above changes are characteristic of industrial systems as such, independently of their institutional set-ups. In other words, the movements of working population, the increases of productivity and the evolution of consumption demand are all consequences of industrial growth as such, independently of whether it takes place in a market (or 'capitalist') economy, or in a centrally planned (or 'socialist') economy.
It is with reference to these fundamental relationships which are common to all types of institutional set-ups that it has been possible to derive a pretty complete picture of the structural dynamics of an industrial economy. On the other hand, with reference to specific institutions, the economic analysis is still at the initial and preliminary stages, even though important results have already been achieved. In the following two sections, a series of arguments will be presented that refer to both types of investigations.

**The Structural Dynamics of Production, Prices and Employment.** As a starting point, it is necessary to define what might be called a 'satisfactory' state of economic growth. It seems reasonable to consider as satisfactory a state of economic growth in which the evolution of the economic system is taking place by maintaining both an approximately full employment of the labour force and an approximately full utilization of the productive capacities in the various branches of the economy. If this definition is accepted, then some constraints are immediately imposed on the growth of the economic system. It is possible to show that, in each productive sector, there is a relationship between the rate of increase in sectoral demand, the technical capital-output ratio and the amount of new investments to be undertaken. It is also possible to show that there is a macroeconomic relationship (i.e. a relationship connecting all the sectors of the economy) that defines the level at which the overall effective demand should be maintained.

When these constraints are satisfied, it is possible to sketch out a path that may be termed 'satisfactory' for the structural dynamics of the relevant magnitudes of an economic system. In each sector $i (i = 1, 2, \ldots, m)$, the physical output will grow each year at the percentage rate $r_i$, where $g$ is the percentage annual rate of population growth and $r_i$ is the percentage annual rate of increase in the *per capita* demand of good (or service) $i$, as defined above. Since all the $r_i$s are different from one another, a structural dynamics of production becomes inevitable.

Moreover, in each sector $i$, the annual percentage growth rate of productivity $p_i$ generates a decrease in the unit cost of production. Under certain ideal conditions, this will also cause a decrease, at the same percentage rate $p_i$, of the corresponding equilibrium price for given rewards to the factors of production. This would imply a distribution of the gains of technical progress through price reductions. There is, however, an alternative way of distributing the gains of productivity increases, which has become more common in industrial economies. This way consists in maintaining unchanged the commodity price (the price of the $i$th good or service, in our example) while at the same time letting the reward of productive factors (of labour, particularly) increase. If, on the other hand, $r_i > p_i$, the $i$th sector will need additions in sector $i$ will remain constant through time only if $p_i = r_i$. If, on the other hand, $r_i > p_i$, the $i$th sector will need additions to its labour force, whereas if $r_i < p_i$, this sector will find itself compelled to dismiss workers (or not to recruit new personnel, as workers retire). As a result, there will be relative changes in the quantity of labour services needed in the different productive sectors, thus determining a structural dynamics of employment.

Some of the most serious troubles characterizing industrial economies arise precisely from the structural dynamics of employment; for it is impossible to separate the labour services from the individuals offering such services. Each individual worker possesses a specific range of skills and is seldom indifferent between working in a familiar environment and working in an unfamiliar place, or according to rules that may conflict with his (or her) attitudes, customs and goals.

**Applications of the Theory of Structural Economic Dynamics.** The analytical framework outlined in the above discussion is open to numerous applications, both in the field of economic theory and in the investigation of the actual working of economic systems. A few examples will be given here.

To begin with, the analysis of the structural evolution of economic systems through time provides a clear explanation of a preoccupying phenomenon which has emerged as a characteristic of industrial societies since the beginning of the Industrial Revolution; namely the co-existence of declining and expanding industries in a process of economic growth. Within the foregoing theoretical framework, it is easy to show that the declining industries are the logical counterpart of the expanding industries, when technical progress is continuously taking place. When certain productive branches enjoy increases of labour productivity due to the introduction of
the spontaneously formed organization and economic structure can be effected (Ishikawa, 1985).

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See also MARKET STRUCTURE AND INNOVATION, TECHNICAL CHANGE.

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structural economic dynamics. The dynamics of modern economic systems since the Industrial Revolution show that permanent changes in the absolute levels of some basic magnitudes (such as gross national product, total consumption, total investments, total employment, etc.) are inherently associated with changes in their composition; that is, with structural change.

In the short run, it is not always easy to distinguish between genuine structural changes (i.e., changes in composition that are permanent and irreversible) and purely transitory and reversible changes (reflecting adjustments to temporary scarcities or to various temporary exogenous shocks). But, as time goes on, transitory changes in either direction cancel out and long-run tendencies emerge more clearly. It thereby becomes possible to single out the interrelations between the cumulative movements of certain magnitudes and the changes that take place in their structure.

HISTORICAL EVOLUTION OF THE BASIC CONCEPTS. The problems of medium- and short-term economic dynamics – already considered by certain Classical economists, such as Ricardo (1817) and Malthus (1820), as well as by Marx (1867-94) – have been analysed at length in the literature on business cycles. By contrast, the problems of long-run structural dynamics have been studied far less frequently, in spite of the interest shown by Adam Smith and Ricardo. The former, in his enquiry into the conditions for the growth of the national wealth, pointed out that a continuous process of expansion presupposes changes in the structure of employment, with the increase in the share of 'productive' (versus 'unproductive') labour (Adam Smith, 1776, II, ch. 3). The latter, starting from the assumption that land and other natural resources are limited and scarce, noted that total production cannot increase beyond a certain level, unless there also is a continuous process of change in the relative sizes of the various branches of an economy (Ricardo, 1817, ch. 2, 5, 6). Some interest in long-term structural dynamics can also be found in Marx. In Marxist terminology, the tendency towards an increase in the ratio of 'constant' to 'total' capital (i.e., an increase in the 'organic composition of capital') presupposes a series of changes in the proportions among commodity outputs (Marx, 1867-94).

It is something of a paradox that those parts of Classical economic theory which have been more fertile from an analytical viewpoint have also been those that have required the most restrictive assumptions on the structure of the economic system (examples are the assumption of a uniform organic composition of capital in Marx, and that of uniform proportions between capital and labour in Ricardo's labour-theory of value). This feature of Classical economic theory clearly did not encourage research on structural dynamics.

The decline of Classical political economy and the subsequent emergence, since the 1870s, of the marginalist theory were accompanied by a gradual loss of interest in the dynamics of the 'wealth of nations', while the problems concerning the allocation of already existing resources moved into the foreground.

The relationships between economic growth and structural change came once again to the fore in the business-cycle
machinery, and, at the same time, their possibilities of finding outlets do not increase at the same rate, or have saturated, the possibilities of employing labour in such branches will inevitably shrink. This does not necessarily entail overall unemployment, but it does mean that a satisfactory level of overall employment will be maintained only on the condition of an adequate degree of labour mobility between productive branches, or a reduction in the working week (an increase of leisure time), or an appropriate mixture of these changes.

Moreover, within the above theoretical framework, it has become easier to understand why and how, in the industrial economies, the long-run tendency to the growth of the national income and employment is accompanied by short-run difficulties of various kinds, causing interruptions of growth and economic depressions. Short-run difficulties are explained as a consequence of the same phenomena that produce the long-run expansion of the economic system. For the structural dynamics needed by an economic system that is expanding through time, while maintaining full employment and full utilization of productive capacity, can seldom be achieved without delays and discontinuities. There is a fundamental contrast between the non-steady character of the expansion of demand for any given good and service (as emerges from the Engel curves analysis mentioned earlier) and the steadier expansion that would be required, for organizational reasons, by an efficient growth of the production units. Instantaneous adjustments are not always possible, particularly in those cases in which it is necessary for each product to use 'specialized' productive resources (such as machinery of a special type, or workers of a particular skill). This characteristic of a growing economy helps to explain booms and depressions and their periodic recurrence through time — and also (which is even more interesting) both in the case of market economies and in the case of centrally planned economies.

Another phenomenon which it has been possible to shed light on is the tendency to the increase in the general level of prices (inflation) that has become so characteristic of many industrial economies of our time. Without going into too many details, suffice it to refer back to the previous remark that a necessary condition for a stable average level of prices is to have price reductions for those goods that are produced in sectors where productivity increases above average. (This is because the prices of goods in those sectors where productivity grows below average will have to increase anyway.) But if there are institutional or organizational rigidities that prevent prices from being reduced, a necessary condition for keeping an efficient structure of prices is an even stronger increase of those prices that should increase anyway. The consequence will be an upward increase in the general level of prices.

We may finally consider briefly international economic relations. Traditional economic theory has never been able to explain in a satisfactory way the growing inequalities among the various economies on the world scene. Long-run movements provide a shocking evidence of such a phenomenon, as it is shown by a comparison of the average per capita incomes of the various countries. (They range at present from an order of magnitude of $10,000 in the United States to an order of magnitude of little more than $100 in the poorest countries of South-East Asia). It is possible to show that the benefits deriving from productivity increases remain in the countries that have obtained them, and are not leaked by international trade to the remaining countries of the world. At the same time, the poorest countries are compelled, by the very structural characteristics of their internal demand, to concentrate their production in sectors with very low, or even zero, rates of growth of productivity. The very same principles also help to explain phenomena to which development economists have paid so much attention, such as the declining trend in the terms of trade between the countries producing primary products and the countries producing manufactured commodities (see Prebisch, 1959) as well as many other phenomena that characterize the contemporary world economic scene.

See also CUMULATIVE CAUSATION.

structuralism. Structuralism is basically a method of enquiry which challenges the assumptions of empiricism and positivism. This method is found in literary criticism, linguistics, aesthetics and social sciences both Marxist and non-Marxist. The principal characteristic of structuralism is that it takes as its object of investigation a 'system', that is, the reciprocal relations among parts of a whole, rather than the study of the different parts in isolation. In a more specific sense this

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