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STATICS AND DYNAMICS IN ECONOMIC THEORY[1,2]

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The concepts of statics and dynamics originated in the science of mechanics. From there they were borrowed by various disciplines, among them economics. In all likelihood this was probably not only due to similarities between the concerns of the sciences in question. More likely, the distinction between statics and dynamics is tied up with something which is characteristic of the very way people think.

It is this characteristic quality of human thought that I shall attempt to subject to closer analysis. In so doing I hope to contribute to clearing away some of the misunderstandings and confusions which have arisen about the distinction between statics and dynamics.

The pure mathematician will find little new or important in the following observations. To the contrary, the mathematical apparatus employed is rather commonplace. However, here as in all other applications of mathematical thought, the formal apparatus is merely an aid. The *raison d'être* of the following observations lies not in the originality of the formulae but in their economic interpretation.

1. THE FUNDAMENTAL DISTINCTION BETWEEN STATICS AND DYNAMICS

Virtually any scientific law can be viewed as a systematic analysis of certain *variations*. All laws—static or dynamic—tell us how a factor (or set of factors) varies if some other factor (or set of factors) varies. The distinction between the static and the dynamic law rests in the fact that the variations addressed by the respective laws are of different kinds.

The variations addressed by the static law are by definition not real variations in time, but formal variations which occur when we compare certain well-defined situations which we imagine are realised *alternatively*. The idea is: if quantitative phenomenon A is of a given magnitude, then quantitative phenomenon B will be of such and such a magnitude. Or, more generally: if the constellation within phenomenon-complex A is such and such, then the constellation within phenomenon-complex B will be such and such. Thus, the static law is a law which can be formulated without introducing the notion of time in a specific form. The observed variations are not variations with regard to *time*, but variations with regard to certain alternatives. In this sense the static law is *timeless*.

The dynamic law, on the other hand, is a law whose aim is to describe how a situation changes from one point in time to the next. The situations that are

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[2] The present thesis is an elaboration of the lecture delivered by the author at 'Socialøkonomisk Samfund' in December 1928.

compared by the dynamic law are, in contrast to the static law, not *alternative* situations (as in the static law) but *successive* situations. In the static law the compared situations are equivalent alternatives. In the dynamic law we add a new principle by which the situations are ordered in a certain succession, namely the time succession. It is precisely this chronological principle and the comparison between one situation and the following which is the essential point in the dynamic analysis.

We shall make the distinction clear by an illustration. Suppose we wish to investigate a set of two phenomena: the price p and the quantity traded x of a certain commodity in a certain market.

The first task is to *observe* the phenomena. First we observe at the point in time[3] t' the price and the quantity. Let the result of the observation be $(p'x')$. This result is entered on a card. We then make a new observation: at the point in time t'' we obtain result $(p''x'')$ which is entered on a new card, and so forth.

When we have obtained sufficient observational material, we collect the cards. *Description of the phenomena* is now complete, and *analysis* of the observations commences. If the analysis is such that it makes no difference whether we shuffle the cards before starting the analysis, then the analysis is static. Thus the analysis would be static if, on the basis of the material at hand, we tried to formulate the law that a high price corresponds to a small quantity, and vice versa.[4] If, on the other hand, the analysis is such that the order of succession and the time sequence between the cards is an essential factor, then the analysis is dynamic. Thus in the first case, time is merely an observational variable. In the second case the chronology is a crucial element.

It should be realised that according to the viewpoint applied here, the distinction between statics and dynamics refers to the analytical method, not to the nature of the phenomena. We may thus speak of static or dynamic analysis, but not of a static or dynamic phenomenon. Phenomena as such are neither static nor dynamic. On the other hand, phenomena as such may be *stationary* or *evolutionary*.[5] All phenomena may be submitted to static as well as dynamic analysis. To be sure, certain phenomena are more amenable to statical analysis than others. However, this classification of phenomena by no means coincides with a classification of phenomena as stationary or evolutionary.

Hence it is important to draw a clear distinction between on the one hand the phenomenological description (in which stationary and evolutionary phenomena can be differentiated) and, on the other, the analysis (in which statics and dynamics can be differentiated). The comparison occasionally seen, namely that

[3] The expression 'quantity traded at point in time t'' should, strictly speaking, be conceived of as the average quantity i traded per unit of time over a short time interval around t'. However, this is unessential in the present context.

[4] The distinction between inductive and deductive laws is unessential here.

[5] As regards the distinction between stationary and evolutionary phenomena, it will be noted that many phenomena which are evolutionary at the *microcosmic* level are stationary at the *macrocosmic* level. The individual is born, lives, and dies. And yet it may be that the population is stationary. The individual capital item is manufactured, is worn down, and disappears. And yet it may be that the capital stock as such is stationary.

statics provides a 'snapshot', whereas dynamics provides a cinematographic representation, is in my view quite erroneous. A snapshot has nothing whatever in common with an analysis. It is merely an observation, a fact, an element in the description of a phenomenon. If, at point in time t', one obtains price p' and quantity x', where does it lead us? No law can be formulated without introducing certain variations, alternative or successive. By the same token, a series of pictures does not in itself constitute an analysis.

So far, I have not mentioned the distinction between kinematics and dynamics. If one were to take into account this distinction, we would have the following scheme of analysis. First, we have statics, in which variations as regards time are absent. Second, we have a part of the analysis in which such variations occur. The latter in turn falls into two parts, namely kinematics and dynamics (in the strict sense). Dynamics (in the strict sense) are based on the *notion of force*. In kinematics this notion is absent. In the following I shall not go into the distinction between kinematics and dynamics (in the strict sense). What, in the following, will be called dynamics (in economics) is the entire non-static part of the analysis. In those parts of economic theory in which it is possible to define a notion of force, it will also be possible to subdivide this non-static part of the theory into a kinematic part and a part which is (in a more restricted sense) dynamic.

When we adopt the dynamic point of view, i.e. comparing one point in time and the following, a number of new notions which do not occur in static analysis become useful. The most important of these is the notion of rate of change with respect to time, i.e. *velocity* with respect to time. More generally one could speak of the *reaction* velocity of the system (or of the process) to certain incentives.

The notion of velocity with respect to time may be illustrated graphically as follows: let us consider a train in motion. We draw a *time curve* showing how the distance covered varies as a function of time: After 1 min the distance covered is 1 km, after 2 min 2.5 km, and so forth. The gradient[6] of this curve at a given moment represents the ratio between a small increment in distance and the corresponding small increment in time. This ratio is precisely the velocity with respect to time, i.e. the velocity with which the distance covered (at the moment of observation) increases per minute.

The gradient[6] of such a time curve varies from one point in time to another. We can represent this variation by drawing a new time curve whose ordinate represents the rate of change of the first curve. For this new curve we can again (at every moment in time) compute the rate of change. This quantity (i.e. the rate of change of the rate of change) is called the *acceleration* of the original quantity. We can continue in this way to introduce growth velocities of higher orders. The more complicated dynamic problems involve not only rates of change of the first order, but also rates of change of higher orders.

[6] The gradient is defined as the angular coefficient of the tangent, i.e. approximately at the angular coefficient of the secant over a small interval.

We shall denote the rate of change with respect to time by a dot over the letter in question. If, for example, X and V denote the total quantity bought and produced of a certain commodity (since a particular point in time is selected as the reference point for time), then $x = \dot{X}$ and $v = \dot{V}$ denote, respectively, the purchase and production *velocity*. Whereas the upper case letters X and V have the designation quantity (and nothing more), the lower case letters x and v have the designation quantity per unit of time. This notation is employed consistently in the following. The variables $\dot{x} = \ddot{X}$ and $\dot{v} = \ddot{V}$ denote, respectively, the purchase and production *acceleration*. They are designated quantity per unit of time per unit of time.

When two situations are compared statically, it is in principle unessential whether the transition from the one of these two situations to the other takes place rapidly or slowly. When we undertake a static analysis we have in mind only that a given situation A_1 in phenomenon-complex A corresponds to a certain situation B_1 in phenomenon-complex B, and that a given situation A_2 in A corresponds to another situation B_2 in B, and so forth. If A changes from A_1 to A_2, then, according to the static law, B will change from B_1 to B_2. However, the static law says by definition nothing about whether this transition from B_1 to B_2 takes place rapidly or slowly. Velocity of reaction is a notion which does not occur in static analysis.

The distinction between statics and dynamics may therefore be formulated as follows. *Any theoretical law which is such that it involves the notion of rate of change or the notion of speed of reaction (in terms of time), is a dynamic law.*[7] *All other theoretical laws are static.* A static law is a comparison between alternative situations, a dynamic law an analysis of rates of change.

Hence it is clear that the static model world is best suited to the type of phenomena whose mobility (speed of reaction) is in fact so great that the fact that the transition from one situation to another takes a certain amount of time can be disregarded. If mobility is for some or other reason diminished, making it necessary to take into account the speed of reaction, one has crossed over into the realm of dynamic theory. Thus, one could also consider statics a borderline case of dynamics by saying that in the static model world all reaction speeds are infinitely great, while in the dynamic model world, on the other hand, reaction speeds are finite variables. Therefore, in a static model world whose state at a given moment in time is entirely determined by a necessary and sufficient number of assumptions, no movement can occur. Or, put more correctly: the model world's state is altered only each time we change our assumptions. But now the changes occur as quick as lightning, because the reaction speed is infinitely high. It is in this sense that one must view the statement that in the static model world and under a given set of assumptions 'perfect mobility but no motion' prevails. On the other hand, the dynamic model world whose state at a certain moment in time is entirely determined by a necessary and sufficient number of prior conditions will, from the moment in question onwards, undergo an evolution

[7] In other words, a variable and its rate of change (in tems of time) must occur in one and the same argument.

whose nature and path are entirely determined by the dynamic laws which apply in the model world in question. Hence, a change of state occurs here without our changing of assumptions.

The static theory's assumptions regarding an infinitely great speed of reaction contain one of the most important sources of discrepancy between theory and experience. In real life both inertia and friction act as a brake on speed of reaction. Therefore static laws basically express what will happen in *the long run* if the static theory's assumptions prevailed long enough for the phenomena to have time to react in accordance with these assumptions. In the real world, however, the assumptions will rarely remain unchanged for such a long time.

It was stated in the foregoing that the static law is a timeless law. This expression must be defined more closely to avoid misunderstanding. A theory such as the static productivity theory incorporates time in a certain way, namely as a measure of the quantity of certain production factors. Work is measured for example in man-hours or man-days. Time is also incorporated when considering the length of the production period. However, none of these observations is dynamic in the true sense. Time is incorporated simply as a measure of certain quantities, *not as a scale along which the various compared situations are placed.* Knut Wicksell has adroitly stated that in this context the individual measures of time lie alongside one another, not consecutively. Thus none of these considerations can be said to be truly dynamic. In principle, we are only dealing with timeless theories in this context.

2. THE STATIC AND THE DYNAMIC MEANING OF THE NOTION OF EQUILIBRIUM

I will now turn to the notion of equilibrium, in particular the distinction between the meaning of this notion in statics and dynamics.

In static theory our initial step in dealing with a problem is to define the set of variables. In other words, we define the set of variables or phenomena whose mutual dependence we wish to analyse. As an example we can examine the static theory of exchange (without production). Consider a market with m individuals and n commodities. In this case the set of variables consists of $(mn + n - 1)$ quantities, namely, in the first place the n quantities that individual no. 1 trades (sells or buys), next the n quantities that individual no. 2 trades, and so on; in all mn quantities. To this must be added the $(n - 1)$ relative prices. It is well known that in the static theory of exchange only relative, not absolute, prices are relevant. We may therefore imagine all prices being expressed in terms of one of the prices, which gives $(n - 1)$ ratios. These $(mn + n - 1)$ quantities should in principle be regarded as the system of variables in the theory of exchange without production. This theory aims namely to examine how the above-mentioned $(mn + n - 1)$ quantities mutually depend on one another. They form, as it were, a closed system.

Once the set of variables is defined the next step is to formulate the *equilibrium conditions* (which could also be called structural conditions). An equilibrium condition is a law which tells us how the variables in the variable set depend on one another. It is a relation which encompasses all or some of the variables in a variable set and which by the very nature of the problem must be fulfilled. It is a condition which is of such a nature that if it were not fulfilled our model world would be disrupted. Hence the term equilibrium conditions. One could say that the equilibrium conditions are the conditions through which the nature of our model world is defined. A pertinent example of such an equilibrium condition in the exchange market is the equation which states that for any commodities, say, commodity no. j, the sum of the quantities sold must equal the exchange value of the commodities bought. Another example is the equation which states that for a certain individual, for example individual no. i, the exchange value of the quantity of commodities sold must equal the exchange value of the commodities bought (budget equation for individual no. i). It expresses the assumption that in our model world there is no (positive or negative) debt formation. A third example is the relations which express individuals' comparative assessments of the various commodities. These relations describe how the respective individuals react to a given price situation: if prices are $p_1, p_2, \ldots, p_n$, then individual no. i will purchase or sell a quantity ${}_ix_j$ of commodity no. j; and ${}_ix_j$ is a characteristic function of $p_1, p_2, \ldots, p_n$ for the individual in question.

The definition of the equilibrium conditions will as a rule contain, explicitly or implicitly, a certain set of variables which may be termed the *parameter system* or the set of *structural parameters*. These are parameters which influence the shape of the equilibrium conditions, and will therefore also influence the variables in the set of variables, but which by the nature of the problem are themselves to be considered independent of the variables in the variable set. Thus, for instance the number of children which individual i has will influence his comparative evaluation of the various commodities and therefore also exert some influence on the quantity he will purchase of commodity no. j. Conversely, on the other hand, the quantity he purchases of commodity no. j has to be considered as having no influence on the number of children (at any rate in the setting of the exchange problem considered here). In other words, the parameter system is a system of variables whose determination falls outside the scope of the present analysis. They belong to the data of the problem at hand.

Alongside the equilibrium conditions we have to consider certain *initial conditions*. These conditions also represent data pertaining to the problem at hand, but they are data of a more incidental nature than the equilibrium conditions. The initial conditions contain only a description of what state the system of variables (or a given part of it) was in at the moment the observation commenced. The initial conditions in the exchange market are, for example, the quantities of goods which the various individuals possess before the exchange transactions begin.

The question of which variables are to be considered to belong to the set of variables and which are to be regarded as belonging to the parameter system and to the set of initial conditions depends on how inclusive the theoretical analysis is conceived. The more inclusive the theory, the greater the number of variables will be transferred from the parameter and initial system to the system of variables. Thus, those variables which figure as initial quantities in the theory of the exchange market *without* production will figure in the system of variables in the theory of the exchange market *with* production.

At this stage the general static problem in the theory of the exchange market without production is to determine the situation that will emerge as a consequence of the given initial and equilibrium conditions. Formulating one or a few of the equilibrium conditions does not in itself contain the solution to the problem, but it is a step on the way to such a solution. For every equilibrium condition that we succeed in formulating, we reduce the degrees of freedom of the system by one. Only when the number of mutually independent equilibrium conditions has become equal to the number of variables in the system of variables is the problem finally solved. Thus, to solve the problem of the exchange market, we need $(mn + n - 1)$ mutually independent equilibrium conditions.

What is characteristic of this approach to the present problem is that all variables are regarded as mutually determined and mutually determinative. In this case we may say that the problem is approached as an *equilibrium problem*. The analysis is undertaken according to the *equilibrium principle*. In contradistinction to this approach is the scholastic way of thinking based on the chain-of-cause notion: A is the 'cause' of B, B is the 'cause' of C, and so forth.

If we attempt to explain the rent of land as what is left of the total product when labour, capital, and the entrepreneur have each received their share, and thereafter explain the profit accruing to the entrepreneur as what remains when land, labour and capital have each received their share, and so on, we have provided no solution whatsoever to the essential problem in distribution. Given the presentation of the problem here there are, namely, several variables, but only one equation (namely the equation which states that the entire value of the product is distributed among the factors of production). Thus, in reality the theories referred to contain nothing more than *pushing one of the unknowns at a time over to the left hand side of the equation.* Only when we attack the static problem of distribution as a problem of equilibrium (through marginal productivity or other equilibrium approaches), do we open the way for a real solution to the problem.

Thereafter I shall examine the principle of equilibrium in dynamics. Certain authors, (e.g. Walras in his 'Eléments d'économie politique pure', p. 301) have stated that it should be possible to go from the static to the dynamic theory simply by imagining the static equilibrium as changing with time. In other words, we should imagine a static equilibrium being brought into being at any and all points in time. However, this is a complete misunderstanding of the nature of dynamic equilibrium. The putting together of a series of static equilibria can never provide the picture of the very flux of events that is the object of dynamic theory.

Equilibrium in dynamics can mean two different things depending on the perspective applied. One may speak of *instantaneous* and *total* dynamic equilibrium. Instantaneous dynamic equilibrium is a kind of relationship of dependence, a certain set of conditions which is fulfilled at all points in time.

Therefore, dynamic analysis may probably in some way be said to analyse a sequence of equilibrium states, each of which is satisfied at any given moment of time. But this equilibrium is fundamentally different from the static equilibrium. *Other* factors are in equilibrium in the case of these instantaneous dynamic equilibria than in the case of static equilibria. In the static equilibrium, as mentioned above, $(mn+n-1)$ different variables keep each other in equilibrium, namely the quantity traded and the prices. In the instantaneous dynamic equilibrium, *a greater number of variables* keep each other in equilibrium, namely the above-mentioned $(mn+n-1)$ variables and, moreover, these variables' *rates of change* with respect to time (in the event also higher-order rates of change, perhaps also other variables). The essential feature of the dynamic approach is precisely the fact that the set of factors which keep each other in equilibrium is extended to include the rates of change.

Furthermore, the static and the (instantaneous) dynamic equilibria differ in that those variables which form part of the latter equilibrium are not, in contrast to those variables which form part of the static equilibrium, identical to the 'unknowns' of the problem. As regards what is to be understood by 'unknowns' there is a fundamental distinction between statics and dynamics. In statics an 'unknown' is simply an unknown *variable*. In the static exchange market there are, for example, $(mn+n-1)$ unknown variables to be determined. The problem is solved when these $(mn+n-1)$ variables are determined by the $(mn+n-1)$ static equilibrium equations. In dynamics, on the other hand, an unknown quantity is the same as an unknown *curve*, more precisely: an unknown *time curve*.

The problem of the dynamic exchange market is not, for example, to determine the above-mentioned $(mn+n-1)$ variables, and their rates of change, with the aid of $2(mn+n-1)$ equations, but to show what form the unknown time curves in the problem will take. To do that requires just as many conditional equations (equilibrium equations) as there are unknown time curves.

In dynamics too, one condition is not enough to determine several unknowns. There have to be just as many (mutually independent) conditions as there are unknowns, and no more. To ascertain whether the dynamic problem has been determined we have to count, on the one hand, the number of unknown time curves and, on the other, the number of equations expressing a condition regarding the instantaneous dynamic equilibrium.

This enumeration may in itself be construed as the application of a kind of equilibrium principle, albeit an equilibrium different from the instantaneous dynamic equilibrium. It could be termed the dynamic equilibrium principle. If the number of unknown time curves is N and the problem is formulated in such a way that it involves the rates of change up to the αth order, then the number of variables entering into the instantaneous dynamic equilibrium will be $(N+\alpha N)$, while the number of unknowns forming part of the total dynamic equilibrium will only be N.

The initial conditions in the dynamic model world are a set of conditions giving information about the magnitude of the variables involved and their rates of change at the moment the analysis started. We shall subsequently discuss examples of how the unknown time curves of such dynamic problems are derived from the instantaneous dynamic equilibrium conditions and initial conditions. As I see it, the further development of this type of analysis will be of considerable importance for an exact elaboration of the theory of the business cycle. In the medley of 'explanations' of the business cycle put forward in the course of time, very few in my view contain any suggestion of dealing with this problem as a true equilibrium problem. The great bulk of business cycle theories have yet to emerge from the stage which was reached by static theory before the static equilibrium theories were developed: the various cycle 'explanations' consist essentially of pushing one of the unknowns over to the left hand side of the equation.

Nevertheless, while considering the distinction between the notions of static and dynamic equilibrium it may be of interest to take a closer look at the notion of *stationary equilibrium*. Stationary equilibrium is not a category on a par with static and dynamic equilibrium. Stationary equilibrium in no way whatsoever characterizes the *method of analysis*; rather it characterizes a specific type of *state*. We might say that it is a way in which the dynamic equilibrium manifests itself. Using a simile, we could say that the distinction between dynamic and stationary equilibrium is the same as that between climate and rainy weather. We cannot characterize a *district* by saying that it has (or does not have) a climate, since climate is present everywhere and at all times. But we could say that the district has high (or low) precipitation. And we can characterize a *discipline* by saying that it is preoccupied with climate. In the same way we may say that a dynamic equilibrium is always present, everywhere (i.e. everywhere there is a question of dynamic theory). Stationary equilibrium, on the other hand, characterizes a particular type of situation which can arise in certain cases and whose emergence is one of those things which it is the object of dynamic theory to explain.

Let us, for example, assume that the price and the quantity of a certain commodity that is sold per unit of time over a long period remain constant. From a particular point in time onwards the supply increases, let us say twofold, and remains constant at this level. In consequence the price will fall. To begin with the price fall will probably be so dramatic that a reaction sets in: the price recovers slightly. However, after a number of fluctuations the price finds a new level and from then on remains constant.

If we submit this process to dynamic analysis we can say that at any and all moments a certain dynamic equilibrium arises between price, the price's rate of change, the turnover per unit of time, and in the event other variables. With the aid of this mental construct, dynamic analysis seeks to show how and at what speed the market situation develops to its final stationary level.

Of course, after this level is reached a dynamic equilibrium will continue to be brought into being at any and all points in time. However, it will be a special type of dynamic equilibrium, namely a dynamic equilibrium *in which all rates of change are zero*. This is what constitutes stationary equilibrium. Stationary equilibrium may thus be construed as a special instance of dynamic equilibrium, brought about by a criterion which characterizes the state (not the mode of analysis).

The law which expresses the stationary equilibrium conditions may be viewed as a law which does not incorporate rates of change (the rates of change do appear not as variables, but as numerical constants (=0)). But, as we have seen, it is precisely this kind of law which is the object of *statics*. Hence, the process observed could also have been submitted to static analysis. We could have disregarded the fluctuations shown by the market before it finds its new level, and confined our attention to this level *per se,* in other words to the fact that a given stationary turnover per unit of time is associated with a certain stationary price (the static demand curve).

Based on this point of view, stationary equilibrium may be viewed as a state characterized by the special instance of dynamic equilibrium, which also comes under the notion of stationary equilibrium.

3. ANALYTICAL AND HISTORICAL DYNAMICS

I will now turn to the distinction between what we might call *analytical* dynamics and *historical* dynamics in economics. This distinction is not of the same fundamental nature as the distinction between dynamics and statics. Both analytical and historical dynamics attempt to explain how a situation grows out of the preceding one. The distinction is of a formal and conventional nature. *Historical dynamics can be said to be an attempt to analyse those phenomena which have yet to be incorporated in, or which it is not possible to incorporate in, rigorously formulated theoretical* laws. From a theoretical viewpoint, analytical dynamics is what constitutes dynamics in the true sense. An example of a historical dynamic law is the following. If we look at the economic evolution of a society we will observe that as population density increases, the economic machinery becomes more complicated and more refined, we get specialization of labour, mechanization develops, a monetary economy and credit economy replaces barter. New legal institutions develop in the labour market, for example, collective bargaining, labour tribunals, arbitration institutions, etc. All these phenomena are more or less intimately connected. *In their historical development they are mutually determinative.* Thus, we may speak of a law which governs all evolution, but it is not a law which can be formulated with the same abstract rigour as, for instance, a dynamic law of demand. It belongs, therefore, to another type of theory.

We may also express the distinction between analytical and historical dynamics as follows: any abstract economic theory, static or dynamic, builds upon a certain background of general assumptions related to the institutional setting. This background could be called the *institutional set-up* of the theory. For instance, the theory that attempts to explain barter between two aboriginal tribes which exchange, say, ivory for cattle (i.e. that part of price theory termed the theory of isolated exchange) has an entirely different institutional set-up from the theory which seeks to explain the relation between inflation and the deficit on the government budget of a modern nation in time of war. Historical dynamics is preoccupied with the evolution of these general phenomena that characterize the environmental-type of the static and dynamic theories, i.e. characterize the institutional framework of general assumptions within which the abstract theory's static or dynamic speculations are worked out.

Another example of the distinction between historical and analytical dynamics is the following: the classical economists, especially Ricardo, showed how an increasing population makes it necessary to take less fertile land under cultivation, or, what in this context amounts to the same thing, intensify cultivation of land already in use beyond the optimal point. They further showed how this fact became a determining factor in the determination of the wage rate and rents. In its main features the theory, as it was developed by the classical economists, is a static theory. The scheme of thought on which the analysis is based is of the same nature as the scheme of thought which underlines, for example, an ordinary demand curve. The argument is: if the population is large, the rent will be high, on the assumption that a certain set of underlying factors (e.g. production technique) remains unchanged. However, the rent theory also contains a dynamic aspect that was already touched upon by the classical economists, and which no doubt will be considered in depth in the future. The theory is dynamic to the extent that it seeks to explain the *chronological order* and the speed of the various phases of the process whereby a rising (respectively falling) population engenders a rising (respectively falling) rent. If the underlying factors (for instance, production technique) are assumed to remain constant during this process, it will be possible to give the theory a precise, abstract formulation, that is to say the theory will become an analytic-dynamic, and not merely a historical theory. On the other hand, the tendency which counteracts the law of diminishing return from land and thereby also counteracts the increase in the rent, namely the development of production techniques, must, at any rate at the present stage of the theory, be regarded as a tendency that is not amenable to analytical dynamic analysis. Indeed, thus far it has not been possible to formulate exact laws or principles that control the speed of evolution, acceleration, etc., of production techniques. One of those factors which hasten the development of production technology is no doubt the very pressure of the population on the soil. In that sense there certainly exists a mutual influence between the rent and the stage of the production technique. Through its stimulatory effect on the development of production techniques, a high rent creates a production tendency which in turn will counteract the high rent. If we succeeded in incorporating this mutual tendency in a precise, abstract formulation *with time as a variable,* we would have made a start on an analytical-dynamic (not merely a historical-dynamic) theory of the development of production techniques. Thus, at the present stage of economic theory we may say that the development of agricultural production techniques represents a tendency, the theoretical analysis of which by definition does not exemplify the distinction between statics and dynamics, but the distinction between analytical and historical dynamics.