# CHAPTER SIXTEEN

## THEORETICAL POSTSCRIPT

HAVING treated, in the preceding chapters, the different forms of economic movements in a concrete way, we may usefully review the theoretical methods employed. This will give us an opportunity to provide a more definite answer to a number of problems which we have solved so far only in a preliminary way.

Time after time we have found that the economic variables —prices, quantities sold, incomes, stocks—did not adapt themselves immediately to changes in the data. For slow and unilateral changes in data the assumption of immediate adaptation constituted sometimes a reasonably accurate approximation, but it did not for rapid changes in the data. Hence, although the changes in the economic variables depend on changes in the data, they do not depend on them in the simple way often postulated by comparative statics. To understand the changes in the economic variables, consideration has to be given to two factors: changes in the data and the reactions of the economy to such changes. These reactions are such that one single change in the data may lead to a movement of economic variables over a long period of time, in the same way as one single push may cause a swing to move back and forth for a long time.

In actual life, moreover, the data change continuously. The economic system is continuously subject to shocks. These shocks are so many and so manifold that with the exception of a few very large individual shocks they may legitimately be considered as a series of random numbers. Certain categories of shocks, such as the fluctuations in crop yields, actually satisfy this condition with a high degree of approximation. It has sometimes been concluded from this that economic fluctuations, par-

ticularly cyclical fluctuations, are nothing but a purely arbitrary and random succession of changes. A series of numbers drawn at random, for instance, the results of a game of chance, it is said, would also indicate increases and decreases. Hence all attempts to find laws of business cycles would be futile, just as it would be futile to look for laws in the successive results of a game of chance. We have referred in this connection to the quasi-period of three years in the figures for crop yields which might provide an explanation of the short cycles with a period of approximately three years in the United States.

This way of looking at cycles is not correct, however. Only if the economic variables adapted themselves immediately to the data would a random fluctuation in the data lead also to random fluctuation of the economic variables. But the fact that the economic variables adapt themselves only slowly leads to a somewhat different and more complicated situation. The effect of a shock at time 1 will be felt in the position of a certain economic variable at a large number of succeeding time units. Conversely, the position at a certain time, for instance, time 10, depends on the shocks which occurred at a series of time units, 10, 9, 8, 7, 6, etc. In order to compute the deviation of a certain economic variable at a certain moment of time on the basis of these different shocks (in the way of our simple examples in chap. xiii), it would be necessary to multiply each of these shocks with different coefficients in order to add up their influences. Some of these influences might be negative. The magnitude of the weighting coefficients to be used would depend on the structure of the economic model, i.e., on certain data which would be considered constant, first among them certain coefficients of elasticity. One might say, therefore, that every economic variable may be considered as a weighted average of all preceding shocks, with the weights determined by the structure of the economy under consideration. But this implies at the same time that the nature of the cyclical movements depends as much on the structure as on the random shocks. Hence every study of the "laws of business cycles" must take account of the effect of the economic structure on the nature of cyclical movements. The knowledge of these laws forms the basis for changes

in the structure by appropriate reforms which would make cyclical fluctuations less harmful.

From what has been said it follows also that the way in which random and systematic components in economic movements are woven together is not so simple as is sometimes implied in certain statistical practices. In particular, there is no question of an addition of a systematic and a random component in the cyclical movement, at least not on the basis of our theoretical model. A systematic movement occurs when, after one initial shock, the system is left to itself without further shocks. In certain simple cases the system will then describe, for instance, a sine curve. As long as no further shocks occur, there will be no further random component. But if further shocks do occur, one cannot say that they should be added to the systematic movement which existed at first; for the prior systematic movement is interrupted as soon as one new shock occurs, and a new systematic movement is started which will last until another new shock occurs. The actual movement is, therefore, the succession of parts of various systematic movements.

If the shocks occur in rapid succession, so that there is a new shock in every new time unit, this description does not lose its validity, but it does lose much of its usefulness. In such situations it is preferable to use the description given before (which is always valid, even when the number of shocks is limited), that the position at every unit of time is a weighted average of all shocks in the past. The movement of the economic variable under consideration can then be considered as the sum of a number of random components but not as one random component. No systematic component needs to be added; the systematic influence of the economic structure is expressed in the weights which enter into the weighted average. Hence, in the cyclical movement, the separation between a systematic and a random component is a problem of an entirely different nature from what is usually assumed in statistical practice.

This practice would be applicable in cases in which there is a systematic basic movement, for instance a trend, a seasonal component, and an undisturbed cyclical component, to which at each unit of time is added a random deviation that has its

consequences at that unit of time but not later. To take the hog cycle as an example, this would mean that if the price were high by some random cause, no increase in supply would follow from this a year and a half later. This situation might be imagined if the farmers, knowing that the high price was due to a random cause, would not count on its continuation. This reaction is possible, of course, but it is likely to occur only for relatively small random deviations of short duration; in statistical practice this treatment would therefore be legitimate for small random fluctuations. For cyclical movements, and in particular for the influences on the economy of changes in crops, this treatment would seem less legitimate, and no attempt to separate random and systematic movements should therefore be made.

The movements which we have studied in our models were all systematic, endogenous movements that would occur if no further random changes in the data took place after an initial disturbance of the equilibrium. These movements will therefore at best indicate the tendencies shown by reality. Knowledge and analysis of these movements is nonetheless of much significance, in particular if one wants to study the consequences of various forms of business-cycle policy or—going one step further—if one wants to select the most suitable measures of business-cycle policy. In business-cycle policy it will rarely be possible to insulate the economy from random disturbances, but it is possible to change the structure of the economy in such a way that its responses to these disturbances will be much less serious. If, as a result of economic policy, the endogenous movements are heavily damped, the economic variables will deviate much less from their normal values than before; any tendency toward a boom or depression will be nipped in the bud, and a certain degree of stabilization will have been achieved in that way.

The simplest type of endogenous movements will have only one component, for instance, one exponential movement or one periodic movement. As soon as one makes the structure of the economy in the model more complicated, in a closer approximation to reality, movements with more components will occur; they will occur as the effect of one and the same system of relations between the various economic variables. To some extent

this was already shown in Example IV (the theory of Kalecki), in which we took account of the process of accumulation which had been disregarded in the simpler Example III. If in certain relations one were to incorporate further characteristics of significance for long-term movements, a movement with more components would clearly appear. It would then not be possible to state that the different components were due to different "causes" (except perhaps as a very rough approximation).[1]

A separation of trend movement and cyclical movement is therefore acceptable only as an approximation and not in principle. This may appear as a theoretical nicety, but it is more than that. It is a question of paramount importance also in the study of business-cycle policy. We mentioned that the objective of such a policy should be to make the damping of the cyclical component as large as possible. However, if the cyclical component and the trend component follow from the same economic structure, will not any change in the structure change the trend component also, possibly in such a way that the damage to the economy is greater than the advantage obtained from the stabilization of the business cycle? This problem raises serious questions for study in connection with the theory of business-cycle policy. They do not fall within the scope of this book, and we must therefore limit ourselves to a simple indication of the problem.

We are now in a position to give a better answer to the three questions raised on page 60 concerning the nature of cyclical movements. On the basis of our interpretation of the causes of economic fluctuations, this nature may be indicated as follows.

1. The cyclical movement is in part a really cyclical phenomenon, in part a random succession of increases and decreases. Sometimes the turning point may be advanced by exogenous causes, such as an unfavorable crop or some political event. But there are also endogenous factors, which come from

1. For instance, as we indicated in chap. x, the elimination from our models of theories that are of importance only for short-term movements will yield only the trend movement as the movement of the model. The relations disregarded may be, for instance, those of the small lags, the effect of variables that change quite rapidly, such as crop fluctuations, and inventory fluctuations. A more detailed treatment of the questions raised in this connection is unfortunately not possible in the limits of this book.

the preceding period of recovery and boom and which lead to the turning point. The recovery may have been started by a new invention or the opening-up of new markets; but it may also be the result of causes flowing from the depression: the depletion of stocks, increases in labor productivity, increases in profitability as a result of the arrest of the price decline of commodities and shares. Often exogenous and endogenous forces will co-operate.

2. It follows that successive cycles are not entirely separate. They would be separate if endogenous forces were of significance, for instance, only at the upper turning point but not at the lower turning point. If that were the case, then the recovery and boom would lead to a crisis, but the latter and the succeeding depression would not lead to the next recovery. But we have indicated that there are also endogenous forces that will lead to a succeeding recovery. These forces are weaker than the endogenous forces that lead to the end of a boom; at least, this is normally assumed.

3. Our explanation of the cyclical movement did not consist of a separate explanation of its four different phases. It appeared that the cumulative upward and downward movements, together with the turning points, could be explained from one system of economic relations, as in our Examples III and IV. It is therefore not necessary to provide separate theories for these four phases. But it is nevertheless possible, for there are also certain systems of relations possible, as given in our Examples I and II, which can explain only unilateral movements. Should statistical evidence make it plausible that reality could better be described by such unilateral relationships, then it would be necessary to provide a separate explanation of the turning points, either in random exogenous factors or, more systematically, in changes of elasticities at the approximation of the position of full employment. In both cases one could consider that there were special causes of the turning points. Statistical analysis has so far not indicated that this type of explanation is necessary, and in any case the systematic change of elasticities when a situation of full employment is approached can better be incorporated in the theory from the beginning. If

one does this, there is again one theory for the three successi phases of recovery, boom, and crisis. Therefore, we preferred tl approach which explains the entire process from one sing theory; but this does, of course, not exclude the role of rando disturbances in reality.

In the preceding chapters we have referred repeatedly t "equilibrium values" of economic variables, without furth specification. We are now in a better position to give an accurat description of this term than would have been possible at a earlier stage. The concept originates in economic statics. Unde the assumptions of economic statics, a stationary position i possible, that is to say, a position that will continue forevei once it has come into being. In economic statics such a station ary position is also called an equilibrium position. It is by n means certain that such an equilibrium position is under all cir cumstances possible in reality. It is in fact quite improbabl that such would be the case. Let us assume for a moment tha an equilibrium position would be possible. Every change in th data would change this equilibrium position. To the extent tha the data themselves fluctuate around a certain average, as may be the case for crop yields, one could indicate as the equilibrium position that position which corresponded to the average value of these data. But with respect to a unilateral movement of the data, such as the growth of the population, this treatment is not possible. Here one might consider the concept of a moving equilibrium. One might speak of an equilibrium development as distinguished from an equilibrium position. But it is also quite possible that even with constant data of the values no equilibrium position is possible, for a constant equilibrium would imply the constancy of all variables. This would imply, for instance, that the stock of capital goods would remain constant, and thus the phenomenon of net investment would be excluded. Hence an equilibrium position cannot exist in an economy in which the average level of investment is above zero. In such an economy an equilibrium development can exist if this concept is properly defined. We have seen above that the movements which an economic system may describe, as long as there are no new and rapid changes of the data, may consist of a number of

components, including both unilateral and periodic movements. These different components may have different relative amplitudes. In that respect, too, there are very many possibilities of movements for one and the same model. Which of these movements the model will adopt in reality depends on the initial change of the data by which the movement is set in motion. A trend component may be accompanied by weak or by strong cyclical components. We may now define as the equilibrium development that component of the possible movements which has the weakest periodic component, that is to say in practice, the trend movement. When an economy follows its trend curve for a certain period, there is no risk of a decline resulting from a cyclical movement as long as no new change in the data occurs. In that respect, therefore, there is an analogy with the equilibrium position in simpler systems, namely, the tendency toward the maintenance of a certain movement. Therefore, we describe as the equilibrium value of a certain economic variable that value which this variable would assume if the system were to describe a movement without periodic components.

In the simple models of economic statics a distinction is made between models with stable and those with unstable equilibria. Similarly in the more complicated models, the equilibrium development of some may be more stable, that of others less stable. The criterion for stability is found in the movements of the system after a change in those data that can be changed. Some systems will respond by a very sharp cyclical movement, others by a very heavily damped cyclical movement which will quickly work off the initial disturbance of equilibrium. Everything depends here on the structure of the different systems. And as we have said before in this connection, the objective of the theory of business-cycle policy is to indicate in which way the structure of a system has to be adjusted in order to obtain an equilibrium development that is as stable as possible. As has been mentioned, it is conceivable that stability can be obtained only at the expense of a slower rate of progress. In that case, a criterion for a choice between these two possibilities would have to be found. But this falls outside the scope of our book.