

The Analysis of Economic Change

Author(s): Joseph A. Schumpeter

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THE ANALYSIS OF ECONOMIC CHANGE

EVER since, in the sixties of the past century, Clement Juglar definitely established the existence of wave-like movements which pervade economic life within the institutional framework of capitalist society, the work of finding, linking-up, measuring relevant fact, has been steadily progressing. Although much hampered by needless controversy and inadequate technique, this work has yielded results which, it is believed, need only be properly coördinated and developed in order to enable economics to offer a substantially satisfactory and reasonably exhaustive picture of the phenomenon, and thus to make what would certainly be its most immediately practical contribution to human welfare. Coördination is particularly necessary of the historical, statistical and analytical modes of approach which are each of them thwarted by that reluctance to coöperation incident to the differences in training, tastes and horizons of individual workers. The purpose of this paper is to explain the main features of an analytic apparatus which may be of some use in marshaling the information we have and in framing programs for further research.

Outside Factors. If we survey, for instance, the course of economic events in England from the beginning of the French Wars in 1792, through the suspension of specie payments, the Peace of Amiens, the trade war with America, up to the crisis in 1809-1810, it becomes obvious that we could without any glaring absurdity account by political "disturbances" for all the fluctuations we observe in our material. Or if we follow the course of the world crisis through the spring of 1931, we may trace the breakdown of the distinct upward movement observable at the beginning of that year to a string of events arising out of the flutter caused by the reopening of the question of the union of Austria to Germany and the movements of short balances incident thereto.¹ Common sense immediately suggests

¹ If we further ask how it was that that particularly sensitive short-balance situation arose in Germany, we find, following events from 1924 to 1929, that the steadily increasing public expenditure, and the methods by which it was financed, amounted to taxing away what would otherwise have been an annual average increase of working capital of about one billion marks. If we deduct from the figure of foreign short-term indebtedness as it stood in 1930 not only the four billions of

that here we have discovered an obviously important source of economic fluctuations. From the ubiquity of such events it follows that practically every economic fluctuation must be a historic individual and cannot be made amenable to explanation but by minute historical analysis of the innumerable factors actually at work in each case. In other words, in order to understand business cycles we must first of all acquire what may be termed historical experience of the way in which economic life reacts to such disturbances, and this is one of the reasons why every conquest of past fact is of paramount practical importance, in some respects of greater importance than additions to our stock of contemporaneous fact which can increase our knowledge over time only by infinitesimal steps. The statistical and analytical description of the various mechanisms of reaction (with a hope in our minds that we may ultimately get as far as to be able to measure the effects attributable to every such disturbance) seems thus to be the most urgent task before us. It should be observed in passing that for various reasons any influence acting on the economic process is practically sure to produce not a single dent but a wave-like motion extending over a longer time than it takes to reach the next disturbance, as well as, if it impinges on a particular spot, a vibration throughout the whole system. Moreover, with adaptation proceeding almost always with a lag and very often with reference to the rate of change of prices rather than to their absolute magnitude, our attempts at exact description are more than likely to result in expressions admitting of periodic integrals.

This being so, the question arises whether there are any fluctuations at all which arise out of the

counterclaims of German banks on short capital account, and the four to five billions which simply were revolving credits financing Germany's foreign trade and which, therefore, were not dangerous, but also the, roughly, five to six billions, which could and would have been accumulated but for that fiscal policy, it is easily seen that the interest rate would have been lower and that that part of foreign short indebtedness, the proceeds of which replaced the formation of domestic working capital, would have been so small as to be no major factor in the situation. We are thus enabled to account for some of the darkest hues of the situation of 1931-1932 by what was not only on the surface, but also in a more fundamental sense, a political cause. Cf. the last two sentences of this section for a defense of this way of reasoning.

behavior of business communities as such and would be observable even if the institutional and natural framework of society remained absolutely invariable. Although disturbance of the kind glanced at and reaction thereto may in individual cases be much more important, yet the presence or absence of a fluctuation *inherent* to the economic process in time is practically and scientifically the fundamental problem and the only one to be considered here. In order to make headway with it, we shall proceed as physical sciences do in those cases in which it is impossible actually to isolate a phenomenon by producing it in a laboratory: from our historic and everyday knowledge of economic behavior we shall construct a "model" of the economic process over time, see whether it is likely to work in a wave-like way, and compare the result with observed fact. Henceforth, therefore, we shall disregard not only wars, revolutions, natural catastrophes, institutional changes, but also changes in commercial policy, in banking and currency legislation and habits of payment, variations of crops as far as due to weather conditions or diseases, changes in gold production as far as due to chance discoveries, and so on. These we shall call *outside factors*. It will be seen that in some cases it is not easy to distinguish them from features of business behavior. All we can do about this here is to recommend to the reader to hold tight to the common sense of the distinction and to consider that every business man knows quite well that he is doing one kind of thing when ordering a new machine and another kind of thing when lobbying for an increase of the import duty on his product. It will also be seen that many of the things we list as outside factors are, when considered on a higher plane and for a wider purpose, the direct outcome of the working of the capitalist machine and hence no independent agencies.¹

¹ Professor W. C. Mitchell, in his review of Professor L. Robbins' recent book (*Quarterly Journal of Economics*, May, 1935), objects to the latter's attributing part of the phenomena of the depression 1929-1934 to "politics." Sociologically, he is of course quite right not only for this case, but generally. The action, e.g., of Sir Robert Peel's administration in repealing the corn laws in 1846 undoubtedly arose out of, and is to be accounted for by the economic pattern of the time and place, itself created by the working of the *whole* social system, of which the capitalist mechanism was a part. But this is relevant only for *some* purposes, for instance, if we wish to *judge* the action of politicians. As far as this is done on predilections of the scientist for certain types of social institutions, it is certainly extra-scientific as well as extra-economic. We should, in this case, have to disagree with *both* the eminent

This is surely so but does not reduce the practical value of the distinction on our plane and for our purpose.

Cycles, Trends, Equilibria, Growth, Innovation. For shortness' sake, we assemble in this section a few necessary definitions and propositions, which are really quite simple, although we cannot help adding here and there somewhat pedantic formulations which are necessary in order to make our meaning perfectly precise to the specialist.

Statistically, the term "cycle" means two things: first, that sequences of values of economic quantities in historic time (as distinguished from theoretic time) do not display monotonic increase or decrease, but (irregular) recurrence of either these values themselves or their first or their second time-derivatives; and secondly, that these "fluctuations" do not occur independently in every such time series, but always display either instantaneous or lagged association with each other.

Statistically, we mean by the word "trend" the fact that in many, although not in all, such time series it is possible to divide the whole interval covered by our material into sub-intervals such that the mean values of the time integrals over these sub-intervals are monotonically increasing or decreasing as we go along in time, or that they display recurrence only once.

If we study, say, the economic state of things in all countries in 1872 and behold the wild excesses of that boom, we shall have no difficulty in assigning very realistic meaning to the terms "want of balance" or "disequilibrium." Nor is it difficult, if we look at things one year after, to recognize that however much the then situation differed from that of 1872 it was similar to it in that it was about equally unbalanced. Again, if we analyze the course of events in, say, 1897, we may well sum up the result by speaking of a comparatively equilibrated state of things. This common sense distinction between comparators mentioned, as they both of them display such predilections. The argument is, however, not relevant if the question is merely what of observable effects may have been due to the Peel policy: for an investigation of the course of English cycles in the 1840's that policy is as much of an outside factor as an earthquake would have been. For the sake of clearness it is essential to keep both standpoints strictly separate. The same reasoning applies, of course, to the distinction of an economic process and its institutional setting in general. The distinction is, in a sense, quite unrealistic. But if we do not make it, we shall never be able to say more than that everything depends upon everything.

tively balanced and comparatively unbalanced states of the economic system is of utmost importance for the description and measurement of cyclical phenomena. In order to bring out the exact skeleton of such observations we define: (Marshallian) *particular equilibrium* exists in an individual industry if this industry as a whole displays no tendency either to increase or decrease its output or to alter the combination of the productive factors it employs. *Aggregative equilibrium* exists if the sum total of receipts of business as a whole, expressed in current dollars, equals the sum total of costs similarly expressed and including as much profit as will induce everybody to keep on doing what he is actually doing. This kind of thing, which is compatible with plenty of disequilibrium as between industries and within industries, is the basic concept in Mr. Keynes' analysis of the monetary process. *General equilibrium* exists if every household and every firm in the domain under research is individually in a state of equilibrium in the sense of Léon Walras. It is only this last concept that matters for us. To give it statistical meaning, we must link it up with certain points on the graphs of our time series. These we call "normal points." As in reality such states can never be perfectly realized we can be concerned only with states which are nearer to, or farther from, them than other states. Hence we further define: *neighborhoods of equilibrium* are time intervals in which normal points occur in the graphs of our time series excepting those which in that interval are deflected by a definite and provable individual circumstance. (The word "neighborhood" is therefore not used here in its strict mathematical sense.) Discussion of the question how we are to locate these neighborhoods cannot be entered upon in this article.

By "growth" we mean changes in economic data which occur continuously in the sense that the increment or decrement per unit of time can be currently absorbed by the system without perceptible disturbance. Increase of population, resulting in an increase of the supply of labor of at most a few per cent per year (historically an increase of three per cent per year is already high), is the outstanding example. If the factors which enter into this category were the only ones at work, there would be obvious economic meaning to the concept of trend and to its determination by least squares or other methods resting on

similar assumptions. In what follows we shall, however, not deal with the problems arising out of mere growth, nor with the very complicated questions of their relation to the other types of factors involved in economic change. In fact we shall, for clearness' sake, disregard it altogether, which, as in the case of outside factors, does not imply any view about its importance.

It stands to reason, finally, that outside factors and growth factors do not exhaust the list of the influences which produce and shape economic change. Obviously the face of the earth would look very different if people, besides having their economic life changed by natural events and changing it themselves by extra-economic action, had done nothing else except multiply and save. If it looks as it does, this is just as obviously due to the unremitting efforts of people to improve according to their lights upon their productive and commercial methods, i.e., to the changes in technique of production, the conquest of new markets, the insertion of new commodities, and so on. This historic and irreversible change in the way of doing things we call "innovation" and we define: innovations are changes in production functions which cannot be decomposed into infinitesimal steps. Add as many mail-coaches as you please, you will never get a railroad by so doing.

It is a question of some interest why the old type of economist, Marshall included, should, while recognizing this element and taking account of it in special cases, yet have persistently refused to face it squarely and to build an analytic apparatus fully descriptive of its mechanism and consequences. For our purpose it is both necessary and sufficient to list innovation, however much it may be linked to the other two, as a third and logically distinct factor in economic change, and to submit the propositions: The kind of wave-like movement, which we call the business cycle, is incident to industrial change and would be impossible in an economic world displaying nothing except unchanging repetition of the productive and consumptive process. Industrial change is due to the effect of outside factors, to the non-cyclical element of growth, and to innovation. If there be a purely economic cycle at all, it can only come from the way in which new things are, in the institutional conditions of capitalist society, inserted into the economic process and absorbed

by it. In fact, the cycle seems to be the statistical and historical form in which what is usually referred to as "economic progress" comes about. This is why any serious attempt at analytic and even at practical control of the business cycle must be an historical one in the sense that the key to the solution of its fundamental problems can only be found in the facts of industrial and commercial history.

Prosperity and Depression. To simplify argument we will in this section make the hypothesis, presently to be discarded, that there is sense in speaking of only *one* "cyclical movement" in our material.

We can of course never expect to discover a definite date when the first cycle arose out of a state of perfect equilibrium, but it is essential, in order to avoid circular reasoning, to make our model describe such an event and, as far as historical and statistical description goes, to make it start from what has first to be identified as a neighborhood of equilibrium. We then get the picture of the system of economic quantities drawing away from this equilibrium or neighborhood under the impact of innovations which would supply, barring outside factors, the only possible "force." Let us visualize this by thinking of any of those booms in this country or in England which everyone would label as railroad booms. The new thing in this case takes years to get into working order and still longer to exert its full effects on the location of industry and agriculture, agglomerations of population, the evolution of accessories and subsidiaries, and so on. During this time there would, in strict logic and if the preceding equilibrium had been a perfect one, be little or no increase in the stream of commodities and services (there may in fact be a *decrease* in the output of consumers' goods), while producers' and consumers' expenditures would increase in consequence of credit creation and in other ways. The realistic complement of this is that, during this period, expenditure regularly expands more than output and that the non-innovating sectors of the economic system adapt themselves to this state of things. It is not possible to show here by the historical interpretation of the behavior of time series (neither should it be necessary to show, for it must be obvious to everyone who has ever, e.g., studied the charts published in this REVIEW) how perfectly this accounts for everything we

mean when identifying a given interval as a time of business prosperity. After a period of gestation, which of course must be distinguished from what we may also designate by this term in the case of an individual firm, the products or services of the new business structures reach their markets, displacing either other such products and services, or methods of production and enterprises linked to them which have now become obsolete, and enforcing a process of liquidation, readjustment, and absorption. This would be so even if nobody ever made any errors and nobody ever misbehaved, although there is no difficulty whatever in understanding that the consequences of error and misbehavior will show up during this period in which the system struggles back to a new neighborhood of equilibrium. On the side of money and credit, the fundamental element which induces all others is the fact that as soon as the receipts stream in from the sale of the new products and as far as they are used to pay back bank loans, deposits will have to contract, in strict logic, down to the point of the previous neighborhood and, in reality, some way towards it. Again, there is no difficulty in inserting into this picture, as understandable consequences of this fundamental chain of events, all the accidental phenomena which experience tells us are usually associated with it. This not only gives a truer picture of the nature and the organic functions of cyclical down-swings, but also accords satisfactorily with statistical evidence.

Whatever starts a deviation of the system from equilibrium always, although not with logical necessity, gives rise to secondary phenomena which are mainly due to the fact that business men will act on the rates of change they observe. The sum total of these induced phenomena which are the center of the mass psychology of cycles and greatly intensify their amplitudes, we call "secondary waves." The expression, first used in 1911, is misleading and is kept only because Mr. Keynes has taken it up. But the thing is very important, so much so that the majority of students of the business cycle see nothing else. Whilst this accounts for many errors in diagnosis and remedial policy, it also helps to explain and partly to justify a large group of "theories" which, though missing the essential phenomenon, are yet perfectly satisfactory when viewed as descriptions of part of

the mechanism of the secondary waves superimposed on the primary ones.

The units of the cyclical movements, then, lie necessarily between neighborhoods of equilibrium. In the simplest form of the model of economic change they have only two phases. But because of the fact that depressive forces gather momentum on the way back from the prosperity-excursion of the system, notably owing to the phenomena incident to the breakdown of the secondary wave, the system outruns usually the first neighborhood of equilibrium it strikes on its way back, and embarks upon a depression-excursion, from which it is forced up by the action of the equilibrium *ligamina* which bring it up again to another neighborhood from which the prosperity of the next cycle starts. Hence we have as a rule four phases: prosperity, recession, depression, and revival. This is almost generally recognized, but it is important to note that for purposes of fundamental analysis we are not free to count cycles from any point or phase we please, for instance, from peak to peak or trough to trough, but must always begin after the revival and at the beginning of a prosperity. It is, moreover, essential to distinguish these two, although it may be difficult to do so owing to the fact that they are both positive. The failure to do so, and especially to recognize that the "forces" at work in revival are entirely different from the "forces" at work in prosperity, is one of the main sources of faulty analysis.

The fundamental question still remains unanswered. Why should the carrying into effect of innovations (as distinguished from "invention" or experimentation which are quite another matter and do not in themselves exert any influence on business life at all — which is the reason why so little has come out of the Marshallian recognition of the element of invention) *cluster* at certain times, and not be distributed in so continuous a way as to be capable of being just as continuously absorbed as the current increase in the supply of labor is? One answer suggests itself immediately: as soon as the various kinds of social resistance to something that is fundamentally new and untried have been overcome, it is much easier not only to do the same thing again but also to do *similar* things in different directions, so that a first success will always produce a cluster. (See, e.g., the emergence of the motor-car industry.) This is indeed

the method of *competitive* capitalism which has not as yet died out in *trustified* capitalism, to spread an improvement and to reap the social harvest — in the succeeding depression. But to carry full persuasion it would be necessary to go much deeper into this phenomenon, the roots of which stretch far beyond the economic field, than is here possible. However, as it has been the unfortunate experience of the present writer that even a very elaborate exposition has failed at times to convey to critics the picture he desired to convey, he prefers to ask the reader to consider the clustering of innovations as a postulate or hypothesis made to fit the facts in the same way as hypotheses are made in physics, irrespective of what might be adduced for or against their objective truth. Yet he feels entitled to say to anyone who doubts this proposition: Look around you in industrial life and see for yourself whether it is not so. Other writers have quite independently stressed the fact that it is possible to associate historically every business cycle with a distinct industry, or a few industries, which led in it and, as it were, applied the torch to what after becomes a flare-up covering a much wider surface.¹ The well established fact that fluctuations in investment goods are so much more marked than fluctuations elsewhere points, by virtue of its being explainable on the postulate mentioned, in the same direction.

It should be added that the above analytic model supplies an interpretation of economic trends which also bears on the technique of their determination. It follows, e.g., that barring the element of growth the trends of our time series are not due to influences distinct from those that create the cyclical fluctuations but simply embody the results of the latter. To these "result-trends," as the writer calls them in his workshop, it is entirely unwarranted to apply formal methods of the type of least squares. For extrapolation there is, of course, no warrant in any case. But there are certain general characteristics which may be used in developing

¹ The first author to do this consciously was, as far as the present writer knows, Mr. D. H. Robertson (*A Study of Industrial Fluctuations*, published in 1915, and an earlier paper in the *Journal of the Royal Statistical Society*), who, equally independently, also developed a schema of the working of the credit mechanism, similar in many respects to the one implied above and developed in 1911, in his *Banking Policy and the Price Level* (1926).

formal methods as more or less rough approximations. No general proposition is possible as to the relative or absolute lengths of the four phases, even apart from the fact that they will be influenced by outside factors. Partly but not wholly for the latter reason no great significance attaches to the mere height or depth of a peak or a trough, although we shall presently find a reason for expecting that certain depressions will be much more severe than others.

The Three-Cycle Schema. The above analysis not only accounts for the fact that waves of prosperity always do arise whenever a neighborhood of equilibrium is reached "from below," and that they always do taper off into a new neighborhood of equilibrium, but, as far as the present writer is able to make out, also accounts for every single fact or characteristic ever proved to be associated with either up-swings or down-swings not provably due to the action of outside factors. The reader is invited to make the experiment of testing this assertion by drawing up a list of what he considers these characteristics to be and observing whether they fit into the model offered. But there is no ground to believe that there should be just *one* wave-like movement pervading economic life. On the contrary, it stands to reason that some processes covered by our concept of innovation must take much longer time than others to have full effect. The railroadization or electrification of a country, for instance, may take between one-half and the whole of a century and involve fundamental transformations of its economic and cultural patterns, changing everything in the lives of its people up to their spiritual ambitions, while other innovations or groups of innovations may arise and disappear within a very few years. Moreover, the former will generally be carried out in distinct steps and thus give rise both to shorter fluctuations and longer underlying swells. Under these circumstances it is not the most natural thing to assume the existence of a single cycle and to postulate that it will display any very marked regularities. This is in fact a very bold hypothesis which could be justified only if clearly imposed upon us by our material. But as this is not the case, even apart from what we may reasonably attribute to the outside disturbances to which our material is subject, it seems much more realistic (and also likely to do away with some spurious irregularities, that is to say, irregularities which are only due to the single-cycle

hypothesis) to admit that there are *many* cycles rolling on simultaneously, and to face squarely the problem of analyzing their interference with each other. As, however, it is necessary for the purpose of handling our time series to settle on a moderate number of distinct movements which may be thought of as superimposed on each other and as passing their normals or neighborhoods of equilibrium *near* the points where they cross the path of the next higher cycle underlying them, the three-cycle schema is here suggested as a fairly useful working hypothesis. Nothing more than descriptive merits are claimed for it, but manifestly it fulfills the one condition which a device of this kind may reasonably be required to fulfill, the condition of carrying historical meaning, which — with material as exposed as ours is to disturbances by outside factors which are not small, independent, or "numerous" in the probability sense — is much more important than fulfillment of any formal criterion.

Historical knowledge of what actually happened at any time in the industrial organism, and of the way in which it happened, reveals first the existence of what is often referred to as the "Long Wave" of a period of between fifty-four and sixty years. Occasionally recognized and even measured before, especially by Spiethoff, it has been worked out in more detail by Kondratieff, and may therefore be called the Kondratieff Cycle. Economic historians of the nineteenth century have unconsciously and independently testified to the reality of the first of these waves our material allows us to observe, viz., the cycle from about 1783 to 1842, and they have also borne out in advance our interpretation of the phenomenon by coining the phrase of the "industrial revolution," which really implies everything we mean. The phrase is infelicitous and justly considered obsolete by now, but it pictures well how the happenings of the period struck entirely unprejudiced observers. The years 1842–1897 are readily interpreted as the age of steam and steel, particularly as the age of the railroadization of the world. This may sound superficial, but it can be shown in detail that railroad construction and work incident to it, connected with it, or consequential upon it, is the dominant feature both of economic change and of economic fluctuations during that time, and of every one of the four phases into which it is possible to divide it. Future historians finally will find no difficulty in

recognizing the initiating importance of electricity, chemistry and motor cars for both the up-swing and the down-swing of the third Long Wave, which rose about 1897. Of course, if we prefer a more usual way of expressing the same thing, we may put these processes also into terms of "investment" and the expansion and contraction of credit: this is certainly a very important part of the mechanism. Unfortunately, this description is not only more usual but also more superficial, and opens the door to all the crudities and errors of the various monetary theories of the cycle. Any satisfactory analysis of causes must start with what induces that credit expansion, as every satisfactory analysis of effects must start by investigating what is done with the increased monetary resources — after which we immediately cease to wonder why the mere increase of credit facilities in or before a depression proves as ineffectual as we know it does. If, however, we stop at the process of investment and postulate that it has a mechanism of its own, we not only fail to get at the core of the matter but we also find it difficult to avoid such desperate logic as is implied in the conclusion that because increase of investment and expansion of credit are associated with a prosperity phase, we therefore can produce prosperity by expanding credit.

The majority of students of the business cycle does not consider the evidence alluded to sufficient to establish this particular cycle. But what does that mean? The term Kondratieff Cycle is for us but a name for a certain set of facts (a certain long-time behavior of the price level, the interest rate, employment, and so on), none of which is open to doubt. It is true that the term also implies an interpretation to the effect that this behavior of our series is amenable to interpretation on the same lines as their behavior in shorter cycles. But this again is merely an inference from historical facts, which have not so far been called in question either. Of course, experience of about two and three-fourths units of a phenomenon does not warrant much generalization, and still less prediction.

It is therefore *only as a statement of fact* that we venture to say that the two complete Kondratieff units within our range of statistical vision contain each of them six cycles of from nine to ten years' duration, equally well established by industrial history, though less clearly marked in our time series, which correspond as a matter of

fact roughly to that cyclical movement which was the first to be discovered. Following the same procedure as in the earlier case, we may call them Juglar Cycles. As pointed out by D. H. Robertson,¹ it is possible in every instance to indicate the particular industry and the particular innovations which are responsible for the up-swing and the process of readjustment.

Finally, every Juglar so far observed (those of the present Kondratieff included) is readily, in most cases and in this country already by inspection, divisible into three cycles of a period of roughly forty months. The existence of this shorter cycle has been pointed out repeatedly these hundred years or more, and still oftener has it been felt and recognized implicitly, but one may remark that it was the two studies by Mr. Kitchin and Professor Crum in this REVIEW that were chiefly instrumental in establishing it.² Evidence about the commercial paper rate, this series being the most purely cyclical of all, is of course particularly important. That this cycle, as well as the others, is more clearly marked in this country than in any other and notably more marked than in England, is easily accounted for by the fact that cycles in most series will tend to be toned down or even ironed out the more a country's economic life is interwoven with international influences and the more its policy approaches Free Trade. The question of the statistical methods which arise out of this analysis (for statistical methods must arise out of our understanding of the phenomenon they are to be applied to) will be taken up at another time. It is, of course, admitted not only that non-cyclical changes also create wave-like movements but that besides the three just mentioned there are other cyclical waves.³ It is held, however, that the three-cycle schema works sufficiently well for the purposes of the stage of rough approximations in which we are, and are likely to remain for a considerable time.

A Research Program. If we coördinate available information, statistical and historical, in the light of the principles sketched out, we get not so much a picture as indications which give us an idea of what the real picture would be like. These principles do enable us to link up in a general way the behavior of those of our series which are most

¹ Cp. previous note, p. 6.

² This REVIEW, vol. v (1923), pp. 10-16 and 17-29.

³ As pointed out by Wardwell, Kuznets and others.

symptomatic of the pulse of economic life as a whole. These "systematic" series may be either "synthetic," as, for instance, series of price levels or of physical volume of production, or "natural," as, for instance, series of interest rates, clearing-debits, unemployment, pig-iron consumption, at least for the pre-war time, or the sum total of deposits. They all, also in a general way, behave as they would have to if the view outlined above were true to life. In the case of what, by way of distinction from "systematic," we may call "individual" series, such as the prices and quantities of individual commodities, our analysis becomes more complicated and perfect knowledge is necessary of the particular conditions in every branch of industry and commerce, of its lags, frictions and inertias, of the mentality of its men, of the particular random influences to which it is exposed, and especially of its active or passive rôle in any given cycle. As the outside factors impinge upon some phase of a process consisting of a number of superimposed wave-like movements, and as every one of these movements itself impinges upon a particular phase of some other movement underlying it, so all of this impinges on a particular resonator in the case of every individual industry or firm, *which responds according to its own structure*. This is perhaps the best way of stating the problem in its full complexity. It also helps us to understand the many "special cycles" which some students have found or think they have found in various individual industries.

Now first, as regards a research program, it may be suggested that not a single one of the "systematic" series above spoken of represents adequately what it is meant to represent. And in no case is our historical or contemporaneous information adequate to account quantitatively for the fluctuations of the systematic series. It is only one side of the problem that this makes convincing verification of the result of any analysis impossible, and that all we can do at present is to say that the testimony of such facts as we have is compatible or incompatible with it. The other side is that many questions are not questions of principle and analysis at all, but simply of relative quantitative importance. The statement, e.g., that in the down-grade of any cycle inertia of wages counts for something in determining the amount of unemployment, is too obvious to require proof; but not only for

practical but also for scientific purposes this is entirely irrelevant as long as we are unable to say whether this element accounts for one per cent or for ninety per cent of the unemployment figure observed in a given place at a given time. No wonder, therefore, that, if we are unable to be more precise than this, economics is considered as entirely useless by the practical man. Yet our analytic apparatus would turn out a definite answer all right, provided the necessary factual information were inserted into it, the assembling of which is, of course, much beyond the means of any individual worker or private group of workers.

Secondly, there is no reliable information at all on a number of subjects which are obviously of primary significance. Two examples must suffice. Waiving our objection to the present tendency to overstress the importance of price levels and monetary magnitudes in general, we may say that the stream of expenditure by households on consumers' goods is one of the most indispensable elements in the analysis of the business cycle. We have acceptable though far from satisfactory indicators for the post-war time but, owing to the exceptional circumstances present in this period, these are almost valueless for a fundamental understanding. And for the pre-war time we have to be content with pay-roll figures and the like, which might easily mislead even if they went further back than they do. Yet there is plenty of stray information stretching over centuries, which, if it could be brought together, would definitely clear up many pressing practical problems such as this one.

Again the process of investment and the corresponding process of credit contraction in down-grades can never, whatever the theorist may say, be fully grasped in its importance and consequences until we know more about the relative importance of its sources and the actual behavior of borrowers and lenders. The decisive figure here is the sum actually spent on the production of durable producers' goods *for new purposes*. It is in these last three words that our chief difficulty lies, which has so far been overcome only in a very few cases: we can follow up, for instance, how much was spent on railroad construction in England in the 'forties. It is difficult enough to find out how great the sum total is that newly enters industry and trade every year. It is still more difficult to find how much of this

is spent on equipment. And even this would not be enough. However, an investigation lighting up this very important side of the past and present of capitalist society would be perfectly feasible.

Although, thirdly, the phenomenon of the cycle cannot be defined and understood as a sort of average between independent changes in individual industries, yet the behavior of individual industries, on the one hand causing and on the other hand responding to the sweep of changing business situations, requires a special study for each of them. Plenty of work has been done in this direction, but, as the decisive questions have hardly ever been in the minds of the writers to whom we owe that literature of industrial monographs, the evidence is incomplete and inconclusive. There is hardly any event, or peculiarity of structural pattern, in any industry which would be irrelevant to the question why

the business cycle is what it is. Besides, if it be true that industrial change is at the bottom of the cyclical phenomenon, its mechanism can be established only by covering in detail all recorded cases of such change. To the thoughtful observer, for instance, a striking similarity reveals itself immediately between such different processes as the development of the English iron industry from the sixteenth to the end of the eighteenth century, and the rise of the motor-car industry in our time. In these, as in many other cases, we have even now advanced much beyond general impressions. There is, however, a long way between this and the goal of establishing the validity of the schema of innovation and showing how innovation produces, together with its monetary complement, the particular kind of waves inherent to the economic life of capitalist society and paralleled by similar phenomena in other fields of human activity.

JOSEPH A. SCHUMPETER.

HARVARD UNIVERSITY.