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Construction Cycles and Long Swings in Economic Growth

The purpose of this paper is to review and assess the evidence bearing on the existence of long waves in aggregate construction and in the major types of construction activity in the United States. These long waves are movements with an approximate duration of fifteen to twenty-five years, similar to the duration of the waves which have often been observed in residential building. This problem is especially interesting because of the part that construction plays in the swings of about the same duration that have been observed in economic life at large; and the present investigation is intended to form a part of a larger study of these general long swings. To place the present descriptive survey of construction activity in proper perspective, a brief statement about the broad features of long swings in economic activity and about my conceptions of their nature is in order.[1]

When one has allowed for the influence of the relatively short business cycles on measures of aggregate output, say, by computing five- or ten-year moving averages, or by some similar device, the resulting figures do not display a smooth growth trend. Rather, periods of acceleration are followed by periods of retardation. These alternations between periods of rapid growth and periods of slow growth may be traced back to the 1820's in the records of United States development. As indicated, they have generally succeeded one another at intervals

[1]The literature on long swings has been reviewed in earlier papers, (1) and (2), by the present writer. (Figures in parentheses refer to References, at the end of this paper.) The important early works were by Kuznets (31) and Burns (7), who established the existence of long swings in rates of growth of output. Kuznets has returned to the subject in a number of later publications, most recently in his *Capital in the American Economy* (27), Chapters 7 and 8. References to the representative writings of these and other scholars are contained in my earlier article (2).

of fifteen to twenty-five years[2] and involve changes of considerable magnitude in our rate of growth. Between 1871 and 1950, the average difference between the rate of change per annum of gross national product at the peaks and troughs of long swings was approximately four percentage points, while the swings in the rate of change of capital formation were even larger, in the neighborhood of ten percentage points. These figures are to be compared with long-term rates of growth in the neighborhood of 3.8 per cent per annum for gross national product and 3.5 per cent per annum for gross capital formation.[3]

The long swings in the growth of output appear to have involved related swings occurring at about the same time in many other areas of American development. They were matched by waves of immigration and population growth, of additions to the labor force, of land sales by the federal government, and of business incorporations. They were also accompanied by swings in the volume of internal migration, in the rate of growth of our cities, in the value and volume of imports, in the balance of payments and capital imports, in the flow of specie across our borders, in the rate of growth of our money supply, and in the rates of change of interest rates, of prices, and of money and real wages. Whatever their ultimate nature, therefore, it appears that the long swings in economic growth have been phenomena ramifying widely through our economic life and involving a complex set of interconnections and responses.

The alternations in the rate of growth of output appear to reflect associated fluctuations in all the elements into which output and its change can be resolved, that is, in the rate of growth of the supplies of resources, in the rate of change of productivity, and in the intensity of resource use. The waves in the rate of growth of resources embrace swings in the growth of both labor supply and capital stock. Before 1930, the former arose chiefly from large waves in the level of immigration. Since that time they have arisen chiefly from changes in the number of native-born persons of working age and from changes in the

[2]This statement disregards two shorter movements, which may conceivably have the same character, one in the late 1880's, the other in the period of the First World War and its aftermath.

[3]See my statement (1), Table 4, p. 436. These figures represent rates of change in data smoothed by computing averages over ordinary business cycles following a procedure described more fully in Chapters 4 and 8 below.

proportion of the population that is in the labor force. The waves in the growth of the capital stock, of course, reflect waves in the level of net capital formation.

The fluctuations in additions to our stock of resources are prominent features of the general long-swing phenomenon. It is unlikely, however, that they adequately explain the movements in output growth. This becomes apparent when one observes that the peaks and troughs of output growth have regularly preceded those in the level of additions to resources, sometimes by five years or more. It is clear, therefore, that some responsibility must be assigned to changes in productivity or to changes in utilization rates. Of the two, the latter are easier to establish unambiguously. The existence of long swings in the intensity of utilization of resources is suggested first of all by the fact that each long swing of output growth was punctuated by a serious depression or protracted period of unusually high unemployment. The influence of these periods of heavy unemployment on output is not completely eradicated by the moving averages or other smoothing devices which may be used to eliminate or attenuate the influence of ordinary business cycles. It continues to be apparent in moving averages of unemployment figures for the period (beginning in 1890) when unemployment data are available. The existence of long swings in the rate of utilization of resources also shows itself in figures representing the rate of growth of man-hours worked, or input of labor, computed from data smoothed in a fashion similar to that used for output. Peaks and troughs in the rate of growth of labor inputs tend to coincide with those in output, and both precede the peaks and troughs in additions to the labor force.

The great waves of immigration, which were such prominent features of American economic history before the 1930's, are indirect evidence of the existence of long swings in the intensity of resource use. Because the immigration waves reflected roughly simultaneous surges in the flow of people from many countries, it is plausible to suppose that some feature of American conditions acted as a common cause. Jerome[4] and others have shown that that cause is to be found in the relative tightness or ease of the United States labor market. We must also consider the significance of the very fact that there were long swings in additions to capital. Since this is the same thing as saying that there were long swings in net investment expenditures, accom-

[4] *Migration and Business Cycles* (25).

panying movements in the level of income and, therefore, in the level of effective demand may be suspected. This is not strictly necessary, for other influences might have acted to offset the effect of investment expenditures on income; but the behavior of investment enhances the credibility of the limited amount of direct evidence on long swings in unemployment.

Long swings in the growth of output were also accompanied by long swings in the measured productivity of labor and capital. These fluctuations were indeed sufficiently wide so that changes in the rate of growth of output appear to have been traceable in about equal proportion to changes in the growth of inputs and to those in productivity. The significance of the observed fluctuations in productivity growth is, however, ambiguous. The fluctuations in productivity growth run synchronously with those in input growth, and both appear to run synchronously with changes in the intensity of resource utilization. The strong suspicion arises, therefore, that the observed waves in productivity growth reflect in part, perhaps chiefly, waves in the intensity of use of employed, as well as total, resources.

We conclude, therefore, that the observed long swings are phenomena arising partly from swings in the rate of growth of resources, partly from swings in the intensity with which resources have been used. Whether they also arise in some significant degree from changes in what may be called *true* productivity growth, that is, growth in the productivity of resources used at an optimum or designed rate of utilization, is not clear. This may well be so, but we cannot observe such changes in isolation. The observed movements of productivity growth also reflect changes in the intensity of use of employed labor and capital, and it seems likely that these have determined the timing, if not the amplitude and pattern, of the observed movements of measured productivity.

It is this dual origin of the long swings in the rate of growth of output—partly in the swings of resource growth, partly in those of intensity of use, and probably, therefore, in effective demand—which gives the behavior of capital formation its peculiar significance. For capital formation constitutes an activity which influences both the growth of the capacity to produce and the growth of effective demand. On the one side, the capacity to produce is augmented by gross capital formation insofar as replacements substitute capital of more modern

design for obsolete equipment and net additions place more and better tools in the hands of labor. On the other, the rate of growth of effective demand depends on the rate of change of gross capital formation both directly, through the implied change in gross investment expenditures, and indirectly, through the effect of a change in investment expenditures on the growth of income and consumption. Whether the addition to the level of effective demand that is contributed by the change in gross investment is greater or less than the addition to productive capacity that is contributed by the volume of gross capital formation is obviously important, since the difference may govern the intensity with which capital stock is being used, and so, presumably, the volume of profits earned and the incentive for further investment expenditures.

This dual influence of capital formation upon both the growth of resources and effective demand suggests the central position which the behavior of investment occupies in long swings. Within the general sector of capital formation, however, the role of construction is of particular interest. In part, this interest stems from the sheer quantitative importance of construction; since the Civil War construction has constituted around half of gross capital formation. In addition, because of the higher rate of depreciation of equipment, net construction makes a still larger contribution to net investment in durable goods than it does to gross.[5] In part, however, construction is of peculiar interest because, at least in some of its sectors, the volume of work has risen and fallen in great waves of approximately the same duration as that of the long swings in the rate of growth of output in general. The existence of such waves is most widely accepted in the sector of nonfarm residential building. The earlier evidence of such waves provided by Riggleman and Long[6] has indeed been challenged on the ground that their samples were small, especially in earlier decades, and mainly representative of very large cities.[7] More recent and more broadly based studies by Blank and Gottlieb[8], however, support the earlier conclu-

[5]See Chapter 2 for estimates of gross construction as a share of gross capital formation and of gross national product.

[6]Riggleman, "Variations in Building Activity in U.S. Cities" (39); and Long, *Building Cycles and the Theory of Investment* (33).

[7]See Colean and Newcomb, *Stabilizing Construction* (12), Appendix N.

[8]Blank, *The Volume of Residential Construction* (4); and Gottlieb, *Estimates of Residential Building* (20).

sions, though they suggest that the amplitudes of decline associated with the long waves may have been somewhat smaller than was previously supposed.

In addition to the long waves in urban residential building, evidence of the occurrence of a succession of long waves in railroad construction of similar duration and generally similar, though not identical, timing has been presented by Silberling, Isard, and, more recently, Ulmer.[9]

In spite of the earlier evidence, however, the scope of the long-wave phenomenon in construction is still in doubt. Long's work had suggested that it extended to urban nonresidential building as well as to residential, but this has been explicitly denied by Colean and Newcomb. And analytical work has generally assumed that while long waves in residential building need special attention, fluctuations in the remainder of capital formation require study only in the context of the shorter business cycles. Therefore, it may be taken as an open question whether there has been a succession of long waves of similar duration in sectors other than residential and railroad building, that is, in industrial building, in the building of stores, office buildings, and other commercial facilities, in building by public authorities, by public utilities other than railroads,[10] and by farmers. Beyond this, and still more important, are further questions: have there been long swings in aggregate construction? If so, have these arisen from the generally congruent behavior of all or most sectors of construction, or do they reflect only the fluctuations in a few?

The central problems of the present paper, therefore, are whether long waves are to be found in all or only in some sectors of construction activity; whether they have a duration and amplitude which make them clearly distinguishable from fluctuations associated with business cycles; whether the waves take the form of successive rises and declines in the level of construction work or only in its rate of growth; whether

[9]Silberling, *The Dynamics of Business* (41); Isard, "A Neglected Cycle: The Transport-Building Cycle" (24); and Ulmer, *Capital in Transportation, Communications, and Public Utilities* (42).

[10]Ulmer's estimates of capital expenditures by various branches of public utilities other than railroads display long swings, but his annual data for earlier decades (as distinct from benchmark figures) are based on interpolations of somewhat doubtful reliability. Ulmer, *Capital in Transportation, Communications, and Public Utilities* (42).

long swings also appear in the sum total of all construction work; and whether the waves in the total reflect generally conforming movements in all or in only some types of construction.

The answers reached are on the whole positive. Since the Civil War, the weight of the evidence suggests that there has indeed been a series of long swings in aggregate construction activity and in the construction work of all the important sectors, not in residential building and railroad construction alone. These waves generally had durations of between fifteen and twenty-five years. So far as aggregate construction is concerned, it cannot be said with assurance that each long upsurge of activity was followed by a distinct long-swing decline. In two cases—in the 1890's and the years before World War I—the observed declines were quite mild. In the 1870's, the evidence is contradictory. Some data point to a major decline in the absolute level of construction. Other series suggest no more than retardation in growth. Allowing for the weaknesses of the statistics, it might be better to assert only that, in these cases, great upswings were followed by distinct and sharp retardations which brought the rate of growth of construction to very low levels for periods which were long in relation to ordinary business cycles. It follows, however, that there was a succession of long swings in aggregate construction, in which large and protracted surges of activity were followed by extended periods of decline *or* by pronounced retardations in growth. Further, these waves in aggregate construction activity reflected generally similar waves in all the major branches of construction, and these occurred in sufficiently congruent fashion to permit us to say that all branches contributed to the long swings in the total. Needless to say, the behavior of the various sectors was far from uniform, and this report reveals the diversities as well as the common features of the sectoral movements. It remains true, however, that the successive upswings (or accelerations) in the level of aggregate construction were invariably accompanied by rises (or accelerations) in all the major types of construction. Long-swing declines (or retardations) in the total were accompanied on each occasion by declines in most branches and by retardation in virtually all. The declines were indeed most prominent in residential building and railroad construction, the sectors in which they had been frequently noted in the past. With the possible exception of nonresidential building in the period immediately before World War I, the growth of all the major

branches not only exhibited retardation during periods of long-swing decline in the aggregate, but the rates of growth became very low, or even negative, for extended intervals.

These findings about the behavior of total construction and its major components since the Civil War go a considerable distance toward establishing the scope of the long-swing phenomenon in this important branch of capital formation. They do not, however, go as far as one would like. They do not settle the degree of regional and local, as distinct from sectoral, participation in the long waves of aggregate construction, nor do they indicate whether similar general waves of construction activity can be found before the Civil War. I hope to report the results of studies of these questions in separate papers. Tentatively, the long swings in the national aggregate of construction appear to have been widely shared by the various localities and regions of the country. With less asurance, it could be said that general long swings in construction were also features of the pre-Civil War economy, at least as far back as the 1830's, and perhaps further.

The finding that there was a succession of long waves in aggregate construction widely shared by the various types of construction does not imply that these waves will necessarily continue to be observed in the future. A number of changes has taken place that makes the recurrence of these phenomena in the future at least doubtful. Railroad construction, one of the types of construction in which long swings were especially prominent, is now much less important than it used to be. In residential building, another branch in which long swings were especially prominent, the mechanism of fluctuations has undoubtedly been very significantly altered since immigration has been restricted, thereby reducing to minor importance this element of instability in the process of household formation. Finally, the construction expenditures of governments have grown in importance. Measures of changes in the importance of the different sectors are presented in the next chapter. Beyond these gross changes, however, it appears, as argued below, that the waves in the sectoral and regional divisions of the construction industry were kept roughly in phase with one another through a set of interactions between construction activity and the rest of the economy, interactions which were part and parcel of the general long swings in economic growth already noted. Structural changes in the economy, affecting the relations between population growth and eco-

nomic activity, our economic relations with foreign countries, our financial institutions, the role of government, and, perhaps most of all, the susceptibility of the economy to deep depressions, will certainly have altered the interplay between construction and the rest of economic activity in ways we cannot now clearly see. It may well be that in the future the various parts of construction will follow courses more nearly independent of one another and that aggregate construction activity will follow a more stable path of growth or, at any rate, a path whose meanderings do not resemble those observed before World War II. Recognizing this, however, it should also be borne in mind that too little is known about the mechanisms of past construction cycles and about their general economic counterpart, the long swings in economic growth. It may turn out that their causes, like those of the more familiar business cycles, are more deeply imbedded than we realize, causing the phenomenon to persist, even if in somewhat modified form, through many apparently radical alterations in our economic arrangements.[11]

[11]If one extends the concept of long cycles in construction to embrace major advances followed by protracted periods of distinct retardation, the period following World War II falls within this definition. For the great upsurge of construction activity in the years immediately following the war was succeeded by a period of very slow advance; and the period of retardation in the growth of construction was matched, though in lesser degree, by a similar change in the rate of advance of total output. (See Chapter 10 below.)