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Conclusion

The general finding to which this survey leads may be stated briefly. Since the Civil War, there was a succession of long swings in aggregate construction activity with a duration between fifteen and twenty-five years. Considering the weaknesses in the records of construction activity before World War I, it cannot be said with assurance that the long waves in aggregate construction in every case took the form of long upswings followed by protracted declines. On two occasions—in the nineties and in the period before World War I—it appears that the declines were mild. The evidence for the 1870's is hard to interpret. The available sectoral series all display large and generally consilient declines. But these data are defective in one way or another, and their showing is contradicted by the behavior of the Kuznets estimates of aggregate construction, themselves faulty, which suggest no more than a decline in the rate of advance. Conceivably, the real movements in all three cases represent no more than retardation in growth. One can, however, say with assurance that there was a succession of long swings in aggregate construction activity in which very large and protracted upsurges, lasting eight to fifteen years or more, were followed by extended periods of decline or pronounced retardation in growth, lasting three to seven years. Further, if the long swings in aggregate construction are viewed as fluctuations in rates of growth, it can again be said with assurance that there was a succession of such swings with a duration between fifteen and twenty-five years and that fluctuations in growth rates were very wide. Finally, in each of the swings, there was an extended period in which the rate of growth became either clearly negative or very low — so low that in view of the weaknesses of the data

it may have been negative. In any event, for periods longer than ordinary business cycles, rates of growth were below the pace which, in the economy at large, has been required to keep the growing labor supply fully employed and the accumulating stock of capital utilized at designed levels of intensity.

The long swings in aggregate construction reflect more than the familiar fluctuations of house-building or railroad construction. Although long-swing declines were most prominent in these sectors, they emerge with more or less regularity in the records of all the major branches of the construction industry. The reality of these movements is attested by comparisons of the durations and amplitudes of the putative long swings with those of the shorter (specific) cycles in the same series and still better by the marked differences in the character of specific cycles when classified by phase of long swings. With the exception of shipbuilding (if that industry is, indeed, properly a branch of construction), the long swings in all the major sectors of construction shared in the long swings of aggregate construction. Upsurges in the level of aggregate construction were invariably accompanied by upswings in all the major branches of the industry. Long-swing declines were accompanied on each occasion by declines in most branches and by retardations in virtually all. Viewed as fluctuations in rates of growth, the conformity of the individual sectors to swings in aggregate construction was well-nigh perfect. Subject to the possible exception of nonresidential building in the period just before World War I, the growth of all the major branches not only exhibited retardation, their rates of growth became very low or even negative for extended intervals during each of the periods identified as declines in the level of aggregate construction activity. In sum, since the Civil War, there has been a succession of long swings in aggregate construction activity. These consisted of upsurges followed either by protracted declines or pronounced retardations, in which all the major sectors of the industry participated. The widespread participation of the major sectors is a finding important in its own right and also as confirmation of the long-swing behavior of aggregate construction.

Participation, needless to say, does not imply uniformity. We have seen that individual sectors skipped one or more declines in the level of activity in which most other sectors shared and that there was an extra movement in a few individual series. The several sectors also

reached peaks and troughs in somewhat different years, and a glance at the charts will show that the amplitudes of fluctuation and the patterns made by the pace of advance and decline varied from sector to sector. With all this diversity, however, there was also an impressive degree of similarity. Peaks and troughs tended to cluster in distinct bands of years. All the sectors experienced long upswings during the great surges of general construction activity; most of them shared in the declines; and those that did not actually decline experienced retardation. Indeed, with practical unanimity, their rates of growth became very low for extended periods.

These findings carry with them a number of implications concerning the sorts of causal factors which an explanation of long swings in construction must encompass and, indeed, concerning the nature of the general long swings in economic growth. They can perhaps be placed in proper perspective if, anticipating the results of other work, we note that long swings in aggregate construction also reflect the widespread participation of construction activity in many localities and regions, as well as in various sectors. Nevertheless, the observation of a tendency for many otherwise divergent spheres of construction to join in common long swings should not be taken to suggest that some set of relations peculiar to the construction industry and the real estate market has operated to generate the observed fluctuations. It is doubtless true that the processes of decision, planning, negotiation, and execution of construction work are more time-consuming than are the same processes in most other branches of investment and production. It is probably also a peculiar characteristic of the construction industry that much work is carried on by small firms who go out of business, and permit their labor forces to become dispersed, when business slumps; so beyond a certain point, rapid revivals of activity are retarded by the need to rebuild capacity in the industry. The response of supply to the emergence of excess demand is, therefore, especially slow in construction. The persistence of a condition of excess demand for protracted periods may well be a factor which attracts more capacity to the industry than it can sustain, which feeds speculative activity, and which stimulates the building of more housing, railroad, industrial, and commercial capacity than the market can, for a time, absorb. Similarly, the very durability of structures is doubtless one reason why an excess supply, when it emerges, causes construction activity to be depressed for a long

time.[1] Important as the sluggish responses of supply to excess or deficient demand may be, however, they are hardly sufficient to explain fluctuations of national scope in any single sector, still less in aggregate construction.

The reason is that structures are not only immobile themselves, they provide products or services which are either specialized in character or else available only in the locality of the structures. Thus, the construction of dwellings gives rise to a local supply of shelter available to satisfy demand only in the same locality. The sluggish response of supply to changes in demand may therefore explain long waves in house-building in particular communities. By themselves, however, such lagged reactions cannot explain why building cycles in individual communities run together to form long waves in the national total of residential building. Similarly, the slow adaptation of the supply of structures to excess or deficient demand might explain long waves in the plant expansion of particular industries, but would not explain such waves in the national total of industrial building. And so also for regional waves in the construction of transportation or electric power facilities and their corresponding national totals. Finally, whatever the basis for the nationwide waves in each sector, supply responses in the construction industry and the real estate market (which are presumably somewhat different in each sector) cannot account by themselves for the formation of national waves in aggregate construction. Some causes must be specified which can produce conditions of excessive or deficient demand in the several sectors at about the same time.

Some of the explanation for the partial unification of local and sectoral fluctuations in construction no doubt lies in the direct connections among them. Street, sewage disposal, water supply, electric power, and local distribution facilities all to some degree complement one another and residential housing. Forces that stimulate the latter will also encourage the former. So, too, the construction of railroads stimulated certain types of industrial building, and there may be other connections of the same sort.

[1] Arthur F. Burns has proposed a theory of long cycles in residential building which depends in part on lagged responses in the building industry and in real estate markets but includes other important elements. J. B. D. Derksen and others have presented econometric studies of building based upon a system of lagged responses. See Burns, "Long Cycles in Residential Building" (5); and Derksen, "Long Cycles in Residential Building" (13).

Some part of the explanation also is almost certain to be found in the impact of wars which, by restricting construction, created great backlogs of unfilled demand for additional structures of all kinds throughout the country. The return of peace was then accompanied by a general burst of construction activity. The disturbances to income and finance associated with great depressions doubtless had the same kind of unifying influence.

These explanations, however, are unlikely to be sufficient. One reason is that the occurrence and progress of protracted depressions and recoveries are not independent of the progress of activity in the construction industry itself. Since income originating in construction work constitutes a large fraction of investment expenditure and, in the past, constituted a major fraction, it is plausible to think that the state of demand for new structures itself played an important part in causing serious depressions and recoveries, or some of them. It is most unlikely that, in this connection, streams of causation should run predominantly in one direction.[2]

A more important reason, however, is that investments in structures cannot be regarded as merely the stretched-out response of construction activity to some initial stimulus given by excessive demand, or to some initial curb imposed by excessive supply. The influences underlying the demands for structures, the cost of building, and the supply of finance are themselves in constant motion; and there is evidence that at least some of these influences are national in scope and have themselves moved in long swings. Thus the demand for residential housing is influenced by the growth of population, or at least by the growth of population in those age groups in which marriage rates and rates of house-

[2]The character of general business cycles does, indeed, seem to have been associated with the phases of long swings in construction. If one classifies the business cycles in the National Bureau chronology according to whether they fell in the upswing or downswing of the general construction cycles (as marked off by the reference dates shown in text table on p. 90, above) one finds that the durations of business-cycle expansions occurring during construction upswings were on the whole longer than those occurring during construction downswings and that the opposite was true of business-cycle contractions. Further, if one takes advantage of an index of the amplitudes of business cycles derived by Geoffrey H. Moore, one finds that similar differences were characteristic of business-cycle amplitudes. An analysis of variance suggests that these differences were systematic. An early version of these calculations was reported in the *38th Annual Report* of the National Bureau of Economic Research, New York, May 1958, pp. 49-53.

hold formation are especially high.[3] And population growth, more especially the growth of population in the critical age groups, has moved in long swings chiefly because, until the 1920's, it was fed by the great swings of immigration, which were themselves dependent on the state of the labor market.

These same demographic changes presumably impinge on construction activity generally. For the age groups in which new household formation is especially important are also age groups that contribute disproportionately to the growth of the labor force. Moreover, since the growth of these age groups was alternately quickened or retarded by waves of immigrant laborers, the impact on the size of the construction labor force may have been extraordinarily strong. Therefore, labor-supply movements may have played a part, now in facilitating, at other times in hampering, the growth of construction activity generally.

So far as investment by railroads and electric power companies is concerned, Lawrence Klein[4] and others have shown that the bulk of the fluctuations since 1920 were connected with fluctuations in the level of profits or with an associated variable—some measure of the intensity of use of capital. My preliminary studies suggest that this set of connections was effective for railroads at least as early as 1870 and perhaps earlier; that movements in capital-output ratios and profits took the form of long waves; that the swings in the utilization ratio apparently arose from swings in the rate of growth of railroad traffic, which was followed, only after some lag, by the addition of new railroad facilities, while the fluctuations in the growth rate of traffic were associated with long swings in the rate of growth of national product.

The national influences controlling the construction of industrial facilities are less clearly visible. Current speculation is that, as in the case of railroad and public utility investment, fluctuations in industrial construction are controlled by the movements of output and capital

[3]An important new study by Burnham Campbell establishes the importance to residential building of shifts in the age distribution of the population and their dependence in the past on immigration waves; "The Housing Life Cycle and Long Swings in Residential Construction" (9). Cf. also Newman, *The Building Industry and Business Cycles* (36), and Kuznets, "Long Swings in the Growth of Population and Related Economic Variables" (28).

[4]"Studies in Investment Behavior" (26).

stock, that is, by influences that determine utilization ratios, or by the closely associated level of profits. If so, it may be possible to show that (as in the case of railroads) there were long waves in capital-output ratios and profits. But this also remains for future study.

Manifestly, even the general lines of an explanation of the long swings in aggregate construction can only be dimly perceived at the present time. One feature of such an explanation, however, seems clear enough. The very existence of long swings in aggregate construction means that they are part of a wider phenomenon. An explanation must, therefore, envisage an interaction between construction activity and the economy at large in which long swings appear in many facets of economic and demographic change; and these feed back, each in its own fashion, to impose something of a common pattern on the otherwise divergent geographical and sectoral branches of construction.

The view I tentatively entertain here is that the long waves in aggregate construction have arisen from the variant response patterns peculiar to the several branches of construction and its many geographical subdivisions which are more or less firmly bound together, partly by the complementary character of different sorts of structures, and partly by influences stemming from an interaction between construction activity and the economy at large. If this view is generally correct, it has implications for the possible recurrence of construction cycles in the future. For there have been marked changes both in the sectoral composition of construction and in the lines of influence which run from construction activity to the general economy and from the economy to construction.

The major changes in the importance of the various sectors have already been noticed (Chapter 2). Construction by governments, a sector of limited size before World War I, has come to include about a quarter of the whole. On the other hand, railroad construction, which was almost a fifth of the total in earlier decades, is now of negligible importance. This means that a sector relatively independent of market forces has taken the place of one characterized in the past by violent long swings. On the other hand, construction by the power and communications industries, which moved in marked long swings in the past, has become larger, while farm construction has been less important in recent decades than before World War I. Nonfarm residential building has continued to constitute about a third of the total since about the

beginning of the century—it was still larger before—but its internal composition has changed. Single-family units, which accounted for 60 to 70 per cent of dwelling units started until about 1930, ran between 80 and 90 per cent of the total between 1945 and 1953.[5] On the other hand, two-family and multifamily units are now much less important.[6] Since these types of housing differ in their construction periods, in the character of the firms which undertake them, in their financial requirements, and in their propensities to engender speculation, such a change in composition presumably alters the way in which the stock of dwelling units and the rate of building respond to conditions of excess demand or supply.

The lines of force running between the construction industry and the economy at large have also shifted in ways which are significant for long swings in construction. The financing of construction activity has changed. Amortized mortgages have replaced conventional contracts in residential building; institutions rather than individuals have become the chief sources of mortgage loans; the government has become important as a guarantor of home mortgages and as a lender of last resort; and it attempts in several ways to regulate the market for real estate finance both for houses and other kinds of structures.[7] Various new kinds of institutional financing have also become important in the market for commercial building. It follows that the construction industry faces different conditions for the supply of funds and that general economic changes which affect the cost and availability of financing strike the industry through new channels and with changed force.

Perhaps still more important are the changes in the influences which run through demographic paths. Before the mid-1920's, when immigration was relatively free, construction activity interacted with population growth in ways which lent added strength to fluctuations in either one. When construction boomed, the associated rise in economic activity made the labor market tight. This, in turn, stimulated immigration.

[5]Cf. Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate* (21), Table B-2.

[6]However, building of multifamily units has been growing during the last few years, while building of one-family homes has been declining.

[7]See *ibid.*, Part B. See also Grebler, *Housing Issues in Economic Stabilization Policy*, New York, NBER Occasional Paper 72, 1960.

Conclusion

Since the immigrants were largely young adults, they raised the volume of additions to population in just the age groups in which the demand for additional housing is especially strong. And since they also included large numbers of unskilled laborers who concentrated in the larger cities, they raised the volume of additions to the labor force in general and, in particular, the potential supply of urban and railroad construction workers. Thus, a long-swing rise in construction activity stimulated the demand for structures and helped to ease the supply of construction labor. When construction activity fell off, the downswing gained force because of the associated decline in the level of immigration.

Since the 1930's, changes in immigration have come to be a minor portion of changes in population growth and labor force growth. Fluctuations in household formation and population growth, however, were larger than in preceding periods.[8] Their chief sources were in the native population and in natural increase. It is plausible to think that in part this is because the impact of the Great Depression and of recovery fell more largely on the resident population of the country, who in former decades, were partly protected by the response of immigration to the state of the labor market. It remains true, however, that the mechanism of population response to depression and recovery is now very different than it used to be and that this must have significance for the course of future fluctuations in construction.

Beyond these changes, which influence the response patterns of private construction, a change must be expected in the behavior of public construction. Much of this activity responds to imperious impulses of its own, particularly construction of defense facilities. Much of it, however, is complementary to private buildings; and there are strong pressures on governments to provide the public facilities which new additions to the stock of housing and of industrial structures require. On the other hand, there also are pressures to use public construction as a counterweight to the movements in the private sector or, at least, to keep the fluctuations of public construction from aggravating the movements of the total. The scope for such deliberate, countercyclical management of construction in the public sphere is likely to widen.

[8]Cf. Kuznets, "Long Swings in the Growth of Population and Related Variables" (28), pp. 25-52; Abramovitz, Statement (1), pp. 448-451; and Campbell, "The Housing Life Cycle and Long Swings in Residential Construction" (9).

Evidences of Long Swings in Aggregate Construction

If the response patterns of the various branches of construction are changing, so too is the impact of construction on the rest of the economy. The share of gross new construction in gross national product has apparently fallen about 25 per cent since the last quarter of the nineteenth century (Table 1).[9] Not only that, the multiplier which measures the response of final demand to a change in the gross national product is, for a variety of reasons, smaller than it used to be; and this decline cushions the impact of given changes in construction on the rest of the economy and, indirectly, on construction itself.[10] The monetary arrangements of the economy also are now less susceptible to breakdown under the impact of declines in demand, a fact which works in the same direction. The net result of these and other developments, which act to make our economy somewhat more shock-resistant, is that declines in construction activity, and associated declines in real estate values, promise to act on the economy with diminished force, to feed back more weakly on construction itself, and so to permit the separate sectors of construction a greater opportunity to go their own ways instead of joining to form a general wave in aggregate construction.

All this, however, is not to say that long swings in construction are due to disappear. Business cycles, somewhat different in their mechanisms and in their severity, have survived many apparently fundamental changes in the structure of the economy. And the same may prove true of construction waves. The years after World War II saw a huge surge of construction activity in which every branch of construction took part. This great diffused boom was based in part on mechanisms which also operated in the past. The big additions to the housing stock and its spread to new locations were only part of the response to a joint demand for structures, including commercial establishments, public utilities, and government-provided facilities. The incomes so distributed helped to generate the demand and the business profits which stimulated industrial and other kinds of business construction. Altogether,

[9]The drop is less pronounced if the future importance of construction is taken to be indicated by its share since World War II, but these have been years of boom in construction activity. On the other hand, the share during the quarter-century following 1929 is perhaps too low because it reflects the Great Depression and the war.

[10]Cf. Burns, "Progress Towards Economic Stability" (6), pp. 1-19.

these activities, directly and through the income streams they fed, made for a tight labor market. Since immigration was restricted, the incomes of young native-born adults were especially favored, and this helped to drive rates of household formation and of births to unprecedented levels.

Underlying all these developments, however, were surely the backlogs of unsatisfied demands and of postponed plans, some stemming from the restrictions of war, others reaching back to the depression of the thirties. Supported by these demands and by generally easy financial markets, construction activity rocketed to very high levels from which growth continued during the first half of the 1950's at a more modest pace. Retardation from the very high rates of advance of the late 1940's and early 1950's was, of course, inevitable. In fact, however, the volume of construction became sufficiently large to make substantial inroads on the backlogs which supported the demand. Residential building far outran the rate of household formation which our demographic structure can normally support. The stock of industrial capital grew faster than output. In these circumstances, the pace of growth in construction became very low.[11] The advance of total new construction

[11]The following figures show the geometric rates of growth per year (per cent) of expenditures for new construction in 1954 dollars during successive intervals since 1946. Except for 1946 and 1962, the terminal years of these intervals represent peaks in total private new construction.

	Private Construction			*Public Construction*			
	Residential				State and		Total New
	Nonfarm	Other	Total	Federal	Local	Total	Construction
Intervals	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1946-48	25.0	5.8	14.6	0	39.7	25.4	16.4
1948-50	16.7	3.1	9.9	16.5	22.0	20.6	12.0
1950-55	3.3	5.7	4.3	8.1	7.8	7.9	5.2
1955-63	1.9	.8	1.4	2.5	3.5	3.2	1.9

Because these rates of growth are being compared with that of gross national product, the underlying series represent the construction component of GNP and differ somewhat in concept and scope from the Commerce-Labor series. The data for cols. 1-3 and 7 for the years 1946-61 are from *Economic Report of the President, January 1964*, Tables C-3 and C-5 (the latter extended back through 1946 by *U.S. Income and Output*, Table 1-7). The 1963 data for the above columns are from *Survey of Current Business*, July 1964, Tables 5 and 65. Total new public construction is estimated as the difference between total new construction and total private construction. The division of total public construction into federal and state and local is based on the distribution of current price series shown in Table C-37, *ibid.*

between 1955 and 1963 was at the rate of only 1.9 per cent per annum; for private construction alone the growth rate was only 1.4 per cent.

Consonant with the retardation in the expansion of construction activity, the rates of growth of private consumption expenditures and, of course, of GNP itself fell to levels which did not fully absorb our growing labor force and stock of capital. It is as yet difficult to know whether unemployment has been feeding back on construction by impeding the rate of household formation. But the decline in the rate of utilization of capital stock has undoubtedly played a part in limiting the rate of advance of corporate profits even in *current* prices and *before* taxes—to 1.5 per cent per annum between 1955 and 1959 and to 1.7 per cent per annum from 1955 to 1963. After taxes and in terms of the price levels of GNP and of construction, there have been actual declines in corporate profits, both absolutely and still more in relation to the growing stock of capital; and this must in part account for the protracted period of slow growth in capital formation and construction experienced in recent years.

As already stated, the alternation between the relatively high growth rates of the immediate postwar period and the lower growth rates during the latter half of the 1950's is not chiefly the outcome of the peculiarities of the construction industry and its associated markets. The long waves observed in construction in the past were only one manifestation, though an important one, of a more general alternation between acceleration and retardation which has characterized United States development. A striking feature of the present period of retarda-

Because the table shows rates of growth during intervals bounded by peaks in total private new construction, it does not do full justice to the retardation of construction growth between successive peaks in residential and "other" private building taken separately. Measured between their own peaks, the growth rates for these sectors are:

Intervals	Residential Nonfarm Construction	Intervals	Other Private Construction
1946-48	25.0	1946-48	5.8
1948-50	16.7		
1950-55	3.3	1948-57	4.4
1955-59	1.7		
1959-63	2.1	1957-63	.2

tion is that, in spite of persistent underutilization of equipment and manpower, it has not so far led to the financial crises, shocks to confidence, and severe depressions of production, employment, and income which marked such events in the past. If these more serious concomitants of retardation can be avoided, there is some prospect that our growth will be less clearly shaped by those diffused accumulations of postponed business plans and deferred personal aspirations which produce a burst of activity in all sectors at once and then give way to generalized retardation. In that event, the special influences which act to differentiate the paths of the various branches of construction may produce a good deal of variety of behavior and so permit the economy to achieve a steadier rate of growth. However, it remains to be seen whether, all things considered, our economy can long sustain a period of heavy investment and rapid growth without the support it has received in the past from the episodic release of hopes and plans temporarily suppressed by depression or war.