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CHAPTER V

POPULATION GROWTH—A BASIC FACTOR

THE search for strategic factors that have determined capital formation in residential real estate begins with the basic long-run relationship between population growth and increase in residential facilities. There is perhaps no other major sector of the economy in which the long-run relationship between population growth and increase in physical facilities, or real capital, has been so direct as in residential real estate.

The analysis in this chapter leads to two conclusions. First, the nexus between population growth and the increase in the housing stock has been maintained throughout the sixty-year period considered in this study. Second, the arrested growth of new residential construction in the long swing from 1925 to 1950, as shown in Chapter III, was not due to a decline in additions to nonfarm population and households. For absolute increments to nonfarm households have shown a long-term increase. Rather, the nexus between population and household growth, on the one hand, and the number of new dwelling units started, on the other, was broken during the thirties and forties because of conversions of existing dwelling units. Conversions in these decades represented a much larger proportion of total units added to the housing supply than ever before and thus emerged as an important factor modifying the historical relationship between the levels of household growth and of new residential construction in terms of dwelling units.

Population Increase and the Growth of the Housing Stock

In the short run, population increases have often been accommodated in a relatively fixed housing inventory—by varying the rate and intensity of occupancy of existing dwellings. In the long run, however, and under conditions of rising real income, population growth has been a strategic factor in determining the number of dwelling units added to the housing inventory.

The life of dwellings has been so long that historically a very small proportion of the additions to the housing stock have been required to replace demolitions and disaster losses.¹ The bulk of new production

¹ Demolitions have averaged about a tenth of total additions to the housing stock over the last sixty years. For details, see Appendix A. Also, for a discussion of the differences between net additions to the nonfarm housing inventory and new construction of private nonfarm dwelling units, see Appendix A. Net additions to the housing inventory are the result of new construction of private nonfarm dwelling units, net conversions, reclassification of dwelling units from farm to nonfarm status, construction of public housing, etc., minus demolitions and disaster losses.

in the long run has been for population growth rather than replacement. On the other hand, additions to the housing stock occasioned by the provision of more than one dwelling unit for existing households have been negligible. The use of more than one dwelling unit per household—in the form of summer houses, vacation or week-end cottages, and similar “seasonal” units—has not yet reached significant proportions, although the number of seasonal dwellings increased rapidly in recent periods.² Consequently, this kind of dwelling use has not been a factor in the past long-term relationship between population growth and the increase in the number of dwelling units. Finally, there is no evidence of a secular change in the level of vacancy ratios that might have affected this relationship, although there have been wide cyclical variations in these ratios.³

Direct evidence of this basic relationship between population growth and additions to the housing inventory has been presented by a number of investigators. In an analysis of data for 257 cities for the decade 1920-1929, Wickens found a high correlation between population increases and dwelling unit building rates.⁴ This conclusion is supported by the relationship between regional population growth and construction data, discussed in Chapter VI. Newman also concluded that “There is strong statistical support for the hypothesis that the volume of building activity . . . is greatly influenced by . . . underlying population movements.”⁵

This relationship has manifested itself in synchronous timing of long swings in population growth and in new private dwelling units started (Table 22). With the exception of the peaks in the eighties, the peaks and troughs in the long swings in nine-year moving averages of dwelling unit starts conform closely to the corresponding turning points in the long swings in nine-year averages of increments to total United

² There were 593,652 vacant seasonal nonfarm dwelling units in 1940 (*Census of Housing 1940*, Bureau of the Census, Vol. II, Part 1, p. 8). In 1950, 1,097,000 were enumerated (*Census of Housing 1950*, Preliminary Reports, Series HC-5, No. 1). The increase in seasonal dwelling units over the 1940-1950 decade was almost 85 per cent, but such units still represented less than 3 per cent of the total number of dwelling units.

³ Wickens estimated vacancies at 5 per cent in 1890, 4 per cent in 1900, 5 per cent in 1910, 1 per cent in 1920, and 5 per cent in 1930. David L. Wickens, *Residential Real Estate*, National Bureau of Economic Research, 1941, p. 55. According to the 1940 Housing Census, the gross nonfarm vacancy rate was 6.5 per cent and the effective rate (i.e. excluding vacant seasonal units and units held for absent households or occupied by nonresidents) 3.8 per cent (*Census of Housing 1940*, Vol. II, Part 1, p. 8). In 1950 the gross vacancy rate was 6.8 per cent and the effective rate 1.7 per cent (*Census of Housing 1950*, Preliminary Reports, Series HC-5, No. 1, p. 1).

⁴ Wickens, *op. cit.*, p. 43.

⁵ William H. Newman, *The Building Industry and Business Cycles*, University of Chicago Press, 1935, p. 36.

TABLE 22

Turning Points in Long Cycles of Population Growth
and Number of New Private Nonfarm Dwelling Units Started,
Derived from Nine-Year Averages

POPULATION GROWTH		NEW DWELLING UNITS	
Peak	Trough	Peak	Trough
1884	1898	1889	1899
1910	1919	1909 ^a	1916
1924	1935	1925	1934

^a The peak in 1909 was followed by a plateau formation until 1912 or 1913.

Source: Population growth from Simon Kuznets, "Swings in the Rate of Secular Growth," mimeographed, National Bureau of Economic Research, Work Memorandum 37, 1952, p. 42. Kuznets dated the net additions ". . . by the last rather than the midyear of the period on the ground that they are cumulative totals whose impact does not become effective until the addition is in fact made." In this table Kuznets' turning-point dates are decumulated by four years so that the nine-year averages of population increments are centered on the midyear of the period to conform to the midyear dating of the dwelling unit series. The population data utilized by Kuznets relate to total United States population growth, rather than nonfarm population growth. Only the latter, of course, directly affects nonfarm residential construction. However, in view of the relatively small absolute changes in farm population over the period in question, it is highly unlikely that a series on additions to nonfarm population would show a very different timing pattern. Further, Kuznets has shown that rural-urban population displacement, which is a rough measure of the farm-to-city migration, fluctuates in conformity with total population and, therefore, with nonfarm residential construction, except for the construction troughs during both World Wars.

New dwelling units from Table 4.

States population, with a possible slight lead in the population series.⁶ The conformity is especially noteworthy in view of the fact, brought out in Chapter III, that before 1925 the turning points in the long swings in dwelling units started diverged considerably from the turning points in the long swings in the rate of growth of gross national product.

⁶ For a theoretical discussion of relationships between long cycles in residential construction and population changes see Arthur F. Burns, "Long Cycles in Residential Construction," *Economic Essays in Honor of Wesley C. Mitchell*, Columbia University Press, 1935, reprinted in Arthur F. Burns, *The Frontiers of Economic Knowledge*, Princeton University Press for National Bureau of Economic Research, 1954. The swings in United States population growth before the mid-twenties were largely attributable to fluctuations in immigration. These fluctuations had about the same duration and timing as those in additions to total United States population; the net change in additions to the foreign-born population between turning points in the long swings in population growth accounted for over half the net change in additions to total population. While swings of similar duration are found in the additions to the native-born white population of native parentage and in the additions to the native-born white population of foreign parentage, there are striking differences in timing. The fluctuations in the increments to the native-born population of native parentage from decade to decade show approximately the same timing as the swings in net immigration. However, the swings in additions to

Forces in Formation of Households

Increases in nonfarm population express themselves in demand for dwelling units through the formation of new households, for the household is the social unit occupying a dwelling unit. For the long period examined in this study and for any consideration of the future course of residential construction, the forces that cause the nonfarm population to arrange itself into households of varying size and composition are of strategic importance.

The formation of new households is influenced strongly, of course, by purely demographic factors—e.g., the growth in population, particularly adult population, and marriage rates, which are themselves a result of changing social attitudes and real incomes, among other factors. But household formation is also influenced by the changing desire and ability of a given population with a given distribution by age and marital status to organize itself into households. The biological family—that is, a married couple with or without children—is only one of the several social units, though the most important one, which may seek or occupy a dwelling unit. The number of households in existence at any time usually exceeds the number of married couples by a significant margin, and exceeds the number of married couples actually living in separate dwelling units by an even larger margin. Conversely, the number of households in existence at any time is usually far less than the maximum number of households that could be formed out of a given population with a given distribution by age and marital status. Changes in the demand for housing accommodations have been the result not only of changes in the total number of married couples, but also of changes in the proportion of married couples that wished and were able to live in separate dwelling units under given conditions, and of changes in the desire and ability of other members of the population to live in such units.

The relative importance of social units other than biological families in the structure of households is illustrated by population data for March 1950 (Table F-1). At that time, only 77 per cent of the nonfarm households were husband-wife families. A little over 3 per cent were parent-child families, and 8 per cent were other family groups, e.g. brother and sister, aunt and niece. Almost 12 per cent of the nonfarm

the native-born population of foreign parentage differ consistently from the swings in net immigration until the decade of the thirties. As a consequence, the series on additions to the *total* native-born white population shows little evidence of fluctuation until the thirties. Simon Kuznets, "Swings in the Rate of Secular Growth," mimeographed, National Bureau of Economic Research, Work Memorandum 37, 1952, pp. 42 and 45, and Simon Kuznets and Ernest Rubin, *Immigration and the Foreign Born*, National Bureau of Economic Research, Occasional Paper 46, 1954.

households in March 1950 were headed by individuals living alone or with other unrelated individuals. Of the total number of husband-wife nonfarm families, 94.3 per cent lived in separate dwelling units; only 64.3 per cent of the parent-child families occupied their own dwelling units.

The number of social units forming households has great potential flexibility. This point may also be illustrated by reference to the 1950 data. Given the marital and age composition of the United States nonfarm population in 1950, it is possible to arrive at a potential maximum for that year of at least 57 million households as against an actual number of only 37.4 million, or half again as large. The difference between the actual and the potential number is composed of groups and adult individuals who currently share households but who are similar in age and family relationships to groups and individuals now forming separate households. The data and steps involved in this calculation are presented in Appendix F.

This calculation serves to illustrate the fact that the number of social units who may demand separate dwelling space is not solely a function of the distribution by age and marital status of the population but is also a function of prevailing economic conditions and social attitudes. Only a portion of the potential addition of 20 million households is likely to exert a demand for separate dwelling units under any reasonable set of circumstances. It is nevertheless true, historically, that the growth in the number of households has in part come about through the conversion of such potential households into actual households, as a result of long-term changes in real income and preference patterns.

Short-run or cyclical variations in the number of social units forming households have often been observed. Doubling up and undoubling of families became household words during the years following World War II. It is equally important to trace long-run changes in the number and size of social units that have formed separate households. Such secular changes can be accepted as a variable largely independent of the volume of residential construction. In the short run, as in the recent postwar period, limitations on the expansion of the housing supply may act as a brake upon the ability of all social units which so desire to live in separate dwelling units. In the long run the desire and ability of social units to form separate households has been determined principally by long-term changes in preference patterns and real income, by related biological changes in the composition of the population (such as the decline in the number of children per married couple), and by the movements of prices and rents of dwelling units, relative to the prices of other goods and services.

The relationship between population and household formation has indeed shown major secular change during the sixty years covered by this study, as is evident from a comparison of the increase in nonfarm households with the increase in nonfarm population (Table 23). Nonfarm population grew about 280 per cent during this period, but the number of nonfarm households rose more than 360 per cent.⁷ The disproportion is even more dramatic for the period from 1900 to 1950. Nonfarm population increased 185 per cent during this half century, while nonfarm households rose 261 per cent, almost half again as great an increase.

Both nonfarm population and nonfarm households have been characterized by declining percentage rates of growth, although there have been swings around this trend. The decline in the rate of population growth, of course, has been greater than that in the household growth rate. The average of the percentage increases in nonfarm population for 1890-1900 and for 1900-1910 was 33.7 per cent; the average for the next two decades was 24.4 per cent; for the 1930-1940 and 1940-1950 decades, 17.7 per cent. The decline in the percentage rate of growth per decade over these three twenty-year periods was about one-half. Average percentage rates of growth per decade for nonfarm households for corresponding periods were 33.7, 28.5, and 26.4 per cent. The corresponding decline in the percentage rate of growth of households per decade over the three twenty-year periods thus amounted to only about one-quarter.

Despite declining rates of percentage growth, the absolute additions to nonfarm population and nonfarm households have risen over the sixty-year period. While 26.4 million people were added to the nonfarm population in 1890-1910, 32.7 million were added in 1910-1930 and 35.0 million in 1930-1950. The increase in the twenty-year increments

⁷ For details on definition and coverage of these series see Appendix C. The growth of nonfarm population, of course, is a result of natural increase in the resident population, immigration from abroad, and migration of farm population to nonfarm areas. To attempt a distribution of past increases in *nonfarm* population among these various sources would involve statistical research beyond the scope of this study. Data on the composition of additions to the nonfarm population are extremely meager even for the less recent past. But it is known that net immigration accounted for an important share of the increase in *total* population of the United States until the twenties; about an eighth of the total increase in United States population from 1870 to 1920 was attributable to the increase in foreign-born population, i.e. net immigration minus deaths of foreign-born residents. Kuznets and Rubin, *op. cit.*, p. 49. Immigration from abroad into cities and towns was a significant factor in the demand for residential facilities until the middle twenties. A large number of immigrants came to this country in family units and thus exerted a fairly immediate demand for separate dwelling units, although doubling up was quite common during the first few years after immigration. Other married immigrants arrived alone but sent for their families when they were established.

TABLE 23
 Nonfarm Population, Nonfarm Households,
 and Nonfarm Household Size, 1890-1950

Year	Nonfarm ^a Population (millions)	Change from Previous Decade	Nonfarm ^a Households (millions)	Change from Previous Decade	Average Population per Nonfarm Household
1890	33.500	—	7.923	—	4.23
1900	44.800	33.7%	10.274	29.7%	4.36
1910	59.895	33.7	14.132	37.6	4.24
1920	74.096	23.7	17.600	24.5	4.21
1930	92.618	25.0	23.300	32.4	3.98
1940	101.453	9.5	27.874	19.6	3.64
1950	127.649	25.8	37.089	33.1	3.44 ^b

^a In 1890, 1910, and 1920 the number of households includes the small number of quasi households. In all years nonfarm population includes the population in quasi households. In 1930, 1940, and 1950 the population and household figures include a small number of urban farm families. For details see Appendix G.

^b The average population in nonfarm households, i.e. the total population actually in households divided by the number of households, was 3.32 in 1950. For discussion of the reasons for including quasi-household population in the numerator of the ratio shown in the table, see Appendix G.

Column

Source

- 1 1890-1900: *Historical Statistics*, Bureau of the Census, p. 25; Martin R. Cooper, Glenn T. Barton, and Albert P. Brodell, *The Progress of Farm Mechanization*, Dept. of Agriculture, Misc. Pub. 630, October 1947, p. 5.
 1910-1940: *Historical Statistics*, p. 29.
 1950: *Census of Population 1950*, Bureau of the Census, Vol. II, Part 1, p. 87.
- 3 1890-1940: *Historical Statistics*, p. 29.
 1950: *Census of Population 1950*, Vol. II, Part 1, p. 97.

to nonfarm households was even greater; the total number of households rose 6.2 million in 1890-1910, 9.2 million in 1910-1930, and 13.8 million in 1930-1950.

Even without direct comparison with new dwelling unit starts as shown in Chapter III, it is apparent that the failure of new construction during the 1925-1950 cycle to increase significantly over the level of the previous cycle cannot be ascribed to lower increments to households. One might expect that a decline in the rate of household growth would lead to a drop in the rate of increase in the number of new dwelling units started, but not to a level movement, if the absolute increments to households continued to increase. Thus other factors must have been at work in arresting the growth of new construction in terms of dwelling units. This point will be taken up later in this chapter.

The changing relation between population and households can be viewed more directly through the variation in average size of nonfarm

households (Table 23). Following a slight rise from 1890 to 1900, household size declined substantially—about 20 per cent—between 1900 and 1950; this decline proceeded at a faster rate during the last three decades than in the previous two.⁸ The fall in household size has had a significant impact upon the demand for dwelling units. At the average size of the nonfarm household in 1900 (4.36), for example, 229 dwelling units were occupied per 1,000 nonfarm population. At the 1950 average (3.44), 291 dwelling units were occupied, or 62 more than in 1900. Even had there been no population growth over this period, changing social attitudes and rise in real income would have caused a substantial increase in the number of dwelling units.

Causes and Effects of Declining Household Size

The decline in the average size of the nonfarm household can be partly ascribed to the lowering of the birth rate and the attendant fall in the number of young children living at home; however, several other factors have been operative. One such factor is the decline in the age at marriage and the increase in the proportion of the adult population that is married.⁹ Another that “. . . has been generally overlooked is the decline in death rates; more and more persons are surviving past the time when their children have left home. . . .”¹⁰ This phenomenon by

⁸ The data for 1890 and 1900 were derived in part from rough estimates of farm population by the Bureau of Agricultural Economics. The indicated slight rise in average size of nonfarm households between 1890 and 1900, therefore, may be a result of the crudity of the underlying data. However, while urban household size declined continuously over the six decades between 1890 and 1950, rural nonfarm household size apparently rose over the first three decades. The rise in nonfarm household size between 1890 and 1900 and the continuous decline in the immediately following decades may therefore be due to the increasing relative importance of urban population and of population increments in total nonfarm population and population change. The more rapid decline in nonfarm household size after 1920 was associated with declines in both urban and rural nonfarm household size.

⁹ In 1890 the median age at first marriage for males in the United States population was 26.1 years, and in 1947, 23.7 years, according to the Bureau of the Census (“Marital Status and Household Characteristics: April 1951,” *Population Characteristics*, Current Population Reports, Series P. 20, No. 38, April 29, 1952). In 1890, 52.1 per cent of the male population of the United States fourteen years old or over was married; in 1950, 67.6 per cent (see *Census of Population 1950*, Bureau of the Census, Advance Reports, Series PC-14, No. 8). The long-run increase in the proportion of married persons is attributable partly to the changing age distribution of the population, i.e. to the fact that the proportion of persons in the younger age groups has been declining, and partly to a rise in marriage rates. The increase between 1890 and 1940 is largely a result of changes in age composition; the increase since 1940, to a rise in marriage rates (see *Average Size of American Households Drops Sharply*, Bureau of the Census, Current Population Reports, Series P. 20, No. 41).

¹⁰ Paul C. Click, “Social Aspects of Housing,” *Scientific Monthly*, November 1948, pp. 355-356.

itself would probably have resulted in some increase in the proportion of households composed of one or two elderly persons. But the historical rise in real income and change in social attitudes toward the composition of the family occupying a dwelling unit have undoubtedly accentuated this development. A related factor is the relative increase in the number of older single persons who maintain households of their own rather than live with relatives.¹¹ Another is the probable relative decrease in the number of lodgers and boarders, resulting from the declining age at marriage and the occupancy of separate dwelling units by persons who formerly would have been boarders or lodgers. Both of these factors again reflect changing social attitudes and rising real incomes. A final factor contributing to the fall in household size has been the declining proportion of nonfarm households with resident domestic servants.^{11a}

How much of the 26.8 million increase in households since 1900 may be attributed to the decline in average household size? A rough estimate can be made by the use of a standardization technique. If household size both in 1900 and in 1950 had been equal to the average of the two years, with nonfarm population increasing as it did over this fifty-year period, the number of households would have increased about 21.5 million. Had population in 1900 and 1950 been equal to the average of these two years, with average household size decreasing as it did, the number of households would have increased by about 5.3 million over this fifty-year period. Thus about 80 per cent of the actual increase in households over the last half century was attributable to population growth, and about 20 per cent, to the decline in average household size.¹²

¹¹ See *loc. cit.* In 1930 and 1940 between 7.7 and 7.9 per cent of United States households consisted of single-person households (*Fifteenth Census of Population*, Bureau of the Census, Vol. VI, p. 13, and *Census of Housing 1940*, Bureau of the Census, Vol. III, Part 1, pp. 10, 20, and 21). In 1950, 9.1 per cent were single-person households (*Census of Housing 1950*, Preliminary Reports, "Housing Characteristics of the United States: April 1, 1950," Series HC-5, No. 1, p. 11). In 1940, 8.3 per cent of all nonfarm households were single-person households; in 1950, 9.8 per cent.

^{11a} Of all the reasons which explain why the growth in households has been more rapid than the growth in population, the most significant by far is the changing age composition of the population. The increase in the relative number of adults has been roughly four times as important as autonomous changes in consumer preferences. Louis Winnick, *The Distribution of Housing Space*, Wiley, 1956, Chap. VIII.

¹² The division of the total increase in nonfarm households between 1900 and 1950 into that portion attributable to population increase and that portion attributable to decline in household size was calculated in the following manner:

First, the increase in the number of households that would have occurred if household size had remained at the 1900 level, with population increasing as it did, was computed. Second, the increase in the number of households that would

*The Changing Relationship between Population Growth
and New Construction*

As would be expected from the relationships between population *growth* and residential construction established earlier, there is no straightforward statistical relationship from decade to decade between the absolute level of nonfarm population and either the net increase in the nonfarm housing stock or the number of new dwelling units started (Table 24). On either basis the number of dwelling units added to the housing inventory per 1,000 population fluctuates greatly from decade to decade, increasing in decades characterized by residential construction booms, and decreasing in decades in which the volume of construction was low (columns 4 and 7). However, the increase in housing stock per 1,000 *increase* in nonfarm population shows a consistent movement (column 5). This ratio shows a slow rise between 1900 and 1920, a more rapid rise between 1920 and 1940, and only a small decline in the sixth decade.¹³ Even in this war-dominated decade the

have occurred if population had remained constant, with household size decreasing as it did, was computed.

The first component of household increase was clearly attributable to population increase; the second, to household size decrease. The difference between the sum of these components and the actual increase in households between 1900 and 1950 is termed the interaction component resulting from the combined effect of the increase in population and the decrease in household size. This component was arbitrarily divided in half, one half being assigned to each of the above components. The sum of each of the original components plus half of the interaction component yielded the estimates presented in the text of increase in households caused by population increase and by household size decrease (see Frederick C. Mills, *Productivity and Economic Progress*, National Bureau of Economic Research, Occasional Paper 38, 1952, p. 4, fn. 3).

If the decomposition is undertaken for each decade separately, and each of the three components is then summed for the five-decade period, the interaction component is much reduced in magnitude. If half of this new interaction component is then added to each of the directly derived components, the resulting estimates of that portion of household increase due to population change and of that portion due to household size change are very close to those derived from the fifty-year period as a whole.

¹³ The data for 1890-1900 are somewhat puzzling. Judging by the change in household size between 1890, 1900, and 1910, and the relationship between the 1900-1910 increase in the housing stock and number of new dwellings per 1,000 increase in population on the one hand and the corresponding 1910-1920 ratios on the other, one would expect a somewhat higher ratio between additions to the housing stock and the increase in population and a somewhat lower ratio of new dwelling units to the increase in population. The divergence in level between the two ratios presented in Table 24 for the 1890-1900 decade and the consequent divergence in the movement of the two ratios between 1890-1900 and 1900-1910 result largely from differences between the assumptions and derivation techniques underlying Wickens' estimate of increments in the housing stock between 1890 and 1900 and the decade estimate of dwelling unit starts presented in Chapter III. There may well have been no such divergences in fact.

TABLE 24
 Relationship between Increments to Nonfarm Population, Increments to the Nonfarm Housing Stock,
 and New Private Nonfarm Dwelling Units Started

Decade	Nonfarm Population (average of initial and terminal years, millions) (1)	Increase in Nonfarm Population (millions) (2)	Increase in Nonfarm Housing Stock (millions of dwelling units) ^a (3)	Increase in Housing Stock per 1,000 Population (number of dwelling units) (4)	Increase in Housing Stock per 1,000 Population (number of dwelling units) (5)	Dwelling Units Started (millions) (6)	Dwelling Units Started per 1,000 Population (7)	Dwelling Units Started per 1,000 Increase in Population (8)
1890-1900	39.200	11.300	2.271	57.9	201.0	2.941	75.0	260.3
1900-1910	52.400	15.100	3.736	71.3	247.4	3.606	68.8	238.8
1910-1920	66.996	14.201	3.579	53.4	252.0	3.593	53.6	253.3
1920-1930	83.357	18.522	6.580	78.9	355.3	7.004	83.6	378.1
1930-1940	97.036	8.835	4.014	41.4	454.3	2.646	27.3	299.5
1940-1950	114.551	26.196	9.942	86.8	379.5	5.393	47.1	205.9

^a No attempt has been made in this table to adjust the estimates of increments in the nonfarm housing stock before 1930, taken directly from David L. Wickens' *Residential Real Estate* (National Bureau of Economic Research, 1941, p. 54), for probable errors or to reconcile these estimates with the data on the housing stock or new dwelling units started, presented in Chapter III. For the purposes of the present discussion, only broad movements in the series are relevant. The margins of error of Wickens' series are probably not sufficient to distort significantly these movements.

Source

Table 23.
 1890-1930: Wickens, *loc. cit.*
 1930-1940: M. H. Naigles, *Housing and the Increase in Population*, Bureau of Labor Statistics, Serial No. R. 1421, 1942.
 1940-1950: *Census of Housing 1940*, Bureau of the Census, Vol. II, Part 1, p. 9, and *Census of Housing 1950*, Vol. I, p. 3.
 6 Table B-1.

ratio was higher than in any decade before 1930.¹⁴ Two inferences can be drawn from this series. First, increases in the housing stock have indeed been closely associated with increases in population. Second, forces have been operating over most of the last half century to raise the number of dwelling units added per unit increase in population—a major one, of course, being the declining average size of the household.¹⁵ The effect of internal migration on this ratio is discussed in Chapter VI.

The data in Table 24 point up a significant change in the source of supply of additional dwelling units. From 1900 to 1930 the number of newly constructed dwelling units per 1,000 increase in population (column 8) closely matches the number of net additions to the housing stock per 1,000 increase in population (column 5). But there is a striking difference in the two decades following 1930. In these decades the number of new units started is far below the total number of dwelling units added to the housing stock, both per 1,000 population increase. The former ratio is only two thirds of the latter in the thirties and only a little more than half in the forties. Also, the series for newly constructed units shows a decline starting in the thirties, while the series for all net additions falls only in the last decade.

A portion of this difference in level during the last two decades is attributable to differences in definition and coverage and changes in vacancy rates. But the major part is due to a marked change in the sources of supply of additional dwelling units. In the decades before 1930 these additions were almost entirely in the form of newly constructed dwelling units. In the last two decades a significant proportion of the increase in the housing stock came from conversions of existing structures. Conversions in the twenties were estimated at about 500,000

¹⁴ The decline in the ratio between 1930-1940 and 1940-1950 is partly attributable to the very high birth rate of the forties. The ratio of additions to the housing stock to increases in *adult* population, which have a more direct influence on housing demand than increases in total population, rose sharply between these two decades. The number of dwelling units added per 1,000 increase in nonfarm persons aged twenty or more was 274 in 1930-1940 and 845 in 1940-1950. Increases in adult nonfarm population cannot be derived from census data for decades prior to 1930-1940.

¹⁵ The rise in the ratio is somewhat greater than would be expected on the basis of the decline in average household size. However, the number of dwelling units added per 1,000 increase in population is a ratio of increments, while the household size series consists of ratios of totals. The trend of the incremental ratio for household size, i.e. the increase in nonfarm population in each decade divided by the increase in nonfarm households, conforms more closely to the decline in the ratio of dwelling units added to the increase in population. The calculated average sizes of the incremental households were: 1890-1900, 4.8; 1900-1910, 3.9; 1910-1920, 4.1; 1920-1930, 3.2; 1930-1940, 1.9; and 1940-1950, 2.9. The very low average size of incremental households in 1930-1940 may have been associated with the abnormally depressed birth rate of that decade.

units, or 27.0 units per 1,000 increase in population.¹⁶ In the 1930-1940 decade 1,070,000 dwelling units, or 121.1 units per 1,000 increase in population, were created by conversions. These units account for more than three-fourths of the difference between the net additions to the housing stock and new privately financed dwelling units, both per 1,000 population increase. In the 1940-1950 decade, conversions equalled 2,000,000 units, or 76.3 units per 1,000 increase in population, about two-fifths of the difference between net additions to the inventory and new privately financed dwelling units. The remainder consists of miscellaneous kinds of shelter added to the inventory, such as trailers, units technically added through changes in census definitions, and public housing.¹⁷

The greater role of conversions in the supply of additional dwelling units during the 1930-1950 period has affected the changes in the level of new residential construction, which were described in Chapter III. These changes, in terms of long-cycle averages for new dwelling unit starts, involved a marked rise from 281,000 units per year in 1892-1905 to 464,000 units in 1905-1925, but only a very slight increase from the average in 1905-1925 to 484,000 in 1925-1950. During the most recent cycle, converted dwelling units have become much more frequent substitutes for new dwellings than was the case before. This substitution has modified the historical relationship between household growth and dwelling unit starts to a far greater extent than has been realized heretofore.

When the data in Tables 23 and 24 on the increase in nonfarm households, additions to the housing stock, and new dwelling units started are combined for twenty-year periods (Table 25), this modifying effect of conversions (and other miscellaneous additions) can be discerned directly. In 1890-1910 and 1910-1930, which approximate the periods covered by each of the first two cycles in residential construction, the increase in the total number of dwelling units roughly equalled the increase in the number of households, and the number of new dwelling units started was a little larger than the increment to the housing stock (which reflects the net effects of demolitions, conversions, and other changes in the housing stock not encompassed in the new dwelling unit series).¹⁸

¹⁶ See Appendix A.

¹⁷ Permanent public housing played a very small role in these decades, equal to 9.8 units per 1,000 increase in population in 1930-1939 and 11.4 in 1940-1949. This was only 2 or 3 per cent of the total additions to the stock in those years. Temporary public housing during the 1940-1949 decade totaled only about 23.4 units per 1,000 population increase.

¹⁸ It would be more appropriate if the data were analyzed for periods marked off by the precise turning points in the long cycles in the number of dwelling

TABLE 25

Relationship between Increase in Households, Increase in Housing Stock, and New Units Started

<i>Period</i>	<i>Increase in Nonfarm Households (millions)</i> (1)	<i>Increase in Housing Stock (millions of dwelling units)</i> (2)	<i>New Dwelling Units Started (millions)</i> (3)
1890-1910	6.209	6.007	6.547
1910-1930	9.168	10.159	10.597
1930-1950	13.789	13.956	8.039

Column	Source
1	Table 23.
2	Table 24.

For the period 1930-1950, which largely covers the third cycle in residential construction, the number of dwelling units added to the housing inventory again approximately equaled the increment in households. But the number of new dwelling units started in this period fell more than 40 per cent short of the net increments to the housing stock. It is clear that the relationships between household growth and residential construction which prevailed during the first two construction cycles were sharply altered during the third cycle by the satisfaction of major portions of the demand for housing facilities through means other than new construction. This alteration significantly reduced the levels of dwelling unit starts (and therefore of dwelling unit expenditures and gross capital formation) during the third cycle as compared with what would have been expected on the basis of the growth in population and households during this period.

The change in the source of additional dwelling units was, of course, directly associated with the conditions that existed during the past two decades. Conversions were stimulated during the Great Depression, when they provided a relatively inexpensive means of meeting housing demand; during World War II, when new construction was restricted and the federal government encouraged and aided conversions; and during the postwar years, when converted units were largely exempt from rent control. The special characteristics of all these years make it impossible to project directly into the future the cessation of growth in dwelling unit starts experienced during the last residential construction cycle. Any judgment of the future level of dwelling unit construction must assess instead the probable behavior of the forces which determine the volume of dwelling units built. Such an analysis is presented in Chapter XVII.

units started. But the data for increase in households and increase in housing stock would have to be derived from arbitrary interpolations between census dates.