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Estimation of Decade Totals, 1860-90

We turn to estimation of decade production before 1890. For this task, the vintage report and urban-permit statistics give little guidance as to secular drift or decade shiftings. It is fortunate that new data have become available for nearly the entire second half of the nineteenth century.

The number and value of new buildings erected in the state of Ohio, by county, were reported annually from 1857 through 1914, together with marriage and real estate conveyance data. The nature of the statistical findings, the adjustments to which they were subjected, and the tests made of their validity will be reported on more fully in a monograph now in preparation.

Original collecting agents of the building schedule were local township assessors working under the direction of county auditors in a program of statistical reporting inaugurated by state law in Ohio in 1857. Local assessors, as a matter of official duty, would keep records of new building (and losses) for the purpose of maintaining property assessment rolls. We first ran audited tapes of reported county residential building and adjusted these tapes for deficient returns. The reported totals behave plausibly when contrasted with increments of assessed real property, or when laid out as time series. A variety of tests indicate that the data we use here have a high degree of reliability. Reports on nonpublic construction were in general compiled with more care than were reports on tax-exempt construction; and statistics, such as we deal with here, of dwelling units by number bypass the adjustments needed to allow for either the changing value of the dollar or shifting appraisal standards. The figures originally reported were adjusted only to allow for incomplete returns, for obvious errors in printing or arithmetic, and for conversion from a

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record of "building completed" to a record of "building performance" for a uniform reporting period.²⁵

Table 4 indicates that the state is qualified to serve as a basis for national estimation. The state was well settled by 1850 and responded fully to the building throbs of the middle-passage years of the nineteenth

TABLE 4
SELECTED INDEXES OF COMPARABILITY, OHIO AND THE UNITED STATES,
1840-1910

Percentage Growth Decennially in Population ^a		U.S.		Urban Population as Percentage of Total Population		Percentage Share of Nonfarm in Total Labor Force		Total Nonfarm Income per Nonfarm Worker (dollars)	
				Ohio	U.S.	Ohio	U.S.	Ohio	U.S.
All	Urban	All	Urban	Ohio	U.S.	Ohio	U.S.	Ohio	U.S.
1840						22	21	356	437
1850	30	190	36	92	12	15			
1860	18	65	36	75	17	20			
1870	14	71	23	59	26	25			
1880	20	51	30	43	32	28	37	34	551
1890	15	47	26	57	41	35			
1900	13	32	21	36	48	40	56	44	609
1910	15	33	21	39	56	46			

SOURCE: Richard A. Easterlin, "Interregional Differences in Per Capita Income, Population, and Total Income, 1840-1950," in *Trends in the American Economy in the Nineteenth Century*, App. A, pp. 97 ff.; *Ohio Population*, State of Ohio, Dept. of Industrial and Economic Development, 1960, Table 3; Bureau of Census, *1950 Census, Ohio*, pp. 35-36; *Statistical Abstract* 1920, p. 32; and *Historical Statistics of the United States, 1789-1945*, 1949, p. 25, Table B13-23.

^a For decades closing in the specified year.

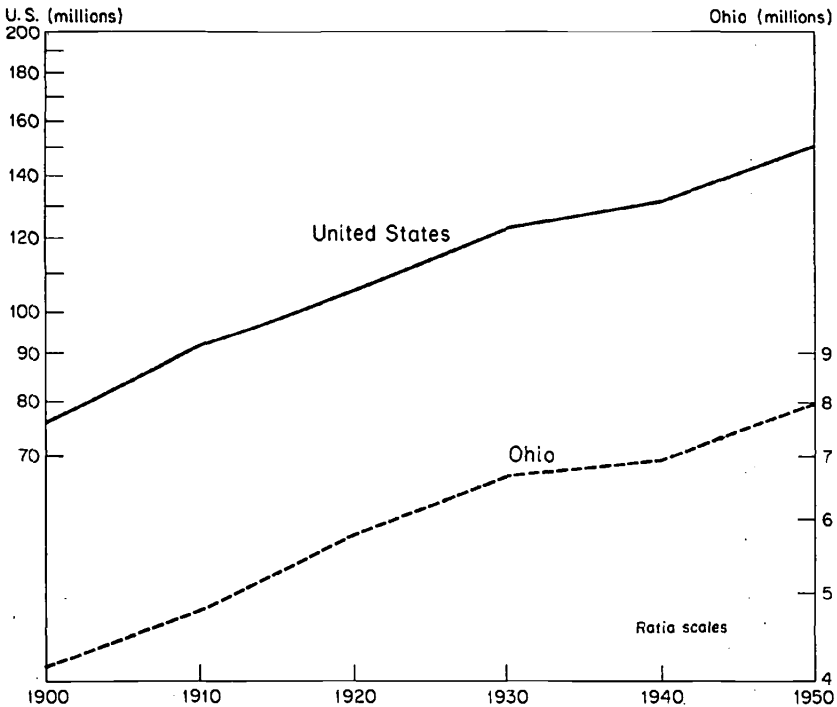
²⁵ Terminal dates of reporting years were either unspecified or shifted from July 1, May 1, and April 12. The practice was to make a spring survey (early or late) of what in effect was construction undertaken in the preceding year and completed by the reporting date. Some small structures could, however, have been commenced and completed within a reporting year ending May 1 or July 1. It was not possible to allow for this, and hence our calendar year allocations may have some "backward" bias. The adjustment for incomplete returns compensated for counties omitted from statewide returns. The adjustment was usually made by linear interpolation. Until the reporting system broke down in 1910-14, only a few counties were omitted from published returns in any given year.

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century. Through that period, industry in Ohio was diversified and urban population was well distributed by size-class of city. In 1850 the state contained 8.54 per cent of the population of the country, 8 percent of manufacturing establishments, and 7 per cent of nationwide real estate value. Decennial rates of growth of urban population were falling both in Ohio and in the nation; and the share of total urban population was rising both in Ohio and in the nation. Table 4 shows that in terms of nonfarm income per nonfarm worker, Ohio by 1880 had moved close to the national average.

Craig and Yocum in a recent study note: "Over the past 50 years, Ohio's growth in population, industry, commercial development, transportation facilities, agricultural output—nearly any economic measure that can be taken—has kept pace almost precisely with the United States as a whole." Their three charts substantiating this finding are reproduced here as Charts 1, 2, and 3. They continue: "The reason there has

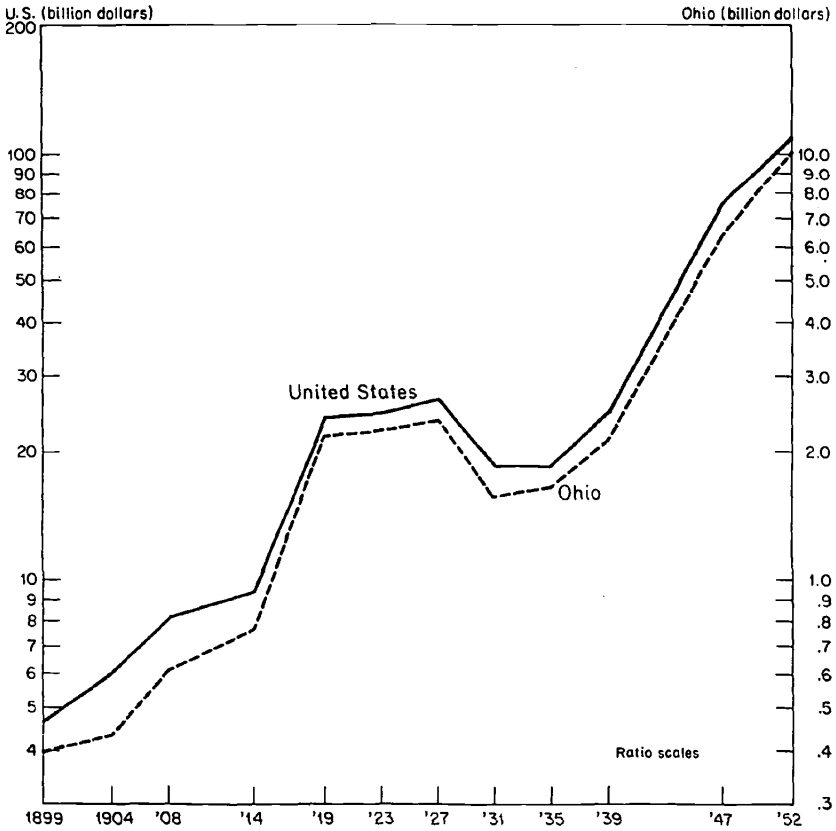
CHART 1
Trend of Population in Ohio and the United States, 1900-50



Source: Craig and Yocum, *Trends in the Ohio Economy*.

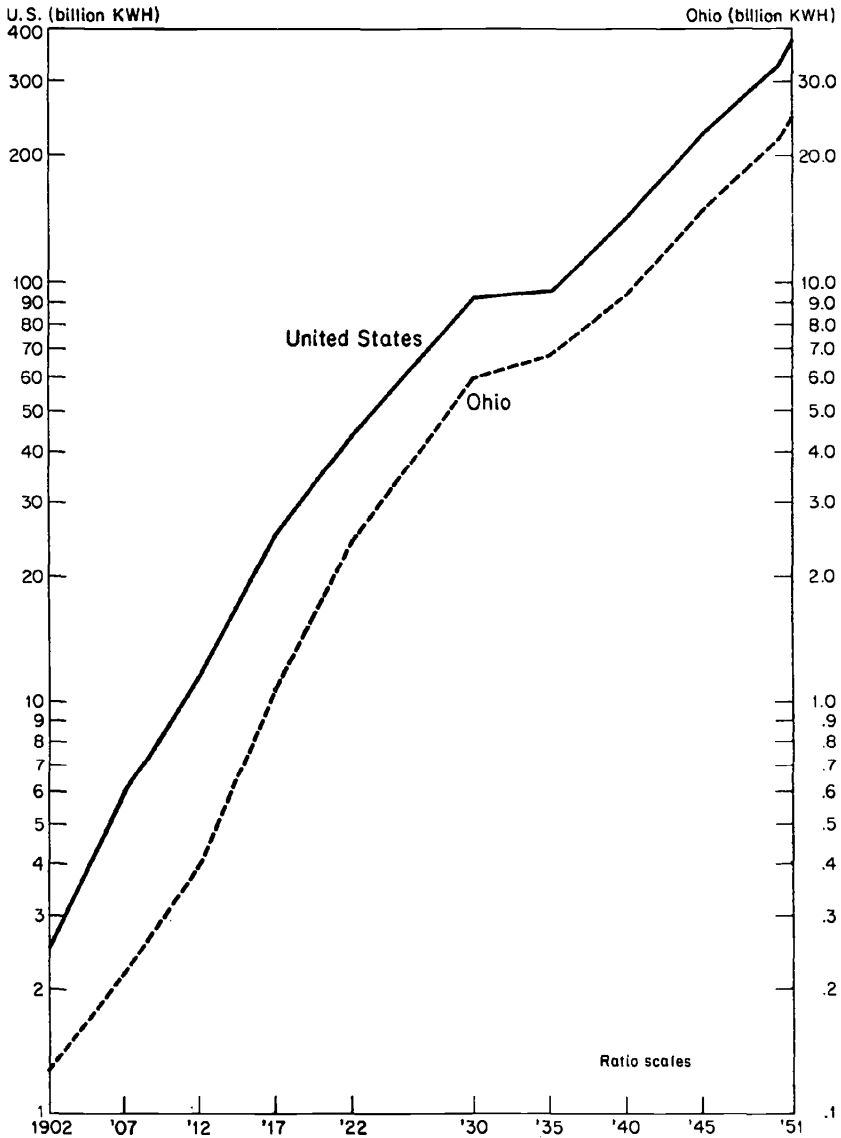
CHART 2

**Trend of Value Added by Manufacture,
Ohio and the United States,
1899-1952**



Source: Craig and Yocum, *Trends in the Ohio Economy*.

CHART 3
Trend of Electrical Power Production in
Ohio and the United States,
1900-51



Source: Craig and Yocum, Trends in the Ohio Economy.

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been a remarkable parallelism between Ohio and the United States as a whole lies not only in Ohio's central location, but in the combination of varied resources and circumstances which have permitted Ohio to develop a diversification of basic economic activities which closely mirrors that of the United States at large."²⁶ The study included an average index of deviation for 1950 showing divergence by selected states from the national distribution of employment by major industrial groups. The details for Ohio are shown in Table 5.

TABLE 5

PERCENTAGE DISTRIBUTION OF EMPLOYMENT, BY MAJOR INDUSTRY GROUPS, OHIO AND THE UNITED STATES, 1950

	Per Cent of Total		Deviation of Ohio Percentage from U.S. Percentage
	U.S.	Ohio	
Agriculture, forestry, and fisheries	12.6	7.1	- 5.5
Mining	1.7	1.0	- 0.7
Manufacturing	26.3	37.1	+10.8
Transportation, communication, public utilities, and construction	14.1	13.2	- 0.9
Trade	19.0	18.5	- 0.5
Service and professional	18.3	16.2	- 2.1
Finance	3.5	2.8	- 0.7
Government	4.5	4.1	- 0.4
Total	100.0	100.0	21.6

SOURCE: Craig and Yocum, *Trends in the Ohio Economy*, Table 1, p. 12.

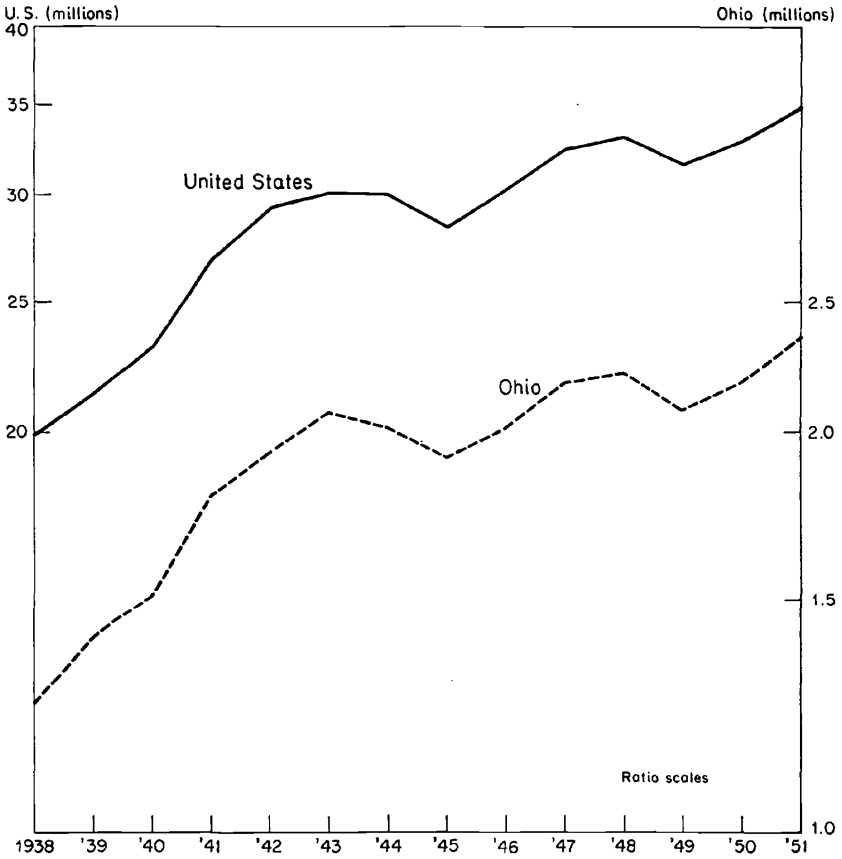
In terms of cyclical sensitivity, Ohio manufacturing is more concentrated than the national aggregate is in durable goods production (nationwide, 41.8 per cent of value added against Ohio, 59.3 per cent in 1939). Nevertheless, the estimated average per cent of compensable labor force unemployed in 1933 was nearly identical in Ohio (28.7 per cent) with the nationwide total (27.5 per cent). The state has also shown employment trends almost parallel to those of the United States (see Chart 4).

²⁶ P. G. Craig, J. C. Yocum, *Trends in the Ohio Economy*, Bureau of Business Research, Ohio State University, Res. Mon. 79, 1955, p. 1.

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CHART 4

**Covered Employment in Ohio and the United States,
1938-51**



Source: Craig and Yocum, *Trends in the Ohio Economy*, p. 29.

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Some structural characteristics of nationwide and Ohio dwellings, 1890-1940, are given in Table 6. By and large, the layout of characteristics is reassuring. The distribution by number of rooms is modal at the five- to six-room house, though there are fewer small units and more larger units in Ohio. The per cent of rented dwellings was somewhat less than

TABLE 6
STRUCTURAL CHARACTERISTICS OF OHIO AND UNITED STATES DWELLINGS,
1890-1940

Percentage Distribution 1939 Nonfarm Dwelling Stock by:	Ohio	U.S.	Percentage Distribution 1939 Nonfarm Dwelling Stock by:	Ohio	U.S.
Number of Rooms			City-size class (continued)		
1	2.3	3.7	Built 1900-40	54.8	73.4
2	5.4	8.4	Built before 1900	39.4	20.6
3	9.9	14.2	In converted units	7.5	7.6
4	13.8	18.1	Rural farm, entire	16.6	25.8
5	23.3	20.7	Built 1900-40	39.5	69.5
6	24.6	17.7	Built before 1900	55.7	26.5
7	9.8	7.4	In converted units	3.8	2.9
8 or more	9.9	8.4	In PMD, entire	62.6	55.5
Not reporting	1.0	1.3	Built 1900-40	72.8	72.3
Period built			Built 1879-1900	16.4	14.1
1935-39	4.7	7.9	Built before 1879	6.2	5.0
1930-34	4.0	6.0			
1925-29	12.4	13.5	Per cent of nonfarm units rented		
1920-24	10.5	11.1	1930	48.50	54.56
1910-19	18.0	17.0	1890	54.64	63.10
1900-09	17.3	16.2	Percentage 1940 nonfarm units, 1-family detached	62.0	55.2
1890-99	11.5	9.5			
1880-89	7.0	5.1	Average value, all nonfarm dwellings		
1879 or earlier	8.9	5.9	1930	\$5,138	\$5,022
Not reporting	5.5	8.0	1900	1,671	1,951
Internal features			Average value, mortgaged nonfarm dwellings		
In converted units	10.2	9.3	1890	\$2,366	\$3,250
Converted to residential	1.1	1.4	1920	5,012	4,938
With private bath and flush toilet	60.3	57.6	Average value, nonfarm home mortgage		
With central heating	62.1	46.0	1890	\$ 879	\$1,293
City-size class					
Urban, Outside PMD ^a	21.4	22.7			
Built 1900-40	57.3	68.7			
Built before 1900	34.3	22.9			
In converted units	12.1	13.3			
Rural nonfarm, Outside PMD^a	16.0	21.9			

SOURCE: Wickens, *Residential Real Estate*, pp. 80-85, Tables A-1, A-3; *Sixteenth Census, 1940, Housing, Characteristics by Type of Structure*, Tables A-1 to A-5, pp. 3 ff., 270-289; Dept. of Interior, Census Division, *Report on Farms and Homes*, 1896; Census Bureau, *Wealth, Debt and Taxation*, GPO, 1907, p. 17.

^aPMD = principal metropolitan district.

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the U. S. figure and the percent of detached one-family dwellings somewhat greater. Possibly the larger size is offset by the older age as reflected in the age distribution. In terms of value, Ohio units were in 1930 only 2.3 per cent above the nationwide average.²⁷ Conversion rates in Ohio closely paralleled the rate in the nation. Except for a lesser farm and a greater principal metropolitan district (PMD) share, the size-class patterns are close. The share of nonmetropolitan urban is nearly identical for Ohio and the nation (21.4 per cent and 22.7 per cent respectively). The rate of growth of housing stock within the Ohio PMD's matches the national pattern. The rate of growth of housing stock in Ohio outside PMD was faster, however, than nationwide before 1900 and slower thereafter, particularly for rural nonfarm areas and to a lesser degree for urban areas outside PMD.

Table 7 and Chart 5 present data indicating comparability between Ohio and the nation with regard to demographic and housing characteristics for the years 1860-1910. The average Ohio family size fell below the national level from 1880 on, reflecting the higher degree of urbanization in Ohio and relatively greater numbers of the typically smaller nonfarm family. The smaller family size so far as children are concerned is indicated by the age distributions. The proportion of productive members of the population—the 15-60 age class—was virtually the same for both Ohio and the nation throughout the entire period. The smaller family size due to fewer children is offset by greater longevity. Rates of marriage for Ohio and the nation were nearly identical.

Charts 6 and 7 spell out the population profile of Ohio in census years, 1860-1910, expressed as percentages of the national totals by age brackets. The steady drop of profile curves for later years reflects the slower rate of population growth in Ohio and the post-1880 smaller Ohio family size. The profiles also show traces of a migratory wave between 1850 and 1880 and a resulting predominance of aged over young. That wave drained away young men—and to a lesser degree women—in the productive and fertile age brackets of 15-35 years. The tendency to emigrate out of the state was apparently sustained through the 1870's. By 1890, selec-

²⁷ This finding as of 1930 is only apparently deviant from the fact that, in 1890, Ohio mortgaged nonfarm homes were some 27.2 per cent short of the nationwide average. (See Table 6, lines 5 and 6). For, as we shall see later, Ohio residential building in the middle eighties was relatively depressed, while residential building elsewhere boomed. Thus, in 1890, the ages of mortgaged homes and mortgages in Ohio were relatively greater than nationwide ages were. We shall return to this issue in a later study dealing with value levels.

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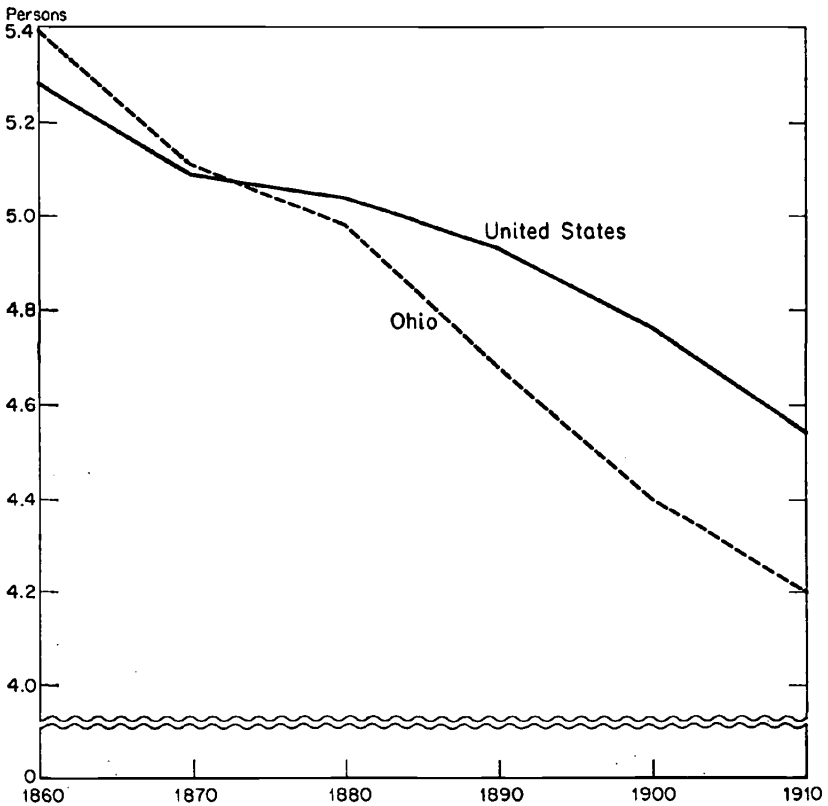
TABLE 7
DEMOGRAPHIC COMPARISON OF OHIO AND UNITED STATES, 1860-1910

CENSUS YEAR	POPULATION BETWEEN AGES, IN YEARS (per cent)										Ohio, Estimated Net Intercensus Migration* (thousands)	
	Average Size Family		0 to 14		15 to 60		60 and Over					
	Ohio	U.S.	Ohio as Per Cent of U.S.	Ohio	U.S.	Ohio as Per Cent of U.S.	Ohio	U.S.	Ohio	U.S.		
1860	5.39	5.28	102.1	41.20	40.50	101.7	54.25	55.05	98.6	4.54	4.45	102.0
1870	5.11	5.09	100.4	39.26	39.20	100.1	55.21	55.77	98.9	5.53	5.03	109.9
1880	4.98	5.04	98.8									
1890	4.68	4.93	94.9	32.95	35.52	92.7	58.66	58.03	101.1	8.39	6.43	130.4
1900	4.40	4.76	92.4	30.85	34.47	89.4	61.21	59.10	103.5	7.94	6.43	123.4
1910	4.20	4.54	92.5	28.19	32.13	87.7	62.89	61.10	102.9	8.92	6.77	131.7
												-12.9
												41.9
												77.7
												207.7

CENSUS YEAR	PERCENTAGE DISTRIBUTION AND MARITAL STATUS, WOMEN 15 YEARS AND OVER					
	Single		Married		Percentage Rate of Marriage, Females, 15 Years and Over	
	Ohio	U.S.	Ohio as Per Cent of U.S.	Ohio	U.S.	Ohio as Per Cent of U.S.
1890	32.4	31.8	101.8	56.5	56.8	3.126
1900	31.1	31.2	99.6	57.2	57.0	3.006
1910	28.9	29.7	97.3	59.5	58.9	3.147
						3.072
						101.7
						95.5

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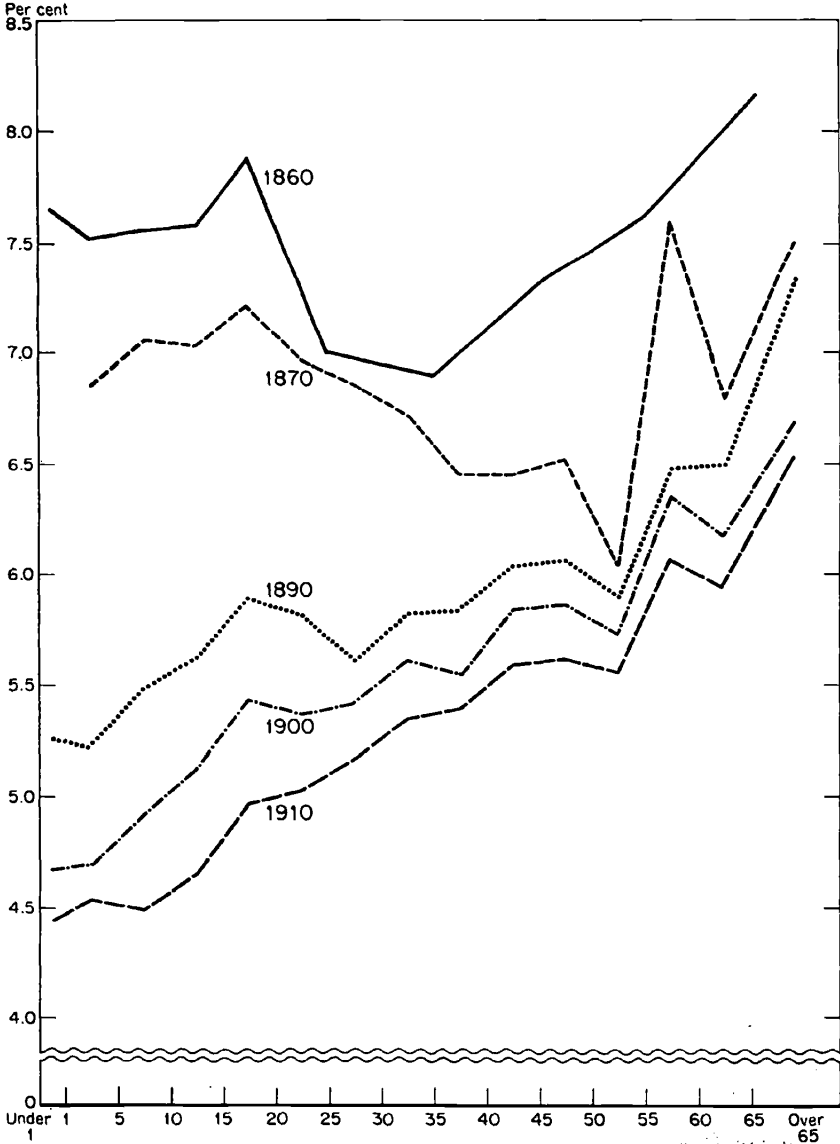
CHART 5
Average Size of Families in
Ohio and the United States,
1860-1910



Source: Table 7.

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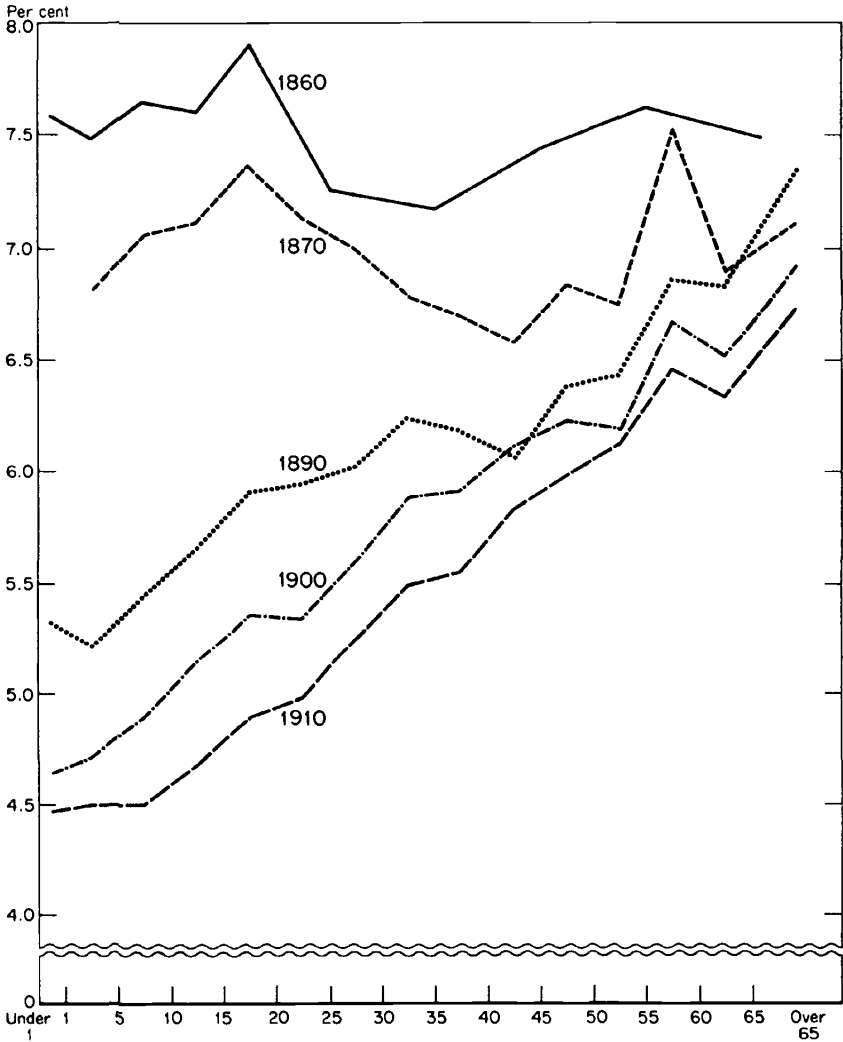
CHART 6
Ohio Male Population as Per Cent of United States
Male Population, by Age, Census Years,
1860-1910



Source: 1860, 8th Census, *Population*, pp. 370-371, 596-597. 1870, 9th Census, *Vital Statistics*, pp. 580-593. 1890, 11th Census, *Population, Part II*, pp. 72-73, 2-5. 1900, 12th Census *Population, Part II*, pp. 78-79. 1910, 13th Census, Vol. 1, *Population*, pp. 303, 394.

CHART 7

**Ohio Female Population as Per Cent of United States
Female Population, by Age, Census Years,
1860-1910**



Source: Same as for Chart 6

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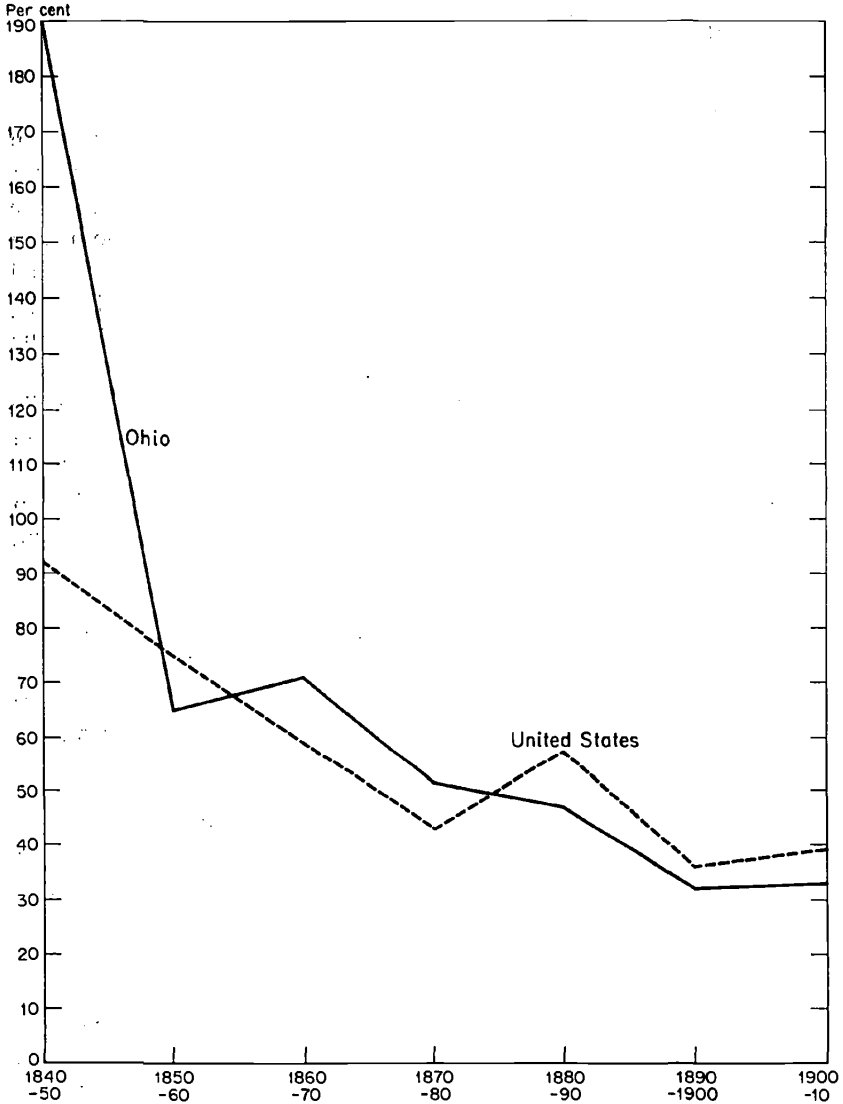
tive age emigration had become mild, and by 1900 and 1910 it had disappeared. Net emigration was apparently reversed during the 1870's (see Table 7) with steadily rising net intercensus immigration. Immigrants apparently account for the Ohio tendency to a higher average age.

These materials indicate that while the state may readily serve as a base for national projection, allowance must be made for certain peculiar features of the state's economic development. Thus, in terms of percentage decennial growth of urban population, inspection of Chart 8 shows three nonconforming decade movements. The decline in the rate of urban growth between 1850 and 1860 was much steeper for Ohio than for the nation. During the sixties, Ohio urban population growth, unlike that of the nation, reversed trend. During the eighties, Ohio urban population had little of the booming growth that marked the national course, indicating that the comparative intensity of long urban-building swings experienced in Ohio cannot be mechanically projected to the national scene.

While Ohio's urban growth and industrial development broadly matched in intensity the nationwide movement, its agricultural population and settlement showed comparatively little growth after the Civil War. Hence, the state became more highly urbanized and industrialized than the nation as a whole. This, in turn, along with selective age migration, helped produce a relatively smaller average household size and a household age composition different from the nation's.

Three alternative sets of census increments are available to project Ohio building experience into nationwide aggregates: urban population, nonfarm dwelling stock, and nonfarm labor force. The first two are derived from the census enumeration of population and dwellings; the third, from the census enumeration of occupations. The three projection bases represent different facets of the process of economic and demographic growth. Growth of the employed nonfarm labor force would presuppose additional households and dwellings. If the rates of household formation per unit of nonfarm labor force are the same in Ohio and in the nation, and if additional nonfarm households are similarly apportioned between urban and nonfarm rural locations in Ohio and the nation, then all three projection bases should yield identical returns. But divergences in returns may reflect not only real differences but also inaccuracies or biased enumeration or estimation of the three projection bases for Ohio and the nation. First, the projection bases are examined for real differences in relative rates of growth and, second, they are assessed for statistical biases.

CHART 8
Decennial Per Cent Change in Urban Population,
Ohio and the United States,
1840-1910



Source: Table 4.

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The relative rates of dwelling-unit increment per unit of labor-force and urban-population increments in Ohio and the nation are presented in Table 8, along with actual nationwide increments in occupied non-farm dwellings and national increments projected on Ohio rates (lines 15-19). Divergences between nonfarm dwellings and nonfarm labor-force increments were largely offset in the aggregate. For the first four decades, projection of nationwide housing increments on Ohio rates yielded figures smaller than those with the shortage concentrated in the first decade. During the 1900's, Ohio rates generated considerably larger figures than were realized nationally. In part, the decade variations reflect real divergences between Ohio and nationwide rates of household formation per unit of nonfarm labor force; in part, they reflect statistical inaccuracies in our nationwide measures of agricultural housing and labor. Enumeration of the nonfarm labor force in the U. S. Census was uncertain for agricultural workers, sometimes included in the category of general or unclassified workers. The Ohio enumeration may have been different from the national especially for the southern states with their fluid institutional patterns of farm operation.²⁸

Another term in our comparison, occupied dwellings, was also difficult to adjust for farm dwellings by methods that could be applied uniformly in Ohio and the nation. Increments in farm dwellings can be gauged chiefly by increments in either farm establishments or farm labor force. The first measure is biased in the nationwide count by the breakup of plantations in the South, offset only in part by the rise elsewhere of large agricultural production units. Hence, the number of farms expanded after 1870 at a faster rate than farm families or farm dwellings did. On the other hand, hired farm labor was not consistently classified from census to census or possibly even for Ohio and the nation.²⁹

The variations shown in Table 8, lines 13 and 14, between Ohio and nationwide rates of household increments per unit of urban population are much greater than the corresponding measure per unit of non-farm labor force. The urban measure yields sizable underestimates for the first two decades. The cumulative tendency to underestimation was generated by higher rates of household formation per unit of urban

²⁸ From 1860 to 1910, farm labor force grew from 6,207.6 to 11,591.8, or by 86.7 per cent. Farms by number grew from 2,044 to 6,406, or by 213.4 per cent. *Historical Statistics*, 1949, Series D37, p. 72, Series K1, p. 278.

²⁹ For the nation as a whole, farm laborers accounted for 51.5 per cent of the agricultural labor force in 1860 and 39.2 per cent in 1910. Ohio shares were about half as large.

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TABLE 8

**NET HOUSEHOLD FORMATION BY NONFARM LABOR-FORCE INCREMENT
AND BY URBAN-POPULATION INCREMENT, OHIO AND THE UNITED STATES,
BY DECADE, 1860-1910
(units in thousands)**

Increment	1860's	1870's	1880's	1890's	1900's
1. Nonfarm labor-force increment					
2. Ohio	106.0	153.0	276.3	258.7	368.3
3. United States	1,525.4	3,016.7	4,491.5	4,521.7	6,892.9
4. Nonfarm dwelling-unit increment					
5. Ohio	53.9	39.8	129.5	111.9	171.8
6. United States	952.1	901.0	2,110.5	2,023.8	2,941.7
7. Urban-population increment					
8. Ohio	282.5	347.8	479.4	488.2	666.8
9. United States	3,685	4,228	7,976	8,054	11,839
10. Dwelling units as per cent of increment					
Nonfarm labor force					
11. Ohio (line 5/2)	50.86	26.99	46.78	43.25	46.65
12. United States (line 6/3)	62.42	29.87	46.99	44.76	42.68
Urban-population increment					
13. Ohio (line 5/8)	19.08	11.44	27.02	22.93	25.76
14. United States (line 6/9)	25.84	21.31	26.46	25.13	24.85
15. National dwelling increment projected on Ohio rates					
16. Labor force (line 11x3)	776	814	2,105	1,956	3,216
17. Per cent of actual (line 16/6)	81.5	90.3	99.8	96.7	109.4
18. Urban population (line 9x13)	703	484	2,155	1,847	3,050
19. Per cent of actual (line 18/6)	73.8	53.7	102.1	91.3	103.7

SOURCE: Tables 9 and 10; Eleventh Census, 1890, *Population*, Part I, p. 913; Thirteenth Census, 1910, *Population*, Part I, p. 1287. Line 5 derived from increment of total occupied dwellings less the farm increment of dwellings.

population in Ohio than in the nation. The average ages of Ohio urban population over the decades and the whole sweep of its age profiles were higher than those in the nation. More crucially, too, rates of urbanization per unit of growth in the nonfarm rural population were higher in Ohio than in the nation. New villages arose more slowly, and existing villages were more rapidly converted to urban status in Ohio than in the nation. Hence, rates of nonfarm housing growth per unit of urban-population increment would be lower in Ohio than in the nation. For these reasons, urban population was not used as a projection basis in our final calculations.

Granted that the statistical biases of the other two projection bases are less serious, are they satisfactory in other respects? Would rates of new residential building in Ohio per unit of our projection bases be

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equal to nationwide rates? If so, it would imply that demolition and shrinkage rates were the same in Ohio and the nation, and that the shares of replacement construction to net growth were the same. Substantially, this is indicated by the scrappy evidence available. The relative share of the more durable brick and masonry structures was nearly the same in Ohio (13.3 per cent) as in the nation (13.9 per cent), to judge by the proportions of standing residential stock of those types in 1940.³⁰ The average age of housing stock in Ohio was probably somewhat under the national average age in the earlier decades of the projection, but continuous western settlement balanced off the newer regions against the older seaboard regions and probably brought the Ohio average dwelling age—and hence rates of shrinkage—into rough correspondence with nationwide levels. Such correspondence is indicated, at least, by the last quarter of the nineteenth century. The existing national shrinkage estimate for the three decades before 1920, stated in terms of per cent of dwelling production, amounted to 11.5, 8.2 and 7.1 per cent, respectively. Residential shrinkage rates in Ohio on the basis of annual counts between 1873 and 1884 probably approached 4 per cent in the 1870's and 5.5-6.0 per cent in the 1880's (see below, page 000). At any rate, the divergence between shrinkage rates, if these fragmentary data are to be trusted, would affect only a small fraction of total production. Hence, projection of Ohio replacement rates upon nationwide totals represents a fairly serviceable expedient, considering our needs, our objectives, and our margin of accuracy.

The work of projecting Ohio building experience into nationwide totals resolved itself into laying out three basic sets of decade aggregates: (1) Ohio and nationwide increments of nonfarm dwellings; (2) Ohio and nationwide increments of nonfarm labor force; and (3) new Ohio residential nonfarm production. In each category, estimation was involved in fixing the farm-nonfarm boundary. For dwellings, it could be gauged in the decades after 1890. Comparison of increments in farm establishments by number of establishments and number of farm families disclosed that farm-family increments were uniformly 25 per cent greater than farm establishment increments. The shrinkage factor was applied to farm establishment increments before 1890. The details of the adjustment are set forth in Table 9. Estimation of the nonfarm boundary in the labor-force increments was confined chiefly to adjustments in the nationwide

³⁰ *Sixteenth Census of the United States, 1940, Reports on Housing, Vol. II, General Characteristics of Housing, by States, GPO, 1944, p. 68.*

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TABLE 9
 CALCULATION OF ESTIMATES, NATIONAL NONFARM DWELLING INCREMENTS, 1860-1910
 (units in thousands)

Census Year	Decade	Dwelling Stock		Farm Stock ^b	Actual Increment	Estimated Increment	Estimated Increment, Nonfarm Dwellings
		Census Recorded ^a	Increment				
1860		5,628.6 ^c		2,044.1			
1870	1860's	7,042.8 ^d	1,414.1	2,660.0	616	462 ^e	952.1
1880	1870's	8,955.8	1,913.0	4,008.9	1,349	1,012 ^e	901.0
1890	1880's	11,483.3	2,527.5	4,564.6	556	417 ^e	2,110.5
1900	1890's	14,430.1	2,946.8	5,737.4	1,172	923 ^f	2,023.8
1910	1900's	17,805.8	3,375.7	6,361.5	625	434 ^f	2,941.7

^a 1850-80: 11th Census, 1890, *Population*, Part I, p. 913. 1890-1910: 13th Census, 1910, *Population*, Part I, p. 1287.

^b from *Historical Statistics*, 1949, p. 95, E1-5.

^c Adjusted upward on basis of 1870 Census report to include slave dwellings comparable with Negro dwellings of later census years.

^d Not adjusted for undercount, which primarily involved agricultural population, not covered by the farm-dwelling adjustment.

^e 75 per cent of value of actual increment.

^f From Census record of increments of farm families, approximately equal to 75 per cent of farm increment. *Historical Statistics*, 1949, Series H89, p. 174.

Estimation of Decade Totals, 1860-90

count, designed to allow for the nonwhite-slave components of the southern labor force in 1860 and for the undercount of Negro labor in the South in 1870, as given in Table 10.

Estimation of Ohio residential dwellings erected were confined in the main to computed allowance for the share in this total of farm dwellings, set forth in Table 11. The procedure was to utilize decade increments in number of farms (column 2) as an acceptable measure of net change in farm dwellings, with some allowance for replacement production of farm dwellings. A special study of the five least-urban Ohio counties during 1900-10 indicated considerable farm residential-replacement building to cover losses from fire, demolition, or scrapping of older buildings.³¹ Accordingly, we presupposed that statewide replacement rates, as set forth in Table 11, column 4, applied to farm dwelling stocks and calculated an allowance for gross farm dwelling production (column 6) and a parallel schedule of nonfarm residential production (column 8).

The details of the projection into nationwide housing estimates of Ohio nonfarm building rates, per unit of nonfarm-labor force and nonfarm-dwelling increments, are set forth in Table 12. All decade turns in nationwide dwelling production (Table 12, and Chart 9) are shared. Since the two multipliers yielded estimates close in pattern and level, and many of the biases inherent in each should be offsetting,³² it seemed sensible to average the two estimates for projection purposes. The resulting level of decade estimates was adjusted upward slightly to fit the previously accepted estimates of 1900-20 (Table 12, line 7, and Chart 9).

The reliability of these decade estimates has been subjected to four tests wholly or partly independent: the first checks for decade pattern and level between 1860 and 1910; the second and third check over-all levels of building between 1860 and 1940; the fourth checks the decade of the eighties.

³¹ The five counties had a 1910 percentage of urbanization ranging between 15.7 and 20.8. They contained, in 1910, 30,591 families and 13,028 farms. Over the decade, total population fell by 3,452; urban population rose by 4,214; while nonfarm, nonurban population fell by 3,835. The number of farms declined by 866. Both farms and rural dwellings of 1900 shifted categories over the decade. Yet, over the decade, 6,751 new dwellings were erected. Replacement building on farms is also indicated by the reported production of new barns and stables (3,093) and the increment (partly induced by price inflation) of value of building on farms (\$8.2 million) averaging \$632 per farm.

³² Biases include: (1) possible nonuniformity by states in the administration of census definitions and enumeration procedures; (2) allowance for farm dwellings by 25 per cent rule (see p. 35); (3) delineation of agricultural laborer from "general laborer"; and (4) variation in the handling between Ohio and nationwide or between successive censuses of semiprivate households.

Estimation of Decade Totals, 1860-90

TABLE 10

**LABOR FORCE, FARM AND NONFARM, UNITED STATES AND OHIO,
BY DECADE, 1860-1910**

	1860 (1)	1870 (2)	1880 (3)	1890 (4)	1900 (5)	1910 (6)
LABOR FORCE RECORDED						
United States						
All	9,425,133 ^a	12,924,951	17,392,099	23,318,183	29,073,233	38,167,386
Farm	4,288,984 ^b	6,263,394	7,713,875	9,148,448	10,381,765	12,582,997
Nonfarm	5,136,149 ^c	6,661,557	9,678,224	14,169,735	18,691,468	25,584,389
Ohio						
All	640,043	840,889	994,475	1,287,101	1,545,952	1,919,055
Farm	302,798	397,613	398,188	414,544	414,662	419,423
Nonfarm	337,245	443,276	596,287	872,557	1,131,290	1,499,632
DECADE INCREMENTS OF RECORDED LABOR FORCE						
	1860's	1870's	1880's	1890's	1900's	
United States						
All	3,499,818	4,467,148	5,926,084	5,755,050	9,094,103	
Nonfarm	1,525,408	3,016,667	4,491,511	4,521,733	6,892,871	
Ohio						
All	200,846	153,586	292,626	258,851	373,103	
Nonfarm	106,031	153,011	276,270	258,733	368,342	

SOURCE, BY COLUMN

- (1) *Eighth Census, 1860 Population*, p. 399, pp. 656-680, for only free persons over 15 years old. Number of students was subtracted from Census figure.
- (2) *Ninth Census, 1870, Compendium*, p. 594, corrected for understatement of 1870 Census. See *Sixteenth Census, 1940, Comparative Occupation Statistics for the United States, 1870 to 1940*, p. 104.
- (3)-(5) *Twelfth Census, 1900, Occupations at the Twelfth Census*, pp. L and XCII.
- (6) *Thirteenth Census, 1910, Classified Index to Occupations*, p. 41 and *Population*, Vol. 4, p. 125.

Notes: Technical Explanation of 1860 Adjustment

^a Correction for 1860 Census was made as follows:

1. Number of students was subtracted from census figures.
2. To count slaves, we took number of slaves by sex, 15 years and over: male, 1,082,563; female, 1,074,748 (*Eighth Census*, p. 595). The number of gainfully occupied slaves was estimated by multiplying the above figures by 0.75 for male, 0.35 for female. These figures were added to the revised census figure 1.

Justification of choosing 0.75 and 0.35 as multipliers: For the years 1890, 1900, and 1910, we have 0.79, 0.84, and 0.87 for males and 0.36, 0.41, and 0.55 for females, 10 years-and-over age class. (*Negro Population in the U.S. 1790-1915*, Bureau of Census, 1918, p. 504.)

Estimation of Decade Totals, 1860-90

The percentage might be much higher for slaves in 1860, 15 years-and-over age class. But, for our purpose, it is necessary to estimate the total number of gainfully occupied persons in the same terms, because Ohio had no slaves in that year. Therefore, projecting back from the figures of 1890, 1900 and 1910, and taking account of difference in age class, the figures 0.75 and 0.35 were chosen.

^b Col. 1, line 1 minus col. 1, line 3.

^c To estimate the nonfarm slave population, the following steps were taken:

1. We estimated the number of gainfully occupied urban slaves by multiplying the total estimated number of slaves in col. 1 by 0.067, which was the estimated fraction of the total slave population living in urban communities (Gunnar Myrdal, *An American Dilemma*, New York, 1944, p. 183).

2. We estimated gainfully occupied, nonfarm, nonurban slaves by multiplying the estimated gainfully occupied urban population by 1.29, calculated as follows: the nationwide figures of urban and rural population, and persons in agricultural pursuits for the years 1910 and 1860, and farm population for 1910 were taken from *Historical Statistics*, 1960. Then nonfarm, nonurban population for 1910 was calculated by subtracting farm population from rural population. To get farm population for 1860, the number of persons agriculturally employed in 1860 was multiplied by ratio of farm population to number of persons agriculturally employed in 1910. Nonfarm, nonurban population for 1860 was calculated by subtraction.

The ratio of nonfarm, nonurban population to the urban population was calculated—1.29. The underlying assumption is that the ratio of nonfarm, nonurban gainfully occupied persons to urban gainfully occupied persons is the same as that of population.

Finally, the total number of nonagriculturally occupied persons was calculated by adding the two figures, estimated above, urban slaves gainfully occupied and nonfarm, nonurban slaves gainfully occupied, to the census figure.

1. The first test reduces to an attempt to build a valid set of estimates of new residential production from the nationwide census returns of occupied dwellings by adjusting for uniformity and allowing for vacancy and replacement production. The details of the estimate are presented in Table 13. The first column presents the census returns, which were adjusted for 1850 to 1860 to include slave dwellings to ensure comparability with post-1860 returns. The second column presents an estimated set of vacancy allowances. For the years 1900 and 1910 we use Chawner's vacancy estimates, which appear reasonable on the surface having emerged from an exceptionally careful study of dwelling counts and family units.³³ Vacancy rates for other census years were gauged to the

³³ Chawner's vacancy estimates compare as follows with Wickens' (per cent):

	<i>Chawner</i>	<i>Wickens</i>
1900	2.53	4.0
1910	3.49	5.0

(Chawner, *Residential Building Process*, p. 16; Wickens, *Residential Real Estate*, pp. 54 ff.). The only nationwide time series of vacancy rates are those reported by the decennial English censuses, 1801-1911. The successive high-low variations run to less than two percentage points and, considering the greater age of the

TABLE 11

DERIVATION OF OHIO NONFARM HOUSING ESTIMATES, BY DECADE, 1860-1910

Decade	Farm Dwelling Adjustment			Statewide Dwelling, Estimated Rate per 100 (4)	Estimated Replacement of Farms (3) × (4) (5)	Total Farm Adjustment (2) + (5) (6)	Replacement Increment of New Production (000's) (7)	Estimated Nonfarm Dwellings Produced (1) - (6) (8)
	Statewide Reported New Dwellings (1)	Increment Farms (2)	Farm Stock, Beginning of Decade (000's) (3)					
1860's	89,490	16,064	179.9	4.58	8,239	24,303	19.5	65,187
1870's	126,365	51,236	196.0	6.73	13,191	64,427	33.4	61,938
1880's	181,390	4,241	247.2	8.13	20,097	24,338	47.7	157,052
1890's	177,196	25,289	251.4	5.55	13,953	39,242	40.0	137,954
1900's	254,120	-4,674	276.7	10.13	28,030	23,356	86.9	230,764

SOURCE BY COLUMN

(1) From audited reports, adjusted for deficient returns, of county auditors, Ohio Secretary of State Reports.

(3) Bureau of Census, 13th Census, *Agriculture*, Vol. V, p. 68.

(4) Derived by dividing replacement increment of new production (col. 7) by the beginning decade total dwelling stock (from Census of Dwellings, *Compendium*, 1880, 1910).

(7) Derived by adding the increment of farms (col. 2) plus nonfarm dwelling units increment (Table 8, line 5) and subtracting the total from statewide reported new dwellings (col. 1).

Estimation of Decade Totals, 1860-90

1900-10 level, taking account of the position of the census year in the building cycle and the amplitude of movement of that cycle. The resulting vacancy estimates have little value in their own right and are used here only to adjust order of magnitudes. The determination of farm dwellings involved the adjustment of farm increments (see Table 9) to allow for the breakup of the plantation system.

Allowance for realistic estimates of conversion and shrinkage present complex estimation problems. The 1940 vintage report, showing that only 10.7 per cent of all dwelling units were converted (and this after a decade in which conversion activity was concentrated), indicates minimal decade rates of conversion, which were comparatively light in the decades between 1860 and 1910. Grebler, Blank, and Winnick have already accepted decade conversion allowances for later decades of the following percentages:³⁴ 1920's, 1.8; 1910's, 2.9; 1900's, 2.2; 1890's, 2.1. Accepting the indicated level, we accordingly specified the following pattern of conversion allowances, expressed as a percentage of dwelling production. A downward trend is specified to allow for the factor of aging:³⁵ 1900's, 2.2; 1890's, 2.0; 1880's, 1.8; 1870's, 1.6; 1860's, 1.4; 1850's, 1.2. The shrinkage ratio is more variable and involves larger magnitudes than conversion rates do. The BLS-NBER shrinkage estimates, drawn in large part from informed guesses by Wickens, were as follows (stated in terms of per cent of dwelling production):³⁶ 1930's, 15.0; 1920's, 8.3; 1910's, 11.5; 1900's, 8.2; 1890's, 7.1.

English dwelling stocks and higher tenancy rates, the absolute levels are comparable with those estimated by Chawner (see the British rates as reproduced in H. W. Robinson, *The Economics of Building*, London, 1939, p. 106). The Chawner estimates are also consistent with the carefully worked out 5.0 per cent estimate of Wickens for 1930 (based on an extensive analysis of 1930 and 1934 data, see pp. 22 ff.) and the census reported gross vacancy rates of 6.5 per cent for 1940 and 6.8 per cent in 1950, including vacant seasonal units and units held for absent households (see BLS-NBER, p. 776).

³⁴ *Capital Formation in Residential Real Estate*, p. 329 (drawing largely upon estimates by Wickens and Chawner).

³⁵ The whole scale of conversion allowances from 1850 to 1940 is too low, since it accounts for only little more than half of the total stock of 3.3 million conversion reported in the 1940 census count. But with present information there is no way to distribute the shortage over the decades; the tendency to conversion probably did not follow a uniform course. Hence, minimal conversion rates in line with the Grebler, Blank, and Winnick estimates are accepted for the purposes of the above calculation.

³⁶ See *Capital Formation in Residential Real Estate*, p. 329.

Estimation of Decade Totals, 1860-90

TABLE 12

DERIVATION OF UNITED STATES HOUSING ESTIMATES BY USE OF
OHIO MULTIPLIERS, BY DECADE, 1860-1910
(thousands)

Ohio Multipliers	Decade					Total
	1860's	1870's	1880's	1890's	1900's	
1. Nonfarm dwellings produced in Ohio per 1,000 nonfarm occupied dwelling increments (Table 11, col. 8, Table 8, line 5)	1,208.7	1,557.8	1,212.8	1,232.5	1,342.9	
2. Nonfarm dwellings produced per 1,000 nonfarm labor force increments (Table 11, col. 8, Table 8, line 2)	615.0	404.8	568.4	533.2	626.5	
3. Variant estimates, nationwide dwellings production						
4. Line 1, above, Table 8, line 6	1,150.8	1,403.5	2,559.6	2,494.3	3,950.5	11,558.4
5. Line 2, above, Table 8, line 3	938.1	1,221.2	2,552.9	2,410.9	4,318.3	11,441.4
6. Average	1,044.5	1,312.4	2,556.3	2,452.6	4,134.4	11,499.9
7. Average adjusted to Chawner 1900-19 level ^a	1,061	1,333	2,597	2,491	4,200	11,682

^a Upward adjustment of 101.58 per cent.

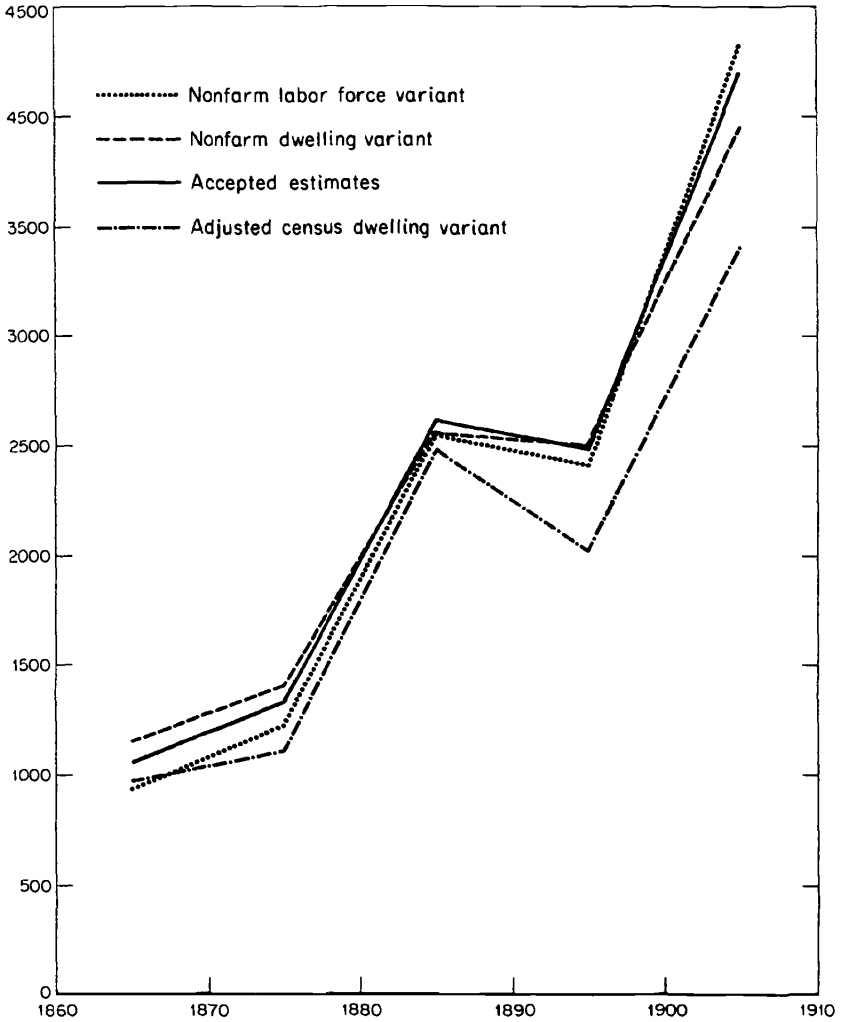
The Ohio report of buildings lost, destroyed, or demolished showed the following ratios to reported production of new dwellings in the same year.

<i>Year</i>	<i>Number</i>	<i>Value</i>	<i>Year</i>	<i>Number</i>	<i>Value</i>
1873	3.60	7.76	1878	4.32	4.62
1874	3.60	7.93	1880	4.69	5.97
1875	3.96	8.51	1881	5.25	14.40
1876	3.64	9.00	1882	5.40	6.52
1877	6.44	7.67	1884	6.30	12.40

For residential building, only the number estimates would be relevant. It would be expected that in the eastern states higher shrinkage

CHART 9

**United States Decade Totals for New Dwellings,
Three Variants, 1860-1910**



Source: Table 12, lines 4, 5, 7; Table 13, col. 8.

TABLE 13
CALCULATION OF ADJUSTED HOUSING PRODUCTION FROM CENSUS DWELLING INCREMENTS, 1860-1910

Census Year	Decade	Number Occupied Dwellings (1)	Estimated Vacancy Allowance (2)	Vacancy Adjusted Stock (3)	Increment (4)	Adjusted Farm Increment (5)	Net Change, Nonfarm Dwelling (6)	Conversion and Shrinkage Rate (7)	Estimated New Gross Production (8)
NATIONWIDE									
1850	1840's	3,896.4 ^a	103.0	4,013		446	1,170	1.8	1,191
1860	1850's	5,628.6 ^b	100.0	5,629	1,616	462	952	2.3	974
1870	1860's	7,042.8 ^c	100.0	7,043	1,414	462	1,080	2.9	1,112
1880	1870's	8,955.8	102.0	9,135	2,092	1,012	2,390	3.7	2,482
1890	1880's	11,483.3	104.0	11,942	2,807	417	1,926	4.7	2,021
1900	1890's	14,430.1	102.5	14,791	2,849	923	3,204	6.0	3,409
1910	1900's	17,805.8	103.5	18,429	3,638	434			9,998 ^d
NATION EXCEPT SOUTH									
Census Year	Decade	Occupied Dwelling Stock (9)	Vacancy-Adjusted Dwelling Stock (10)	Unadjusted Farm Increment (11)	Estimated New Gross Production After Conversion and Shrinkage (12)				
1850	1840's	2,343.5	2,413.8						
1860	1850's	3,645.2	3,645.2	437.7	808				
1870	1860's	4,742.5	4,742.5	403.1	711				
1880	1870's	5,948.7	6,067.6	702.9	641				
1890	1880's	7,849.7	8,163.7	250.4	1,917				
1900	1890's	9,685.6	9,927.8	388.7	1,443				
1910	1900's	11,868.2	12,283.6	147.0	2,350				
					7,062				

SOURCE BY COLUMN

(1) & (9) 11th and 13th Censuses, *Population*, Part I, pp. 913, 1287, respectively.

(2) See text, pp. 39ff.

(5) Table 9.

(7) Determined by subtracting estimated conversion rates (p. 41) from loss rates (p. 45).

(11) Actual count of number of farms, first difference. *Abstract of Census, 13th Census, 1910*, p. 238.

^a Adjusted to include slave dwellings on par with post-1860 census returns; calculated at rate of six slaves per dwelling (1860 rates).

^b Adjusted by 1870 Census report to include slave dwellings comparable with post-1860 census returns.

^c Not adjusted upward for 3.3 per cent population undercount, which did not seem to have affected the farm count or the nonagricultural sector.

^d 1860-1910 only.

Estimation of Decade Totals, 1860-90

rates would prevail. A rising tendency is indicated, though in part it may reflect the cyclical movement in process. Other reports have shown that shrinkage activity and demolition accelerates in the building boom phase.³⁷ The years of the early eighties involved a marked boom. In selecting shrinkage rates, consideration was also given to reported shrinkage rates elsewhere involving average annual replacement as a per cent of new residential production:³⁸ Canada, 1920-1940, 19.4; Hamburg, 1885-1913, 13.2; Glasgow, 1873-1913, 45.0. The Glasgow rates as compared with the Hamburg rates disclose the influence of high average age of stock and slow rates of secular growth. Allowance must also be made for the temporary character of nonfarm dwellings in the first round of settlement, the tendency to quick obsolescence, and relatively high rates of fire loss. In the later decades, demolition would accelerate in metropolitan communities owing to programs of highway and road building and revamping of city layout and design. In view of the Ohio demolition report, it seemed safe to commence with a relatively low 3 per cent rate for the 1850's. The progression ends with the comparatively well-established rate of 15 per cent for the decade of the 1930's. Intermediary rates were logarithmically interpolated.

The crudeness of this procedure is recognized. Loss rates on total housing stock are probably a function of its average age, percentage share of wood to masonry construction, and rate of new residential building. There is no reason this interplay of influence should work out to a steady logarithmic progression of loss rates expressed as a fraction of new decade residential production. However, in the absence of intensive research on loss rates and with uncertainty regarding absolute decade loss levels, we have accepted the following percentages for the United States, 1850-1940: 1850's, 3.0; 1860's, 3.7; 1870's, 4.5; 1880's, 5.5; 1890's, 6.7; 1900's, 8.2; 1910's, 10.0; 1920's, 12.3; 1930's, 15.0.

Table 13 also presents a similarly derived schedule of estimated gross residential production for the entire nation except the South. Since

³⁷ Thus Ohio decade replacement rates (see Table 11) were 8.13, 5.55, and 10.13 per hundred dwellings of stock for the eighties, nineties, and nineteen-hundreds.

³⁸ See A. K. Cairncross, *Home and Foreign Investment 1870-1913*, London, Cambridge University Press, 1953, p. 26; K. Hunscha, *Die Dynamik des Bau-markt*, Vierteljahreshefte Zur Konjunkturforschung, Sonderheft 17, Berlin, 1930, p. 60; O. J. Firestone, *Residential Real Estate in Canada*, University of Toronto Press, 1951, pp. 382 ff., 393 ff. Chawner used demolition rates for the period 1900-1936 ranging from 2.5 units per 10,000 persons in 1926 and 1928 to 6.0 units in 1935 (*Residential Building Process*, p. 14).

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nonsouthern farm increments corresponded more closely with the indicated real movement of agricultural population and its dwelling stocks, the farm-dwelling increments were unadjusted. This leads to a probably excessive spread between the national and nonsouthern or to an exaggerated account of southern nonfarm dwelling production. Our estimates presuppose that the nonsouthern part of the nation contributed only 71 per cent of the nonfarm residential production between 1860 and 1910. The share, judging by measures of change in urban population of nonfarm labor force, may well approach 80 per cent. A more precise regional breakdown of nonfarm residential building was not feasible within the limits of this study.

The difficulty in reconciling the regional accounts underscores the crudeness of our efforts to build up from census returns an estimate of new residential production. The aggregate level estimated falls short by 13 per cent of the level projected by the two Ohio multipliers, which we have accepted. In part the shortage derives from our inability to adjust for underestimation in the census dwelling count between 1850-1910.³⁹ More important is the decade pattern of movement as shown in Chart 9, which conforms closely to the pattern of our accepted estimates.

2. A second test of these estimates provides a check on the aggregate level of residential building involved—11.7 million new nonfarm dwellings between 1860 and 1910. Between those years nonfarm population to be housed grew by approximately 45.6 million.⁴⁰ The average-size

³⁹ Thus for 1900 and 1910 we used an unadjusted census count of 14,430,100 and 17,805,800 occupied dwellings (see Table 13). The adjusted totals for households used in *Historical Statistics, 1949, H89-112*, were 110.0 and 113.8 per cent greater.

⁴⁰ For 1910, total nonfarm population was recorded by the Census at 59,895,200. The problem is thus to build up an 1860 nonfarm estimate. Of the two components of this estimate—urban and nonurban—the urban is recorded at 6,216,500. We build up the nonurban component by assuming that resident farm population will show the same pattern of movement as total agricultural employment (as taken from the occupations census). This is a more reliable basis for projection than movement in number of farms. Farm-family size patterns probably did not shift much over the fifty-year period. The numbers (in thousands) are as follows:

	1860	1910
Urban population	6,216.5	41,998.9
Rural population	25,226.8	49,973.3
Farm employment	6,207.6	11,591.8
Nonfarm, nonurban population	8,048.6	17,896.3
	(derived)	
Total nonfarm population	14,265.1	59,895.2

SOURCE: *Historical Statistics, 1960*, pp. 25-29, 63.

Estimation of Decade Totals, 1860-90

nonfarm household to be accommodated in 1910 was 4.24 persons,⁴¹ which would call for 10.76 million dwellings. If we allow for a 3.5 per cent vacancy in the end stock in 1910 and if we specify a 6 per cent shrinkage (for fire and loss) in post-1860 production as consistent with the last tabulation, we emerge with a total new residential requirement over the fifty years of 11.8 million units.⁴² This is close to the magnitude of our accepted decade levels.

3. A third check of over-all magnitudes is made possible by the Housing Census of 1940. Cumulation from 1860 to 1939 of all our estimates yields a total of 27.4 million dwellings. A comparison of that total (in thousands) with the known 1860 and end-1939 standing stock of nonconverted eligible nonfarm dwellings is shown in the next tabulation.

1. Estimated new production nonfarm units 1860-1939	27,418
2. Estimated 1860 nonfarm stock	3,167 ^a
3. Total available (items 1 plus 2)	30,585
4. Surviving eligible end-1939 standing stock of nonconverted nonfarm units	26,211 ^b
5. Gross disappearance (items 3 minus 4)	4,374
6. Disappearance as per cent of new production (item 5 as per cent of item 1)	15.95

^a Average of two estimates: (a) using nonfarm population estimate for 1860 (see n. 40) and latest average nonfarm family size (4.24 persons), and (b) taking households, 1860 Census, minus "free" farms, plus estimated slave urban families (from Table 13 at 43,000).

^b Total census standing stock less converted and "ineligible" units and less estimated transfer from the farm sector (Table 2, and 16th Census, *Housing*, 1940, III, Table A-1, p. 9.)

The number of traceable 1860 units reported in 1940 as surviving through to 1940 was 633,000 units. If that count, probably an understatement, be conceded, the disappearance rate of the post-1860 production was 6.71 per cent, a not implausible rate for post-1860 stock. The total disappearance rate, 15.95 per cent, is very close to that recorded for Canada between 1920 and 1940 (see footnote 38). It is worthwhile to compare this total disappearance rate with the disappearance rate implicit in the scale of loss rates developed by Wickens and by Grebler *et al.* for 1890-1940, and extended logarithmically and smoothed in our reference scale back to 1850 (tabulation, p. 45). Applying the reference

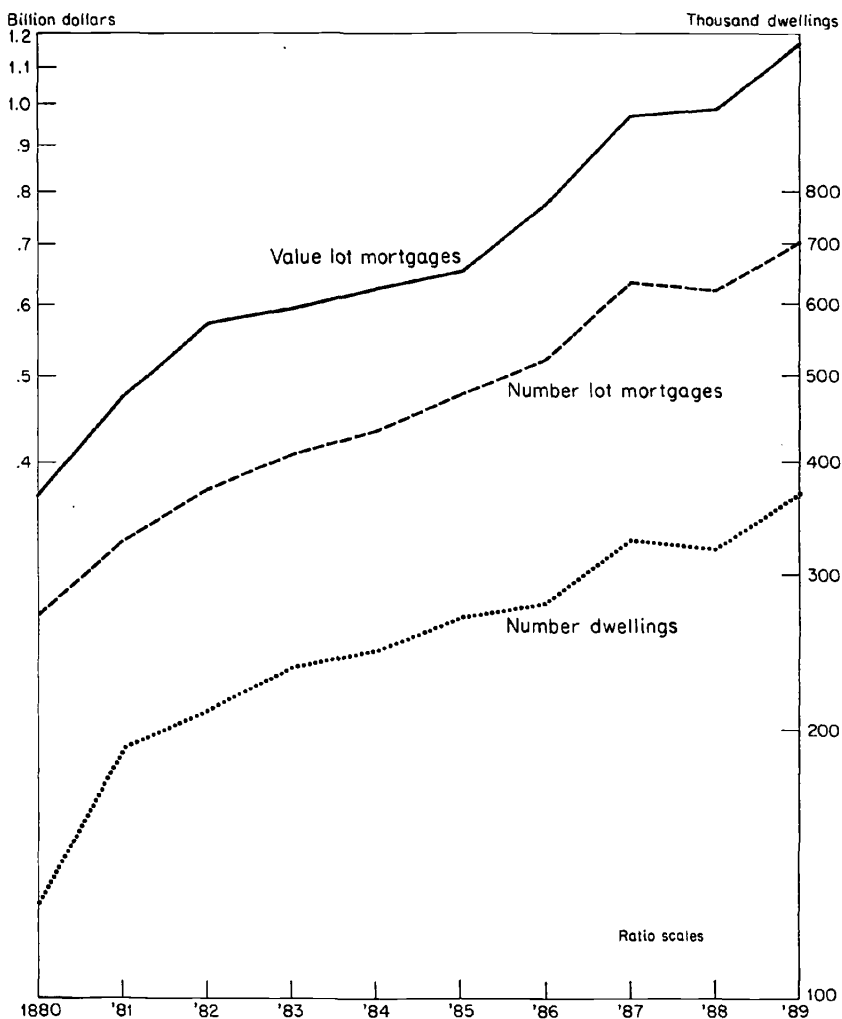
⁴¹ This includes quasi-households as counted in the 1910 Census (see *Capital Formation in Residential Real Estate*, pp. 82, 393 ff.).

⁴² Details are as follows (in thousands): vacancy rate of 3.5 per cent (Chawner's estimate), 377; 6 per cent shrinkage from current production (fire and loss), 646; estimated net dwelling requirement, 10,759; total required production gross, 11,782.

Estimation of Decade Totals, 1860-90

CHART 10

**Annual Mortgage and Building Activity,
Nationwide, 1880-89**



Source: U.S. Census, *Report on Real Estate Mortgages, 1890*, p. 317; and Table 15, below.

Estimation of Decade Totals, 1860-90

shrinkage scale yields a gross disappearance over the eighty-year period of only 2,709,000 units, appreciably less than gross disappearance implicit in our measures (4,374,000 units). I suspect the gap owes more to understatement of the reference shrinkage scale than to overstatement in our estimates of new production.

4. A fourth test is available for the decade of the 1880's. The 1890 Census included reports of a nationwide survey of the number and value of mortgage instruments recorded annually from 1880 to 1889 in connection with real estate located in municipalities of all size classes. Mortgage recordings should move coordinately with series of new residential building, though with dampened amplitudes.⁴³ Chart 10 plots the movement of our estimated national housing series and the census-derived nonfarm mortgage series. Patterns of change are congruent both in form and amplitude.

⁴³ Specific total average amplitude measurements for long building cycles for Ohio 1880-1900, are as follows (in thousands):

	<i>Residential Building</i>	<i>Value of Mortgage Loan Recordings</i>
Mean of 3 sample Ohio groups	207.0	140.8
Statewide aggregate	120.0	66.9