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THE CAPITAL-OUTPUT RATIO IN
RESIDENTIAL REAL ESTATE

AGGREGATE nonfarm rent has grown more rapidly than residential capital. Consequently, if the capital-output ratio for residential real estate is defined as the ratio of capital to gross rent, the ratio has shown a substantial decline over the past sixty years. The decline is evident in both column 3 and column 6 of Table I-1, each corresponding to different measurements of the capital-output ratio. Under the first measurement the ratio is derived from current-price series with the value of land included in capital. Under the second, land is excluded and both numerator (capital) and denominator (rent) are adjusted to a constant-price base by specific indexes. The latter ratio, which has declined far more drastically than the former, over 60 per cent from 1889-1898 to 1939-1948,[1] is, of course, the more significant. Current-price series are affected by the revaluation of both existing assets and current output, and the value of land is of little use in predicting the volume of capital formation associated with a change in output, the most common use of capital-output ratios. Capital-output ratios are presented in current prices mainly to permit an independent check of their trend by referring to data on the market relationship between the capital value and rental value of a house.

The primary cause of the decline in the residential capital-output ratio appears to be the increase in the number and importance of facilities and services, the costs of which are fully included in the measurement of current output but which lead to no increase in residential capital (as it has been defined in this study) or to an increase which is disproportionately small compared with the increased value of output.[2] A detailed discussion of these changes is found below.

[1] The more pronounced decline in the capital-output ratio shown in column 6 is attributable to the greater rise in the construction cost index by which the numerator is deflated, compared with the rent index by which the denominator is deflated.

[2] As in other sectors covered by the National Bureau's Capital Formation Study, output is valued in gross terms. Aggregate nonfarm rent is conceptually measured as the sum of contract rents for tenant-occupied dwelling units and imputed gross rent of owner-occupied dwelling units, although numerous statistical flaws, discussed later, cast considerable doubt on the accuracy of the rent estimates, particularly for earlier decades. The rent data therefore include all charges the landlord makes for the use of electricity, gas, and water, and for the use of consumer equipment such as refrigerators, stoves, and furniture. The value of consumer equipment is not, however, included in the estimate of residential capital. The Department of Commerce excludes the aforementioned items from its published

TABLE I-1

Capital-Output Ratios, Nonfarm Residential Real Estate,
Selected Periods, 1889-1948
(*dollars in millions*)

	CURRENT DOLLARS			1929 DOLLARS		
DECADE	Average Annual Value of Residential Real Estate (Including Land) (1)	Average Annual Residential Rent (2)	Capital-Output Ratio (3)	Average Annual Value of Residential Capital (Excluding Land) (4)	Average Annual Residential Rent (5)	Capital-Output Ratio (6)
1889-1898	$ 16,917	$ 1,130	15.0	$28,594	$ 2,043	14.0
1899-1908	27,147	2,160	12.6	39,845	3,680	10.8
1909-1919	46,134	3,661	12.6	52,444	5,451	9.6
1921-1929	90,285	{ 7,873 { 8,768	{ 11.5 { 10.3	68,559	{ 7,655 { 8,471	{ 9.0 { 8.1
1929-1938	91,214	8,731	10.4	78,868	11,096	7.1
1939-1948	138,249	11,823	11.7	80,175	15,157	5.3

Column	Source
1, 4	Table D-1.
2	Data for 1889-1908 from Simon Kuznets, *National Product since 1869*, National Bureau of Economic Research, 1946, p. 144. Kuznets' data include residential farm rent, which was removed by applying an estimated ratio of farm rent to aggregate rent. The latter ratio was derived by taking the ratio of farm families to total families in each decade and reducing this ratio to allow for the lower average rental of farm compared with nonfarm homes. Thus in 1890 and 1900, farm families comprised 37.6 and 35.6 per cent, respectively, of all families. Since the weight of farm rent in total rent during the period 1921-1950 ranged between 30 and 40 per cent of the weight of farm families in total families, a factor of 40 per cent was applied to the 1890 and 1900 percentages and the results were averaged. On this basis the proportion of farm rent to total rent for the decade 1889-1898 was calculated as 14.6 per cent (compared with 6.2 per cent in 1950). A similar procedure was employed for the decade 1899-1908.

For the period 1909-1919 the rent data are taken as the average of nonfarm rent for the years 1909, 1914, and 1919 as estimated by William H. Lough (*High Level Consumption*, McGraw-Hill, 1935). Alternatively, Kuznets' rent data for the decade 1909-1918 might have been used (after removal of the farm component); if adjusted by the procedure described above, average annual nonfarm rent based on Kuznets' data is quite close to that obtained from Lough and would leave the capital-output ratio for the period unaffected.

For the period 1921-1929, both Lough's and Harold Barger's (*Outlay and Income in the United States, 1921-1938*, National Bureau of Economic Research, 1942) estimates are presented. The derivation of both sets of estimates rests upon certain questionable assumptions (discussed below), making an unequivocal choice difficult.

For the period since 1929 the Department of Commerce unpublished estimates of nonfarm contract rents, upon which the published series of space rent is based, are used. |
3	Column 1 divided by column 2.
5	Column 2 deflated by the BLS index of rent for the period 1914 to 1950 converted to a 1929 base and extended to 1889 by the index of rent presented by Carl Snyder in *Business Cycles and Business Measurements* (Macmillan, 1927, pp. 291 and 137).
6	Column 4 divided by column 5.

While changes in the capital-output ratio in residential real estate may be important for some analytical purposes, their significance for the present study is greatly limited. The close tie which exists between residential construction and increases in population and households renders the need for this device less pressing than in the case of other sectors. In contrast to other sectors of the economy, the ratio does not offer a promising tool for estimating future capital requirements. Imputed rent constitutes a very large and increasing fraction of total nonfarm rent, as much as two-thirds in 1950. There are difficulties in measuring, let alone forecasting, consumer demand for a service not purchased on the market, since the valuation of the output is less objective and hence more vulnerable to error. The imputed rent totals in historical rent estimates have often been based on an estimated ratio between the capital value and rental value of a dwelling unit, that is, an assumed capital-output ratio, so that the estimates of capital and of output have no independent standing. Moreover, as the subsequent discussion points out, the ratios are affected by changing capitalization rates for residential real estate. The data employed in estimating capital-output ratios should be free from such distorting influences, although changes in interest rates can conceivably play a part in explaining the trends in the capital-output ratio for any given sector.[3]

Changes in the Gross Rent Multiplier

An independent check of the trend in the capital-output ratio is afforded by the ratio between the value of a parcel of real estate and its gross rent as established in the market. Capital values (including land) are frequently taken by real estate practitioners to be equal to some multiple of the expected gross monthly or annual rent—hence the term "gross rent multiplier." This has led to the adoption of certain rules of thumb, e.g. a single-family house is worth 100 times its monthly rental value, or an apartment house is worth 6 times its annual rent. These rules of thumb reflect, even if loosely, actual market relation-

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series on "space rent" (*National Income and Product of the U.S., 1929-1950*, Dept. of Commerce, 1951, p. 80). The substitution of space rent for contract rent would have only moderately reduced the decline in the capital-output ratio. Space rent does not exclude, for example, maintenance, repairs, and real estate taxes. A long-run increase in the share of these expenses in gross rent, which seems probable, would serve to depress the capital-output ratio. The absence of data prohibits the estimation of a capital–net output ratio in which net output is defined as net income originating in a given sector.

[3] A change in capitalization rates which merely brings about a revaluation of assets is not relevant to the capital-output ratio. On the other hand, a change in interest rates which alters the relative amount of real capital used in production cannot be dismissed in consideration of factors affecting the movement of the capital-output ratio.

ships. The few statistical studies of the ratio between the prices of specific parcels of residential real estate and their gross rents indicate that the distribution of ratios for a particular type of real estate is characterized by a considerable degree of central tendency. While information on gross rent multipliers is for obvious reasons difficult to obtain, sufficient data have been assembled to provide at least an impression of the long-run change in these market ratios and to suggest some explanations of the change.

The available evidence points to a long-run decline in the gross rent multiplier, thus confirming the decline in the capital-output ratio. A sample of market transactions during the early nineties indicated an average gross rent multiplier of 14.1, i.e. 14.1 times annual gross rent income, for single-family houses, 9.5 for tenements, and 10.1 for apartment houses (Table I-2). During the twenties the gross rent multipliers of the latter two types of structures were between 6 and 8; during the late forties the multiplier was about 10 for single-family houses, between 4 and 5 for tenements, and between 5 and 6 for apartment houses. The gross rent multiplier is affected by cyclical forces evident in the decline in its level during the thirties compared with the twenties and forties.[4] The cyclical variations make it difficult to ascertain a long-run movement from bench-mark data. Nevertheless, the impression given by the data is one of a pronounced downward drift.

While the data refer to residential real estate located mainly in the Northeast, especially New York City, a similar decline seems to have occurred in other types of urban real estate widely scattered in location. For example, a study of nonresidential real estate located in the business district of San Francisco and Oakland points to a decrease in the gross rent multiplier since 1925.[5] British experience also reveals a downward trend.[6]

Before proceeding to an explanation of the causes of this decline it is useful to state two propositions concerning the gross rent multiplier, which are derived from and are corollary to the conventional capitalization formula. These propositions not only bring out certain inherent and nearly self-evident relationships between the value of a

[4] More direct evidence on the cyclical movement of the gross rent multiplier is seen in a study of a sample of comparable apartment houses located in Chicago. During the upswing in the cycle the multiplier rose as follows: 1934, 4.0; 1940, 4.2; 1941, 4.5; 1942, 4.6; 1943, 5.6. Eugene T. Mulhern, "Trends in Apartment Costs," *Review of the Society of Residential Appraisers*, July 1944.

[5] Paul F. Wendt, "Central City Property Values," to be published by the Bureau of Business and Economic Research, University of California (Berkeley, California).

[6] H. Campion, *Public and Private Property in Great Britain*, Oxford, 1939. Data taken from probated estates show the following multipliers at different dates: 1911-1913, 13.8-14.3; 1926-1928, 11.5-12.8; 1932-1934, 10.0-10.5.

parcel of real estate and its gross rent but also help in establishing a convenient framework for organizing the subsequent discussion.

The first of these propositions may be stated as follows: *Given equal capitalization rates, the gross rent multipliers of any two properties or of the same property at two points of time are directly proportional to the ratios of net to gross income.*[7]

As an example, assume two properties with the following gross and net income data:

	Property I	Property II
Gross rent	$25,000	$14,000
Operating costs	10,000	7,000
Net income	$15,000	$ 7,000

If the net incomes of both properties are capitalized at the same rate—say, 8 per cent—in arriving at market price, property I is valued at $187,500 and property II at $87,500. The gross rent multiplier for the first property is, then, $187,500/$25,000 or 7.50, and for the second property, $87,500/$14,000 or 6.25. It can be seen that the ratio of the two given rent multipliers, 7.50/6.25, is equal to the ratio of the net to the gross income of the two properties, .60/.50.

The second proposition is even more obvious and requires no illustration: *Given equal ratios of net to gross income, the gross rent multipliers of two properties or of the same property over time are inversely proportional to the corresponding capitalization rates.*

The first proposition implies that, if certain factors have produced over time a cyclical or long-run fall in the ratio of net to gross income, the gross rent multiplier will decline, other things equal. The second proposition implies that if capitalization rates have risen over time—if, for instance, the relative desirability of real estate as an investment has decreased—the gross rent multiplier will also decrease. Only the first proposition can be measured and verified; the second is less objective and supportable more by qualitative judgments than by actual data.

Although both factors have been segregated for analytic convenience, they jointly exert their influence in setting the level of the gross rent multiplier, acting in the same direction or in opposite directions. For example, single-family houses typically have higher gross rent multipliers than apartment houses because they tend to be associated with

[7] Throughout the discussion no distinction is drawn between current and anticipated gross and net income. Although anticipated income is more pertinent for a capitalization formula, statistical observations can obviously deal only with current or past income data. Net income in this discussion refers to net operating income and is not to be confused with "net income originating" (or sum of factor payments), which enters into the discussion of capital-output ratios of other economic sectors.

TABLE I-2

The Gross Rent Multiplier at Bench-Mark Dates, 1890-1949

	Single-Family	Tenement	Apartment House	Other
1890-1892	14.1	9.5	10.1	..
1900	12.5	9.1	..	..
1905	11.1	..	..	..
1912	11.0 11.1	10.5	10.6 9.9	..
1913	12.1	..	9.0	..
1919	9.8	..	..	..
1923	..	..	6.2	..
1925	..	7.1	6.4	..
1936	8.3	..	..	..
1937	..	..	7.5	..
1937-1938	8.3	..	..	..
1937-1940	..	4.5	..	6.3
1939	7.4	..	..	..
1940	..	..	7.2	..
1940-1941	8.6	..	..	..
1941	7.9	5.1	4.1	6.5
1941-1942	..	..	5.5	..
1942	..	5.1	..	6.6
1943	..	3.2	4.8	..
1948	10.1	..	8.3	..
1949	..	4.6	5.6	..

Source

1890-1892: New York City, compiled from the files of the *Real Estate Record and Guide*. The *Record* reported many of the sales of the real estate auction exchange in Manhattan. All sales which could be unambiguously identified as residential properties and where both price and gross rent were given became part of the sample. The sample was further expanded by the inclusion of advertised residential properties, since the total number of auctioned properties was too small. The total sample for the three years numbers 109 cases. The bulk of the sample was derived from 1891; toward the end of 1892 both advertisements and auction sales reported in the *Record* became increasingly thin, and by 1893 they had virtually disappeared.

The 109 residential properties, of which 19 represent auction sales and 90 represent advertisements, consisted of 19 single-family, 53 tenement, and 37 apartment houses. The gross rent multiplier was derived separately for auctioned properties and for advertised properties for each of the three types of structures; in every case the gross rent multiplier derived from auction sales was somewhat higher than that for advertised properties. This is probably due to the "bargain" appeal of the adver- · tisements implicitly stressing a favorable relation between the asking price and gross rents. Also, there was probably some tendency for the latter to be overstated, judging from editorial comments on contemporary ethics in rent roll padding. The multiplier showed remarkably little dispersion within any structure type; the use of medians would not have changed the results significantly.

1900: Single-family, Philadelphia, as cited by Robert W. DeForrest and Lawrence Veiller in *The Tenement House Problem*, Macmillan, 1903, p. 347. This is the average gross rent multiplier of two types of working class single-family homes offered alternatively for rent or for sale. The bench-mark date is an approximation.

Tenement, New York City, from *ibid.*, pp. 360-361. The multiplier has been computed from financial data presented for a sample of 25 tenements. Both the

(notes continued on next page)

Notes to Table I-2 (continued)

capital value and the gross rent incomes are estimates by Elgin Gould, who did the analysis. A 6 per cent vacancy allowance, based on current operating experience, was used in the computation.

1905: Single-family, Utica, from Charles J. Fuess, *How to Buy Property*, Utica Advertising Co., 1906, p. 11. An estimate of a Utica real estate broker.

1912: Single-family, first figure, Baltimore, from Alfred D. Bernard, *Some Principles and Problems of Real Estate Valuation*, U.S. Fidelity and Guarantee Co., 1913, p. 134. Estimates by the author, a real estate expert for a large Baltimore financial institution. The data for single-family homes are for frame cottages. Second figure, Albany, from Lee K. Frankel, "Financing the Small Home," in *Housing Problems in America*, National Housing Conference, Cambridge, 1912, pp. 95-105. Data drawn from 29 single-family homes offered alternatively for sale or for rent.

Tenement, New York City, from Reginald P. Bolton, *Building for Profit*, De Vinne, 1922, p. 41. From financial data presented for 6 tenements and 3 apartment houses. Bolton cites the data as having been drawn from actual operating experience.

Apartment house, first figure, *ibid.* Second figure from Bernard, *loc. cit.*

1913: Single-family, nationwide, from Leifur Magnusson, *Housing by Employers in the U.S.*, Bureau of Labor Statistics Bulletin, November 1917. From official BLS study of employer housing in the United States. Data drawn from the years 1911-1915 have been centered in 1913.

Apartment house, Rochester, from F. A. Austin, "The Investment Value of Rochester Real Estate," *Real Estate Magazine*, September 1913, pp. 12-16. Median multiplier of 5 Rochester apartment houses. The financial data seem to have been given as estimates rather than being drawn from actual records.

1919: Single-family, nationwide, *U.S. Housing Corporation Report*, Dept. of Commerce, 1920, Vol. I, p. 47. Derived from actual prices received or asked for over 2,000 units of war housing in single-family homes. The selling price and appraisals are considered (p. 172) to be considerably below construction costs and are based upon prewar values. This implies an understatement in the derived gross rent multiplier.

1923: Apartment house, 15 cities, cited by John A. Zangerle in *Principles of Real Estate Appraising*, McMichael, 1924, pp. 69-70. Actual market data for a sample of 80 apartment houses in 15 cities.

1925: Tenement and apartment house, New York City, from Leo Grebler, *Real Estate Investment Experience*, Columbia University Press, 1955. The capital values are based on either acquisition cost or cost of construction; the gross rent data are for the year closest to either acquisition or completion. The gross rent multipliers used here are averages for the years 1920-1929 and have been centered on 1925. The gross rent multiplier for Chicago apartment houses at this time was also apparently between 6 and 7 (see *Annals of Real Estate Practice*, National Association of Real Estate Boards, 1926, Vol. 5, pp. 69-70).

1936: Single-family, Middle Atlantic, from C. Lowell Harriss, *History and Policies of the Home Owners' Loan Corporation*, National Bureau of Economic Research, 1951, Chap. 3. Harriss states that the most frequently used gross rent multiplier in HOLC appraisals of single-family homes was 100 times the monthly rent. It should be pointed out that HOLC appraisals tended to be above the "abnormally depressed" market. However, since the rental value used in the appraisal also tended to be above the current market, the net effect upon the gross rent multiplier is perhaps only a slight overstatement.

1937: Apartment house, nationwide, from the *FHA Annual Report* for 1937, pp. 75-76. The gross rent multiplier is for new rental property; it tends to be higher than that for apartment properties of average age.

1937-1938: Single-family, New York City, from George Gratz, Jr., in *Review of the*

Notes to Table I-2 (continued)

Society of Residential Appraisers, September 1941. From a study of actual sales prices and rents for 500 single-family homes sold in Kings, Queens, and Nassau Counties. Since frequencies for each rental class were not given, an unweighted average of the 4 most typical classes was computed.

1937-1940: Tenement and other, Elizabeth, N.J., from Pierson Ostrow, "Sales Prices and Income Data," *Review of the Society of Residential Appraisers,* December 1943. The data are derived from actual sales prices and actual rents for a sample of 47 to 69 two-family properties and 35 to 60 four-family properties. The four-family multiplier has been placed in the tenement column, since the sample structures were apparently of low quality.

1939: Single-family, Philadelphia, from Karl Scholz, "The Relationship of Gross Rents to Sales Price," *Review of the Society of Residential Appraisers,* June 1943. Professor Scholz's study contains actual sales prices and rents for a sample of 1,179 single-family homes sold in 1939. The detailed study is available in typescript at the Lippincott Library, University of Pennsylvania. The gross rent multiplier is an arithmetic mean.

1940: Apartment house, from the *FHA Annual Report* for 1940, p. 89.

1940-1941: Single-family, Detroit, from a study conducted by the Detroit Chapter of the Society of Residential Appraisers (*Review of the Society of Residential Appraisers,* September 1941, pp. 2-5). The gross rent multiplier is the average of frame and brick single-family homes given separately in the study. Since the frequencies for each rented class were omitted, the more typical multipliers were considered to be in the $30 to 40 rent class for frame homes and the $40 to 50 class for brick homes. The data are derived from actual sales prices and rents.

1941: Single-family, Seattle, from J. Harold Sparkman, in *Review of the Society of Residential Appraisers,* December 1941. The multiplier given here is for the median of the 5 quality classes presented separately in the study.

Apartment house, Minneapolis, from Fred L. Chapman, "Capitalization Rate for Apartment Properties," *Appraisal Journal,* October 1942, pp. 363-365. The data are from actual sales prices and rents of a sample of 26 apartment houses. The multipliers were also classified by age of structure and show an inverse relation to age. Properties 15 years old or less had an average multiplier of 4.78; those 16 to 24 years old averaged 4.17; and those 25 to 36 years old averaged 3.74.

Tenement and other, Elizabeth, N.J. (see note for 1937-1940).

1941-1942: Apartment house, New York City, sample of 41 six-story elevator apartment buildings in Brooklyn and Queens. The financial data have been provided by Ross Hill of the Union Dime Savings Bank. Assessed values have been adjusted to market values by the correction factor supplied for this type of property by the Research Division of the New York City Tax Department.

1942: Tenement and other, Elizabeth, N.J. (see note for 1937-1940).

1943: Tenement and apartment house, New York City, from Temporary State Housing Rent Commission, *Survey of Rents,* pp. 227-232. Assessed values were derived from tax payments divided by the Manhattan tax rate for 1942-1943. Assessed values were then adjusted to market by the 1943 ratio of sales price to assessed values for Manhattan real estate, supplied by the Real Estate Board of New York City. While the use of rent data derived during a year in which rent control was in force is not completely satisfactory, it should be noted that in 1943 there remained a considerable number of vacancies in Manhattan. Actual gross income in 1943 was still about 6 per cent below the scheduled income, whereas in 1949 earned gross was virtually 100 per cent of scheduled income.

1948: Single-family and apartment house, from the *FHA Annual Report* for 1948, pp. 50 and 76. The apartment house multiplier is for new property; the single-family multiplier is for the average of new and existing properties.

1949: Tenement and apartment house, New York City (see note for 1943, where a similar technique was followed).

both higher ratios of net to gross income and lower capitalization rates. On the other hand, a tenement may have a higher net-to-gross ratio than an apartment house but yet be characterized by a lower gross rent multiplier because it is a riskier investment. In this case, the second factor would more than offset the first.

Changes in the Ratio of Net to Gross Income

The long-run decline in the gross rent multiplier appears to be associated with a long-run decline in the ratio of net to gross income,[8] although the thinness of the data and the fact that age of structures or location cannot be kept constant decreases the reliability of the findings. There are almost no published records of operating ratios for residential real estate that extend over both long periods of time and wide geographical areas. However, a study of real estate operating experience made by the Institute of Urban Land Use and Housing Studies, of Columbia University, plus other scattered data presented in Table I-3 yield an impression of a downward trend in the ratio of net to gross income. This impression is further strengthened by a number of deductive considerations. In 1900 the ratio of net to gross incomes for tenements located in New York City was about 60 per cent;[9] in the twenties, 52 per cent; and in 1943, 37 per cent. The ratio for apartment houses in Manhattan declined from slightly more than 52 per cent in 1912, to 48 per cent in the twenties, to 34 per cent in 1943. In Rochester the ratio for multi-family structures fell from about 61 to 38 per cent between 1912 and 1942. It is unfortunate that data on single-family houses, the most important type of structure outside of New York City, are lacking. The operating experience of single-family homes, understandably, does not appear on the records as frequently as that of multi-family structures.[10]

Further substantiation of a declining ratio of net to gross income is found in the operating experience records of an identical group of resi-

[8] Net income has been defined as income after allowance for operating expenses but before deduction for depreciation or debt service. Gross income refers in most instances to the actual rent receipts at the time the property's valuation is established either by sale or by appraisal. In a number of instances the gross income data are given in the sources as scheduled gross income, that is, the prospective income for the immediate future.

[9] Leo Grebler, *Real Estate Investment Experience*, Columbia University Press, 1955. This study analyzes the operating experience of New York City income property of all types (including nonresidential) for the period between 1900 and 1950. In 1892 the litigants in a dispute involving the valuation of tenements agreed on only one essential, namely, that a net-to-gross ratio of 75 per cent was reasonable (*Real Estate Record and Guide*, 1892 [1st half], p. 318).

[10] The net-to-gross ratios for single-family houses in New York City show a decline from 37 per cent in 1915-1919 to 24 per cent in 1945-1949. Grebler, *op. cit.*

TABLE I-3

Ratio of Net to Gross Income by Type of Structure
at Various Bench-Mark Dates, 1900-1943
(per cent)

	Single-Family	Tenement.	Apartment House
1900	..	59.0 66.5	..
1912	68.8	63.9 61.4	51.4 56.6
1916	67.4		
1928	..	51.7	47.7
1942	..	37.5	..
1943	..	37.4	34.1

Source

1900: Tenement, first figure, from DeForrest and Veiller, *The Tenement House Problem*, Macmillan, 1903, pp. 360-361. This is an estimate based on current operating experience allowing for 6 per cent vacancies, then prevailing in tenements. Second figure from estimate of George J. Kenney, a real estate agent experienced in the management of tenements (cited in *ibid.*, pp. 379-383).

1912: Single-family, from Cecil C. Evers, *The Commercial Problem in Building*, Record and Guide Co., 1914, pp. 263-264. These are estimates. The single-family ratio is for a middle class brick home.

Tenement, first figure, from Reginald P. Bolton, *Building for Profit*, De Vinne, 1922, p. 41. Second figure from F. A. Austin, "The Investment Value of Rochester Real Estate," *Real Estate Magazine*, September 1913.

Apartment house, first figure, from Evers, *loc. cit.* Second figure from Bolton, *loc. cit.*

1916: Single-family, from *U.S. Housing Corporation Report*, Dept. of Commerce, 1920, Vol. I, p. 47. The data are from a survey of real estate operators, based on their experience for the years 1913 and 1948, and have been centered on 1916. Operating expenses include taxes and assessments, maintenance, and insurance and are the median values given in the survey.

1928: Tenement, from *A Survey of Apartment Dwelling Operating Experience in Large American Cities*, Federal Housing Administration, 1940, pp. 12-13. The data refer to New York City multi-family structures. The walk-ups are here considered to be tenements. The operating experience for the years 1926-1930 has been averaged and centered on 1928.

Apartment house, from *ibid.*, pp. 12-13.

1942: Tenement, from *Survey of Rents*, Temporary [New York] State Housing Rent Commission. The tax rate for Rochester is that for Monroe County.

1943: Tenement, from *ibid.*

Apartment house, from *ibid.*

dential properties, which cover the period 1899-1938.[11] The decade averages of net to gross income derived from these data show the following movement: 1899-1908, 50.1 per cent; 1909-1918, 45.6 per cent; 1919-1928, 45.6 per cent; 1929-1938, 39.2 per cent. The downward trend was evidently accentuated by a relatively sharp decline during the thirties. The increasing age of these properties, however, may limit the usefulness of the findings.

[11] *Four Decades of Housing with a Limited Dividend Corporation*, Federal Housing Administration, 1939, p. 102.

Grebler's work, which provides the longest consistent series, confirms the decline in the net-to-gross ratios of residential real estate (Table I-4). From a level of 51 per cent in 1900-1904 the ratio dropped to 30 per cent in 1945-1949. Likewise, the ratio for elevator apartments declined from 48 per cent in 1920-1924 to 31 per cent in 1945-1949, and that for walk-up apartments, from 59 to 28 per cent. Grebler's data, however, do not indicate that the net-to-gross ratio for lower quality apartments (walk-up) is invariably higher than the ratio for elevator apartments.

TABLE I-4

Ratio of Net Income and Taxes to Gross Income,
Residential Real Estate, New York City,
by Five-Year Periods, 1900-1949
(per cent)

	ALL RESIDENTIAL		ELEVATOR APARTMENTS		WALK-UP APARTMENTS	
	Net to Gross	Taxes to Gross	Net to Gross	Taxes to Gross	Net to Gross	Taxes to Gross
1900-1904	51	10				
1905-1909	50	12				
1910-1914	48	13				
1915-1919	52	12				
1920-1924	54	13	48	16	59	11
1925-1929	55	15	55	16	55	13
1930-1934	39	22	43	22	36	21
1935-1939	34	22	32	25	37	19
1940-1944	30	21	27	24	33	18
1945-1949	30	18	31	19	28	17

Source: Leo Grebler, *Real Estate Investment Experience*, Columbia University Press, 1955, Appendix VI.

Effects of New Services and Facilities on the Ratio of Net to Gross Income

The ratio of net to gross income is likely to be modified by the absence or inclusion of various services in the rent bill. Other things equal, the higher the value of the services provided, the lower will be the ratio of net to gross income (and therefore the lower the gross rent multiplier).

As illustrated in Table I-3, the net-to-gross ratio for single-family houses is ordinarily higher than that for multi-family structures. This is partially due to differences in the services provided.[12] The occupant

[12] The cost of services and facilities included in the rent paid by tenant occupants as a percentage of gross rent varies with type of structure. These services account for about 9 per cent of the gross rent of single-family houses, 11 per cent of the gross rent of two-family houses, and nearly 25 per cent of the gross rent of multi-

of a single-family house ordinarily provides his own fuel, his own janitorial services, and often even repairs and maintenance. In the case of multi-family structures, the buildings with higher rentals have more services, payment for which is included in the rent,[13] and also tend to have lower ratios of net to gross income.[14]

There has been a long-run tendency for the number and value of facilities included in rent to increase, which, judging from the cross-sectional data, is capable of explaining the fall in the ratio of net to gross income. First, there appears to have been an upward trend in the proportion of gross rents going toward the payment of local real estate taxes, at least in many urban localities. In Manhattan, taxes accounted for about 12 per cent of rents of tenements at the turn of the century, 12 to 14 per cent in 1912, 14.5 per cent in 1926-30, and about 19 per cent in 1943. In Grebler's sample the share of gross income going to taxes increased from 10 to 18 per cent from 1900-1904 to 1945-1949 (Table I-4 above). In Rochester, taxes increased from about 12 to 14 per cent of gross rent in 1912 to about 19.5 per cent in 1942. A similar trend was found in the San Francisco area for the period 1925-1950.[15] Property taxes can be viewed as the payment for local facilities which an occupant purchases as a joint service with housing. In view of the pervasive tendency for municipal services to expand, the increased share of real property taxes observed in the case of multi-family structures has probably been a general phenomenon affecting also the single-family house.

Similarly, there has been an increase in the frequency with which water, electricity, refrigeration, and furniture are provided to the tenant and paid for by him as part of gross rent (Table I-5). Although the data cover only the period since 1929,[16] it can be inferred, considering

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family structures. David L. Wickens, *Residential Real Estate*, National Bureau of Economic Research, 1941, p. 141.

[13] Wickens, *op. cit.*, p. 140.

[14] *Survey of Rents*, Temporary [New York] State Housing Rent Commission, 1950, pp. 226-232. The ratio of net to gross income ranged from 34 to 41 per cent for dwelling units renting for $40 or less and from 26 to 34 per cent for dwelling units renting for $60 or over.

[15] Wendt, *op. cit.*, p. 48-49.

[16] An additional measure of the increasing inclusion of facilities in the rent bill is found in a comparison of the series on aggregate nonfarm space rent and contract rent of the Department of Commerce. The lower the ratio of the former to the latter, the greater is the importance of housing services other than mere shelter. This ratio, 92 per cent in 1929 for tenant-occupied dwelling units, declined to 85 per cent in 1940 and 73 per cent in 1950. Space rent is published in *National Income* (Dept. of Commerce, 1951). The contract rent series, kindly made available by the Department, is not currently published.

TABLE I-5

Proportion of Tenant-Occupied Dwelling Units in Ten Cities with
Selected Facilities Included in Rent, Bench-Mark Dates, 1929-1950

(per cent)

	Atlanta	Birmingham	Cleveland	Minneapolis^a	Portland, Me.	Richmond	Seattle	Indianapolis	Portland, Ore.	Jacksonville
Water										
1929	57.1	29.2	78.0	77.8	79.0	13.0	58.4	43.5		
1933	61.0	30.1	82.6	81.3	85.0	19.3	70.0	51.4	30.7	76.3
1950	80.9	53.9	96.5	87.5	95.3	38.1	87.3	71.4	83.2	76.0
Refrigeration										
1929	4.6	3.4	4.3	10.1	2.0	5.1	13.5	8.3		
1933	7.4	7.0	7.2	16.2	5.7	10.6	21.4	13.9	7.0	57.1
1950	32.6	17.2	23.2	36.3	24.3	29.4	53.3	27.0	1.5	20.8
Electricity										
1929	4.1	3.1	4.6	9.4	4.0	2.4	12.8	12.4		
1933	5.2	2.3	5.4	11.1	6.2	3.1	17.4	16.7	11.7	2.1
1950	18.9	12.2	16.4	28.1	21.8	12.8	34.7	37.3	28.1	11.1
Furniture										
1929	2.3	2.2	3.2	12.7	3.8	1.2	22.9	3.9		
1933	2.6	3.0	3.7	15.4	7.4	2.2	.30.6	4.7	24.1	4.8
1940	7.1	5.4	11.9	26.7	5.3	4.8	48.7	9.6	43.9	17.6
1950	12.4	8.2	13.5	31.8	18.4	14.4	45.1	22.2	55.8	38.5
Garage										
1929	15.3	17.2	32.9	26.1	8.9	4.7	26.3	35.1		
1933	20.2	23.4	39.1	31.7	11.7	8.2	33.2	40.6	36.7	15.6
1950	17.9	10.2	32.0	22.4	14.3	6.5	17.8	26.4	15.7	22.5

a Including St. Paul in 1950.

the introduction and growing use of many of these facilities, that the upward trend characterized the entire period beginning in 1890.[17]

The addition of services and facilities paid for in or imputed to gross rent has produced a significant change in the character of the output of residential real estate, one similar to the changes taking place in other sectors of the economy. The stock of residential real estate is no longer merely a producer of the service of shelter; it also produces many additional consumer utilities, which add to the value both of its output and of the resources embodied in its capital. This is analogous to the transformation of the automobile in which the production of the basic utility of transportation has been augmented by ancillary consumer utilities in the form of upholstery, heaters, low pressure tires, radios, etc., most or all of which are purchased as part of a joint product.

Not all of the additional services and facilities reflected in gross rent lead to changes in the amount of capital used. Some services (janitorial or municipal) add to rent but not to residential capital; others, such as furniture and refrigerators, while adding to rent, increase capital only so far as the balance sheet of the landlord is concerned. Such movable equipment is excluded both from the capital costs of a new structure and from additions and alterations in construction expenditure series (Chapter III). The latter, however, capture the cost of such facilities as electric wiring, plumbing, and central heating, the services of which are paid for in gross rent. The addition of equipment of this kind tends to depress the gross rent multiplier in the same way that additional services do, i.e. by lowering the ratio of net to gross income. For equipment has a shorter life than the shell of the house, causing a disproportionate increase in the depreciation charge,[18] and is subject to more maintenance and repair, causing a disproportionate increase in this expense account. Stated another way, the addition of services alone

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[17] According to Dewhurst, the ratio of consumer expenditures on fuel, lighting, electricity, gas, and water to total consumer expenditures on space rent increased from 25 to 38 per cent between 1909 and 1941. J. Frederick Dewhurst, *et al.*, *America's Needs and Resources*, Twentieth Century Fund, 1947, Table 55, p. 149.

[18] As an example, assume that at the beginning of the period a $10,000 house providing virtually pure shelter had a gross rental of $1,000, the gross rent multiplier being 10. Given a 50-year life (linear), annual depreciation is $200 a year. Assuming the only operating cost is $200 for maintenance and repair, net income becomes $600, and the net-to-gross ratio, 60 per cent. Now suppose that electric wiring costing $1,000 is to be added, and that it has an expected life of only 20 years. If the landlord wishes, or is forced, to keep his net return at 6 per cent of total investment, gross rent will rise to $1,130. This rent now covers an extra $50 in depreciation, an extra $20 in maintenance and repair (assuming that this account increases proportionately, a conservative assumption), and an additional $60 as return on the $1,000 investment. As a result, the ratio of net to gross income falls from 60 to 58 per cent, and the gross rent multiplier, from 10 to 9.7.

produces a decline in the gross rent multiplier since rent is increased but capital remains constant. The addition of many kinds of equipment causes a decline in the gross rent multiplier by increasing rent proportionately more than capital, since the former is subject to the burden of the higher depreciation and maintenance expense associated with the newer types of equipment.

Changes in the Capitalization Rate of Residential Real Estate

Any variation in the rate at which net income is capitalized will also, it was stated, cause the gross rent multiplier to vary. The relatively low rate of capitalization associated with single-family houses explains, to an important extent, the relatively high gross rent multiplier applied to this type of structure.[19] Such a low rate stems from two considerations. First, market values of single-family houses are determined in large part by purchasers who buy without serious reference to the investment yield possibilities, i.e. they purchase consumer capital rather than a business investment. Second, even if considered from an investment point of view the single-family house represents a safer employment of capital than does the multi-family structure.[20]

The existence of any secular movement in the capitalization rate applied to residential real estate cannot be determined without an adequate method of measurement. While the historical record can be mined for data on prices and current net income, thereby permitting the measurement of current and realized yields in real estate,[21] such data cannot supply any information on the attributes of the stream of

[19] Appraisers frequently make the statement that single-family houses "do not capitalize." That is, if valuation were to be determined by applying a going capitalization rate for real estate to expected net income, the resulting value would be far less than the actual market value, implicitly suggesting a lower-than-average rate. The FHA, in recognition of this fact, adopted an interesting device in appraising single-family houses. At first it suggested (*Underwriting Manual*, Federal Housing Administration, 1938 ed., par. 1420) the addition of an "amenity rent" to estimated rental value, on the principle that the owner occupant tends to derive more utility from the house than a tenant occupant. In a later edition (*Underwriting Manual*, 1947, par. 1215) the "amenity rental" was abandoned in favor of a direct increase in the gross rent multiplier to allow for "owner-occupancy appeal."

[20] The Society of Residential Appraisers, in a nationwide questionnaire survey of real estate appraisers concerning the relative risk, measured by stability of values, of different types of residential structures, obtained the following results: single-family houses, with the exception of the highest price class, were ranked first; two-to four-family houses were placed second; and large multi-family structures last. *Review of the Society of Residential Appraisers*, March 1938. Recent studies of mortgage lending experience also indicate a relatively lower level of risk associated with the single-family house. See, for example, Raymond J. Saulnier, *Urban Mortgage Lending by Life Insurance Companies*, National Bureau of Economic Research, 1950, p. 83.

[21] Grebler, *op. cit.*

expected income. In the case of an asset such as residential real estate, where annual net income is not fixed and expectations of capital gain or loss govern investment decisions, the level of current yields may offer a poor approximation of the level of capitalization rates.

It appears from general observation that there has been some tendency for capitalization rates for real estate to rise. While few would deny that such an increase occurred as a result of the collapse of real estate values after 1929, it is much more difficult to establish the existence of an upward trend in earlier decades. According to the data presented in Tables I-2 and I-3, the relative decline in the gross rent multiplier for apartment houses between the turn of the century and the twenties was greater than the relative decline in the ratio of net to gross income for the same type of property, permitting at least an inference of some upward revision in capitalization rates. But on the whole, such inference must rely more upon impression than upon data.

For much of the period, possibly extending into the twenties, real estate seems to have occupied a relatively high position in the investor's scale of preferences. There was widespread confidence in the investment performance of real estate and in future value increments. Even the more cautious, who counseled against overoptimism in urban land speculation, pointing out that the costs of holding real estate in anticipation of a rise in value reduced the actual return, apparently did not doubt that a capital gain would accrue. Nor were such views necessarily irrational; urban real estate values were on a consistently rising trend between the nineties and the twenties. As Grebler has stated, "The first three decades of [the twentieth] century emerge as a kind of 'golden age' for . . . real estate investments . . . at least so far as the movement of income is concerned. There was an almost uninterrupted increase in gross income from the early years of the century to 1929-1930. The index of gross income [rose] almost four times . . . [and] the rise in net income was even more spectacular."[22]

The decline in real estate values since the late twenties may have brought an end to this era. While the disfavor with which real estate investment was viewed in the thirties is understandable, the real estate boom of recent years lacks such important attributes of earlier booms as (1) the mass appeal of real estate speculation (formerly even people of average means frequently held small plots of land for speculation or small multi-family structures for investment); (2) the unamortized mortgage, which reflects a high degree of confidence in steadily rising values; (3) heavy mortgage lending on vacant land. Furthermore, a decade of rent control has undoubtedly adversely

[22] *Ibid.*, Chap. IV.

affected investor attitudes toward residential real estate to a greater
extent than investor attitudes toward other types of real estate.

Trends in Residential Rent

Aside, then, from possible changes in capitalization rates, the objec-
tive force acting to depress the gross rent multiplier and, by implica-
tion, the capital-output ratio, has been the increase of services and
facilities associated with household operation and paid for in (or
imputed to) current rent expenditures. The effect of these services and
facilities can be observed in the much greater rise in nonfarm rent
compared with the growth in nonfarm population and residential
capital. While the per capita value of residential capital remained
roughly constant (Table 36), the per capita rent charge increased
from $52 in the 1899-1908 decade to $133 in the 1939-1948 decade
(constant prices).

TABLE I-6

Average Annual Per Capita Rent,
Selected Periods, 1889-1948
(*dollars*)

	Current Dollars	1929 Dollars
1889-1898	28.9	52.1
1899-1908	41.2	70.2
1909-1919	54.9	81.4
1921-1929	94.4[a]	91.8[a]
1921-1929	105.2[b]	101.6[b]
1929-1938	90.0	114.3
1939-1948	103.7	132.6

[a] Based on Lough's estimates.
[b] Based on Barger's estimates.
Source: Rent data from Table I-1; nonfarm population data (average of popula-
tion at the beginning and end of nearest census dates) from Table 24.

Rent expenditures not only have risen faster than population but,
unlike expenditures for new residential construction, have broadly
kept pace with the rise in nonfarm income (Table I-7). Aside from
the period in which rents were kept low by rent control, no decline in
the rent-income ratio in current prices is discernible. When the rent-
income ratio is measured from constant-price series, a rise in the ratio
is apparent. While rising income apparently failed to call forth a
proportionate increase in capital expenditure for shelter, it may have
produced an approximately proportionate increase in total housing
services as measured in rents.

TABLE I-7

Ratio of Total Nonfarm Rent to Total Nonfarm Disposable Income,
Selected Periods, 1899-1948

(*dollars in millions*)

| | CURRENT DOLLARS | | 1929 DOLLARS | | RENT-INCOME RATIO | |
| | | | | | Current Dollars | 1929 Dollars |
	Rent (1)	Income (2)	Rent (3)	Income (4)	(5)	(6)
1899-1908	$ 2,160	$ 15,956	$ 3,680	$ 30,199	13.5%	12.2%
1909-1919	3,661	32,495	5,451	43,476	11.3	12.5
1921-1929	{ 7,873[a] { 8,768[b]	63,994	{ 7,655[a] { 8,471[b]	62,980	{ 12.3 { 13.7	{ 12.2 { 13.5
1929-1938	8,731	57,343	11,096	67,395	15.2	16.5
1939-1948	11,823	115,101	15,157	101,400	10.3	14.9

[a] Lough's estimate.
[b] Barger's estimate.

Column	Source
1, 3	Table I-1.
2, 4	Raymond W. Goldsmith *et al.*, A *Study of Saving in the United States*, Princeton University Press, 1955, Vol. III, Table N-3.

Existing Nonfarm Rent Estimates

The reluctance to gauge trends in the capital-output ratio solely from aggregate data is engendered largely by weakness in the data, particularly in the rent series. Except for the two decades 1898-1908, historical rent estimates have been based in part or wholly on the relationship between house value and rent; a capital-output ratio derived from such data is affected by the size of the assumed gross rent multiplier. Thus Lough, whose rent data for the period 1909-1929 are adopted, obtained his estimates by applying a gross rent multiplier (more properly, its reciprocal) to an estimated average value for owner-occupied and tenant-occupied dwelling units. These multipliers were not selected with reference to market observations and appear altogether implausible. In the first place, the same multiplier was assumed for both the owner-occupied and tenant-occupied portions of the inventory; since the multiplier varies greatly with type of structure and, in turn, the weight of each type of structure varies greatly in each of the tenure classes, it is difficult to accept such an assumption. Second, the multipliers illustrated by Lough for the years 1914-1923, and 1929 are 8.0, 6.7, and 8.0 respectively—lower than the multipliers which would be obtained from the data shown in Table I-2 weighted by type of structure. Third, the absence of any net change in Lough's multipliers between 1914 and 1929 raises serious questions. Although Lough's gross rent multipliers appear to be low, his residential wealth estimates are also substantially lower than the estimates given in this

study or developed by other investigators. Consequently, his rent estimates may be well within acceptable margins of error.

Barger's rent estimates for the period 1921-1929 are based on Simon Kuznets' work in *National Income and Its Composition, 1919-1938,* and it is in the latter source that explanation of the series is found. Essentially these estimates are tied to the 1930 Census of Population, which reported the distribution of the value of owner-occupied[23] and the contract rent of tenant-occupied dwelling units. Total rent paid is obtained as the product of the number of tenant-occupied units and average rent, the latter estimated from the median rent. Imputed rent for owner-occupied dwelling units is based on the product of (1) an average rent estimated by use of a gross rent multiplier applied to the average value of an owner-occupied dwelling unit and (2) the number of owner-occupied dwelling units. The gross rent multiplier is from Wickens' *Financial Survey of Urban Housing.* There is some evidence that Wickens' gross rent multipliers are understated because of an overstatement in owners' estimates of value, which probably accounts for the lower level in 1929 of imputed rents in Kuznets' rent data relative to those presented by Lough and the Department of Commerce.

Kuznets' annual estimates for the years preceding 1929 are based on interpolation or extrapolation.[24] The size of inventory in each year and the tenure ratios are derived by linear interpolation between 1920 and 1930 of census data. Average paid and average imputed rents are extrapolated by means of rent indexes (Bureau of Labor Statistics and National Industrial Conference Board). It is clear that linear interpolation of the inventory or tenure ratios in the 1920-1930 decade, which was characterized by both a sharp expansion and a pronounced contraction of new construction, is not likely to produce a highly accurate annual series although total rent for the decade is less affected by the assumption of linearity. The decade total is probably more seriously affected by the assumption that average rent can be approximated from the movement of a rent index during a period in which the composition of the housing inventory was subject to significant change. Judging from data covering the past two decades, the fact that average rent of new dwelling units is higher than that of existing units[25] is likely to give an upward bias to such an estimate. Thus, if average contract rent

[23] There is strong internal evidence in the 1930 census reports that, at least in many cases, structure values rather than dwelling unit values were obtained, thus tending toward an overstatement of average value. Cf. Appendix D above.

[24] The estimation is done separately for individual cities over 100,000 in population and for cities under 100,000 as a group.

[25] A similar discussion is found in Sherman J. Maisel's "Have We Underestimated Increase in Rents and Shelter Expenditures?" (*Journal of Political Economy,* April 1949).

reported in the 1950 Census of Housing ($39) were extrapolated back to 1940 by means of the BLS rent index, average rent would be estimated at $31 compared with the actual average reported of $24, an overstatement of nearly 30 per cent. The overstatement in the 1940-1950 decade is undoubtedly exaggerated because of rent control, but the same test performed for the 1930-1940 decade, a period of relatively little new construction, would have resulted in an overstatement of about 7 per cent. It is likely that the overstatement in average rent in the twenties lies between these magnitudes and may have reached 20 per cent by 1920.

The Department of Commerce, in preparing its rent estimates for the period since 1929, also makes use of a gross rent multiplier in estimating imputed rent of owner-occupied dwelling units. This multiplier is derived from the 1940 Census of Housing, in which an independent estimate of the rental value of owner-occupied units was obtained by reference to comparable rented dwelling units. It appears that in some instances the Census Bureau enumerators made use of a rule-of-thumb multiplier in lieu of an independent measure.[26] The BLS rent index is also used by the Department of Commerce in deriving its annual series of average rent for both tenant- and owner-occupied dwelling units.

[26] Cf. *Survey of Current Business, National Income Supplement*, Dept. of Commerce, 1951, p. 83.