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Appendix H

URBAN RESIDENTIAL BUILDING INDEX, GERMANY: Series 0018 (1890-1900 = 100) 1867-1913

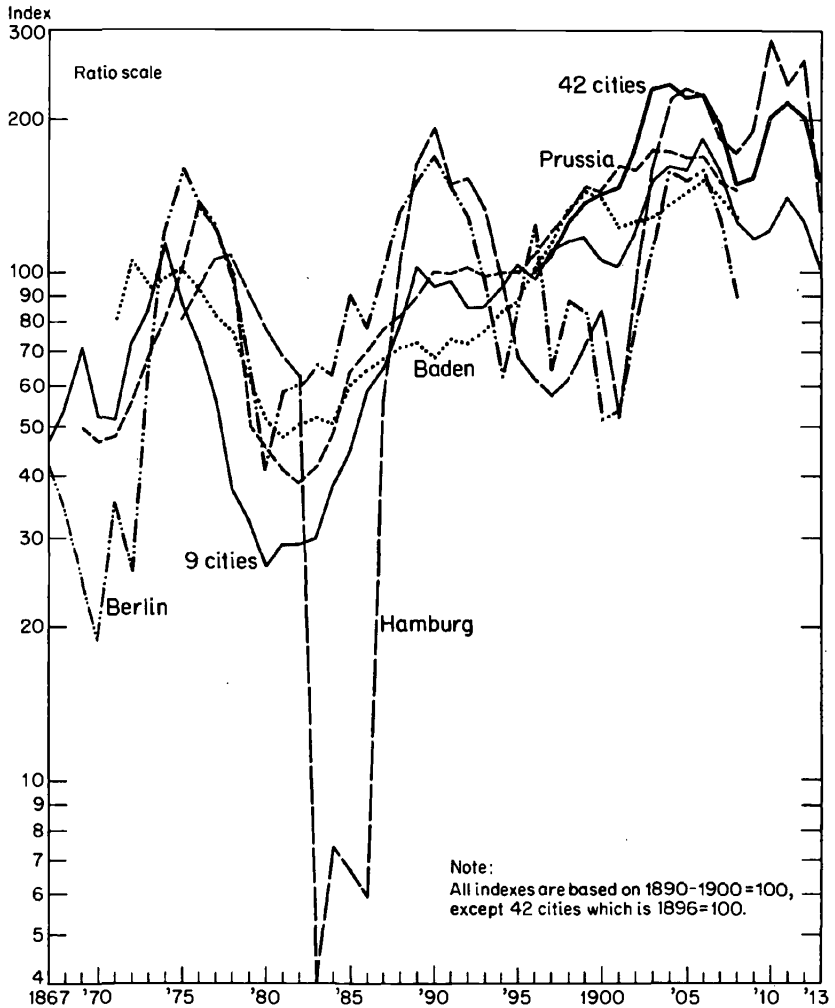
The materials out of which this series was constructed consisted of a number of measures of varying origin concerning urban residential building in Germany between 1867 and 1914. The various measures are listed below, with source identification, and are graphically reproduced in Chart H-1.

<u>Measure</u>	<u>Our Series Number</u>	<u>Years</u>	<u>Source</u>
1. Net Annual Change Supply of Residential Dwellings:			
a. Berlin	0022	1841-1909	See Appendix B, p. 254.
b. Hamburg	0300	1875-1913	See Appendix B, p. 269.
2. Number of Main Buildings Constructed, Baden		1871-1908	NBER Series File 2,81b.
3. Number of Residential Buildings Constructed, Nine Cities ^a		1867-1913	Derived from [239, p. 23].
4. Dwellings Erected, Forty-two German Cities (Medium and Large)		1896-1913	[136, p. 59].
5. Net Adjusted Annual Growth, Number Residential Buildings, Prussia, All Urban Communities (3-Yr. Moving Average)		1869-1908	[87, p. 36].

^a From 1867 to 1873 based on only four cities (Bremen, Köln, Breslau, Duisberg); Kiel and Aachen added in 1874; Gladbach, Dortmund, Freiburg added in 1880; Köln was dropped out in 1880 and restored in 1896. The series was crudely adjusted to uniform coverage by use of weights obtained from average population standings as of 1910 and estimates for earlier benchmark years. Returns for 1867-73 and 1874-95 were raised by 1.6 and 1.4 per cent, respectively, to adjust to a nine-city basis. The nine cities had in 1910 a total population of 2,210 thousand persons, while Berlin with suburbs had 3,730 thousand persons.

The basic data for measure number 5 above, presented by Feig and Mewes as a "limited if defective" (gewisser, wenn auch

CHART H-1
Measures of Urban Residential Building, German Cities
and Regions, 1867-1913



mangelhafter) substitution for building statistics, was provided by the Prussian tax administration, which made available to the authors an annual listing from 1870 to 1910 of the number of taxable residential buildings in Prussia ("Anzahl der . . . steuerpflichtigen Wohngebäude . . . Preussen"). The authors adjusted the increments (or first differences) to allow for variation in reporting lags and fiscal year; and as adjusted the increments correspond to completions within the calendar year [87, pp. 31-33]. From 1870 to 1879 only total building reports

were available; for 1880 and later separate totals were provided for residential buildings located in cities ("Städte") and the rural communities ("Auf dem Lande").

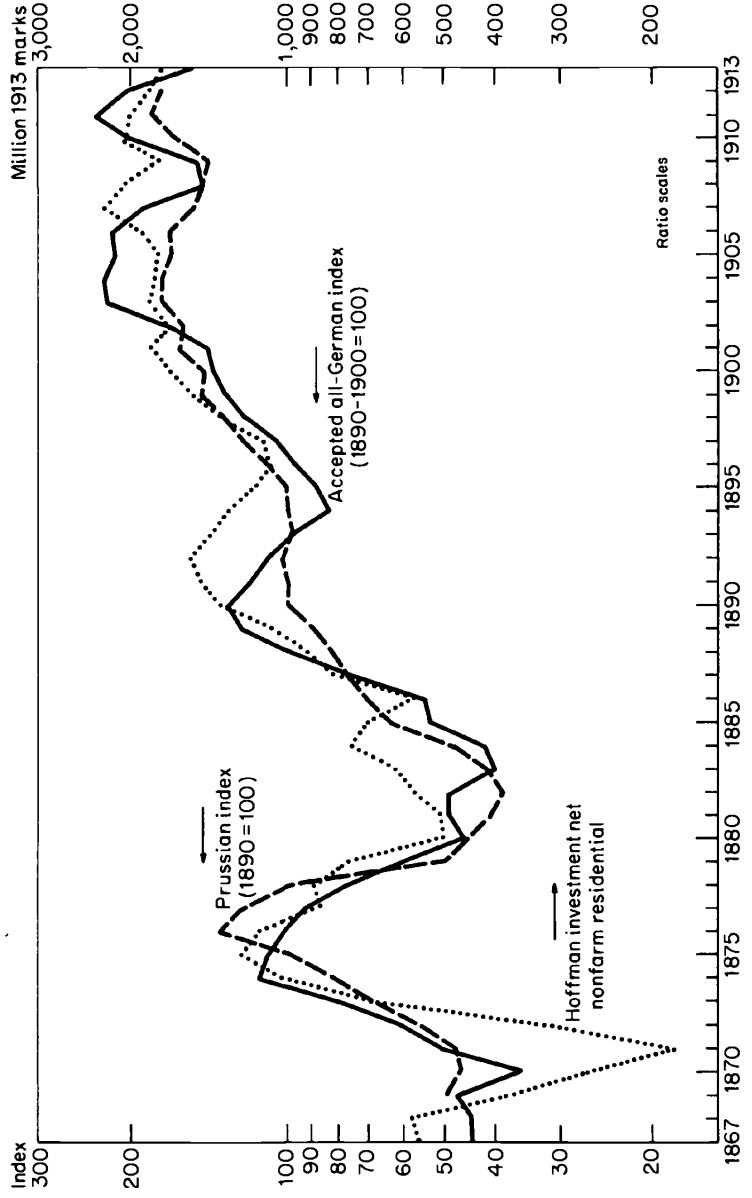
In order to derive from these data a usable index of urban residential building, three sets of adjustments were made. First, the urban series was extended to 1868 on the basis of index behavior (1878 = 100) of total buildings. This seemed acceptable, since urban building accounted for all the net growth in later years and for most of the yearly variation. Secondly, some smoothing seemed indicated to offset yearly variations which creep into a flow series that would be affected by fiscal year variations, by variations in classifying buildings or by conversion of rural villages to city status. Hence, we applied a 3-year moving average. Finally, adjustment seemed desirable to offset the downward bias of a count of residential structures rather than of dwelling units. True, total structures over the period 1868–1908 increased by some 276 per cent, while Prussian urban population between 1870–1910 rose at nearly the same rate, 263 per cent [291, pp. 139–40]. However we know that during the period there was an increase in building density (number of dwellings per building), which in Berlin rose from 11.2 in 1867 to 19.77 in 1905 [219, p. 130]. Between 1897 and 1904 the average number of dwellings contained in apartment structures in 42 German cities rose from four to seven and maintained the latter level through to 1913 [136, pp. 60–62]. Moreover, there probably was some decrease in the number of persons per dwelling, which in Prussia in 1851 was 8.13 persons per dwelling, one of the highest for the period in Europe [70, p. 100]. In view of these facts it seems likely that our series has a sizable understatement of the secular drift; and to put the series on par with our other series of dwellings, adjustment seems indicated. For this purpose we computed an annual steady rate per cent factor (1.005756)" which yielded a 25 per cent growth over a 40-year period.

The pleasing degree of similarity of pattern between these six divergent measures of residential building gave assurance that a satisfactory index measure could be derived by various weighting schemes from our assembled measures. Between 1896 and 1913 the superiority of the 42-city index over all competing measures seemed clear. Before 1896 we experimented with a number of weighting schemes which included the all-Prussian

index. It was finally decided to drop this index, since it overlapped to a high degree with our other measures. Between 1875 and 1896 the index measures for Hamburg, Baden, Berlin, and nine cities were averaged with weights of 2, 2, 3, 3 respectively. Since half of the index (Hamburg and Berlin) are on a *net* change basis, amplitude tends to be exaggerated. However, inclusion of Baden which covers both rural and urban building tends to offset this. The weights were arbitrarily assigned to avoid giving Hamburg and Berlin more than 50 per cent of the influence on the total. We extended the series back to 1867 on the basis of partial city coverage (Berlin and nine cities for 1867–70 and Baden between 1871 and 1874). We could not readily have used the all-Prussian index because of its later peak (1877). In Chart H-2 we compare our all-German urban residential building index and the independent Prussian series. The fit is close, and we may, accordingly, feel that our contrived index faithfully represents the main contour lines and trend movements of German urban residential dwelling production.

Also shown on Chart H-2 is a graph of a new estimate for German residential construction which became available after preparation of the contrived index. The new estimate was prepared as one of a comprehensive set of national income and expenditure estimates for Germany from 1851 onward. See [130]. For Prussia the estimate was derived partly from Prussian tax returns without indication that numbers or values were utilized, and also without benefit of differentiation between urban and rural building available from our sources since 1880. As rural buildings were allegedly declining in relative importance, Hoffman believed that the tax return data was subject to an expansive bias. Hence he averaged them with another source with what was believed to have a contrary bias, namely, net annual differences in insured values for residential properties insured in Prussia through public carriers, though these carriers insured a falling fraction of eligible property relative to private nonreporting carriers [130, p. 220 f.]. For non-Prussian states Hoffman used available insured values of public carriers, who were given by law a legal monopoly of insurance operations. Insured values were believed to be based upon the original cost of construction or so-called *Anschaffungspreisen*. From time to time, however, these were reappraised (“Allerdings ist zu berücksichtigen, dass fast alle Anstalten von Zeit zu Zeit

CHART H-2
 Urban Residential Building Indexes, Annually, Germany 1867-1913 (1890-1900 = 100)



sämtliche Immobilien neu taxieren’). Hoffman believed that by careful review of carrier reports the distorting effects of reappraisals had been eliminated, though he recognizes that the elimination may not be complete (“. . . est es trotzdem möglich dass Neutaxierungen, die nicht zu ausgesprochenen Sprüngen in der Entwicklung der Versicherungswerte führen, übersehen werden”). From the year 1873 onward, the scope for revaluations would appear to be limited, as indicated by the congruence of the new estimate with direct measures of urban building activity for sampled urban populations. But it appears to us that revaluations were probably responsible for the rather wild movements of the Hoffman series between 1868 and 1871, since the fall by two-thirds in that period seems unlikely. Likewise the range of fluctuation from 1851 onward seems improbably wide. The annual estimates for the first seven years of the new series from 1851 onward are as follows in million marks: 200, 460, 360, 90, 110, 60, 120 [130, p. 257].