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CHAPTER 6

Price and Value in Long Local Cycles

A. INTRODUCTION

Our survey of long local cycles has so far recorded only the movement of a network of physical activities—erecting buildings, subdividing lots, buying realty, extending mortgage credit, foreclosing loans, migrating, marrying, and moving in and out of homes. These activities involve a decision influenced by the balance of returns over cost, which, at most points, will be systematically affected by the level of price or value—the price of used realty, the value of vacant urban land, the cost of new building, the rate of interest on mortgage loans, the level of money rents, and profits of realty undertakings.

This system of prices and values may play a purely neutral role in building cycles by adapting itself to the movement of physical activities and giving this movement a suitable pecuniary expression. Such would be the case if the response of supply to changes in effective demand was perfectly elastic at a constant level of value. We know this is not the case, nor are prices and values in the building and realty market constant over time. We likewise know, or suspect, that different segments in the price and value system will be unevenly affected by building cycles. The markets concerned—for building materials and labor, for mortgage finance, for urban land and used realty, for shelter — differ considerably in procedures for price setting and in degree of responsiveness to changes in demand and supply. The ultimate sources of new supply are mobilized at different time rates and respond in different rhythms to market signals.

Uneven change in relevant prices and values will alter the crucial margins which motivate action by builders, buyers, renters, developers, and mortgagors. This change in margins will itself play an important role in the course of events which forms long swings; the margins may restrain the impulse to fluctuation, or they may augment it.

The purpose of this chapter is to describe this role, to the extent made possible by the available information. First we spell out the principal equilibrium relationships between realty prices, rentals, and the cost of new building. The characteristic features of the urban land market and the role played in this market by speculation are reviewed in some detail. Realty values are grounded in part on urban land values, and at the margin, where new land development occurs, the amplitude of fluctuation in turnover is, as we have seen, extreme. Likewise, realty values are grounded in the cost of new building, which resolves into costs of building materials, building labor, and mortgage finance. Following this preliminary inquiry into equilibrium price relationships and market behavior, the sources and weaknesses of time series available for analysis are described. Our information about price and value is woefully incomplete; methods and bases of valuation are not fully consistent; and some of our samples are very skimpy in the light of variations manifested. The conclusions to be drawn must take into consideration these qualifications.

B. PRICE SYSTEM IN RENTAL AND REALTY MARKETS

The price levels in realty markets are closely related to each other. The monthly rental price will be geared to the sale price of used rental property by capitalization of expected net rental income. An increase of rental prices will thus induce a corresponding improvement in sale prices for the properties involved. For single dwellings the capitalization factor over long time periods has ranged from 100 to 120 times the going monthly rental.[1]

If rent rates correlate with purchase prices of used rental properties, these purchase prices—along with those of owner-occupied dwellings—must, over extended periods, be closely geared to the cost of constructing similar structures, including the builder's profit. Of course, where there are poor facilities for rapid urban transportation, new construction will be handicapped by a rising price premium for access. New properties may avoid stigmas attached to old neighborhoods and may embody novel styles. The greater the attraction of new housing and the more efficient the facilities for transportation, the greater the depreciation of used realty. Since people have varied preferences for new and old housing, the markets for each will usually exhibit continuous interlinkage. As used realty prices get higher relative to new construction, some owners or occupants of old housing will be tempted to shift to new.[2]

The intensity of building is likewise related to the value of land. "In places where the value of land is high, each square foot is made to yield perhaps twice the accommodation, at more than twice the cost, that it would be made to give, if used for similar purposes where the value of land is low" [184, p. 447]. Since building arts are flexible and, by alteration of design, materials, layout, allow for nearly continuous substitution of broad classes of input factors for each other, the resulting input-output functions are readily differentiable and yield smooth continuous schedules of marginal value. The whole development of land and building in the metropolitan region of New York provides continuous illustration of the reciprocal influence between site value, style of building, and patterns of location [132, Chaps. 2, 6].

The complex of equilibrium price relationships serves a set of broad allocative functions. Dwellings are allocated to competing users, capital resources are used for alterations or for new building, the choice is made to buy or rent, and new building is put in housing or in other investment forms.[3] As usual, these price relationships will be more effective in promoting equilibrium, the greater the role of new investment in maintaining or augmenting supply.[4] Two basic prices are involved: the price of urban land and the cost of new construction.

C. PRICE OF URBAN LAND

The price of development land enters into the urban real estate market as an input factor, with indefinite physical, but limited economic, life expectancy. The price of development land will at the minimum be fixed by use of land for agricultural purposes [239, p. 151; 58, pp. 444 f.].

Above this minimum price, its equilibrium value for residential use depends upon two different types of influences. First, there is the influence of cost of adapting raw land to a form suitable for urban use. These costs include land assembly planning, land clearance, drainage, and public improvements for streets, sidewalks, sewage, and other public facilities. A second influence is that of relative preference: for larger lot size, for land further away from city centers, and for newer surroundings. These preferences will be affected by the efficiency of urban transportation and by techniques for dense construction. Improvement of techniques for dense construction—as were yielded by the automatic elevator or by steel frame construction—tends to cheapen the cost of producing urban buildings and thus reduces demand schedules for urban land. Improved methods of getting to and from work widen the radius of effective access and reduce the schedule of premiums paid for closeness. If the streetcar in its day had a revolutionary effect on land values, so much the greater has been the effect of the automobile and the expressway [282, pp. 92 ff.].

But if the value of urban land is thus basically an emergent from a competitive price process involving an interplay of utility and cost forces reaching equilibrium through adjustment of marginal values, it is also affected by a special force which involves the withholding of urban land from the market for the sake of capital gains or, as Henry George put it, "the holding of land for a higher price than it would then otherwise bring" [101, p. 255]. The value of undeveloped or vacant land will be gauged not only by capitalization of present and future incomes but also by the expected level of future land values. Thus, like the long-term investment value of money, the actual value of urban land "is largely governed by the prevailing view as to what its value is expected to be." In this sense its value is a "highly psychological phenomenon" in which, of course, present level, past trend, and future projections fold into each other [153, pp. 203 f.]. It was Henry George, in his classic *Progress and Poverty*, who first developed this truth and focused it on urban land value.[5] But it was Leon Walras who propounded a formal theory of land value which recognized the role of expectation concerning its rate of growth.[6] Only later did J. M. Keynes show how expectation variables played a role in the macroeconomic process [153].

It is not easy to measure the approximate importance to be assigned this speculative component in the value of urban land sites. In terms of market behavior, the volume of resources invested during most of the nineteenth century in vacant land held for purposes of speculative gain probably exceeded idle cash balances withheld by fear of capital loss. The practice of custom building on privately procured lots in the United States turned every potential homeowner into a potential land speculator. The phenomenal rise of land values in core areas of central cities or in business districts dazzled the imagination [60, pp. 415– 423]. Land was commonly sold on long terms of payment, and mortgage financing could readily be obtained. In Europe, speculative investment in urban land was not so widely diffused among wage-earners but was founded on even longer experience in urban land appreciation [233, II, pp. 109f., 239ff.; 180, pp. 59–85]. In England the practice of leasing rather than selling land, both agricultural and urban, for building purposes brought into existence a special class of investor who took long speculative positions in realty. In Germany the spectacular rise of land values generated by the relatively high rates of urban growth during the nineteenth century was accompanied by widespread speculative investment in urban environs by specially formed land-development corporations [283, p. 358f.].

Trade in urban land was facilitated by a market organization with professional agents, record-keeping facilities, insurance and advisory services. Ease of sale did not compete with high-grade bonds or government securities but probably compared favorably with many equity interests or participations. Thus, while the liquidity premium of undeveloped land was of a low order, liquidity considerations would rarely impede investment attracted by hope for capital gains. And speculative investment was facilitated by the low costs of holding land idle. Undeveloped or unplatted land with high speculative value was commonly assessed in America at its farming or agricultural value, due to the unwillingness of the courts to venture far from established guides to value.[7] And assessment of both lots and farmland has been conclusively shown to run substantially under levels of assessment of improved urban land [261 (1959), Tables 7–10; and (1963), Tables 7–11]. In England vacant lots were not generally subject to property tax during our survey period; and undeveloped land on city outskirts used for farming purposes was generally assessed at its farming values [256, Chap. 7]. In Europe, property taxation of vacant land was not regarded as a serious deterrent to speculative investment [221, p. 272 ff.; 180, pp. 271 f., 276 f.; 80, pp. 14, 55; 239, p. 150 f.].

Given a fairly serviceable market organization, a tradition of a "bull market" in land values, and arrangements for purchase of land as an investment sideline and on instalment terms of finance, it is thus understandable that most growing cities of the Western World became surrounded by a ring of speculative land held for purposes of capital gains through urban development. Undeveloped parcels of land and vacant lots would drift into the hands of those who had the highest estimate of the future worth of the land and were prepared to act on the basis of their estimate. Their schedule of estimates would determine the collective supply schedule for land for development use and building. Against this schedule would be thrust a standard demand schedule derived from current demand for building sites. An increase in the demand schedule for land would in the first instance increase lot turnover, reduce the inventory of usable vacant lots and thus tend to increase land prices; and this change in price would exert a reflex influence on the supply function, chiefly through its effect on expected future values. The behavior of the supply schedule would doubtless depend upon the steadiness in price behavior to date and the consistency of its trend. On the other hand, an overdevelopment of lots could, if many holders should be forced to try to realize their investment (as occurred at crisis points in the business cycle), induce a forward movement of the supply schedule. It would seem, then, that substantial variation in both the psychological conditions of supply and building demand for vacant land would give the price of land wide scope for variation.

This variation need not be the same over time or in different places. The greater partitioning of land ownership in America, the infrequent use of the long-term ground lease, the policy of overdevelopment or creation of pockets of vacant land in or around growing cities, and our system of property taxation of vacant sites perhaps induced a lower mean level of site values, or a lesser differential between agricultural and urban land values, than in Europe where the tradition of land appreciation had deeper historical roots, where land on city outskirts was often laid out in princely holdings, and where land dealing was more of a professional business pursuit.

D. COST OF NEW BUILDING

The cost of new building in a given locality undergoing long waves would vary moderately if these long waves were not diffused throughout the economy. A booming local economy could attract additional building labor, building materials, and building finance by offering moderate premiums to attract mobile factors from other centers. Factors could then be released as growth rates receded. Long cycles in building costs would then measure migration premiums required to attract and repel input factors to local centers.

We have seen, however, in our survey of reference chronologies that local long cycles of residential building are to a high degree synchronized (see Table 1-1). They are thus part of a nationwide movement that is systematically influenced and to a degree interlinked both positively and inversely with kindred movements running their course in the Atlantic economy. We have also seen in Chapter 3 that it is not only demand for residential building that fluctuates in long swings. New homes require new stores, new schools and public buildings, new factories, and shops. We found that different types of urban building rose and fell together, and that with appropriate lags particular types of new construction are complementary in character.

If this is so, then the characteristics of the supply function of building—the response of suppliers of building to changed demand by means of a change in price or quantity—will play an important role in the process of long swings. If this supply function is highly elastic, then the cost of building would tend to be maintained, and shifts in demand would induce an appropriate shift of quantities. But if it were prices that responded freely, the variations in demand would spend themselves in high amplitude variations in building wage rates, costs, and prices. Some inquiry into the characteristics of the supply function is hence required to round out an investigation of building cycles.[8]

The supply function of building is not itself a simple function but a family of functions for the crucial input factors of building labor, investable funds, and building materials. With the rise of the business contractor, the segregation of a specialized wage-labor class, and the unions that this class brought into existence, it is reasonable to suppose that the supply elasticity of building labor was reduced. Unionization in the building trades was most effective and achieved the greatest job control in the metropolitan centers where, in addition, the greatest thrust of the building cycle was felt. But the full elasticity of pricing for the contractor component of building supply—and this went a long way when carpenter and contractor often consolidated roles—was unhindered by unionism. How easy for a master workman, serving as contractor, to scale up his terms of bidding when work was abundant and the order book was full and, conversely, to bid close, or to price down, when the demand for his services flagged [118, pp. 219f., 519f.].

Even if building labor and contractor services were available, and if the supply of building materials was readily expansible, more resistance might be encountered with the supply of investable funds. Investable funds must be partly accumulated by the investor and advanced as equity capital; these funds may be raised as loan capital borrowed at long-term interest rates. In the course of the long building cycle, mortgage interest rates would be affected by the well-known "Kondratieff" movement, which has alternatively raised and lowered interest rates, as well as agricultural prices, in long waves of approximately fifty to sixty years in duration.[9] In periods of Kondratieff upward movement, such as between 1897 and 1920, rising interest rates would put residential building, as apparent in Germany and England, under financial restraint.[10] Sensitivity to interest rate and capital flows is enhanced when mortgage lending is organized around legally prescribed or historically evolved interest "ceilings," such as prevailed in pre-1914 Germany or in post-1945 America [114, p. 78ff.; 156, p. 74–94; 136, p. 25f.].

Fully as important as the absolute level of interest rates are relative rates or differentials between yields of mortgages and of high-grade long-term bonds. These differentials must be interpreted in the light of the imperfect loan markets for residential mortgage credit and the resultant tendency for shifts in terms of lending to concentrate upon loan terms other than the quoted interest rates. The rationed—or imperfectly competitive—character of mortgage loan markets, and of many over-the-counter credit markets, has been alluded to in many investigations. See [122, pp. 39–50; 156, pp. 77f.; 206, pp. 25ff.; 229, Vol. II, pp. 617ff.].

Yield differentials have repeatedly played an important role in housing market analysis. The short-run movement of industrial and residential building in Germany was nearly inverted with a small residential lead [136, p. 45]. There was almost perfect inversion in American post-1945 short-run cyclical behavior of capital funds mobilized in nonfarm mortgage debt and corporate securities [115, pp. 22f.]. German analysts reported that an upward wave of industrial activity, while stimulating use and demand for shelter facilities, would tend to diminish the flow of funds needed to finance new construction [283, pp. 365f.; 213, p. 499; 240, p. 86]. Kuznets has demonstrated that, between 1870 and 1920, American long waves in residential building and railway construction were matched by inverted movements in rates in growth of industrial and other investment, so that for capital formation as a whole only a mild wavelike impulse is detectable.[11] In England, a similar inversion of long movements in rates of growth of residential building and industrial (or foreign) investment has been found to prevail in the whole pre-1914 period [45; 46; 245].

E. SERIES UTILIZED

For our tabulations we have utilized thirty-three time series. Five relate to rent and fourteen to sale prices of real estate. Six series relate to building costs, one to wage rates, three to building materials, and four to mortgage yields. Few of our series relate to the same area. Allowance must often be made for divergent statistical techniques used in compiling series or in classifying data. Our sampled series in any one class are too few to yield reliable measures of statistical significance. However, with these and other limitations, we can extract clues on the shifting balance between demand and supply in the interrelated markets for building input factors, housing for hire, improved real estate for sale, and unimproved land in process of development.

Our series on local price of improved real estate come from many sources. Two of the patterns measure real estate selling price in Paris and Berlin. For Berlin, the movement of these prices was derived from the appraised insurance value of purchased parcels of improved properties. While some influence of composition of sales by type, size, or class of property may affect the ratio, price should exert preponderant influence on per parcel value. The Paris index is derived from manipulation of ratios of sale prices for the same residential rental structure at different points of time within a twenty-year period. No allowance was made for alterations in the internal fittings or structure. The mean ratios of the second and third quartiles were computed, linked, and adjusted by a three-to-five-year moving average from 1841 to 1939. Separate study of the square-foot price for homogeneous types of property sold in 1939, but classified by decade of origin, showed that an annual rate of depreciation of 1.2 per cent per year fitted the observed value shrinkage. Applying this calculated rate of depreciation to actual sale price indexes yielded a rectified index which for 1841 to 1913 was utilized in our analysis. See [75, pp. 169–192].

Our two Manhattan series show estimated aggregate value of all realty and an average value per warranty deed. The latter measure is also available from 1877 onward for the State of Ohio and its sample groups for all platted nonfarm property. The average value of a deed, like the average cost of constructing a room, will reflect variations in "mix" as well as price. It will, however, reflect major movements of value levels, and it may provide a clue to shifts in realty price levels. The reliability of "consideration" quoted in deeds is evaluated in Appendix E.

Our rent data—analogous to our price and cost data—are of two classes. Two of our rent series (for Berlin and Hamburg) are for rent charged for occupied dwellings. This is the measure of rent ordinarily used in studies on the cost of living. The rent most significant in realty markets or in investment decisions is advertised rent charged on vacant dwellings. Series for the latter should respond more sensitively to changes in shelter market conditions. For the city of Hamburg, rent measures on both bases are available; for two other cities, a rental series on vacant units was included in our summary table. For Chicago and Manhattan, measures of rent on vacant dwellings are available only for relatively short time periods. Hence the returns for these two cities are not included in the summary tables, though they are discussed in the text.

Our price information for urban site values relates to three different areas and to different components of urban site values. Our fullest information is from Ohio public records of warranty deeds or transfer instruments for unplatted land, subject to the jurisdiction of incorporated municipal governments. Before platting, land is not divided into private lots or laid out into public streets and walks. Transactions in such unplatted land were separately reported in Ohio conveyance statistics and were analyzed for four sample area groups. Only so-called bona fide deeds (excluding deeds reporting nominal consideration) were utilized in this tabulation.

Another major source of site value data is drawn from a century of experience in America's third largest metropolis, Chicago. The land-value records and real estate history of Chicago were the object of a celebrated investigation by Homer Hoyt [134]. Hoyt utilized all available data and records to establish a chronology of long-swing peaks and troughs of land values from 1830 to 1933. He scoured the records to establish the aggregate value of land in the various districts of the city. His estimates of value were based upon sales of property, assessments, and contemporary informed opinion. Though the property sold in most downtown and business areas was improved, the values were estimated for sites alone. Sales consideration expressed in deeds formed the main basis for estimation prior to 1891. For the next twenty years, Hoyt relied upon appraisals, sales, advertised prices, and opinions. Between 1910 and 1929, estimates were based on a local annual real-estate value map. But for noncommercial districts, only sales of vacant land or of sites with negligible improvements were utilized. Since sales were fewer in trough years, estimation methods were cruder, including use of a percentage shrinkage derived from opinion of "current observers." However, shifts in land value were of the same magnitude as shifts in recorded deed consideration.[12]

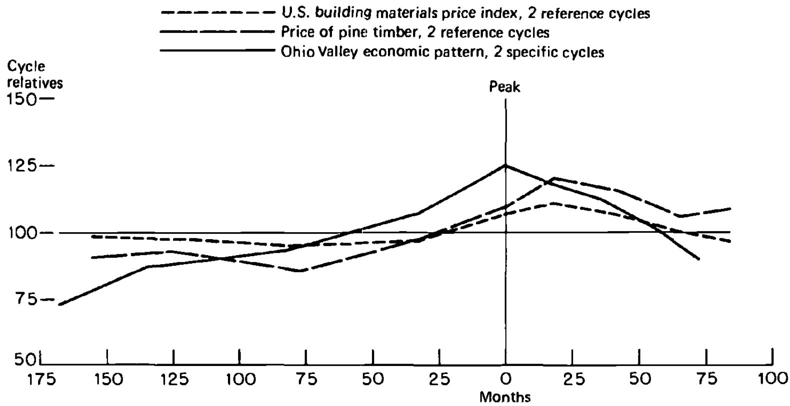
Hoyt's estimates are dominated by values for improved urban land in a large, rapidly growing industrial city. The Ohio information related to site values of unimproved acreage land located chiefly in urban environs. Our third source of site-value information relates to vacant lots within a large and slowly growing European city—Paris.

Our series on cost of building was most complete on prices of building materials marketed to a large extent on a nationwide basis. Building materials make up somewhat more than half of the cost of building; for the United States and Germany, national or regional price series were found or contrived that reached back to the first decade of the nineteenth century and covered five long swings. The German series was compiled some years ago and is limited, for the early years, to relatively few local reporting sources [144]. The American series was contrived during this research by linking and weighting different series covering different periods and applying to distinct regional centers. It was found necessary to use arbitrary weights; in view of the diversity of regional price movements before 1861, some effect on over-all index behavior may have been produced by the weighting scheme. A detailed description of the new price series and its sources will be found in Appendix D. An independent check on our results may be found in a nationwide quarterly price series, derived from three to five reporting centers, of unit prices for pine timber. Average reference cycle patterns of our average price index, of the pine timber price index, and of a general benchmark pre-1861 series are set forth in Chart 6-1.[13] As expected, the general building price index is more sluggish in movement than the one-product index; but it has a similar conformation. Both lag at peaks.

Some seven series on building costs were analyzed covering four different countries. Three of these series (United States, London, and Germany) use a weighted average of factor input price levels (for building materials and building labor). Three other series allow for the additional influences of changes in productivity and in the quality and/or size of house rooms. While size probably did not undergo long cyclical fluctuation, the assortment of qualities probably responded mildly to cyclical influences. A seventh series shows the effect of building cycles on labor markets by tracing average hourly earning differentials between building and manufacturing labor in the United States.

CHART 6-1

Average Long Cycles, Ohio Valley Economic Pattern, Specific, Building Materials Price Index, Price of Pine Timber U.S., Reference 2 Cycles, 1821–1861



With regard to mortgage yield data, we were fortunate in finding long time series of mortgage yields in four countries: United States (1879–1932), Germany (1870–1913), Scotland (1816–49), and France (1879–1913). The American series represents average contract rates for mortgage loans recorded on Manhattan properties [114, pp. 492–503]. The German series represents average emission rates of German mortgage banks. These institutions, similar to our savings and loan associations, extended credit predominantly on urban mortgages. They raised capital not by accepting deposits, but by public sale of debenture instruments (*Pfandbriefe*) in capital markets. Net change in mortgage loan holdings closely corresponds in pattern of movement and level to *Pfandbriefe* issued. Our third series is of mortgage rates on landed securities for Scotland. This series arose out of the peculiar practice of fixing interest rates on mortgage loans by a conference of investors, accountants, and trustees who met semiannually and who were chartered for that purpose [102, pp. 134–136; 97, Vol. II, pp. 923ff.]. Our fourth mortgage yield series is the annual average rate charged on mortgage loans by the *Credit Foncier,* a nationwide mortgage-lending institution, established in France in the 1850's.[14]

F. SURVEY RESULTS

Vacant Land Price

Cyclical measures for vacant land value covering the Ohio and Paris experience are summarized in Table 6-1 and are graphically exhibited in Charts 6-2 and 6-3. The price of undeveloped Ohio acreage showed the widest range of movement, with highly irregular cyclical timing, of all our price series (see Table 6-1). Total specific amplitude of our four available local Ohio series was 336, or double the next most variable level of price and some 40 per cent above Ohio residential building amplitude. This wide range of amplitude in price per acre is obtained with annual series smoothed by a three-year moving average. However, we were unable to adjust for irregularities in the underlying data and for extreme variations in specific years. If we allow for the dampening effects of smoothing and of aggregation of county returns into county groups, the Ohio per-acre price amplitudes are comparable to the high amplitudes (mean value 681) yielded by the seven series in subdivision activity proper (see Chapter

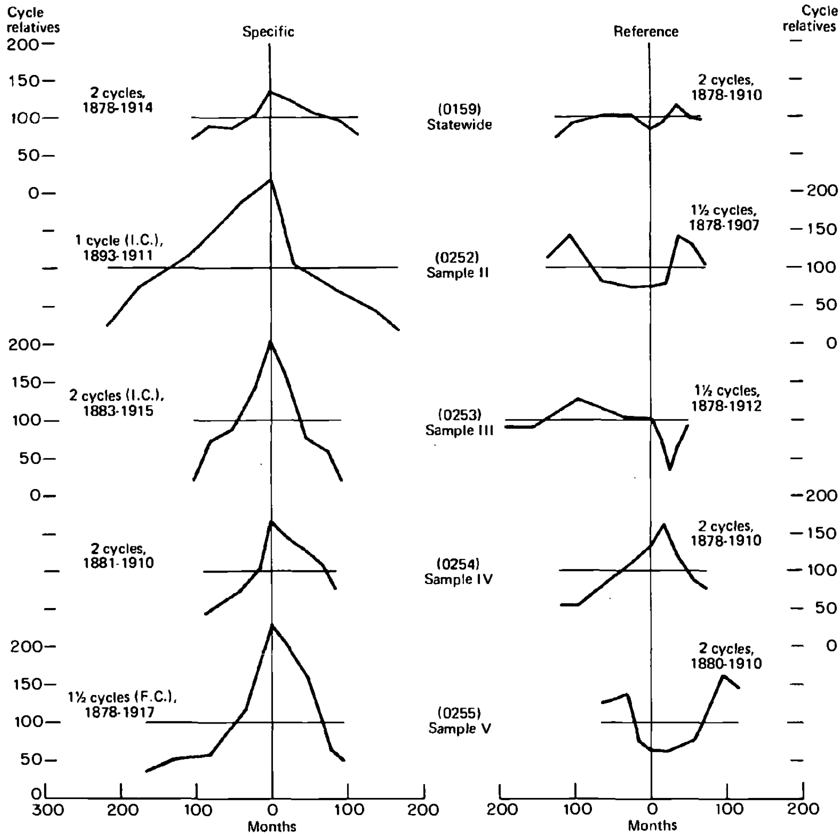
TABLE 6-1
Summary Measures, Local Long Cycles, Price of Vacant Land

Measures	Paris[a] Mean	Ohio Price Per Acre,[b] Unimproved Land: Mean	High	Low
Full specific duration (years)	18.5	21.5	32.0	14.5
Specific cycle amplitude (cycle relatives)				
Full	132.2	336.1	390.6	216.3
Full per year	7.15	15.97	22.67	12.21
Fall per year	−7.99	−18.9	−24.18	−13.04
Full reference amplitude (cycle relatives)	104.8	187.7[c]	195.2	173.0
Secular weighted average growth per year (per cent)	2.933[d]	2.54	5.092	.401
Lead-lag turning points (years)	−1.33	−.94[e]	4.25	−8.25[c]
Average deviation (years)	4.00	2.77	5.25	0
Lead-lag reference pattern (years)	2.60	−.40[e]	3.50	−7.0[e]
Optimal serial correlation, trend adjusted				
Lead-lag (years)	n.a.	[f]	3	−2.0
Correlation coefficient (r)	n.a.	[f]	.601	−.314

n.a.—not available.
[a] Series 0273, which had four specific long cycles, in which six turning points were matched and two unmatched.
[b] Includes series 0252 through 0255, which had 6.5 specific long cycles, in which fifteen turning points were matched and two unmatched.
[c] Excludes 0252.
[d] For long specific cycles only, omitting high growth rate 1840–68 where level rose fifteenfold. Equivalent short-cycle rate would approach 4 per cent.
[e] Analyzing group IV on an inverted basis as other sample groups were inverted.
[f] Only series 0252, 0254 available.

CHART 6-2

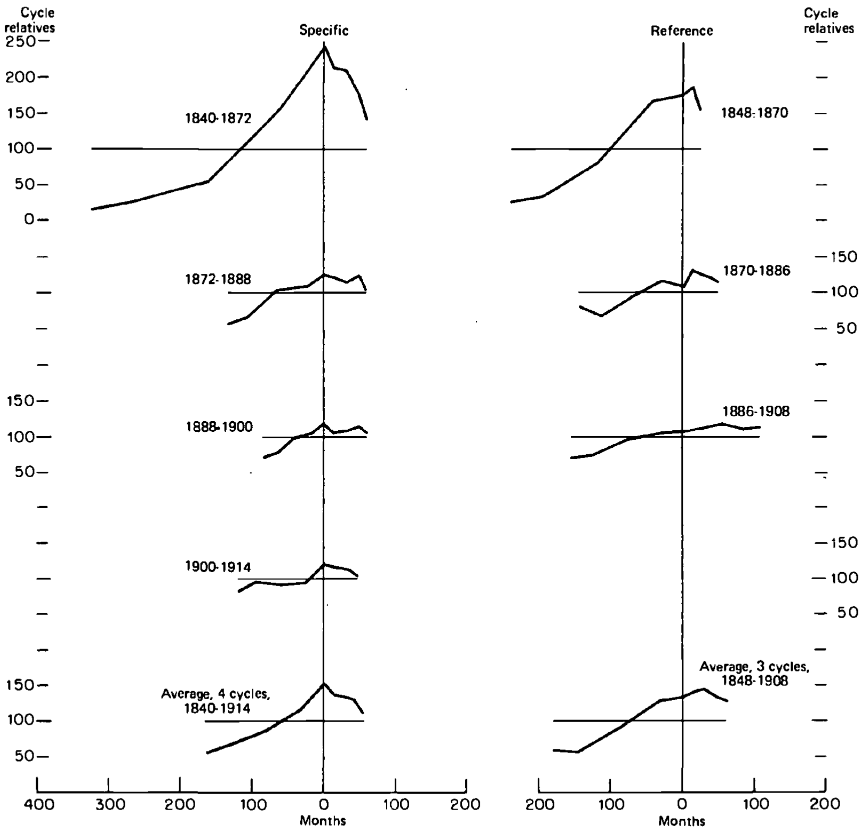
Patterns of Average Specific and Reference Long Cycles, Ohio Statewide and Samples—Average Price per Acre Town Acres (Bona Fide Deeds)



4). It is perhaps significant that mean amplitudes in the particular sample groups did not vary with secular annual rise of per acre price. Amplitude levels were nearly the same for the two sample groups with a low growth rate (for groups I and II, .456 per cent) or a high growth rate (groups IV and V, 4.624 per cent).

Whereas specific cycles in price per acre are clear-cut, there is relatively poor synchronization with long-wave movements in other phases of real estate and building markets. This is evidenced by the erratic form of the reference cycle patterns reproduced in Chart 6-2. Three out of four of those for the Ohio sample groups are governed by irregular forces; there is relatively poor correspondence of reference to specific amplitude.

CHART 6-3
Patterns of Successive Specific and Reference Long Cycles and Their Averages, Paris, Price of Vacant Land



The statewide aggregate reference cycle pattern and correlogram show little evidence of systematic integration with dominant statewide movements. This irregularity of timing may be due to the neutral timing pattern of the volume of development activity, as indicated by measures for acres of land sold, dollar volume of mortgages recorded, and value of consideration in bona fide deeds. The development patterns reached turning points midway in the residential building cycle. Irregularities in the price behavior of development acreage sold would, under these circumstances, either induce a more complete inversion (as was the case with groups II and V), shift back to positive timing (as with group IV), or would leave intact the neutral position (group III). The collection of all of these modes of response on the statewide level perhaps caused the reference pattern simply to become irregular.

In almost all relevant respects, Paris price experience differs from that of Ohio (see Table 6-1). To what extent the difference reflects the pricing of developed lots in Paris and undeveloped acreage in Ohio is difficult to tell. The array of long cycle patterns shown in Charts 6-2 and 6-3 graphically indicates what our amplitude measure tells us numerically, namely, that Paris amplitudes of vacant land pricing are far below, some two-fifths, those of Ohio. Reference declines are very mild. Timing is positive but variable, with an appreciable lag of 2.6 on reference cycle timing but a lead of 1.33 years on six matched turning points. Vacant land pricing has nearly double the amplitude of fluctuation of used residential prices and tends to lead this series by about half a year. The only major specific cycle was the first wave, with its fifteen-fold rise of values between the 40's and 60's and its appreciable five-year period of decline. Thereafter the trend growth of vacant land values responded mildly, after appropriate delays, to very moderate residential cyclical rhythms.

It is worthwhile relating the land value experience of Chicago to that of Ohio and Paris. Tabular data for Chicago land value cycles are set forth in Table 6-2. The graph of site values over

TABLE 6-2
Land Value Cycles in Chicago, 1833–1933

Chronology of Cycles			*Total Amplitude*			
T	P	T	*Rise*	*Fall*	*Full*	*Full per Year*
1833	1836	1842	156	161	317	52.2
1842	1856	1861	143	84	227	11.9
1861	1873	1879	141	89	230	12.8
1879	1892	1897	122	49	171	9.4
1918[a]	1926	1933	58	87	145	9.7
Average 1842–1933			116	77.3	193.3	11.0

[a] Though Hoyt "dates" the rise for land values as commencing in 1920 (see 134, Table LXVI, p. 409), his "datings" are with reference to deviations from trend. Elsewhere he dates the "boom period" as 1918–26 and shows a 150 per cent increase for land values in 1926 over 1918 (p. 404). Hence we allowed \$3.333 billion for a 1918 land value, as opposed to \$2 billion in 1915 (p. 470). We have followed Hoyt in assuming that the cyclic long-wave process was smoothed out between 1897 and 1918.

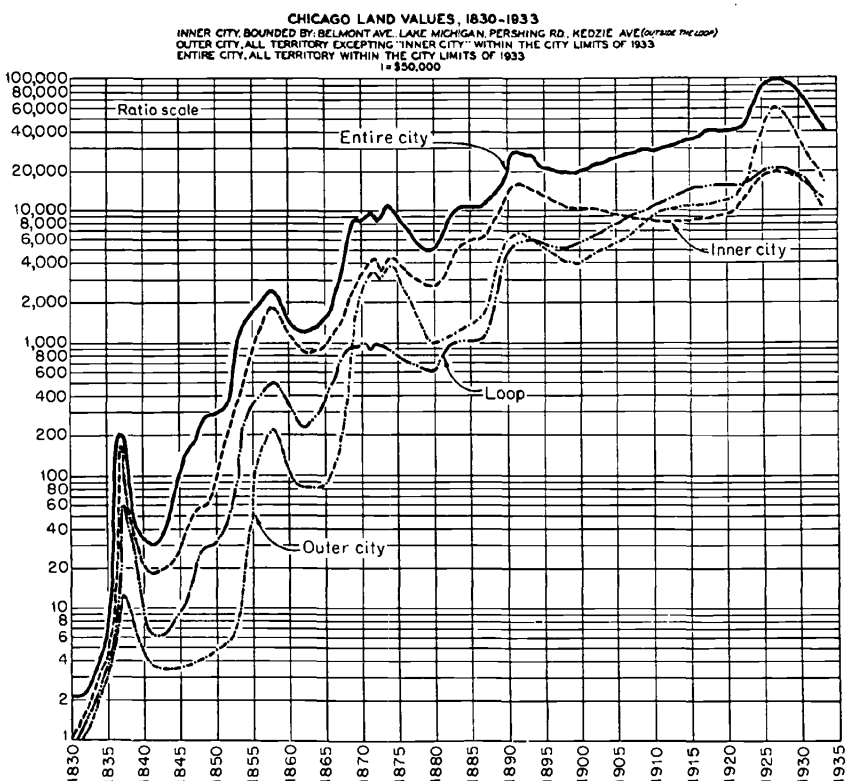
time is reproduced in Chart 6-4. Excluding the near-apocryphal, first speculative boom-bust, with its extremely high annual rates of change, amplitude of total movement shows a marked receding tendency indicated by a skipped reference cycle (1897–1918), during which land values merely slowed up on the rise but did not fall in any general way.[15] The decline of amplitudes also showed up in the moderate behavior of amplitudes during the Great Depression. Mean amplitudes of rise are 116.0, of fall −77.3, and of both phases 193.3.

Oscillation of values was uneven among the different sections of the city and types of property. But though uneven, the shift of values was diffused. Timing was nearly concurrent with peaks and troughs of new building, with a slight lead in upturns.[16]

It is not easy to reconcile this scattered testimony about urban site movements in long swings, either with itself or with the

CHART 6-4

Chicago Land Values, 1830–1933



expectations raised by our analysis of the speculative characteristics of urban site values. Quite clearly this speculative component was not uniformly active in all surveyed communities. It is noteworthy that, in the economically matured but steadily growing metropolis of Paris, speculative activity in land values could be very restrained. Our Ohio records indicate that speculative exuberance was varied in its timing and was often irregular in its reference behavior. Some of this irregularity may have been due to incompleteness of submission for public recording of true selling prices or, even if these prices were properly reported, to variations in the "mix" of acreage land being sold. The Chicago experience exhibited a powerful movement of site values in developed land.

Building Material Prices

Even in the nineteenth century, when urban land was at a premium, the cost of building, including site improvements, exceeded pure site costs. The most cyclically volatile surveyed component of building cost was prices of building materials. In this respect, the German and American series make an interesting parallel, since they both stretch across the five major waves of the nineteenth century (see Charts 6-5 and 6-6 and Table 6-3). The great war inflations took turns in severity. The inflation generated by the Napoleonic wars reached higher peaks in Europe than in America. The war inflation of 1860–70, which came a few years earlier in America than in Germany, was more severe in this country. The nonwar patterns are amazingly similar, allowing for a more flattened version for Germany in the 1830's and for America in the 1880's. The average cycle patterns of the first five successive cycles are graphed in Chart 6-7 (first figure). The form and position are nearly the same, except for a milder and shorter American decline. If the mean American duration is longer (19.0 years against 16.8 for the German), the total specific amplitudes are of the same order of magnitude (90.4 and 97.4, respectively). The German pattern tends to lead in timing of both peaks and troughs, and the American series leads at peaks. However, the average peacetime pattern of the American and comparable German and English cycles in the middle and late nineteenth century shows that German price experience was cyclically more vigorous than the American

CHART 6-5
Patterns of Successive Specific Long Cycles, U.S. and Germany,
Building Materials Price Index, 1802–1932

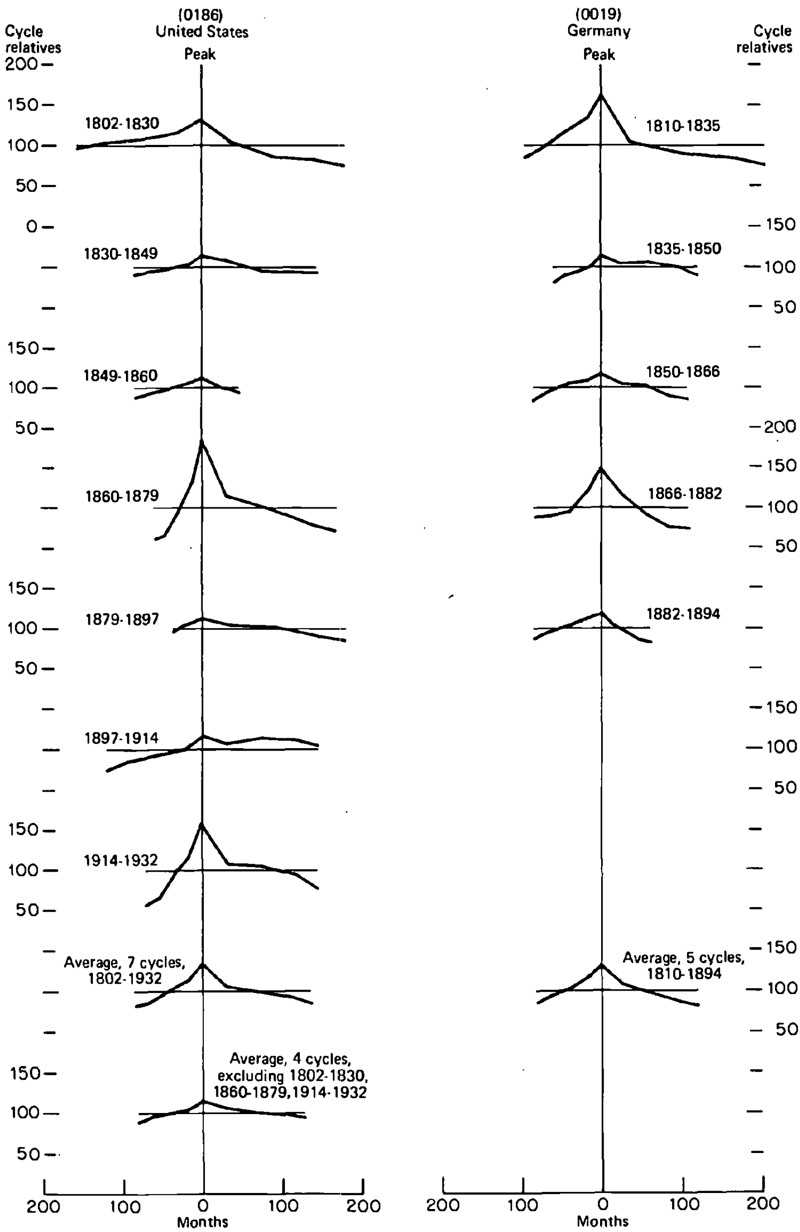
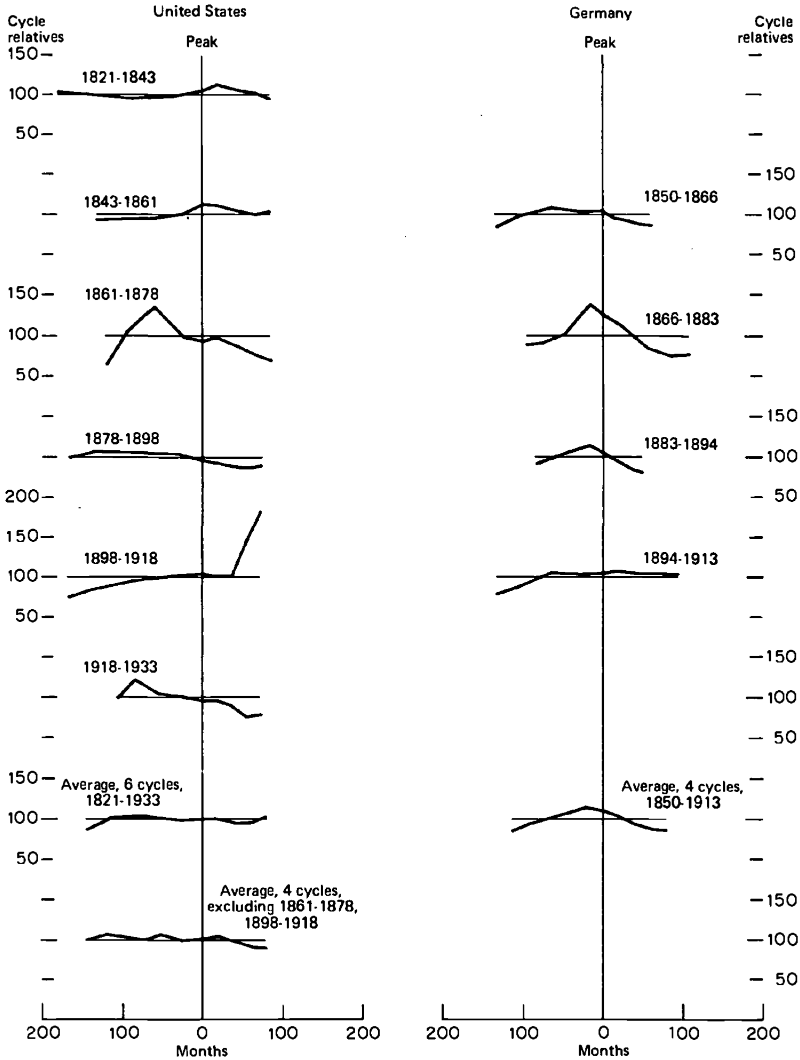


CHART 6-6

Long Reference Cycle Patterns, Successive and Average, U.S. and Germany, Building Materials Price Index



which, in turn, was more responsive to long swings than the English (see Chart 6-7, middle figure).

The very mild response behavior of the British price index, in comparison with the German and American, partly reflects a slower tempo of British long cyclical movement and partly the absence of war inflationary stimulus. The total English amplitude, between 1852 and 1911, is nearly as great as for the four

TABLE 6-3
Summary Measures, National Long Cycles, Building Costs and Building Materials Prices

Measures	*Building Costs*[a]					*U.S. Differential, Building Trades, Manufacturing Hourly Earnings*[b]
	Mean		*Median*	*High*	*Low*	
Full specific duration (years)	17.72	(2.56)	19.5	20.0	13.5	18.8
Specific cycle amplitude (cycle relatives)						
Full	50.6	(10.3)	42.6	85.1	30.6	47.9
Full per year	2.94	(1.15)	2.67	4.36	1.57	2.55
Fall per year	−2.60	(1.63)	−2.07	−4.61	−.39	−2.39
Full reference amplitude (cycle relatives)	34.1	(16.8)	31.0	64.6	12.9	19.8
Secular weighted average growth per year (per cent)[f]	−.025	(.875)	−.083	1.176	−1.110	.197[g]
Lead-lag turning points (years)	.67	(1.97)	1.00	3.20	−2.67	.66
Average deviation (years)	2.19	(.83)	2.64	3.14	1.00	2.30
Lead-lag reference pattern (years)	1.16	(1.12)	1.11	2.50	0	.75
Optimal serial correlation, trend adjusted[i]						
Lead-lag (years)	2.33	(1.26)	2.0	4.0	1.0	
Correlation coefficient (r)	.672	(.31)	.860	.912	.247	

Measures	*Building Material Prices*			
	U.S.[c]			
	Peace Cycles (1830–1914)	*All Cycles (1802–97)*	*England*[d] *(0275)*	*Germany*[e] *(0019)*
Full specific duration (years)	16.3	19.0	29.5	16.8
Specific cycle amplitude (cycle relatives)				
Full	42.7	90.4	42.8	97.4
Full per year	2.64	4.76	1.45	5.80
Fall per year	−1.93	−3.93	−1.69	−5.05
Full reference amplitude (cycle relatives)	15.2	37.5	7.4	58.0
Secular weighted average growth per year (per cent)[f]	n.a.	n.a.	n.a.	.171
Lead-lag turning points (years)	.33[h]	0.11[h]	−2.00	−.14
Average deviation (years)	4.67	4.06	3.00	1.24
Lead-lag reference pattern (years)	.75	−3.1	2.25	−.90
Optimal serial correlation, trend adjusted[i]				
Lead-lag (years)				0
Correlation coefficient (*r*)				.748

[a] Includes series 0275, 0020, 0014, 0076, 0167. Series 0078 is added in figures for full reference amplitude, secular weighted average growth, and lead-lag reference pattern. These series had twelve specific long cyles, of which thirty-three turning points were matched and two unmatched.

[b] Series 0313, which had four specific long cycles, in which nine turning points were matched.

[c] Series 0186. The peace cycles cover four specific long cycles from 1830 to 1860 and from 1880 to 1914, with eight matched turning points. The total cycle column includes one more long cycle with an additional matched turning point.

[d] Series 0275, which had two specific long cycles, in which five turning points were matched.

[e] Series 0019, which had five specific long cycles, in which nine turning points were matched.

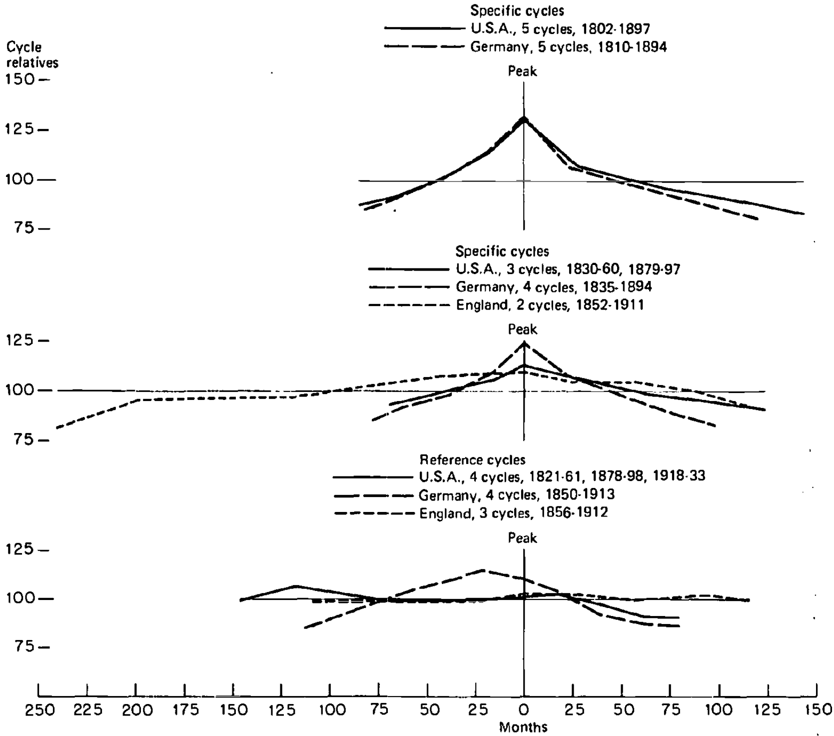
[f] Excludes series 0275, 0020.

[g] Average of reference and specific secular movement, positive basis.

[h] Leads at peaks and lags at troughs. *i* Excludes series 0076 and 0167 from building cost measures.

CHART 6-7

Long Cycle Patterns, Building Material Price Index, U.S. and Germany, 1802–1897, England, 1852–1912



American nonwar cycles (between 1830 and 1860, 1880 and 1914), though annual rates of movement are much lower. Turning points are all matched and exhibit the same tendency to lead found in Germany.

Amplitudes of long-wave movement for prices of building materials—in America at least—are more vigorous in long (building) than in short (business) cycles relative to corresponding fluctuations in building activity. Total specific short-cycle amplitude of wholesale prices for building materials (monthly, 1892–1938) was one-fifth of the average short-cycle amplitude of two monthly nationwide building-permit series which straddled the period (Long, 1891–1916, and Babson–Bradstreet, 1908–38). The corresponding long-swing fraction was over two-fifths. In part, the difference in price behavior over short and long cycles may be attributable to the different time periods studied. Our long-cycle measures primarily reflect the experience of the nineteenth century, when intensity of competition in product markets was relatively high. Prices of building materials in the first half of this century closely rivaled hides and leather with regard to frequency and magnitude of yearly price change.[17] During the short-cycle experience of the late nineteenth and early twentieth centuries, markets were sheltered and prices were increasingly administered.

Considering the intensity of competition which prevailed in building material markets of the nineteenth century, the confinement of long-cycle specific price amplitude to a third of residential activity amplitude is anomalous. This arises, in part, because our measures of building activity are confined to new building and omit coverage of repair and maintenance operations which account for from 30 to 40 per cent of all building activity in the United States and between 40 to 50 per cent for most European countries. See [136, p. 7f.; 107, p. 83]. Repair, maintenance, alterations and additions fluctuate moderately both in short and long cycles and their derived demand for building materials would likewise fluctuate moderately. For seven major cities Burns found that total specific amplitude of short cycles in additions and alterations was 20 per cent under amplitude measures for new building. His explanation is still cogent [39, p. 53]:

> Although the repairs and alterations of actual life merge into new building, there is an important distinction between the two. As we have already stressed, little new building is likely to be undertaken, unless the business outlook and the state of the building and capital markets are deemed sufficiently favorable to justify investment in long-lived goods. On the other hand, if certain alterations are not made, production must come to a standstill, or premises cannot be rented, or considerable discomfort must be tolerated by owners occupying their own houses. Not infrequently, the full cost of alterations or repairs can be recovered within a year or less, even when the year is one of acute depression. It may also be more convenient to make needed repairs when business is dull than when business is booming. Hence alterations and repairs are distributed more uniformly over time than is new building.

Building Costs

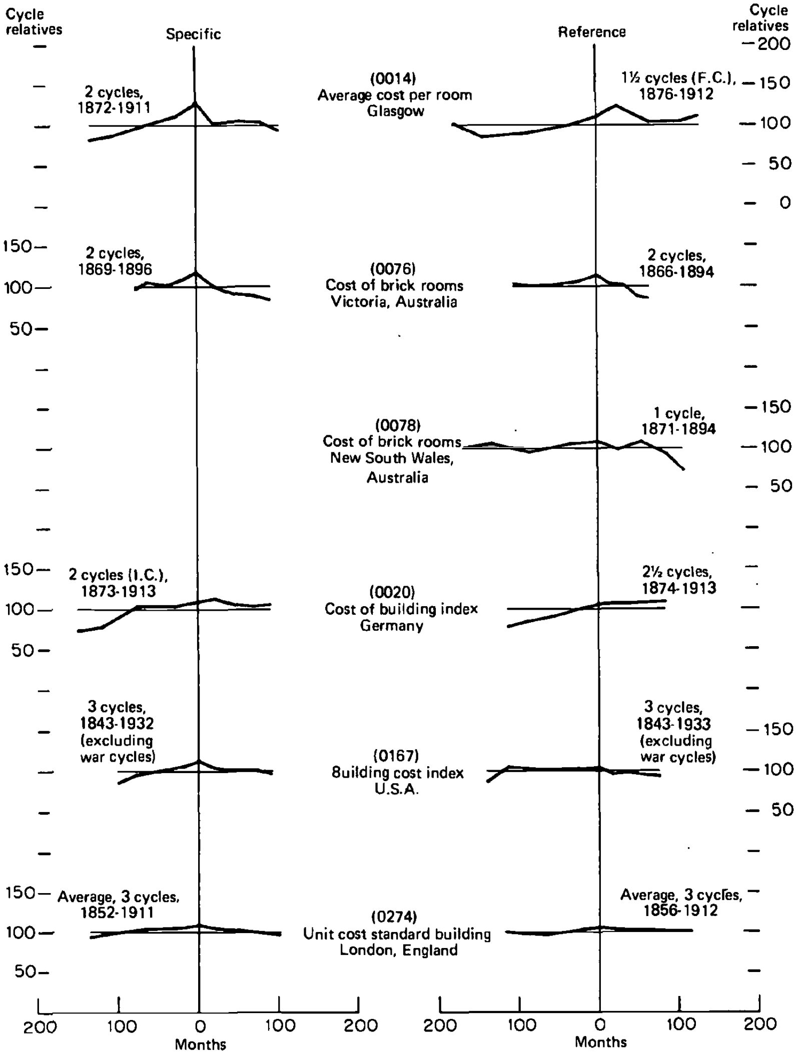
Building costs should have a much dampened range of movement compared with prices of building materials. The more lively movement of prices for materials is joined to the more sluggish cost behavior of building labor. Hence, Table 6-3 records a total mean specific amplitude for cost of building which is nearly half the amplitude of prices of building materials. While materials' prices tend to lead at turning points, building costs tend to lag. However, this lag is variable and shows up only on reference cycle patterns for Victoria, Australia, and Glasgow, Scotland (see Chart 6-8). For the three national building-cost indexes—the United States, England (London), and Germany—sluggishness is dominant in reference cycles, with only the slightest suggestion of cyclical behavior.

The cyclical movement is perhaps more perceptible in the individual than in average cycle patterns, due in part to the offsetting character of the long-wave price movements which turned up reference-cycle patterns in the 1900's and turned them down in the 1870's and 1880's. But these price movements are not part of the building-wave process. Our average reference cycle pattern thus represents a kind of deflated version of building costs in which the element of the Kondratieff long-wave price movement is rubbed out. This same kind of deflation was at work in the German and in the American cost indexes as well.

The sluggish behavior of building wage rates cuts down the relative long-swing amplitude of over-all costs of building. Labor costs in absolute terms are important as an element in total building costs, and thus they affect the whole scale of values for property and rentals. Tension in the labor market would be reflected in building-trade earning differentials, or the percentage margin over hourly earnings in manufacturing. Any tendency for building booms to be retarded by shortage of labor or inelasticity of the labor supply function should be indicated by upward movements in pay differentials.

Recent work in American hourly earning statistics made it possible to compute percentage differentials back to 1860. The series expresses the value of hourly earnings of building trade workers as a per cent of hourly earnings of workers in manufacturing (see Chart 6-9 and Table 6-3).[18] The differential had little or no tendency for secular upward growth, despite the greater role of union power in the building trades, ending up in the mid-twentieth century not far from where it was located by Adam Smith in the mid-eighteenth century. The slight upward course of

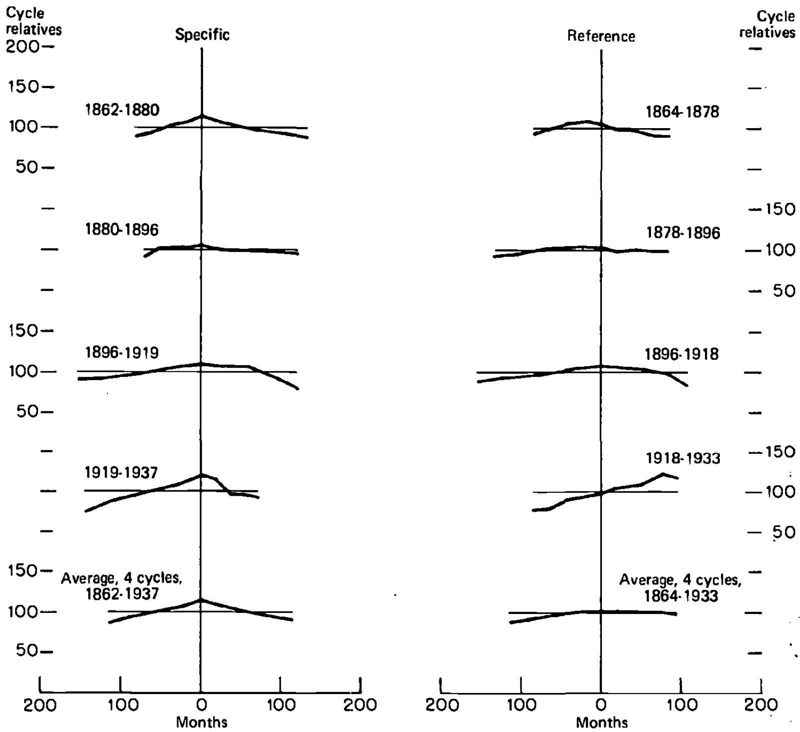
CHART 6-8
Patterns of Average Specific and Reference Long Cycles, Building Costs, Five Areas



the differential (0.2 per cent per year) was chiefly due to our use of union-based records of building-trade hourly earnings, whereas hourly earnings for manufacturing were measured both for union and nonunion plants. Amplitude on the whole was slight. Total specific cycle amplitude was only 47.9 cycle relatives and total reference amplitude was only 19.2 cycle relatives.

CHART 6-9

Successive and Average Long Cycle Patterns, Average Hourly Earning Per Cent Differentials in Building Trades and Manufacturing, U.S., 1860–1937



The timing history of the differential is significant. At the first four turning points, the differential led by a mean of 1.25 years; at the last three, it lagged by 3.67 years. This shift reflects the market influence of the building-trade unions, which could not, however, permanently widen the differential.

The mild amplitude of the building-trade wage differentials over reference cycle periods, together with the unresponsive movement of building-trade wage rates—except in very severe depressions—indicate that building cycles were not appreciably curbed by pressure in labor markets. Neither were these cycles curbed, as we have shown earlier, by pressure in markets for building materials. We turn to capital markets, and primarily to the record of differential interest rates, to see whether pressure there was more acutely registered than in material and labor markets.

Mortgage Yield Differentials

Three of our mortgage yield differential series are shown in Table 6-4. The French data were not included because the years covered were too few to establish more than one long-cycle chronology, though interesting cyclical characteristics are indicated (see Chart 7-1). Successive specific and reference cycle patterns are presented to permit close consideration of the behavior involved (Charts 6-10, 6-11, and 6-12).

There are eight clear-cut and systematic specific cycles in the three countries, with total specific amplitude for the German and American series at 134–135, nearly three times the amplitude of the American building-wage differential. (For the one clear-cut specific cycle in the French series, 1880–99, specific amplitude was about one-fourth less; considering the dampened character of the French long-wave process, that was considerable.) The much higher level of the Scotch amplitude and the much longer lag on both peak and trough, nearly approximating neutral timing, are probably due to the negotiated and crudely calibrated adjustment of mortgage rates by an investor-borrower state council. The rates were fixed at conventional levels and were adjusted in multiples of 25 basis points. Mortgage rates fixed in this way should lag on reference chronologies and should involve higher peaks and lower troughs, with a corresponding higher amplitude. If the series had been smoothed by a moving average, or by averaging peak and trough values, presumably Scotch amplitudes would have corresponded more closely to American and German amplitudes.

The characteristics of reference-cycle patterns are equally interesting. There were altogether seven and a half reference cycles surveyed for our three countries. In each case, the patterns are positive, rising in reference expansions and falling in reference contractions. There is variability in timing as witnessed by the individual reference patterns. On the available evidence, Manhattan indicates a tendency to lead, but this was not consistent and did not prevail at turning points; for that reason it possibly was not significant. The German tendency to lag was a little more prominent and shows up on both reference cycle phasing and turning-point counts. There were altogether five lags, three leads, and five synchronous timings for the two countries on matched turning points. The Scotch tendency to lag

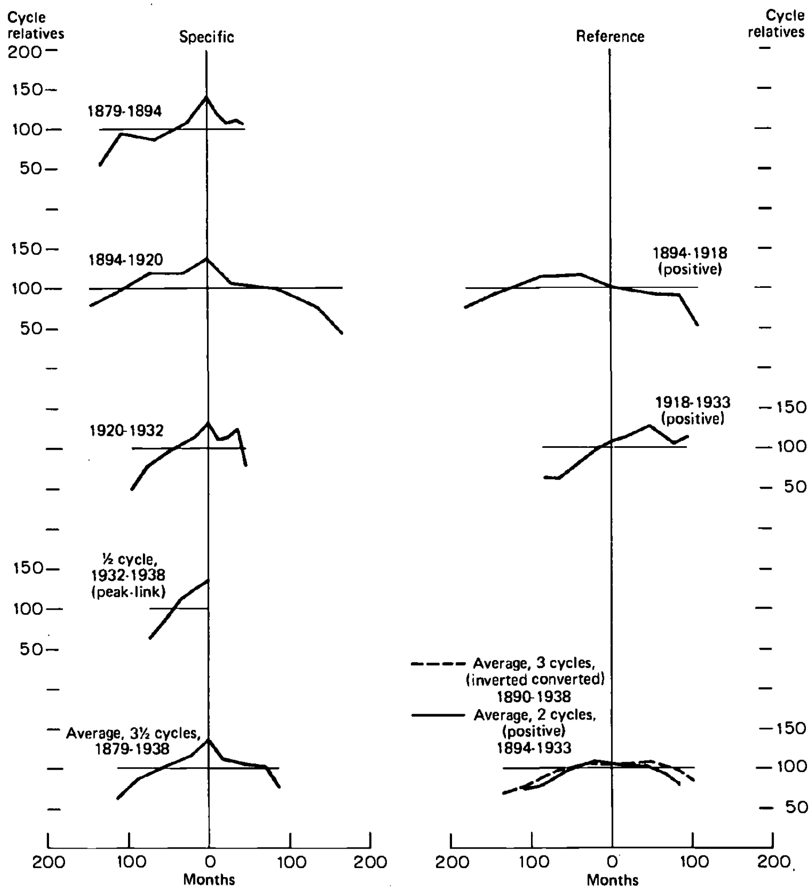
TABLE 6-4

Summary Measures, Long Cycles, Mortgage Yield Differentials, U.S., Germany, Scotland

Measures	*Mean*	*Manhattan,*[a] *U.S.*	*Germany*[b]	*Scotland*[c]
Full specific duration (years)	14.6	16.6	14.7	12.5
Specific cycle amplitude (cycle relatives)				
Full	166.4	134.2	134.2	230.8
Full per year	11.91	8.16	9.12	18.46
Fall per year	−15.92	−8.21	−8.39	−31.17
Full reference amplitude (cycle relatives)	88.2	66.6	59.2	139.1
Lead-lag turning points (years)	.88	.16	.67	1.80
Average deviation (years)	1.44	1.55	1.66	1.12
Lead-lag reference pattern (years)	.85	−.90	.75	2.70

[a] Series 0268, which had 3.5 specific long cycles, in which all seven turning points were matched.
[b] Series 0267, which had 2.5 specific long cycles, in which all six turning points were matched.
[c] Series 0300, which had two specific long cycles, in which all five turning points were matched.

CHART 6-10
Patterns of Successive Specific and Reference Long Cycles and Their Averages, Mortgage Yield Differentials, Manhattan

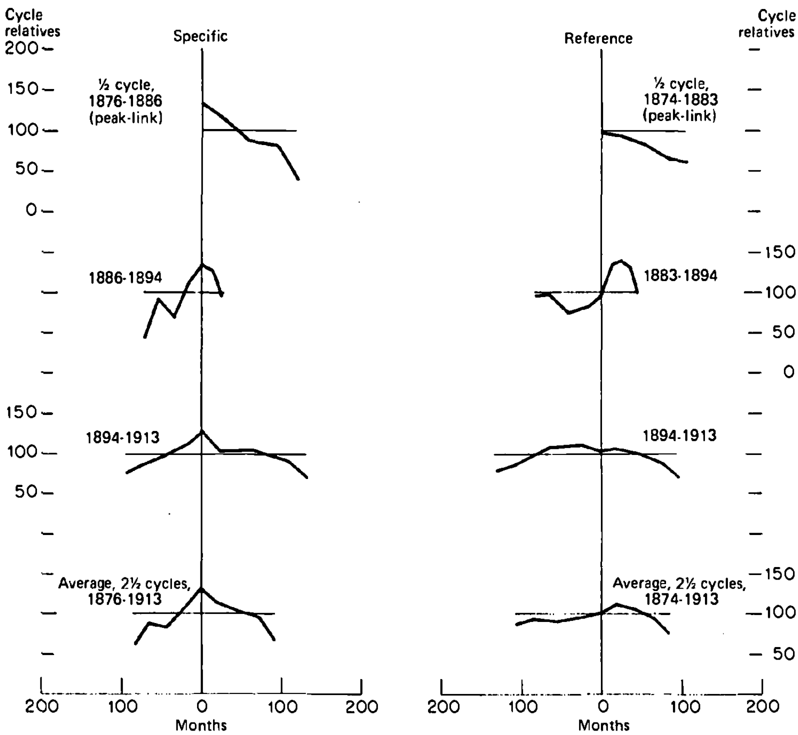


was certainly reinforced by the sluggish kind of pricing decisions made.

Because of timing variability and near absence of upward trend, less than half of the total specific amplitude is retained in reference cycles. Nevertheless, the reference falls are unambiguous. The patterns clearly reflect a consistent response of capital markets to long building expansions and contractions; they indicate that during long expansions capital funds were procured by paying widening interest differentials. Long building contractions are in turn accompanied by improving terms of finance and more favorable access to loan markets. This in

CHART 6-11

Patterns of Successive Specific and Reference Long Cycles and Their Averages, Mortgage Yield Differentials, Germany



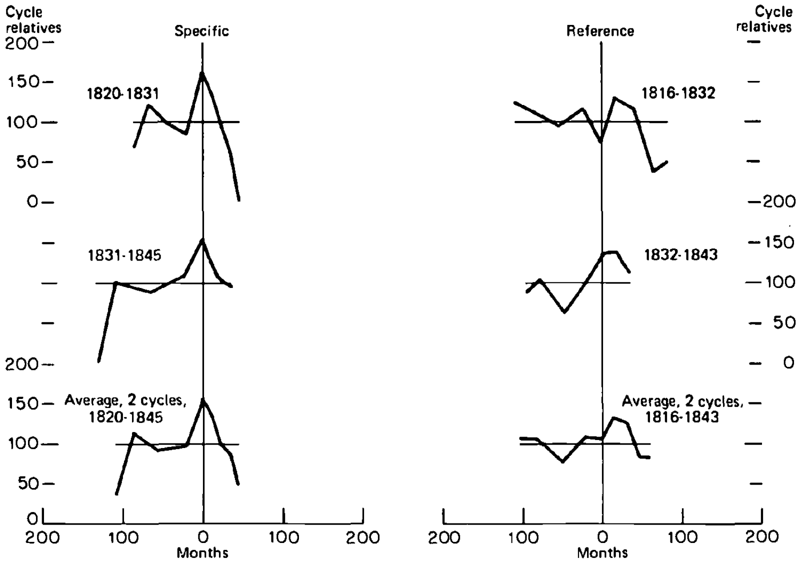
general confirms the hypothesis of Guttentag that short cycles would appear to be related "mainly to changes originating in the mortgage market" as opposed to long cycles which appear to be actuated by changes in demand [115, p. 281]. Our results also reinforce the suggestion of positive association disclosed in earlier investigations between long expansion periods and either "large or increasing spreads."[19] Finally, the tendency to positive covariation of yield differentials and fund flows has in general been confirmed in the American postwar experience. Particularly since mid-1953, the "influence of yield spreads on gross flows," moving at a lag, "has been particularly evident" [156, p. 13].

Rentals

Shifts in cost of land and of new building must now be related to shifts in prospective building rental revenues. If rates of rental

CHART 6-12

Patterns of Successive Specific and Reference Long Cycles and Their Averages, Mortgage Yield Differentials, Scotland



fluctuate in harmony with building costs, including site values, then the deterrent effect of higher building costs on new construction would be offset. Our information on rents indicates that this offset at least partially occurs (see Table 6-5 and Charts 6-13 and 6-14). Rentals exhibit a long swing, rising in building expansions and falling in building declines; moreover, varying somewhat more than building costs, if rentals for vacant units are the working guide to rental incomes of newly built properties. Total reference amplitude for vacant units was some 52 cycle relatives (61 for specific) against a mean total reference amplitude for building costs, covering materials and labor costs, of 34 cycle relatives (51 for specific). Shifts in rental returns for new construction would thus have exceeded the range in fluctuation of building costs alone. The excess would go at least part way in redressing the balance of additional cost growing out of higher land charges and higher interest costs for mortgage finance.

If rental incomes of newly built properties more closely approximates rental incomes of occupied, rather than vacant, dwelling units, then a much lesser amplitude of rent fluctuation and a smaller offset against shiftings in site values, building

TABLE 6-5
Summary Measures, Local Long Cycles, Rent

			Vacant Dwellings[b]			
Item	*Units*	*Occupied Dwellings*[a] *Mean or Total*	*Mean or Total*	*Hamburg*[b]	*St. Louis*[c]	*Glasgow*[d]
A. Totals						
1. Number of series		2	3			
2. Number of specific long cycles		5	6	2	1.5	2.5
3. Number of turning points (TP):						
a. Matched		10	12	4	4	4
b. Unmatched		3	2	0	0	2
B. Mean values						
4. Full specific duration	Years	15.15	12.4	12.5	11.3	13.5
5. Specific cycle amplitude						
a. Full	Cycle relatives	37.2	60.7	74.0	43.5	64.6

	b. Full per year	"	2.27	4.89	5.92	3.95	4.79
	c. Fall per year	"	−2.13	−4.14	−6.57	−3.17	−2.67
6.	Full reference amplitude	"	22.6	51.8	68.1	39.1	48.1
7.	Secular weighted average growth per year	%	.814	n.a.	n.a.	n.a.	n.a.
8.	Lead-lag (LL) TP:						
	a. LL	Years	.30	−2.28	−4.25	−2.1	.5
	b. Average deviation	"	1.72	2.46	1.88	3.00	2.5
9.	LL reference pattern	"	.38	−2.3	−4.0	−2.9	0
10,	Optimal serial correlation trend adjusted:						
	a. LL	Years	−.5	−2	−4	0	n.a.
	b. Correlation coefficient	r	.75	.637[e]	.750	.523[f]	n.a.

n.a.—not available.

[a] Includes series 0025 and 0031, which had five specific long cycles in which ten turning points were matched and three were unmatched.

[b] For series 0032, 0083 and a Glasgow series.

[c] For items 1–9 series 0134 of St. Louis rentals 1890–1914 by Albert Rees [218, p. 97f.]; for item 10 series 0083, running to 1933, was used.

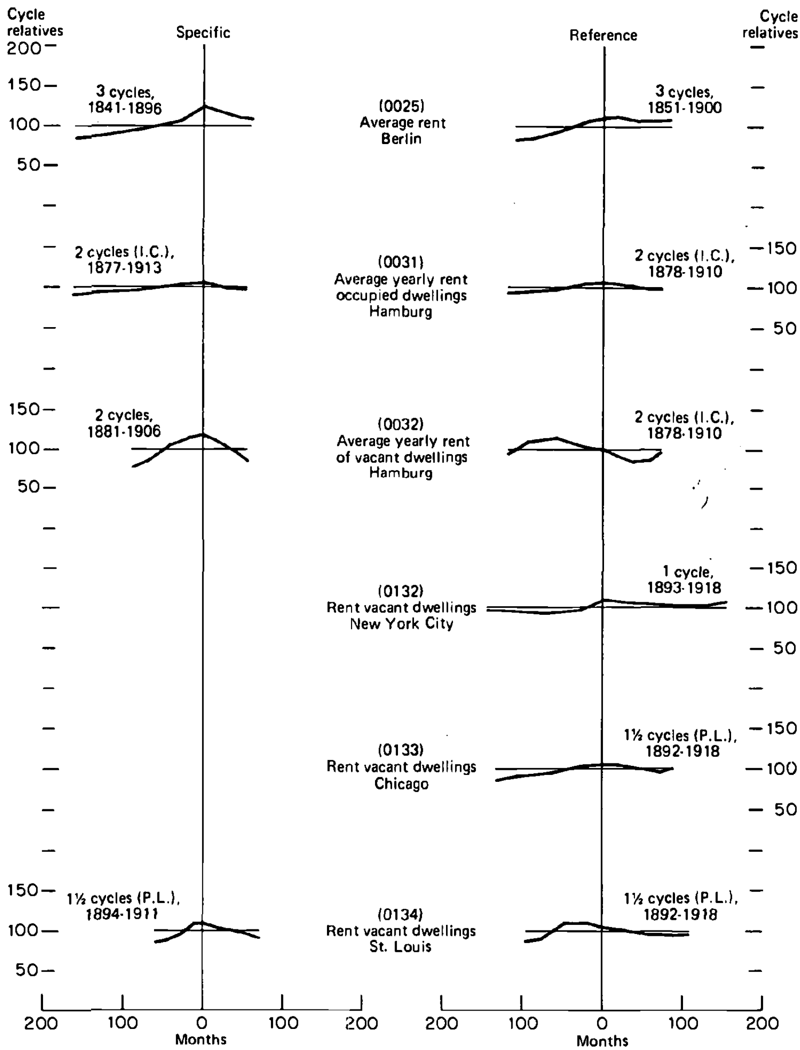
[d] Results only approximate since between 1870 and 1912, 10 years omitted (1891–95 and 1896–1900) [46, pp. 16 ff.].

[e] Excludes Glasgow.

[f] Includes war period.

CHART 6-13

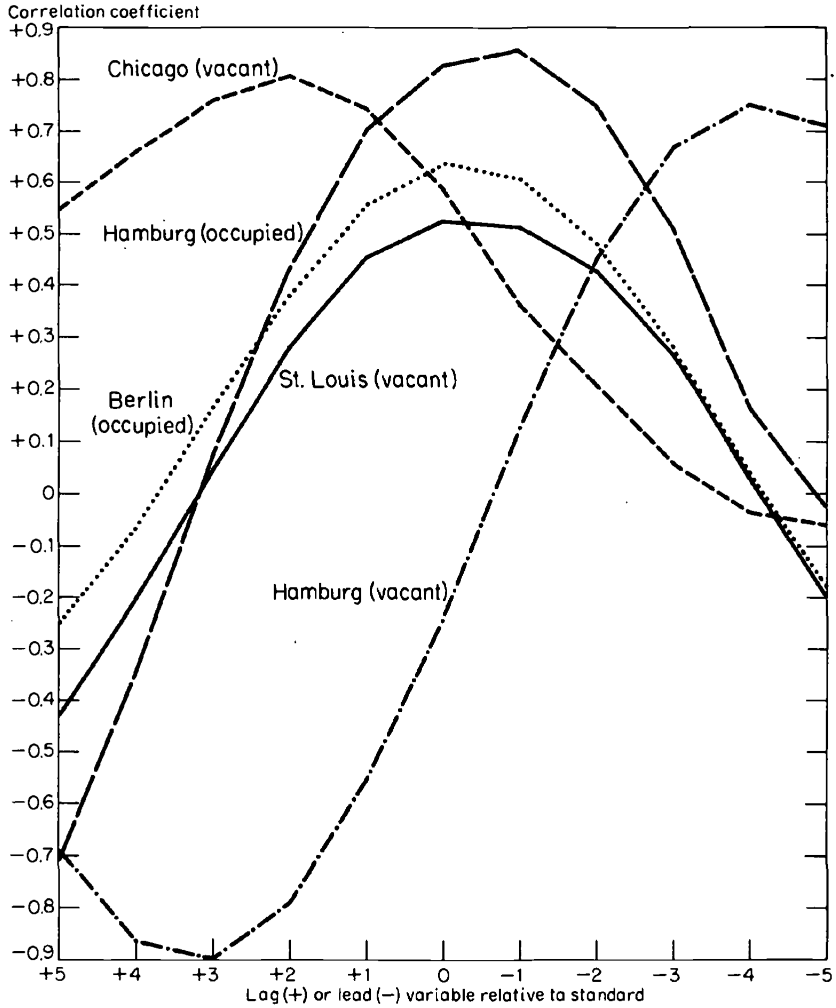
Patterns of Average and Specific and Reference Long Cycles, Rent, Six Cities



costs, and interest charges, are observable. The amplitude of reference fluctuation of occupied rentals was only some 23 cycle relatives (37.2 for specific), giving evidence either of the strength of contract frictions for occupied rentals or of a tendency for fluctuating demand to seek vacant facilities.

If newly built properties embody innovations which result in the formation of distinct housing submarkets, then neither the

CHART 6-14
Correlogram, Rent Series (Trend Adjusted) Five-Year Moving Averages



rentals of vacant nor of occupied housing units belonging to other submarkets would govern rent levels for new building. The evidence on timing interplay between occupied and vacant rentals is suggestive but not fully consistent nor does it clearly point to the emergence of distinct submarkets. On the mean values, vacant rentals lead occupied rentals by a margin of 2.25 years on twelve matched turning points, 2.3 years by reference cycle stages, and 2 years on correlogram values. The Hamburg rent correlograms clearly exhibit this relationship and over the full range of two pre-1914 cycles (see Chart 6-14). St. Louis reference cycle patterns exhibit the same clear lead. However, the lead over residential cycles is greatest for Hamburg, falls to less than one year for St. Louis, and—according to the correlogram and reference cycle patterns—turns into a lag for Chicago and approximately simultaneous timing for Manhattan and Glasgow. Since nonrental residential construction would affect the correlation in the Chicago and St. Louis series, variation in timing is understandable. But variation in such cities as Hamburg, Manhattan, and Glasgow—where rental construction dominates—is more difficult to explain.

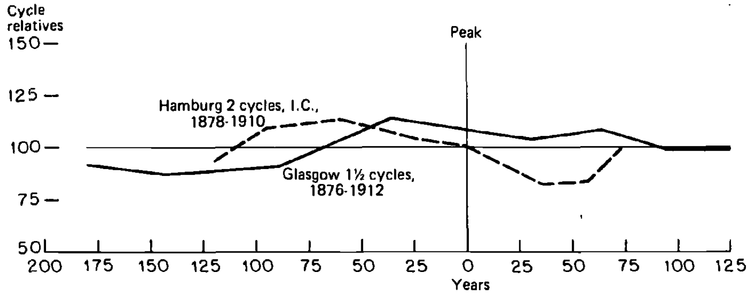
That variation in timing is in some sense structural and not random is indicated by the correlograms of our three vacant rental series (Chicago, Hamburg, St. Louis). The Hamburg correlogram exhibits classical neutral timing inverted to that of vacancies. High positive coefficients for high lead values in vacant rentals are matched, as we have seen, by high negative coefficients for vacant units of the same serial order (see Chapter 5). This is as expected and is confirmed by multiple regression analysis, as will be seen later in this chapter. Rent prices for vacant units in Hamburg respond perfectly with little lag to cyclical shifts in the relative number of vacant units. But with the same vacancy pattern in St. Louis (see Chart 6-14), the rental correlogram of cycle pattern does not exhibit this inversion, nor is it indicated in Manhattan or in Chicago.

The classical form of the Hamburg rental market and its long cyclical swings stands out clearly in contrast to Glasgow. For both cities, between 1870 and 1911, rentals for occupied and vacant dwellings were separately tabulated. The Glasgow data is imperfect, since for ten years it was necessary to interpolate estimates.[20] For both cities the resultant average reference-cycle patterns are shown in Chart 6-15. The Hamburg pattern is a classical instance of neutral timing perfectly inverted to its vacancy pattern. The Glasgow vacant rental is less well outlined, and can be analyzed at best either as irregular or with an expansion phase of II–IV and a contraction phase of IV to II.

The more sensitive differential between occupied and vacant rentals should correspond inversely with building if the same housing submarkets are involved. When occupied rentals exceed vacant rentals, residential building should be discouraged. When

CHART 6-15

Patterns of Average Reference Long Cycles, Average Rent of Vacant Dwellings, Glasgow and Hamburg



vacant rentals rise relative to occupied rentals, residential building should be encouraged. Hamburg experience conforms to expectations with its perfect neutral timing. The corresponding chart for Glasgow shows less rationale. Even allowing for the indicated upward trend in the differential, corresponding to a secular accumulation of deteriorated property, observed oscillations are poorly related to oscillations in vacancies or in building.

The structure of the rental markets in Hamburg, Glasgow, Manhattan, and Chicago diverged significantly with regard to the position and function of vacant units. Vacant units in Hamburg appear to be more like occupied units; in Glasgow vacant units may have corresponded more to substandard units, toward which demand would gravitate in depressed times. If these units were characterized by negative income elasticity to some significant degree, then some of the differences in our rental patterns for vacant units is explicable. Boom building periods would then be associated with positive occupied-vacant rent differentials. Regression analysis of Hamburg observations showed that changes in long cycle relatives of occupied rentals for corresponding long specific cycle phases were 35 per cent of the changes for vacant rentals.

For Chicago and Manhattan, however, variability of vacant rentals seemed more restrained. For the one specific cycle that could be identified in the two series, amplitude both total and per year was of the same order of magnitude as our measures for rent of occupied dwellings. Mean total specific amplitude for Manhattan and Chicago was 41.2, or only 107.5 per cent of mean occupied rental and two-thirds of other vacant rentals. Rate of amplitude per year was 2.31, or only slightly above that for occupied rentals. Inspection of the chart will show highly dampened reference cycles. Yet Manhattan and Chicago should have experienced lively rental markets.

Perhaps restrained amplitude and timing in these cities are due to the fact that the survey of vacant dwellings was restricted to advertised rentals for dwellings characteristic of mean family incomes of workmen. Since advertisements specified little information regarding quality of accommodations, the mean quotations may reflect changes in "mix" offsetting shifts in level [218, pp. 97ff.]. It is known that less desirable units in every price class have a higher vacancy incidence and correspondingly will tend, in good times, to predominate in want ads. In bad times, the incidence of vacancies among higher quality units will rise. The systematic shift in composition of vacant units will dampen the amplitude of the mean value of the observations, since the peak rentals will predominantly measure less desirable units and trough rentals will reflect the availability of better units.

The varied behavior of rentals for vacant and for occupied units explains why highly diversified views regarding rental behavior could all derive some semblance of empirical justification. At the one extreme was the view that "rents are more sensitive than other real estate prices. . ." [217, p. 101]. Other analysts have stressed the "notoriously sticky" behavior of rents.[21] Both views are consistent if a distinction is made between vacant and occupied rentals.

Real Estate Prices

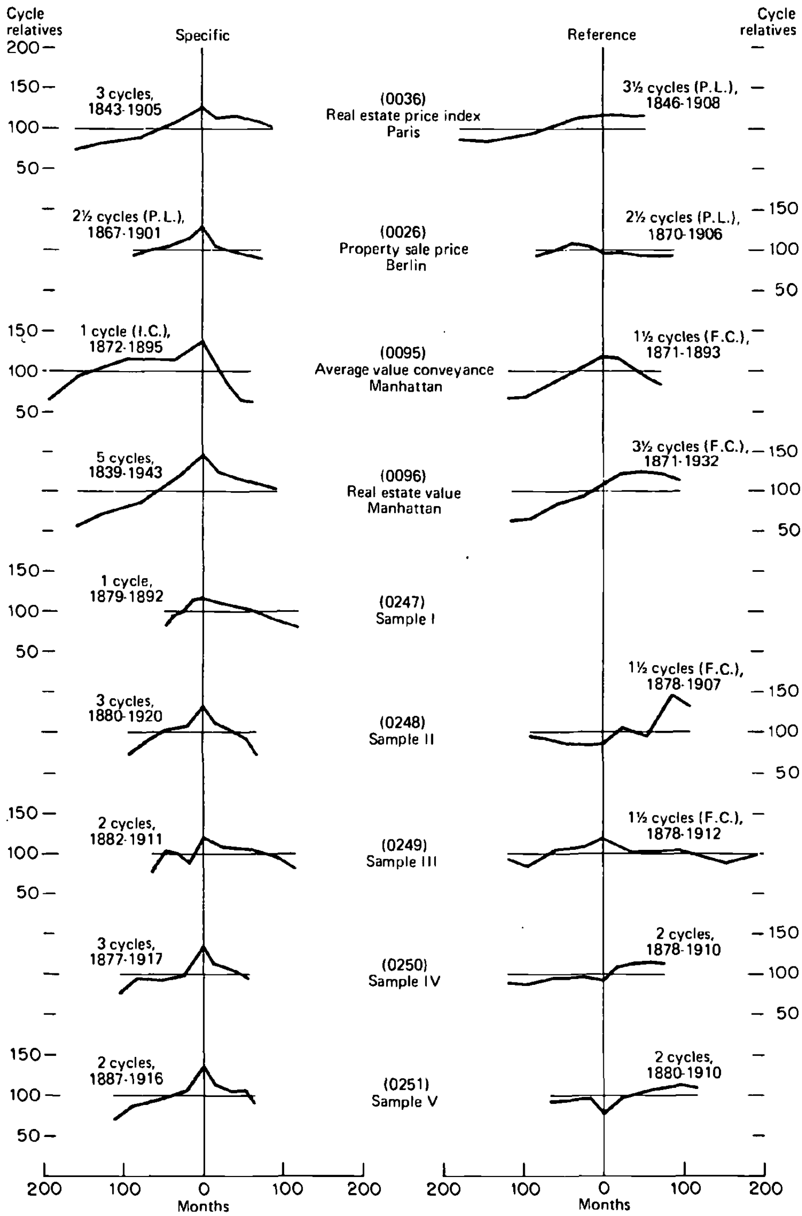
Variations in the value of vacant land and in the level of rentals, both for vacant and occupied dwellings, will tend to affect selling prices of improved nonfarm property. We have nine series whose tabular results are brought together in Table 6-6 with graphic results shown in Chart 6-16. For both the Ohio and non-Ohio series the mean specific total amplitude was near 100 and the per year rates of specific declines were relatively high (−7.45). These amplitudes are less than one-third of those reached by prices for acreage land, but are nearly twice the amplitude of cost of building and of vacant rentals. This relatively active response of real estate selling prices to swings in

TABLE 6-6
Summary Measures, Local Long Cycles, Real Estate Price

Measures	Ohio[a]				Non-Ohio[b]		Totals			
	Mean	*Median*	*High*	*Low*	*Mean*	*Median*	*Mean*	*Median*	*High*	*Low*
Full specific duration (years)	13.96	14.0	14.5	13.4	18.95	20.75	16.17	14.50	21.0	13.3
Specific cycle amplitude (cycle relatives)										
Full	97.92	101.8	121.6	70.6	108.42	104.4	102.6	101.8	148.7	70.6
Full per year	7.06	7.63	9.12	5.04	6.04	5.94	6.44	6.33	9.12	3.73
Fall per year	−7.18	−8.35	−10.84	−3.53	−7.78	−6.24	−7.45	−6.72	−15.20	−3.46
Full reference amplitude (cycle relatives)[c]	67.5	64.5	88.4	52.6	57.2	53.3	62.4	64.5	88.4	34.1
Secular weighted average growth per year (per cent)[d]	1.075	1.188	1.860	.337	.621	.723	.905	.956	1.860	−.325
Lead-lag turning points (years)	−.53	−.25	−1.33	−3.33	1.02	1.28	.16	0	3.67	−3.33
Average deviation (years)	2.85	2.89	4.52	1.55	2.23	2.11	2.57	2.40	4.52	1.55
Lead-lag reference pattern (years)[c]	−1.20	−.83	1.00	−4.15	.813	1.00	−.194	−.37	3.05	−4.15
Optimal serial correlation, trend adjusted[e]										
Lead-lag (years)	.75	1.0	4.5	−3.5	−.17	.5	.36	.5	4.5	−3.5
Correlation coefficient (r)	.805	.780	.970	.690	.318	.674	.596	.690	.970	−.402

[a] Includes series 0247 through 0251, which had eleven specific long cycles, in which twenty turning points were matched and five unmatched.
[b] Includes series 0036, 0026, 0095, and 0096, which had 11.5 specific long cycles, in which twenty-one turning points were matched and six were unmatched.
[c] Excludes series 0250. [d] Excludes series 0096. [e] Excludes series 0248 and 0095.

CHART 6-16
Patterns of Average Specific and Reference Long Cycles, Real Estate Sales Price, Nine Areas



demand reflects the fluidity of market pricing characteristic of real estate markets, which may try to take off on speculative flights characteristic of urban land values. But in flight, prices for existing improved property are related to the movement of building costs, which govern the terms on which new construction is made available. Real estate selling prices will also reflect anticipated rental revenues. The behavior of the selling price of improved nonfarm property thus embodies a kind of weighted average of the price patterns for cost of building and land values, on the one hand, and of property returns on the other hand, as indicated by rental movements.

If our mean values reflect the typical order of magnitude then the amplitude of selling price of improved property (including land) is approximately double that of the cost of building new structures (excluding land and builder's profit). The approximate long-cycle component amplitude indicated for unimproved site value alone is somewhere near 200 cycle relatives, if our Ohio acreage value sets proper outer limits. But site values play a smaller role in realty value than cost of building. The proportions of site value to building cost for residential property of the kind principally reflected in our analyzed series changed over the years. Excluding all improvements (roads, sidewalks, grading, utilities, parks, curbs, and so on) which build up site values, it is doubtful that a four-to-one ratio of building cost to bare site value would be far out of line. In that case, a 34 per cent amplitude for building costs and a 200 per cent amplitude for site value would yield a total amplitude of realty improved values of 67 cycle relatives, or about what was observed for improved realty price swings.

It is worthwhile checking these estimates of real estate value and building cost movements, drawn from fragmentary data, with records of other experience and with judgments of other investigators. Our findings are reaffirmed by the report of David Blank that in most periods the market price of homes fluctuates more widely over the short run than do construction costs, the difference in rise or fall perhaps amounting to as much as 10 per cent in a period of several years. The long-run movement of prices and home-building costs "is remarkably similar" [21, p. 78]. This finding in its own way confirms the substantial emphasis which courts have placed on cost of reproduction in determining value. "The most strikingly distinctive feature of *judicial* valuation . . . is to be found in the proneness of the courts to single out the estimated replacement cost of replaceable property, minus certain allowances for depreciation, as the most reliable index or measure of value [25, p. 150]. The courts would find refuge in a rule which constitutes a safe upper limit of value. For the same reason, professional appraisers have come to feel it an unsafe guide in particular cases. This is partly due to inapplicability of general depreciation rates to the individual property and partly to circumstances which have impaired or built up going concern values or have made the property not worth reproducing [25, pp. 150–176]. Both courts and appraisers in their own way recognize the truth set forth in our empirical findings: that average prices of improved realty fluctuate with greater amplitude but in close correspondence to building costs.

Vacancy and Value Shiftings

By its nature, any movement in vacancies is a public event. The empty dwelling is talked about by neighbors and street observers and will often be listed with dealers or formally advertised to the public. Vacancies are thus highly visible and serve to signal the shifting currents of demand and supply for shelter. The signal is communicated quickly and evaluated by participants in the real estate market with the interpretive skill developed by artisans in a craft. Signals require evaluation since only in recent years have up-to-date comprehensive vacancy statistics for our large cities been collected and made public. The vacancy rate as a single magnitude has only acquired common notoriety since our experience with rent control. Even now, however, a given value of a vacancy rate will need to be interpreted in the light of its derivation by way of type of building or location, any cumulative drift, and other abnormal factors.

The change in vacancies has potent effects on the financial operations of rental property. The variable or "user" costs of using shelter facilities are slight and irregular and may be wholly offset by handling charges of tenant management.[22] The larger part of additional revenue obtained by filling a vacancy will go to swell profits or to reduce losses. Since the profit margin of the landlord is not a large one, a slight movement of the vacancy rate will have multiple effects on profits of operation. As we have seen, rent levels on vacant properties "lead" peaks and troughs of building activity proper, but in their turn they lag behind peaks and troughs of vacancies proper. For the same reason that rents begin to move, sale prices of rented property, in their own dampened way, will respond to cheerful news. Still more indirectly, there will be a tendency for values of vacant lots to rise.

The predominant role of vacancies in generating changes in rent has been indicated by multiple regression analysis.[23] The linkage of rents to vacancy rates has been graphically exhibited for a number of leading cities in terms of an "occupancy-rental pattern" which has definite form under given market conditions [22, pp. 181–208; 91, pp. 241–247, 263ff.]. The influence of vacancies on rent is paralleled by similar "market-clearing" functions, which seek to explain short-term interest rates by "excess bank reserves" and wage-rate changes by unemployment.[24]

Only in the United States, and perhaps in a few of the smaller communities in Europe, was there an extensive market for single-family residences and a stock of vacant single-family dwellings awaiting sale. A much smaller proportion of the owner-occupied stock will be vacant for this purpose, since it will be advantageous for an owner to continue to reside in a property until it is sold. The mean rental vacancy rate for the period 1960–64 was between four to five times the corresponding rate for owner-occupied dwellings [269, p. 699]. A given change in demand for sale property tends to affect prices of the vacant sale units much more dramatically than the rental market. The different buyers and sellers who succeed each other for purposes of completing one or two transactions on the owner-occupancy market develop comparatively little rational awareness of market trend or market behavior. The realized level of selling prices in such a market should tend to be abnormally sensitive to changes in stocks of vacant properties on the market for sale.

In a perfect market the shift in demand which is recorded in the movement of vacancies, allowance being made for any new construction or retirement of old structures, would directly affect both selling prices and rental rates; and any influence of vacancies on building would be transmitted through the price effects. As Cairncross and Tinbergen noted "the stickiness of rents, closely connected with the long duration of letting contracts and further imperfections in this market, prevents such a rapid adaptation." Tinbergen accordingly concluded, as did

Cairncross, that "the number of unoccupied houses influences building activity independently of its indirect and lagged influence through derived price changes [252, I, p. 93; 46, pp. 15f.]. For the cities of Stockholm and Hamburg it was possible to conduct multiple regression analysis on residential building and to evaluate the direct influence on vacancy rates against the influence of rent which, as we have just seen, is itself influenced by vacancies lagged for an earlier period. Owing to the choice of units, the regression coefficients can be interpreted as specifying the multiplied response in building (in terms of per cent deviation from trend) induced by a 1 per cent change in the explanatory factor. For both Stockholm and Hamburg the regression results, summarized in Table 6-7, indicate that a 1 per cent change in vacancy rates is from three to four times more potent in affecting building, though with a longer lag, than a 1 per cent change in rent or in income variables. However, some of the variables are statistically suspect; there were a number of inconsistent regression runs from Stockholm. Hence the elasticity coefficients are only broadly significant. These results, it must be added, were obtained from analysis of short-run movements, derived by computing deviations from a nine-year moving average; analysis of longer waves with longer time lags might alter results appreciably.[25]

Since vacancy rates constitute, both directly and through a derived influence on price, the main working mechanism of the housing market, it is not surprising that vacancy rates have from the outset been singled out for special attention by students of building cycles. A German commentator, writing in 1905 about a long building cycle in Munich between 1805 and 1911, noted that only "when the number of vacant dwellings is under 3 per cent can one speak of a rising housing need" which "gives the impulse to a higher level of building activity" [220, p. 80f.]. Emmy Reich in her extended study of Berlin, so often cited in these pages, described the mechanism of the housing market and signals for advance and retreat in terms of movement of vacancy rates. The British report which first brought to light the long-swing movement in London housing production did not fail to note that the variation in the number of empty houses was closely associated with it [238, p. 169]. Hoyt pivots his version of the upswing phase of the Chicago building cycle around the tendency for vacancies to disappear as "people crowd into all

TABLE 6-7
Regression Coefficients, Rent, Vacancy, Incomes on Residential Building (in Terms of Deviations from Trend); Hamburg 1878–1913, Stockholm 1884–1913

Item	*Vacancy*		*Rent*		*Total Income, Stockholm*	*Corporate Profit Rate, Hamburg*
	Hamburg	*Stockholm*	*Hamburg*	*Stockholm*		
Regression, simple	−15.5					
Regression, multiple, excluding rent	−20.1	−4.4			4.29	1.72
Regression, multiple including rent and other factors	−16.5	−3.7	5.20	1.14	3.75	1.71

SOURCE: Tinbergen [252, I, pp. 103–111]. Vacancies were lagged 3 years for Hamburg and 1.5 years for Stockholm. Other terms were lagged one year, except corporate profit rate in second line, where a zero lag was used.

the available space" so that "rents of old buildings rise" [134, p. 375]. Summing up these studies in his comprehensive analysis of the German housing and building market before 1914, Hunscha estimated that between 20 and 40 per cent of new housing demand was concurrently either underprovided or over-provided, while the time gap between new demand and new supply runs to one to two years [136, p. 16]. Cairncross reduced the "logistics of the building cycle" to the "magnitude of the swing in empty houses that builders are prepared to treat as normal" [46, p. 31f.]. It was not long before formal sequence models were designed and statistically evaluated showing a building cycle revolving around a decision lag and the cumulation of a building "deficit."[26] And the practical experience of a prolonged siege of rent controls showed that vacancy rates were at once the supreme test of the "normality" of a market, the criteria for release from rent control, and the best means of predicting the expansive power of rent movements.

G. SUMMARY

Prices at four different levels—urban site values, building input factor markets, rental values, and values for improved residential properties—correspond to basic markets in which the new and the old are continually adjusted on a plane which aligns techniques, returns, and benefits in shifting equilibria. The market for vacant land includes raw farmland or wasteland as well as developed lots which are graded, landscaped, and equipped to serve as building sites. Vacant sites traditionally have zero wastage and low costs of upkeep; they tend to appreciate rather than depreciate over time; investment in them can be financed with long-term loans at moderate interest rates; they are either tax exempt or usually subject only to a diluted property tax; and they have access to organized realty markets which provide a fair measure of liquidity. As an investment asset, vacant urban land is tangible, can be evaluated best with local knowledge informally absorbed, and is not especially subject to economies of scale. Hence investment in land for capital gains has been a basic feature of urban land markets. The gains involved have generally been of a long-term nature, since trading costs would preclude the in-and-out movement common to speculative markets for primary staples or standard investment securities. Prospects for capital gains depend on values expected to be maintained or value growth rates to be sustained over a long forward period. Thus urban land values have acquired an elasticity of response and a potential for cumulative movement unique to any major productive input factor. It would be expected that land value movements would be slow to start, would develop considerable momentum, and would persist long after reversal was signaled.

Something like this is indicated by our survey returns for sale values of undeveloped urban land in Ohio. The 5½ long specific cycles in acreage values experienced a total mean amplitude of 336 and a reference amplitude of 188 cycle relatives. These cycles moved irregularly but with a strong tendency to invert, with a lead of a year or two relative to residential building (or a lag of six to seven years behind building cycles). Value levels for subdivided vacant lots and building sites exhibited a lesser degree of instability, with nearly concurrent timing. Paris means amplitude for subdivided vacant lots was 132.2 and Chicago's record, over a comparable stretch of years, was 193.3 cycle relatives. In both areas amplitudes receded as urban growth rates slowed down.

The cyclical shifting of urban site values was accompanied by a lesser movement of building costs, dampened by the greater supply elasticity. The price response of building materials to long-swing shifts in building for the five long cycles which spanned the nineteenth century were studied in Germany and in the United States. A striking parallelism of form and regularity of timing characterized the two sets of long cycles. For both countries the century included two wartime inflations—around the Napoleonic wars and around the 1860's–1870's. The American mean duration was somewhat longer (19.0 years compared with 16.8 years); the American mean total specific amplitude was a little less (90.4 compared with 97.4); and the yearly rate of fall was of lesser magnitude than that of Germany. American timing around reference turning points was more variable, so that mean American reference amplitudes (37.5) were a full third under the German (58.0).

In settled peacetime periods, mean reference amplitude was minimal for the United States and England. For England (1870–1913) it was only 7.4 cycle relatives, for the United States (1830–60, 1880–1914) only 15.2 cycle relatives.

Our measures for total unit building costs—reflecting changes in building material purchase prices, productivity shiftings, and unit labor costs—exhibited a corresponding degree of responsiveness to cyclical shifts in demand. Total specific amplitudes for twelve long cycles in unit building were only 34.1 ± 16.8 cycle relatives, reflecting the very sluggish behavior of building-trade unit labor costs. This probably accounts for the clear-cut tendency of building costs to lag two or more years at turning points, in reference cycle measures and on correlograms.

An insight into the impact of building cycles on conditions in the labor market is afforded for America by building-trade earning differentials over manufacturing hourly wage levels. A definite cyclical pattern was exhibited, tending to lead at the earlier turning points and to lag at the later ones. Mean total specific amplitude was 47.9 cycle relatives, of which only 19.8 survived timing variabilities for inclusion in reference amplitude. The effect of a relative wage change of around 1 per cent per year on a demand for building, which fluctuates nearly ten to fifteen times that much, is inappreciable.

Of larger magnitude is the price premium paid in the capital market to mobilize the funds needed to finance building booms. Interest rates themselves moved sluggishly in long fifty to sixty year movements and showed little direct responsiveness to building cycle rhythms. But relative differentials of mortgage yields over bond yields for three countries exhibited distinct long specific cycles, with a mean duration approximating that of the relevant reference cycles. A positive cycle of mortgage rate differentials means that building expansions mobilize capital by paying a rising interest premium; conversely, building contractions would be impeded by relatively easier terms of finance. Of eighteen potential turning points, none were unmatched and mean deviation in timing from the mean lead-lag was only 1.44 years. Mean characteristic total specific amplitude, allowing for special characteristics of our Scottish series, was some 134 cycle relatives; and between 60 to 70 of these relatives carry through to the reference level. The tendency for the mortgage yield differential to lag was greatest in Scotland where mortgage rates were negotiated by a quasi-public cartel. In Germany, France, and the United States the differential led or lagged according to circumstances.

These cost shifts for land, labor, building materials, and finance were in part offset by a parallel movement in rentals. This movement was considerable for vacant dwellings (specific amplitude of 60.7 and a reference amplitude of 51.8). With a two-year lag, these swings in value, somewhat dampened, became reflected in occupied rentals, which, in turn, enter into the income stream. Vacant rentals affect incentives to build additional rental facilities. The positive and substantial covariation of building costs and rentals means that landlords have passed on to ultimate users the higher costs of building and at least some of the burdens of appreciated urban site values and higher interest charges on mortgage credit.

Though rental returns did not seem to rise (or fall) on the scale matching the cost of land, building, or finance, selling prices of old realty (chiefly dwellings) more nearly achieved this result. They showed a mean specific total amplitude range of 98–108 and a reference amplitude of 57–68, as compared with 51 and 34 for building costs alone.

NOTES

1. See [114, pp. 406–425; 195, pp. 14–41; 13, pp. 101–136].

2. For data and survey see [114, pp. 407–425]; for French capitalization rates over five centuries see [228, pp. 446f.]. British capitalization data is presented in [46, pp. 212–215].

3. For two interesting statements of these allocative functions, see [256, pp. 43–46; 217, Chap. 12].

4. See my paper [111, pp. 37f.].

5. The rise in the value of land because of its greater scarcity as population grows is augmented by "the confident expectation of the future enhancement of land values" and this leads to "speculation, or the holding of land for a higher price than it would then otherwise bring." In every growing city "much vacant or poorly used land is withheld from use" and at the limits of the growing city "we shall not find the land purchasable at its value for agricultural purposes, as it would be were rent determined simply by present requirements; but we shall find that for a long distance beyond the city, land bears a speculative value, based upon the belief that it will be required in the future for urban purposes. . . [101, pp. 255–257].

6. See especially [276, pp. 270, 386–392, 425ff.; 277, pp. 257–360].

7. How far assessors could go in assessing land for its probable future, rather than its actual present market value was—as Bonbright reported in 1938—a "much litigated question," with courts generally reluctant to go beyond "value based upon the present use in the absence of clear proof that there is or will be another use" [25, I, p. 489].

8. In this inquiry, I have drawn upon my earlier discussion of this subject in [107, pp. 78–86].

9. The systematic movement of interest rates in the Kondratieff periods is well-established fact. See, among other works: [76, II, pp. 53 ff.; 183, pp. 206–215; 177; 154, II; and 229, II].

10. The structural change in the influence of financial conditions on German residential building, reported by Hunscha between 1895 and 1900, may reflect this basic shift [136, p. 31].

11. ". . . when population-sensitive capital formation was increasing more rapidly, other capital formation was increasing less rapidly." This inversion in timing "resulted in so much cancellation that the comprehensive capital formation totals fail to reveal distinct long swings" [161, pp. 333, 351].

12. Thus percentage decreases from peak are listed for Hoyt's land value and for consideration in deeds [134, p. 405]:

	Land Value	Deed Consideration
1873–78	56	51.4
1892–98	33	65.0
1926–32	60	51.5

13. The benchmark series was compiled by T. S. Berry; see [16]. He used methods devised by Edwin Frickey [94, 95]. Arithmetic deviations were taken from link relatives of nine annual series; deviations were standardized for amplitude by expression in quartile deviations. Averages of middle quartile units were taken for each year, converted back to percentages, and cumulated into a time series. See Appendix A in Berry. The nine types of series from which the "pattern" is extracted include: Cincinnati prices, steamboat launchings and tonnage, toll receipts (Ohio canals), public land sales, imports and exports, immigration, and bank and finance series.

14. The rates were obtained from the *Credit Foncier* by Lucien Flaus, Paris, and kindly made available by letter, 30/11/62, to this author. See [93, p. 36]. On operations of the *Credit Foncier* see [170, pp. 241–254]. The mortgage loans are "principally on city buildings and town lots" (p. 248).

15. See Hoyt's detailed canvass of the period [134, pp. 200–232]. Hoyt concluded that "there was no general land boom in which values took a sudden spurt" and no "wild excitement" but a "steady advance" of land values "in the Loop, the North and Northwest sides along the newly extended elevated lines and in the outlying centers. . . . [The] painful remembrance of the aftermath of 1890 checked any tendency toward reckless speculation" (p. 207). Nevertheless in 1909 market opinion was described as "firmly convinced" that prices would "never stop going down" (p. 223).

16. In Hoyt's datings, land values and new construction begin at the same time, land values reach a maximum position above "normal" four months before construction; the decline begins concurrently; but construction reaches a trough 1.7 years ahead of land value (p. 409). Using our datings, out of eight turning points, three represent leads, one a lag, and four concur. At peaks the lead is zero; at troughs, −1.

17. Annual per cent change in prices over the whole period 1784–1861 was for the several commodity classes: building materials, wood—5.49; building materials, other—6.38; ferrous metals—3.96; nonferrous metals—6.36; fuel

and lighting—7.42; grain products—13.0; hides and leathers—6.61. See [18, pp. 424–425].

18. The stimulus for the preparation of this series was a paper by Earl A. Thompson, "Induced Innovation and the Building Cycle," read at the 1962 session of the Econometric Society (brought to my attention through the courtesy of Victor Fuchs). Thompson prepared an index purporting to represent skilled and unskilled pay differentials within the building trades. This probably has a wider margin of error than the building-trade–manufacturing differential; in any case, it exerts little or no influence on the sluggish process of technological improvement in building. Thompson reports a skill differential lead by some three years, or by more than our occupational differential. Using our over-all building chronology, we derive a net lead (inverted basis) of −.8 years (on 9 turns, average deviation 2.27 years). See also [64, p. 379].

19. Grebler et al. [114, p. 226] found in a comparable series that "none of the three contraction phases was accompanied by a high spread"; our cycle patterns show that contraction phases at a lag were accompanied by falling spreads. Of course, at particular points of time other influences operative in the capital market and in building will affect either the yield or building magnitudes. Hence, irregularities and consequent dispersion around our mean cyclical standings is to be expected. The striking fact is that dispersion is comparatively so restrained. Our conclusions are derived from comparison of Manhattan mortgage yields with Manhattan building, not with nationwide building series. Grebler et al. compared building and yield differentials by grading whole long expansion or contraction phases with mortgage yield spreads as "large," "small," or "changing." Hence our more detailed analysis refines their conclusions.

20. Figures for 1891–94, 1896–1900, and 1909 were linearly interpolated. See [46, p. 16]. The listed values in the source of rentals of "all houses" were converted to "occupied houses" by the formula $V \cdot r^{v} + (1{,}0 - V)r^{o} = r^{t}$, in which V = vacancy rate, r^{v} = mean rental for vacant houses, r^{o} = mean rental for occupied houses, and r^{t} = mean rental for all houses.

21. [46, p. 15]; [252, II, p. 93; 206, p. 41]. The virtual doubling of personal income between 1914 and 1919 in the United States generated an increase of the BLS rent index of only 8 per cent and in net rental income of only 35 per cent [67, p. 117]. Even more striking is the limited fall of only 18 per cent in the BLS rent index between 1925 and 1933–34 though house purchase values fell by 31 per cent [91, p. 55].

22. Perhaps "user" charges, as the term was developed by J. M. Keynes [153, pp. 66ff.] is more rightfully applied to housing rentals than to use of other structures or facilities.

23. Our most acceptable econometric test has related rent indexes to vacancies and family income (with some other factors included). The regression coefficients measure elasticities because of the unit values used. Vacancies emerged as the most important explanatory influence.

1914–37	*Family Income*	*Occupancy Ratio*	*Source*
Chawner Regression	.778	2.5	[52, p. 56]
Derksen Regression	.52	4.9	[72, p. 97]
Klein Regression	X	2.0	[157, p. 109]

24. "We shall regard the excess reserves as inventories of money available to the borrowing public at the going interest rate. When the banks accumulate large excess reserves they find that there is a glut of the money market and that the price of money, interest rates, must fall." L. Klein [157, pp. 101, 21f.]. See also, [22, pp. 283–299; 82, pp. 383ff.].

25. Thus the "income" variable for Stockholm was national income, while Hamburg building would be only dubiously influenced by nationwide corporate profitabilities. The rent index, too, was very hypothetical before 1915. Actual average rents per room in Stockholm are only available from housing censuses taken in 1894, 1900, 1905, 1910, and annually after 1915. The rent index before 1894 was estimated from a cost of building index. See [172].

26. The sequence model was designed by Jan Tinbergen and J. Polak [253, pp. 241ff.]. In this model, $B_t = aD_{t-b}$, in which a is a parameter indicating degree of response to demand, b represents a lag of response, D_t represents accumulated deficiency or surplus. Period and amplitude of fluctuations and character (damped, explosive, etc.) will depend upon the relative magnitudes of the two parameters.