NBER WORKING PAPER SERIES
ON
HISTORICAL FACTORS IN LONG RUN GROWTH

THE PRICE OF HOUSING IN NEW YORK CITY, 1830-1860

Robert A. Margo

Historical Paper No. 63

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
November 1994

This paper is a draft of portions of Chapter 4 of R. Margo, Wages and Labor Markets Before the Civil War, (in progress). I am grateful to Jeremy Atack, Clive Bell, Stan Engerman, David Wildasin, and seminar participants at Vanderbilt and William and Mary for helpful comments. This research is supported by the National Science Foundation. This paper is part of NBER's research program in the Historical Development of the American Economy. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

NBER Historical Paper #63
November 1994

THE PRICE OF HOUSING IN NEW YORK CITY, 1830-1860

ABSTRACT

The trend in the price of housing before the Civil War is one of many unsolved mysteries of American economic history. The reasons for the mystery are simple. Existing time series of antebellum housing prices are either not true price indices, or else do not extend back in time before 1850.

This paper presents new archival evidence on the rental price of housing before the Civil War. The evidence pertains to the New York City metropolitan area over the period 1830 to 1860, and is drawn from newspaper advertisements. The advertisements are sufficiently detailed to construct price indices that control for some housing characteristics as well as location within the metropolitan area. The most important finding is that the relative price of housing increased between 1830 and 1860. Incorporating the new housing price indices into existing antebellum cost-of-living deflators (which generally exclude housing) suggests that economic historians have over-estimated real wage growth before the Civil War.

Robert A. Margo
Department of Economics
412 Calhoun
Vanderbilt University
Nashville, TN 37235
and NBER

1. Introduction

The trend in the price of housing before the Civil War is one of many unsolved mysteries of American economic history. The reasons for the mystery are simple. Existing time series of housing prices are either not true price indices, or else do not extend very far back in time before 1860. In addition, they are subject to serious biases. The well-known indices produced by Adams (1975), or by David and Solar (1977), for example, refer to construction costs, not rental (or asset) prices, even though the supply of housing services is dominated by the stock, not current investment.

The only true rental price index, that of Hoover (1960), derives from the Weeks Report of the 1880 census. The Hoover index begins in 1851, and thus sheds no light on the course of housing prices before that date. The index has also been severely criticized by Lebergott (1964, p. 342; see also Fogel 1989). The Weeks data used by Hoover pertain to company-owned housing that was apparently offered to employees at below-market rents. Thus, the ability of the Hoover index to capture both trend and cycles in rental prices can be questioned.[1]

This paper presents new archival evidence on the rental price of housing before the Civil War. The evidence pertains to the New York City metropolitan area over the period 1830 to 1860, and is drawn from newspaper advertisements. The idea of using newspaper advertisements to measure housing prices is not new.

Rees (1961), in particular, drew upon advertisements to estimate rents in six cities between 1890 and 1914. As far as I am aware, however, this is the first paper to use advertisements to estimate rents for the antebellum period.

The advertisements are sufficiently detailed to construct time series of rental prices that control for some housing characteristics as well as location within the metropolitan area.[2] They are also consistent with a priori expectations of the determinants of housing prices. I find, for example, that size was a significant determinant of housing price, as was location within the metropolitan area. I also find that the relative price of housing in New York City rose between 1830 and 1860, and that incorporating housing prices into the calculation of real wages suggests that economic historians may have overestimated real wage growth before the Civil War.

2. Growth of New York, 1830-1860

With a population of 124,000, New York was already the largest city in the United States in 1820.[3] The next forty years witnessed further population growth: by 1860 the population of the city had swelled to 814,000. Several factors account for this remarkable growth. First, the antebellum period was one of rapid urbanization, particularly in the Northeast. The proportion urban in the country rose from 7 percent in 1820 to 20 percent in 1860. Antebellum growth in New York, in other words, was but the

most prominent example of a wider economic phenomenon.

Second, improvements in internal transportation dramatically reduced the shipping agricultural goods from the hinterland. As a result, regional specialization increased, and the tertiary sector grew enormously in New York between 1820 and 1860, as the city exploited its natural comparative advantage as a port. It is important to keep in mind, however, that antebellum urbanization was not primarily driven by "export-led" growth. Growth in demand for city-produced services from the hinterland and from small towns in the surrounding area also led to increased city growth, particularly in manufacturing (Lindstrom 1977; Wilentz 1984; Stott 1992).

Population growth in New York was also fueled by immigration. In the late 1820s, immigration to the United States averaged between 20,000 and 30,000 annually. The number of immigrants on an annual basis doubled in the 1830s, and then increased sharply again (to over 200,000) in 1847. A very large share of immigrants passed through New York -- 70 percent, for example, in 1848 (see, for example, Stott 1992, Appendix C). In 1855, fully 55 percent of New York residents were foreign born.

As the city grew, land use changed dramatically. In 1820, the (effective) northern boundary of the city was Houston Street (in modern-day Greenwich Village). By 1860, the city was built-up to approximately 42nd Street, with considerable pockets of housing located further north in the Upper East and West Sides. Growth was not confined to Manhattan Island; it spilled over into

nearby areas in New Jersey, and into Brooklyn, Williamsburg, and Staten Island. By 1860, for example, the population of Kings County (eg. Brooklyn) was 279,122, compared with 11,187 in 1820 (Rosenwaike 1972, p. 32).

Population growth "uptown" and outside of Manhattan was made feasible by advances in urban transportation through a network of ferries, stages, "omnibuses", and eventually street railways. By moving further away from the center, households could economize on housing costs. In any case, a more distant location became a necessity for many residents as firms increasingly outbid households for central locations (Stott 1992). By increasing demand for more distant locations, population decentralization produced upward pressure on housing prices at the periphery, because land at any given distance from the center of the city was, by definition, in fixed supply. Many of these more distant locations, however, were close substitutes, so the effective supply of land at the periphery might have been fairly elastic, at least outside the city proper, thereby mitigating any upward pressure on rents.

3. Data

Data were collected from microfilm copies of advertisements for rental housing originally appearing in three New York newspapers: the New York Daily Advertiser (1830-1835); the New York Tribune (1836-1860); and the New York Times (various years

in the 1850s). Three aspects of the sampling procedure should be noted.

The first aspect reflects the timing of the New York City housing market. Typically, leases in New York ran from May 1 to April 30, in accordance with the custom of "May Day" (May 1; see Scherzer, 1992, ch. 2). May Day was moving day in New York. Lengthy newspaper stories regularly appeared in early May describing (and decrying) the utter chaos that ensued as rich and poor alike carted their belongings through the streets of Manhattan to their new homes. Because of this (peculiar) market timing, advertisements for rental housing appeared much more frequently in April than in other months, so much so after 1852 that there was no need (on grounds of sample size) to collect data from other months of the year. Before 1852, and especially in the 1830s and 1840s, however, it was necessary to read literally every column of every page, in order to find sufficient observations.[4] Even so, the number of observations for certain years is very small, and to estimate price indices at all it is necessary in some cases to pool the data across years (see below).

Second, the number of advertisements that contained explicit price information was a subset of the universe of advertisements for rental housing. Comparisons of advertisements with and without price information could detect no clear differences in housing characteristics (and, therefore, no basis for discriminating econometrically between the two). Advertisements

without price information, however, occasionally contain statements like "Rent low to a good tenant", suggesting the willingness of (some) owners to negotiate price depending on the characteristics of prospective tenants and, presumably, the state of the market (see Blackmar 1989, p. 238) The working hypothesis is that, if an advertisement contained an explicit price, the price was non-negotiable. While there is little reason to suppose that an index based on such prices would be biased in terms of long run growth rates, it is possible that it would be insufficiently volatile over the business cycle.[5] Since the indices that I present are more volatile than the Hoover index, any short-run biases merely underscore the cyclical inadequacies of the Hoover index.

Third, the vast bulk of rental housing in New York exchanged hands without need of a newspaper advertisement. The Tribune and the Times were middle (and upper-middle) class newspapers. As such, there were relatively more advertisements for rowhouses than three-room immigrant tenements, or for the squalid cellars that so occupied the attention of urban reformers in the 1840s. Still, there are observations on tenements, cellars and, importantly, on single rooms in boarding houses or cheap hotels, along with luxurious (for the nineteenth century) brownstones. To the extent that characteristics of housing can be controlled for in the regressions, the fact that the advertisements pertain to only a small fraction of the New York housing stock should not bias the results.[6]

The advertisements themselves vary greatly in length and in the information provided. In general, the sample selection process rejected advertisements that were vague as to the size of the unit, measured in terms of number of rooms or floors (eg. "house for rent"). Most contained either an exact street address, or information on nearby cross streets (for example, "49th Street and 3rd Avenue"). Prices were stated either by the day, week, month, or year. Many advertisements contained information on various characteristics of the unit, for example, whether there was indoor plumbing, gas, bathrooms, kitchen ranges, storage facilities, fixtures, a yard or garden, access to public transportation. Some even indicated the landlord preferred an "American" tenant (see below).

It is important to note that any housing characteristics were self-reported by the landlord (or the landlord's agent). I have no way of verifying if, in fact, a particular unit fit the description in the advertisement. Also, I have no way of knowing that, if a particular characteristic is not mentioned in the ad, the housing unit lacked the characteristic, or if the landlord simply failed to mention it. Thus, housing characteristics are measured with error. Since my interest is primarily in the trend in rental price, measurement error will not be an issue unless it is correlated with the trend.

Sample statistics are shown in Table 1. All told, there are 1,200 observations in the sample, 88 percent of which refer to private dwellings or apartments. About 65 percent of the

observations occur after 1850. Approximately 77 percent of the observations (= 898/1,151) pertain to New York City or separate villages located on Manhattan Island (eg. Harlem), with the remainder scattered between Brooklyn, other nearby locations in New York State (for example, Long Island), or New Jersey.

4. Econometric Analysis

The most salient characteristic of "housing" is its heterogeneity. Because of this heterogeneity, it is customary to estimate an hedonic index of housing prices (Rosen 1974). The hedonic index is derived from a regression of the log of nominal rental price, r:

$$\ln r = X\beta + \epsilon$$

Included in X's are characteristics of the housing unit, and (in my application) dummy variables for years or groups of years or a linear time trend. All rental prices are adjusted to be on a <u>per diem</u> basis; for example, if the annual rent is given in the advertisement, it is divided by 365 days.[7]

The process of coding the sample identified a large number of housing characteristics that might have appeared in any given advertisement. In the majority of cases, information on many (or most) of these characteristics was missing. In addition, the occurrence of particular characteristics (for example, gas) was

frequently highly correlated with other characteristics (for example, gas fixtures). Extensive experimentation with the sample identified a much smaller subset of characteristics that either were generally significant (in the statistical sense) determinants of rent, or whose inclusion in the regression was important for substantive reasons (for example, year dummies with insignificant coefficients).

One of these variables, the number of rooms, requires comment. In general, no information is available on square footage, so the number of rooms serves as the only indicator of the size of the unit. Although the number of rooms was given in many of the advertisements, in other cases the number of rooms had to be inferred from ancillary information -- in particular the number of stories.[8] In addition, while living-type rooms (for example, parlors or bedrooms) appear to always be included in the count of rooms, the same cannot be said for attic or basement rooms, bathrooms, and kitchens. Preliminary regression analysis established that dummy variables for the presence of such "utility" rooms were almost always significant, and thus these variables were included in the final estimation (see the discussion below).

Sample means are shown in Panel A of Table 2. It is noteworthy that the average rent (this is rent per day, see below) was lower outside of New York City by about 8 percent (-0.08 = -0.425 - (-0.345)) even though the average size of units in the non-city sample was nearly 35 percent greater than in the

city [0.346 = exp(0.297 = 1.795 - 1.498) - 1]. By moving outside the city, in other words, households could economize on housing costs.

The regression results are shown in Panel B of Table 2. Preliminary regressions established that the time trend differed between New York City and non-New York City observations, so separate regressions are shown in the table. I discuss first the coefficients of the various housing characteristics. Because these do not differ much across the different regressions, I primarily focus on the regression in Column 3. The discussion of the coefficients of the year dummies and the time trend is deferred to later in the paper.

The size of the unit, as proxied by the number of rooms, significantly affected the rental price. The number of rooms is entered in logarithmic form, so the coefficient is an elasticity. This elasticity was less than unity in all the regressions shown. Were the elasticity equal to one, the rental price would have been strictly proportional to the number of rooms. A coefficient less than one, however, suggests some (unmeasured) diseconomies of consumption or, equivalently, declining marginal utility as the number of rooms increased.[9]

The length of the rental contract had a significant effect on rent. When converted to a <u>per diem</u> basis weekly rentals were less expensive than daily rentals; monthly or annual rentals were less expensive still, but there was no significance <u>per diem</u> price difference between monthly and annual contracts.

Vacancy risk coupled with transactions costs may explain some of these differences. Units that typically rented in the short-term market faced a higher degree of vacancy risk than annual rentals; to compensate, the owner of the unit received a higher per diem rental (see Blackmar 1989, p. 242, on vacancy risk from the landlord's perspective). In addition, the costs of finding tenants were probably higher (again, expressed on a per diem basis) for short-term rentals. On average, owners of short-term rental units would have to advertise (for example, in the newspaper) more frequently than owners of long-term units, and such costs were passed onto tenants in the form of higher per diem rents.

Not all of the per diem difference between daily or weekly rentals and monthly or annual rentals, however, should be attributed to vacancy risk. If a dummy variable for furnished units is included in the regression, its coefficient is usually positive but insignificant. The majority of furnished units is the sample were offered for daily or weekly rental, so it is difficult to disentangle the pure effect of furnishings from the effect of the length of the rental contract.[10]

The variable MODERN takes the value one if the unit contained certain "modern improvements" (a phrase commonly appearing in the advertisements) -- specifically, the presence of a water supply or gas -- and zero otherwise. In the early 1840s, New Yorkers could have fresh "Croton Water" -- Croton was the name of the firm providing the water -- piped into their

homes or yards from a reservoir. Indoor gas, initially another luxury, first appeared in the 1840s (Stott 1992, p. 172). The presence of either characteristic had a significant effect on rent, raising it by about 15 percent (slightly lower outside of New York City).

The presence of bathrooms, a kitchen, attic or basement rooms also increased the rental price, with bathrooms being more valuable than other types of rooms. Units which included board (common in boarding houses) had higher rents. The number of meals mattered -- "partial" board (breakfast and tea) was less valuable than full board, which also included the evening meal. The sharing of accommodations affected rental price. Two individuals sharing a single room (or three sharing two rooms) paid a premium over a single individual renting a single room; the premium, however, was less than proportional, so "doubling-up" did reduce the per-person cost.

Rent varied by location within the metropolitan area. I divided Manhattan into nine neighborhoods, following Scherzer's (1992) geographic definitions.[11] In the New York City regressions, the reference neighborhood is the Central Business District (CBD). The CBD began (in lower Manhattan) at City Hall, and comprised the area between Broadway and the Bowery (see the map in Scherzer, 1992, p. 218).

The New York City regressions also include a variable measuring (straight-line) distance in thousand meter increments from the housing unit to City Hall.[12] A rent gradient is clearly

evident; an increase of a thousand meters in distance from City Hall reduced rent by about 8 percent (Column 3). Note that, because the regressions also include dummy variables for Manhattan neighborhoods, the gradient coefficient measures a pure effect of distance. Controlling for distance to City Hall, neighborhoods close to water (the Tip and the Dry Docks) appear to have been less attractive to households, as suggested by lower rents. In Column 5, the distance variable is interacted with the time trend. The interaction term is positive, indicating that the rent gradient (in Manhattan) flattened over time; that is, housing prices increased more rapidly over time at locations further from City Hall than at nearby locations.

In the non-New York regressions, the reference neighborhood is Brooklyn-Williamsburg. Locations in Brooklyn were accessible to lower Manhattan via a network of stages and ferries. A Brooklyn address was evidently more attractive than living in one of the villages in the far northern sections of Manhattan (Harlem or Yorkville), or on Staten Island or Long Island, but not compared with New Jersey (eg. Hoboken).

As noted earlier, a landlord might indicate a willingness to rent only to "Americans". If the landlord paid (in the market sense) for the privilege of exercising such a prejudice, the rental price of the unit should have been lower, other factors held constant. I did find a negative effect, somewhat larger in the non-New York City regressions, but none of the coefficients were statistically significant.

Also as noted earlier, many housing characteristics recorded in the advertisements failed to exhibit significant coefficients in preliminary regressions (although one might expect them to be significant, on a priori grounds), possibly because the absence of such characteristics in the advertisements cannot be taken as incontrovertible evidence that the unit lacked the characteristic. I found no indication, for example, that the presence of chandeliers, marble mantels, or pocket doors had a significant effect on rent, although the coefficient for these characteristics was positive. Nor did I find a positive effect of brick construction, even though brick houses were presumably less susceptible to fires than frame houses. The presence of a yard or a garden might be expected to raise rent but, again, the relevant coefficients were statistically insignificant. Nor could I detect any effect of access to public transportation, perhaps because most areas represented in the sample were served by some type of public transportation, such as stages, ferries, or (later in the period) street railways.

5. The Time Trend in Housing Prices

Hedonic indices of housing prices can be derived from the hedonic regression coefficients.[13] Figure 1 shows the indices for city and non-city locations as derived, respectively, from the regressions in columns 1 and 3 of Table 2. The New York City index is set equal to 100 in 1860; the non-city trend is set

equal to 66.0 in 1860; the difference reflects the hedonic price of housing in non-city locations relative to city locations, as derived from the regressions.[14] Because of the relatively small sample size on which it is based, particularly in the 1830s, the non-city index should be viewed cautiously.

The coefficients of the linear time trend in the hedonic regressions provide convenient estimates of the average annual rates of growth. Outside the city, the growth rate in housing prices was low -- about 0.3 percent per year -- and the coefficient of the time trend was not statistically significant. Holding distance fixed, housing prices in the city grew at about 1.0 percent per year (derived from the regression in column 3 of Table 2).[15] As pointed out in the previous section, the growth rate of housing price increased with distance from City Hall; if the interaction term between distance and the time trend is evaluated at the sample mean, the rate of growth was slightly higher, about 1.2 percent per year.

Changes in housing price, however, were not constant from year to year (see Figure 1). In general, the changes in the city index were broadly similar to movements in wholesale prices. For example, housing prices rose during the first half of the 1830s, and then declined into the early 1840s, similar to wholesale prices. The city index rose by about 28 percent between 1844 and 1860, but the upward trend was not, however, uniform. Housing prices rose from 1842 to 1848, declined from 1848 to 1850, then rose more or less continuously to 1860, except for brief declines

in 1854, 1856, and in 1860.

The same general patterns were broadly evident for housing prices outside the city, with some exceptions. The decline in housing prices outside the city was evidently much steeper in the early 1840s. The non-city index was basically flat in the 1850s, suggesting that the supply of housing sites at the margin of development was much more elastic outside than in the city.

Although the broad pattern of housing price changes is similar to that of wholesale prices, the trend growth rates were different. A regression of the Warren-Pearson wholesale price index on a linear trend yields a coefficient of -0.006 (-0.6 percent per year). Relative to wholesale prices, the price of housing in New York City rose between 1830 and 1860, by about 1.6 percent per year. There also was a relative price increase for housing outside the city, but at a smaller magnitude (0.9 percent per year). The implications of increases in the relative price of housing for estimates of real wage growth before the Civil War are considered later in the paper.

Attempts to econometrically model year-to-year changes in housing prices were unsuccessful, in the sense that the regressions uniformly failed to be statistically significant at conventional levels. For example, I estimated a regression of the first difference of the relative price of city housing (that is, the city index divided by the wholesale price index) on population growth and on new construction of dwelling units. The coefficient on population growth was positive, suggesting that

the relative price of housing rose as demand (proxied here by population growth) increased, but the coefficient was statistically insignificant. Similarly, I could detect no effect of new construction on the relative price of housing, perhaps because new construction was very small relative to the existing stock of housing.[16]

6. Real Wages and Housing Prices

Virtually all studies of real wages before the Civil War omit even a proxy for the price of housing from the price deflator (exceptions are David and Solar 1977, and Sokoloff and Villaflor 1992). To illustrate the effects of incorporating the price of housing into the calculation of a real wage index, I build upon wage indices constructed by Williamson and Lindert.[17] Williamson and Lindert constructed a nominal wage index for urban common labor from various standard sources, along with a price deflator from sub-components of the Warren-Pearson wholesale price index.

For the purposes of the calculation, the index of housing prices is set equal to a geometric weighted average of the New York City and non-New York City price indices.[18] The weight is 0.825, the value of the ratio (New York City population/(New York City population + Kings County population)) in 1845 (Rosenwaike 1972, pp. 32, 36).[19] Incorporating this weighted average index into the Williamson-Lindert deflator requires a budget share, α,

for housing.[20] The budget share implied by Hoover's computations is $\alpha = 0.2$.[21] I set the budget share equal to 0.3, on the theory that antebellum city dwellers alloted a somewhat higher proportion of income to housing (Stott 1992, p. 167).

According to Williamson and Lindert's original wage indices, real wages grew at about 1.1 percent per year from 1830 to 1860. Using a budget share of 0.3 reduces the trend rate of growth of real wages to 0.86 percent year, or by 22 percent.[22]

Similar qualitative results are obtained over sub-periods. For example, the Williamson-Lindert real wage index shows a slight increase in real wages (1.8 percent) between 1849 and 1860; adjusting for housing prices, real wages declined by 5.3 percent. On the other hand, because housing prices lagged slightly behind the rise in non-housing prices during the first half of the 1850s, the sharp decline in real wages between 1846 and 1855 evident in the Williamson-Lindert real wage index is somewhat muted when housing prices are incorporated into the price deflator. According to the Williamson-Lindert index, real wages fell by 28.8 percent between 1846 and 1855; the new index registers a smaller decline (23.7 percent) over the same interval.

In sum, incorporating the new housing price indices into Williamson-Lindert price deflator reduces the estimated growth of real wages before the Civil War. Whether this excercise is legitimate, of course, depends on whether the increase in the relative price of housing was a geographically widespread

phenomenon, or whether it was confined to New York (and perhaps a few other antebellum cities). To truly generalize my finding, it will be necessary to collect rental advertisements for other parts of the country.

7. Conclusion

This paper has presented hedonic indices of housing prices for the antebellum period, drawing on newspaper advertisements pertaining to the New York metropolitan area between 1830 and 1860. To the best of my knowledge, these indices are the first to measure changes in housing prices prior to 1850, for any location in the United States. Patterns in the data are consistent with prior expectations about the behavior of housing markets. In particular, the price of housing was a function of the characteristics of the housing unit, such as size, and also of location within the metropolitan area.

Previous studies of real wages before the Civil War have generally excluded housing prices from the price deflator, in effect assuming that the price of housing relative to other goods did not change. The evidence presented in this paper suggests, however, that for workers in large urban areas at least, the relative price of housing may have risen. Incorporating an increase in the relative price of housing of the magnitude observed in New York City reduces the rate of growth of real wages between 1830 and 1860, although it does not alter the

finding that real wages increased between these two dates. Further research will require the collection of similar advertisements from other antebellum newspapers.

Notes

1. Lebergott (1964, p. 342), for example, argues that the Weeks data appear to substantially understate increases in housing costs during the Civil War.

2. Aside from the time period, my study differs from Rees (1961) by making use of hedonic regression analysis to control for housing characteristics. Aside from the number of rooms, Rees did not control for any housing characteristics in constructing his rental indices, except in excluding upper-class housing from his sample of advertisements (Rees 1961, p. 99). In particular, Rees did not control for location within the metropolitan area; I find that location has a significant effect on rental price. Moorhouse and Smith (1994) estimate hedonic prices for row houses in the South End of Boston over the period 1850 to 1874. Their study differs from mine in a number of ways. First, their data pertain to a single neighborhood (the South End) of Boston. Second, the dependent variable in their study is the "real" sale price, where "real" means the nominal sale price deflated by the Hoover rent index; thus Moorhouse and Smith do not examine changes in the relative price of housing, nor are they able to examine changes in housing prices before 1850 (Moorhouse and Smith, p. 272, report that they found no trend in real housing prices, as they define real, between 1850 and 1872). On the other hand, Moorhouse and Smith's data is subject to less measurement error than mine, because theirs was derived from deeds, maps, and

direct observation of the dwellings, the exteriors of which have generally been unchanged since the date of construction.

3. The literature on the social and economic history of New York City is too vast to list here. Representative recent sources, on which the discussion in the text is based, are Blackmar (1989), Stott (1992). and Scherzer (1992).

4. A dummy variable indicating that an advertisement appeared in April had a positive coefficient, but its magnitude was very small and it was statistically insignificant.

5. On the other hand, because the advertisements refer to units that were vacant (or would be vacant as of, for example, May 1), they yield a price index that is probably more volatile than a price index that pertained solely to occupied units; on this point, see Rees (1961, p. 100).

6. Because observations on lower-class housing are scattered across the years in the sample, it is possible that my indices will miss increases (or decreases) in price in particular years because of insufficient sample size.

7. Weekly rentals are converted a <u>per diem</u> basis by dividing by 7 days and monthly rentals by dividing by 30 days.

8. I assumed that there were 3.5 rooms per story; this figure is based on those advertisements which gave both the number of rooms and the number of stories. Varying the figure (for example, 3 rooms per story or 4 rooms per story) has little effect on the coefficients of the year dummies.

9. An alternative explanation emphasizes declining average costs of construction as the number of rooms increase. To a first approximation, land costs can be treated as fixed, so that the total cost, C, of building a unit with N rooms would be $C = F + zN$, where z is the marginal cost of a room. The elasticity, ϵ, of C with respect to N would be $\epsilon = (N/C)dC/dN = zN/(F+zN) < 1$.

10. If daily and weekly units are excluded from the New York City regression, the coefficient of a dummy variable indicating the unit was furnished was 0.332 ($t = 4.674$), or a rent differential of about 39 percent.

11. Units that could not be located on a map were excluded from the regressions, which accounts for the disparity in sample size between Table 1 and Table 2.

12. I used a variety of maps to identify locations and measure distance; see, for example, the maps in Stokes (1967).

13. If $\delta(t)$ is the coefficient for year t, then the index, I(t), is $I(t) = \exp(\delta(t))$. For coefficients that pertain to groups of years, rather than to single years, I linearly interpolate over the sub-periods in question. The Appendix gives the yearly values of the indices shown in Figure 1, along with the weighted average of the two indices used in Section 6.

14. Specifically, I estimate the price of a three-room unit located in the Manhattan CBD at City Hall (that is, distance from the CBD is set equal to zero), rented on an annual basis, from the regression in Column 3 of Table 2. Similarly, the price of a three room unit in 1860 located in Brooklyn, rented on an annual

basis, is estimated from the regression in Column 1. The log difference in rents (Brooklyn - CBD) is -0.415, or an index number of 66.0 (= exp(-0.415) x 100).

15. The difference in trend growth rates between the city and non-city regressions may be exaggerated, because the city regression holds distance from the CBD fixed. If, however, the distance variable is excluded from the city regression, the coefficient of the time trend is only slightly reduced, to 0.9 percent per year.

16. For the 1834-47 regression of the relative price of housing, annual population figures were linearly interpolated from the five year figures in Rosenwaike (1972, p.36). The data on new construction of dwelling units are from Blackmar (1989, p. 276).

17. I use the Williamson-Lindert nominal wage index and price deflator because the Margo-Villaflor (1987) wage index and Goldin-Margo price deflator for the Northeast has not yet been extended to 1860. Margo (1992) demonstrates that the choice of a nominal wage index is not crucial as far as determining the long-run rate of growth of real wages before the Civil War.

18. The substantive results were unaffected if a arithmetic weighted average is used.

19. Because the weight (0.825) is fixed, changing it would not alter the pattern of year to year movements, although it would affect the trend growth rate. If annual weights were used that reflected population decentralization, the resulting index would have a somewhat lower trend growth rate as well, because

population grew more rapidly outside the city than in it, and housing was cheaper outside the city. A variable weight housing index, however, would be inconsistent with the rest of the Williamson-Lindert deflator, which is based on fixed consumption weights.

20. If wl is the Williamson-Lindert deflator, and hp is the housing price index, the overall deflator, d is

$$\ln d = (1-\alpha)\ln wl + \alpha \ln hp$$

That is, d is a geometric weighted-average of the component price indices. Similar results were obtained with a linear weighted average (that is, $(1-\alpha)wl + \alpha hp$).

21. Strictly speaking, this is the budget share for housing that reproduces Series E-174 in U.S. Department of Commerce (1975, p. 212), Hoover's overall consumer price index, as a weighted average of Series E-176 ("All items less rent") and Series E-180 ("Rent").

22. If Hoover's budget share is used ($\alpha = 0.2$), the reduction in the trend rate of growth of real wages is correspondingly smaller, to about 0.97 percent per annum.

References

Adams, Donald R. 1975. "The Residential Construction Industry in the Early Nineteenth Century." Journal of Economic History 35: 794-816.

Blackmar, Elizabeth. 1989. Manhattan for Rent, 1785-1850. Ithaca, NY: Cornell University Press.

David, Paul and Peter Solar. 1977. "A Bicentenary Contribution to the History of the Cost of Living in America." Research in Economic History 2: 1-80.

Fogel, Robert W. 1989. Without Consent or Contract: The Rise and Fall of American Slavery. New York: W. W. Norton.

Goldin, Claudia, and Robert A. Margo. 1992. "Wages, Prices, and Labor Markets Before the Civil War," in C. Goldin and H. Rockoff, eds. Strategic Factors in Nineteenth Cenntury American Economic History, pp. 67-104. Chicago: University of Chicago Press.

Hoover, Ethel D. 1960. "Retail Prices After 1850." In W. Parker, ed. Trends in the American Economy in the Nineteenth Century, NBER Studies in Income and Wealth, Vol. 24, pp. 141-186. Princeton: Princeton University Press.

Lebergott, Stanley. 1964. Manpower in Economic Growth: The American Record Since 1800. New York: McGraw-Hill, Inc.

Lindstrom, Diane. 1977. Economic Development in the Philadelphia Region, 1810-1850. New York: Columbia University Press.

Margo, Robert A. and Georgia C. Villaflor. 1987. "The Growth of

Wages in Antebellum America: New Evidence," Journal of Economic History 47 (December 1987): 873-895.

Margo, Robert A. 1992. "Wages and Prices During the Antebellum Period: A Survey and New Evidence." In R. Gallman and J. Wallis, eds. American Economic Growth and Standards of Living Before the Civil War, pp. 173-210. Chicago: University of Chicago Press.

Mills, Edwin and Bruce Hamilton. 1994. Urban Economics, Fifth Edition. New York: Harper-Collins.

Moorhouse, John C. and Margaret Supplee Smith. 1994. "The Market for Residential Architecture: 19th Century Row Houses in Boston's South End," Journal of Urban Economics, 35: 267-277.

New York Daily Advertiser, various issues, 1830-1835.

New York Times, various issues, 1851-1860.

New York Tribune, various issues, 1836-1860.

Rees, Albert. 1961. Real Wages in Manufacturing, 1890-1914. Princeton: Princeton University Press.

Rosen, Sherwin. 1974. "Hedonic Prices and Implicit Markets." Journal of Political Economy, 82: 34-55.

Rosenwaike, Ira. 1972. Population History of New York City. Syracuse, NY: Syracuse University Press.

Scherzer, Kenneth. 1992. The Unbounded Community: Neighborhood Life and Social Structure in New York City, 1830-1875. Durham, NC: Duke University Press.

Sokoloff, Kenneth L. and Georgia C. Villaflor. 1992. "The Market

for Manufacturing Workers During Early Industrialization: The American Northeast, 1820 to 1860." In C. Goldin and H. Rockoff, eds. Strategic Factors in Nineteenth Century American Economic History: A Volume to Honor Robert W. Fogel, pp. 29-65. Chicago: University of Chicago Press.

Stott, Richard B. 1992. Workers in the Metropolis: Class, Ethnicity, and Youth in Antebellum New York. Ithaca, NY: Cornell University Press.

U.S. Department of Commerce. 1975. Historical Statistics of the United States: Colonial Times to 1970, Part 1. Washington, DC: U.S. Government Printing Office.

Wilentz, Sean. 1984. Chants Democratic: New York City and the Rise of the American Working Class. New York: Oxford University Press.

Williamson, Jeffrey and Peter Lindert. 1980. American Inequality: A Macroeconomic History. New York: Academic Press.

Table 1

Distribution of Sample

	N	Percent
A. By Decade		
1830-40	145	12.1%
1841-50	278	23.2
1851-60	777	64.7
Total	1,200	
B. By Location		
Manhattan (inc. Harlem-Yorkville)	920	76.7
Brooklyn-Williamsburg	214	17.8
Other NY	35	2.9
New Jersey	24	2.0
Missing	7	0.6
C. By Type of Unit		
Private house or apartment	1,061	88.4
Boarding house	60	5.0
Hotel	79	6.6

Source: see text

Table 2

Hedonic Regression of Housing Prices: New York City, 1830-60

A. Sample Means

	Non-Manhattan	Manhattan
Log(Rooms)	1.795	1.498
Attic	0.149	0.124
Basement	0.351	0.332
Kitchen	0.144	0.126
Bath	0.051	0.171
Modern	0.250	0.370
Rented by:		
Week	0.085	0.138
Month	0.077	0.113
Year	0.816	0.712
American tenant preferred	0.013	0.028
Sharing premium	0.008	0.019
Partial board	0.024	0.015
Full board	0.011	0.047
Neighborhood		
Manhattan		
Tip		0.120
Lower West Side		0.252
Dry Docks		0.045
Lower East Side		0.088
West Side		0.167
East Side		0.135
Upper West Side		0.059
Upper East Side		0.032
Harlem/Yorkville	0.064	
Staten Island/Long Island	0.040	
Other New York	0.027	
New Jersey	0.064	
Distance to CBD (in 1000 meters)		2.665
Time trend	21.037	20.916
Time x Distance		62.044
Year Dummies:		
1830-31	0.027	0.034
1832-34	0.021	0.052
1835-36	0.016	0.017
1837-39	0.027	0.028
1840-41	0.013	0.010
1842-43	0.032	0.043
1844-45	0.032	0.052
1846	0.051	0.017
1847	0.029	0.025
1848	0.072	0.018
1849	0.053	0.020
1850	0.021	0.031

Table 2 (continued)

1851	0.064	0.065
1852	0.039	0.023
1853	0.048	0.043
1854	0.056	0.051
1855	0.074	0.093
1856	0.074	0.093
1857	0.053	0.060
1858	0.056	0.078
1859	0.053	0.056
Log(Rent per day)	-0.425	-0.345

B. Regression Coefficients

	Non-Manhattan		Manhattan		
	(1)	(2)	(3)	(4)	(5)
Constant	-0.619	-0.807	-0.624	-1.030	-0.920
	(3.973)	(4.787)	(5.707)	(9.869)	(8.038)
Log(Rooms)	0.659	0.618	0.782	0.784	0.780
	(12.655)	(12.113)	(23.706)	(24.322)	(24.207)
Attic	0.032	0.029	0.093	0.085	0.101
	(0.494)	(0.451)	(1.902)	(1.784)	(2.114)
Basement	0.093	0.031	0.105	0.108	0.114
	(1.811)	(0.611)	(2.888)	(3.010)	(3.171)
Kitchen	0.140	0.153	0.037	0.030	0.032
	(2.085)	(2.292)	(0.775)	(0.626)	(0.673)
Bath	0.171	0.117	0.109	0.102	0.106
	(1.654)	(1.125)	(2.458)	(2.340)	(2.435)
Modern	0.118	0.140	0.140	0.147	0.142
	(2.015)	(2.466)	(3.617)	(3.872)	(3.729)
Rented by:					
Week	-0.472	-0.466	-0.405	-0.322	-0.323
	(2.714)	(2.678)	(4.347)	(3.593)	(3.612)
Month	-1.136	-1.070	-0.980	-0.890	-0.889
	(6.041)	(5.740)	(8.853)	(8.402)	(8 410)
Annual	-1.028	-0.908	-0.743	-0.635	-0.641
	(5.433)	(4.867)	(6.621)	(5.918)	(5.991)
American tenant	-0.122	-0.122	-0.089	-0.056	-0.063
	(0.642)	(0.627)	(0.957)	(0.613)	(0.687)
Share	0.223	0.283	0.304	0.219	0.222
	(0.846)	(1.077)	(2.564)	(1.894)	(1.928)
Partial board	0.947	0.948	0.663	0.667	0.664
	(5.509)	(5.533)	(5.104)	(5.192)	(5.182)
Full board	1.400	1.024	0.830	0.826	0.816
	(5.596)	(4.348)	(9.673)	(9.952)	(9.846)
Neighborhood					
Tip			-0.113	-0.139	-0.148
			(1.602)	(2.029)	(2.178)
Lower West Side			-0.071	-0.096	-0.087
			(1.208)	(1.653)	(1.503)
Dry Docks			-0.205	-0.176	-0.166
			(2.299)	(2.023)	(1.908)

Table 2 (continued)

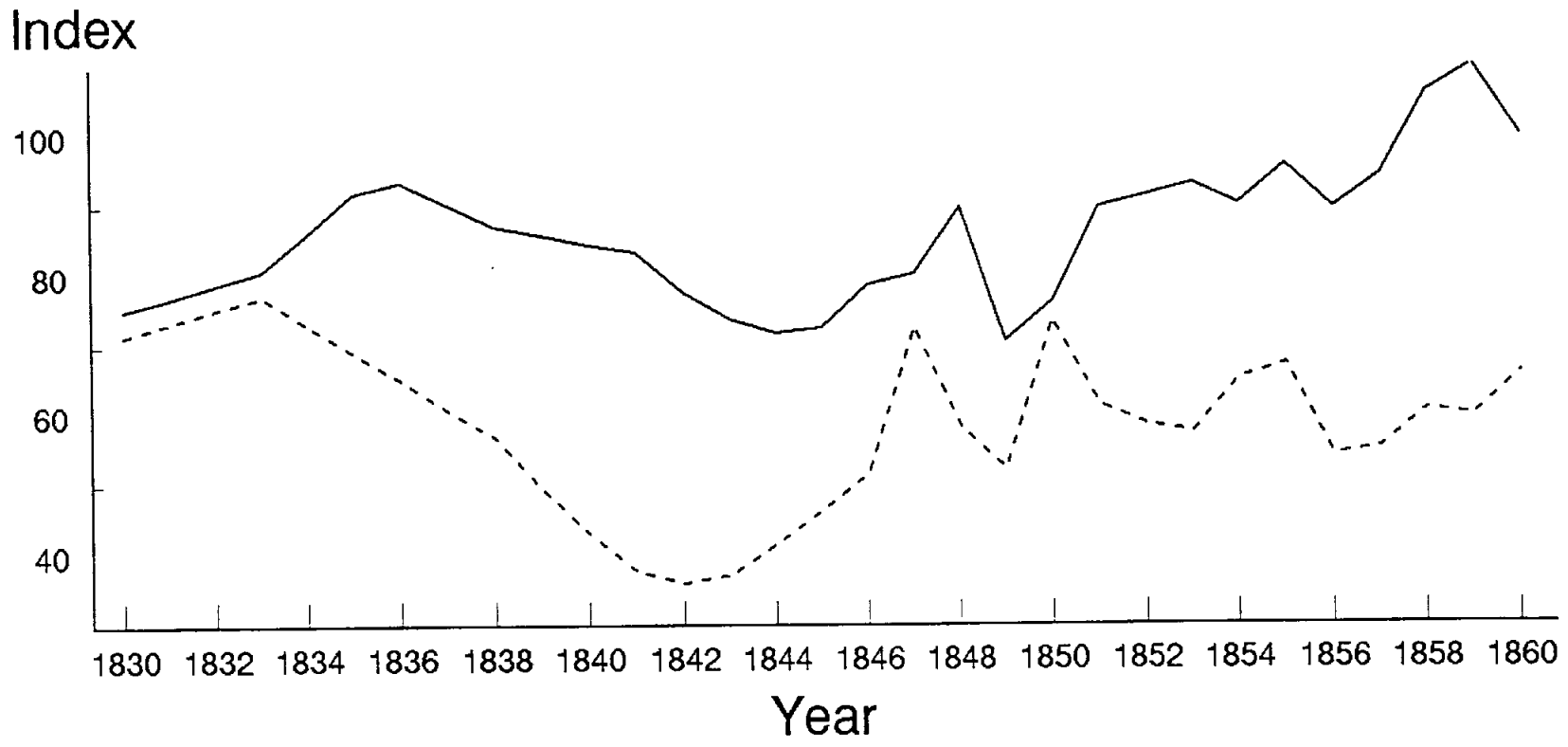
Lower East Side			-0.052	-0.045	-0.032
			(0.715)	(0.636)	(0.451)
West Side			-0.067	-0.077	-0.099
			(0.899)	(1.051)	(1.338)
East Side			-0.008	-0.017	-0.036
			(0.111)	(0.226)	(0.481)
Upper West Side			-0.055	-0.048	-0.108
			(0.526)	(0.473)	(1.025)
Upper East Side			0.091	0.065	0.009
			(0.741)	(0.534)	(0.070)
Harlem/Yorkville	-0.277	-0.285			
	(2.994)	(3.126)			
Staten Island/ Long Island	-0.318	-0.308			
	(2.865)	(2.737)			
Other New York	-0.097	-0.136			
	(0.709)	(0.990)			
New Jersey	-0.072	-0.075			
	(0.764)	(0.824)			
Distance to CBD (in 1000 meters)			-0.078	-0.080	-0.139
			(4.773)	(4.962)	(4.631)
Time trend		0.003		0.010	0.004
		(0.906)		(4.185)	(1.146)
Time x Distance					0.003
					(2.324)
Year Dummies:					
1830-31	0.093		-0.273		
	(0.608)		(2.593)		
1832-34	0.159		-0.213		
	(0.961)		(2.287)		
1835-36	0.019		-0.050		
	(0.102)		(0.382)		
1837-39	-0.149		-0.137		
	(0.938)		(1.257)		
1840-41	-0.542		-0.146		
	(2.655)		(0.911)		
1842-43	-0.631		-0.291		
	(4.009)		(3.068)		
1844-45	-0.409		-0.361		
	(2.924)		(4.079)		
1846	-0.248		-0.239		
	(1.991)		(1.876)		
1847	0.063		-0.219		
	(0.422)		(1.965)		
1848	-0.124		-0.108		
	(1.115)		(0.860)		
1849	-0.236		-0.348		
	(1.928)		(2.866)		
1850	0.108		-0.272		
	(0.656)		(2.695)		

Table 2 (continued)

1851	-0.071		-0.108		
	(0.622)		(1.340)		
1852	-0.117		-0.090		
	(0.895)		(0.793)		
1853	-0.137		-0.071		
	(1.083)		(0.792)		
1854	-0.012		-0.103		
	(0.103)		(1.235)		
1855	0.018		-0.043		
	(0.157)		(0.610)		
1856	-0.195		-0.109		
	(1.795)		(1.508)		
1857	-0.179		-0.058		
	(1.520)		(0 719)		
1858	-0.084		0.060		
	(0.724)		(0.811)		
1859	-0.098		0.098		
	(0.798)		(1.199)		
N	375	375	785	785	785
R^2	0.489	0.448	0.643	0.638	0.640

Absolute values of t-statistics in parentheses. Dependent variable is log (rent per day). Left-out year dummy is 1860; Non-Manhattan: left-out neighborhood dummy is "Brooklyn-Williamsburg"; Manhattan: left-out neighborhood dummy is "Central Business District"
Source: see text

Figure 1
Housing Price Indices, 1830-1860
New York Metropolitan Area



Note: New York City Index = 100 in 1860
Non-New York City Index = 66 in 1860

Appendix

Housing Price Indices

	NYC	Non-NYC	Weighted Average
1830	75.2	71.5	80.1
1831	77.0	73.4	82.2
1832	78.9	75.3	84.1
1833	80.8	77.2	86.2
1834	86.2	73.1	90.1
1835	92.0	69.1	94.1
1836	93.5	65.1	94.4
1837	90.3	60.8	90.6
1838	87.2	56.9	87.0
1839	85.9	49.6	83.9
1840	84.6	43.1	80.9
1841	83.4	37.6	78.0
1842	77.6	35.9	72.9
1843	73.7	37.1	70.3
1844	71.9	41.5	70.2
1845	72.6	46.3	70.8
1846	78.7	51.5	78.6
1847	80.3	72.5	84.8
1848	89.8	58.3	89.5
1849	70.6	52.2	72.0
1850	76.2	73.6	81.4
1851	89.8	61.5	90.3
1852	91.4	58.7	91.0
1853	93.1	57.6	92.0
1854	90.2	65.2	91.6
1855	95.8	67.2	96.7
1856	89.7	54.3	88.3
1857	94.4	55.2	92.4
1858	106.2	60.7	103.5
1859	110.3	59.9	106.6
1860	100.0	66.0	100.0

Source: see text. The Weighted Index is a weighted geometric average of the New York City (NYC) and non-New York City indices, indexed to 100 in 1860.