

Local Indexes of Apartment Rent and House Sale
Prices*

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Introduction

This research collects data at the local level in order to assess historical changes in the Consumer Price Index (CPI) for rent, the category carrying by far the largest single weight in the CPI. In addition to evaluating local data on apartment rent, it also develops a local price index of the sale price of existing houses as a way of evaluating the GDP deflator for residential structures. Most economists appear to support the conclusion of the 1996 Boskin Commission that the CPI overestimates inflation, because it does not fully capture the effects of substitution among products and outlets or the effects of new products and quality change in existing products. However, it is possible that in some categories for some time periods some specific components of the CPI may understate rather than overstate inflation in those categories. Our hypothesis is that in the area of housing, the CPI for rent understates inflation for part or all of the period between 1925 and 1999. We have developed a companion index of the sale price of existing houses to compare with the GDP deflator for residential structures;

we do not have any initial presumption whether such a local house price sale index would rise faster or slower than this component of the GDP deflator.

Evanston, Illinois, is the location for a pilot project to determine the feasibility of this kind of research. Most important, data were readily available in the archives of the local suburban newspaper, which has published continuously since the 1920s. In addition, the housing stock in Evanston combines aspects of city and suburb, serving as a microcosm for a range of different types of apartments and houses. The closest northern suburb of Chicago along Lake Michigan, Evanston has a population of about 72,000 (as of July, 1998). Although many of its inhabitants commute daily, Evanston has a sizeable downtown and numerous neighborhood shopping centers containing many businesses that attract consumers from neighboring suburbs, including retail shops and restaurants. It is also home to a major research university and many public schools. The population ranges from very wealthy to poor, and homes range from mansions to tiny houses and modest apartments. The city was founded in

the mid-1800s and was well established by 1925, the year for which our data begins. These factors allowed us to collect data on rent and house prices for a variety of living units over the past 75 years.

Apartment Rent Index

The first phase of our research involved collecting apartment prices over the interval 1925-99 from classified advertisements in the *Evanston Review*, a weekly local newspaper. In order to control for quality change, data were collected on apartments for which the advertisement provided detailed descriptions, including number of rooms and bathrooms, proximity of public transportation, schools, and/or shopping, parking, heat (type and whether included in rent), air conditioning (first appearing in the 1960 ads), and whether anything else was included (such as appliances). We noted other descriptive attributes, such as wood floors or garden view, and terms such as "luxury building." Of course, because of space limitations, each ad did not contain information for each of the mentioned categories. When possible we chose buildings that listed the specific address, and only considered unfurnished

apartments. Data were collected for every five years from 1925 to the present. September was chosen as the month for each sample because many buildings advertise at this time, possibly to attract returning college students, although August and October were also used as a supplement if the September issues did not contain enough data. Our ideal was to find the same building addresses repeated from sample to sample. In some instances this was possible, and a "Specific Address" index was compiled. However, for several time periods, insufficient data containing specific address information were available. This was particularly a problem for 1945 and 1950, when there was a housing shortage. This problem affected comparisons for the surrounding periods.

To analyze our data, we matched apartments as closely as possible over each five-year interval. When possible, we matched apartments in the same building and with the same description (especially number of rooms and bathrooms), so that our resulting rent index is equivalent to the "matched model" indexes used in previous research on durable goods, apparel, and computers. We were able to

find between three and eleven exact address matches for each interval other than 1925-1930, 1940-1955, and 1965-1970. Because of the small number of matches in some instances and the lack of information in others, we filled in the gaps in the "Specific Address" index by borrowing from the average index (discussed below). The five-year change in rent for each matching apartment was averaged together with equal weights, yielding a log rent change for each five year period. This series of changes was then cumulated into the "Specific Address" rent index, which is displayed and compared with the CPI for rent in Table 1 and Figure 1.

To supplement the first index, we grouped apartments into categories based on number of rooms for 3, 4, 5, and 6 room apartments. To make the sample as accurate as possible, we included as many apartments for which we could find data (generally at least ten, but fewer for the intervals previously mentioned for which data were limited. Starting with the 1960 ads, some ads contained information about the number of bedrooms rather than the number of total rooms. This alternative method of counting rooms

extended through current data, and became the norm in the ads. It was not clear whether an apartment listed only as a "1 bedroom" was better averaged with the "3 room" or "4 room" categories. However, many ads included wording such as "1 bedroom, 4 room apartment" during the transitional years. By using this transitional information and by comparing listed rents, we decided to convert between the listings on the following scale: 1 bedroom=4 rooms, 2 bedroom=5 rooms, 3 bedroom=6 rooms.

After compiling the mean data for 3, 4, 5, and 6 room apartments for 1925-1999, we used the same raw data to compile several other indices. In the years from World War II to the present, there were sometimes insufficient listings for 3 room and 6 room apartments. To make up for this, we compiled an index including only 4 and 5 room apartments (for which data were plentiful). To compare with our other indices, we also compiled an index using the median, instead of the mean, for 3, 4, 5, and 6 room apartments. Since the median, mean and the 4-5 room indexes were very close, Table 1 and Figure 1 display only two rent indexes for comparison with the CPI, the Specific

Address index and the Median index for 3,4,5, and 6 room apartments.

Differences between the CPI and the two new apartment rent indexes are summarized at the bottom of Table 1, which displays average annual growth rates over the intervals 1925-50, 1950-75, and 1975-99. Differences between the two new rent indexes are relatively minor, and both display growth rates faster than that of the CPI in all three periods. The difference for the Specific Address index is 1.78 percent per year in 1925-50, 0.98 percent per year in 1950-75, and a much smaller 0.29 in 1975-99. The average annual growth rate for the entire period is 1.03 percent faster than the CPI for the Specific Address index and 1.23 percent faster for the Median index.

The primary weakness in the new rent indexes is the potential for unmeasured quality change. Presumably the Specific Address index is more accurate than the Median index (the latter is used to proxy the former for those time intervals when insufficient Specific Address information was available). The most important types of quality differences among apartments are carefully

controlled in the new indexes, especially number of rooms, bathrooms, location, and presence or absence of air conditioning. There may be some downward bias, because the indexes do not make any explicit allowance for age, and many of the apartments were new in the 1920s and more than 70 years old in 1999. While this source of bias was corrected after 1988, it has been estimated that the downward bias for aging in the CPI prior to 1988 is 0.3 percent per year (Randolph, 1988). Since our new indexes share with the CPI the method of following the same apartments over time, they share both the aging bias and also the lack of explicit allowance for renovations and modernization that may largely or entirely offset the aging bias.

To further explore these data, we have begun to carry out hedonic regression analysis. The log of price is regressed on the log of size (rooms, bedrooms, and/or bathrooms, depending on the available data) as well as on other characteristics that can be defined as dummy variables. We are currently working to improve the information available for the regressions by, for instance,

pinpointing distance to transportation from a map for those apartments where no specific information is available on proximity to transportation.

House Price Index

The second phase of our research involved developing a price index for sales of existing Evanston houses for comparison with both the BEA deflator for residential structures and an index of the resale prices of existing houses.¹ Again we used classified ads from the *Evanston Review*. This exploratory study includes only the years 1925, 1940, 1950, 1972, 1985, and 1999. It was not feasible to find exact address matches from the classified

1 . The BEA index used here is chosen for convenience, since annual data are presented on the same page for 1925-99. This is the implicit deflator for the net stock of residential structures. See "Fixed Assets and Consumer Durable Goods for 1925-99," *Survey of Current Business*, September 2000, pp. 19-30, esp. pp. 20-21. The rate of increase displayed by this index is extremely close to that of the BEA's implicit deflator for residential structures, e.g., 4.48 vs. 4.38 percent per annum over 1959-99.

ads. Instead, we compared as closely as possible based on the following criteria: size, location (neighborhood), and features (i.e. central air conditioning, size of yard, number of porches, whether kitchen and bath are modern, etc.), and style of architecture. We avoided choosing modern architecture in the later years, in the hope that the houses chosen in 1999 might resemble the comparable houses from 1925. We chose 9 suitable houses for 1925 and found comparable houses for each year, continuing the nine separate strings of comparable houses. Occasionally there were blanks when a comparable house was not found. For each period, we calculated the average log change from the previous period of all houses for which we had data and cumulated the log changes into the index shown in Table 2 and Figure 2.

Also shown for comparison, beginning in 1975, is the Office of Federal Housing Enterprise Oversight (OFHEO)'s regional Chicago house price index. This information is available from www.ofheo.gov. The OFHEO compiled this index using a weighted repeat sales methodology modified from that posed by Case and Schiller (1989). The mortgage

information was obtained from the Federal Home Loan Mortgage Corporation (Freddie Mac) and the Federal National Mortgage Association (Fannie Mae). Data are available nationally, regionally, and by metropolitan area, so we worked with the applicable Chicago index.

As shown at the bottom of Table 2, the new Evanston house price index exhibits a rate of increase which is quite different than that of the BEA deflator, but the sign of this difference shifts over time. The annual average growth rate of the new index minus that of the BEA deflator is -1.72 percent for 1925-50, +1.33 percent for 1950-75, and +1.92 percent for 1975-99. The differences average out to only -0.18 percent for 1925-75, but the difference after 1975 is substantial. Like our new index but unlike the BEA deflator, the OFHEO index of repeated sales of the same houses includes the value of land and therefore might be expected to increase faster than the BEA deflator. The difference in the annual growth rate of the OFHEO index and the BEA deflator is 0.97 percent for 1975-99, while the difference over the same interval between the Evanston and OFHEO indexes is a further 0.95 percent per year.

When the house price and apartment rent indexes are compared, the house price index increases faster than the apartment rent index by 0.80 percent per annum over 1925-99 and by 1.25 percent per annum over the more recent 1975-99 interval. The difference between the BEA deflator for structures and the CPI for rent shows a different pattern, 1.52 percent per year over 1925-99 but a mere -0.01 percent per year for 1975-99. The big difference is in the first interval, 1925-50, when there is a huge gap of 3.93 percent per annum when the BEA deflator for structures is compared with the CPI for rent and a much smaller 0.16 percent per year in the Evanston house price index compared to the Median rent index. Thus far, the research raises the possibility that the CPI for rent may be downward biased by a substantial amount prior to 1975 and especially prior to 1950.

Next Steps

While further steps can be taken to refine the Evanston indexes, the more important next step of the research should be to gather data on rent for several other geographical areas, using the same methods. The

possibility of a significant downward bias in the CPI for rent, the most important single component of the CPI, in the middle of the 20th century has sufficiently important implications as to be worth studying further.

Table 1. Evanston Apartment Price Indexes and CPI

<i>Year</i>	<i>CPI for Rent</i>	<i>Specific Address Index**</i>	<i>Median Index***</i>	<i>Observations, Specific Address Index</i>	<i>Observations, Median Index</i>
1925	100.0	100.0	100.0	****	16
1930	90.3	122.7	119.8	10	16
1935	61.9	62.2	73.3	10	37
1940	68.7	82.1	84.7	6	35
1945	71.9	108.3*	114.2*	*	*
1950	86.1	134.5	143.8	***	9
1955	103.1	158.9	169.6	***	25
1960	112.1	155.9	178.9	6	28
1965	118.5	154.9	177.3	7	23
1970	134.6	232.3	257.8	****	16
1975	167.9	335.6	355.0	3	22
1980	234.2	494.5	504.9	3	23
1985	320.2	695.9	694.6	5	20
1990	395.4	846.8	920.8	11	29
1995	450.6	955.7	996.8	12	42
1999	506.9	1087.1	1257.6	10	26
Annual Growth rates					
1925-50	0.60	1.18	1.45		
1950-75	2.67	3.65	3.61		
1975-99	4.61	4.90	5.27		
1925-75	1.04	2.42	2.53		
1925-99	2.19	3.22	3.42		

*1945 Specific Address and Median numbers were estimated.

**Specific Address index was created from exact address matches, Evanston Review classified ads.

***Median index was calculated by taking the median of similar apartment matches, but not only specific address matches.

****Taken from Median index because of lack of specific address matches.

Table 2. Evanston House Price Index, BEA Index, OFHEO Repeated Sales Index

<i>Year</i>	<i>BEA Implicit Deflator for Residential Structures</i>	<i>OFHEO Repeated Sales</i>	<i>Evanston House Data</i>
1925	19.29		21.06
1940	20.60		13.32
1950	44.30		31.55
1972	77.40		65.36
1975	100.00	100.00	100.00
1976	107.93	107.52	
1977	121.57	125.32	
1978	135.27	144.26	
1979	152.03	150.81	
1980	167.68	151.46	
1981	177.10	159.95	
1982	182.85	153.72	
1983	186.11	162.70	
1984	191.41	171.68	
1985	196.39	178.56	215.46
1986	205.71	193.85	
1987	212.49	216.67	
1988	219.39	241.42	
1989	225.68	261.17	
1990	229.42	275.81	
1991	230.51	286.17	
1992	238.48	297.17	
1993	247.33	307.12	
1994	258.42	319.26	
1995	263.58	329.69	
1996	271.01	339.97	
1997	279.44	350.73	
1998	289.60	363.35	
1999	301.66	380.91	477.88
Annual Growth rates			
1925-50	3.33	-	1.62
1950-75	3.26	-	4.61
1975-99	4.60	5.57	6.52
1925-75	3.29	-	3.12
1925-99	3.72	-	4.22

Figure 1. Evanston Apartment Price Indexes and CPI

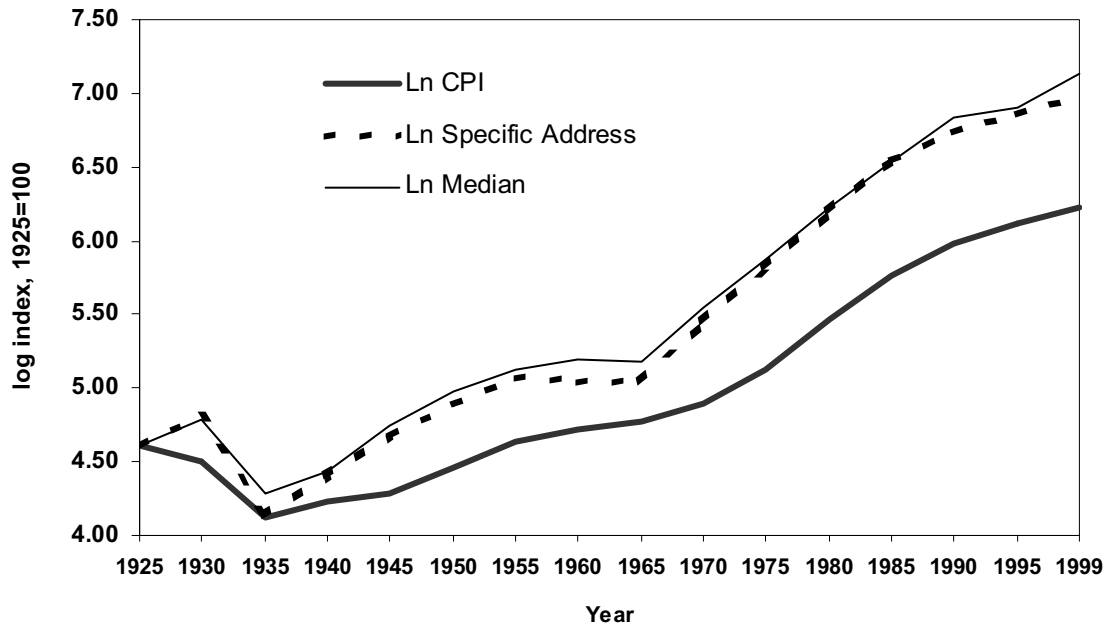
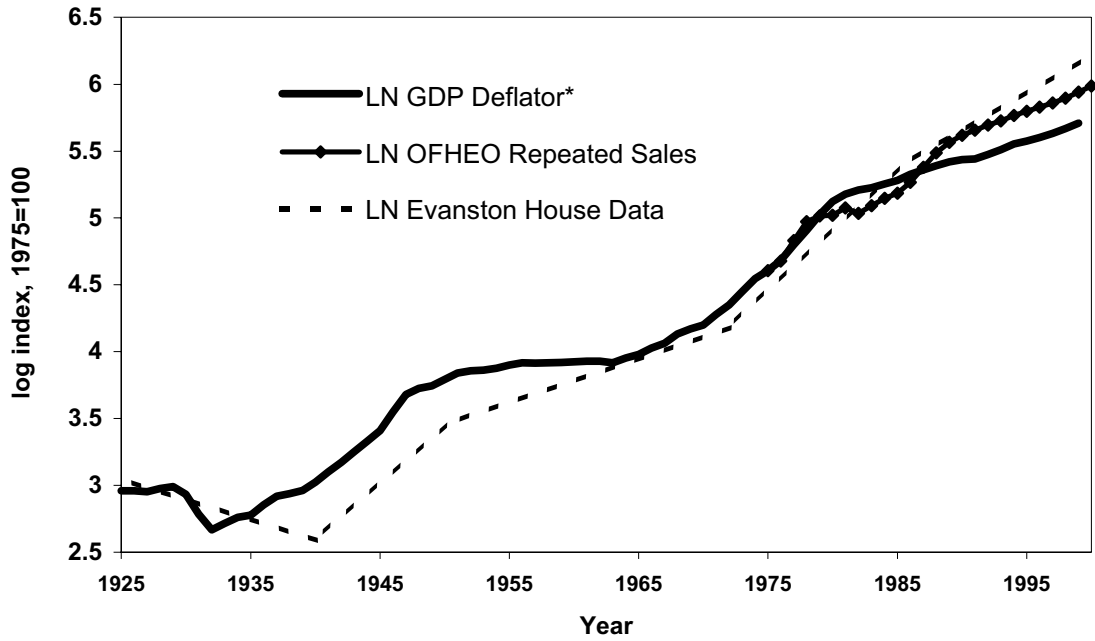


Figure 2. Comparing the Evanston House Price Index with BEA Index and OFHEO Repeated Sales Index



* BEA Implicit Deflator for Net Residential Housing Stock