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# **100 years of Commercial Real Estate prices in Manhattan**

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## **ABSTRACT**

This paper is able to put together a data base of 86 repeat sales transactions for office properties in lower and mid town Manhattan spanning the years from 1899 through 1999. Using this limited data base, decade-interval changes in real property prices are estimated - with varying degrees of precision. Our conclusions are two. First, adjusting for inflation, commercial office property values are 30% lower in 1999 than they were in 1899. Secondly, within any decade values often rise and fall by 20-50% in real terms. With these results, the long term appreciation in commercial property is seen to be no greater than inflation and to experience considerable decadal risk.

## **I. Introduction.**

Recently there has been renewed interest the long term appreciation of real estate assets – both those occupied by households as well that used by firms. Early studies, such as that by Hoyt and later Mills focused on land values and showed that while the aggregate assessed value of urban land soars during periods of rapid urban growth, land value per capita in Chicago was almost the same in 1930 as in 1845 – when adjusted for inflation. This is consistent with the recent work of Atack and Margo. Using actual land parcel transactions from New York City they determine that any prices level increases from 1835 to 1900 are mainly due to the Civil War decade’s general price inflation. Factoring that out, Manhattan land prices in 1900 were quite similar in real dollars to 1835. Studies of land values in the 20<sup>th</sup> century, such as that by Edel and Sclar again showed little gain in assessed residential prices beyond inflation in Boston over the period from 1900 to 1970.

In terms of asset prices, studies of house values since the late 1970s, such as Capozza, Hendershott and Mack, find that using the newer repeat sales price indices, residential property appreciation differs widely in its underlying trends across cities: some exceeding while others barely keep up with inflation. The 1997 paper by Eicholtz however, has caused many researchers to pause. Consistent with the work just discussed Echoltz shows that there has been little *real* growth in Amsterdam house prices since 1628 – almost three centuries. Despite no long term trend, however, there are sustained swings in real prices over particular periods ranging from as short as a decade to as long as 50 years.

Studies of commercial property values (e.g. Fisher, Geltner, Webb) all are based on more contemporary data and have tended also to find little appreciation beyond inflation – at least since the late 1970s. Similarly several authors have noted that commercial property rents tend to be stationary in real dollars (e.g. Wheaton and Torto). In this study we contribute to the evidence on commercial property by examining 100 years of commercial office values in Manhattan – creating a repeat sales price index with actual transactions data. We find that since 1899 office values in Manhattan have actually fallen slightly – adjusted for inflation. We also find that during many individual decades,

prices have risen or fallen as much as 50% on top of inflation. Hence our conclusion is that owning commercial real estate historically has yielded little appreciation beyond inflation although considerable appreciation risk.

Our paper is organized as follows. In the next section we briefly review some theoretical arguments and empirical facts about long term property values – to try and reconcile the findings to date. Section III then describes our efforts to collect repeated sales transactions for a set of Manhattan office buildings. Section IV reviews our estimation methodology, section V our results while we draw some final concluding observations in section VI.

## **II. Theoretical Models of Real estate Asset Price Appreciation.**

The most widespread model of real estate appreciation is based on the monocentric model (e.g. Muth). The comparative statics of this model (as shown by Wheaton in 1974) are unambiguous. Population growth alone is sufficient to generate significant real increases in land value – if transportation technology remains the same. The problem is that over the last two hundred years this has not been the case. In fact early streetcars, subway rail transit and then automobiles have all increased the speed of travel by a factor of as much as 10. Even allowing for the greater monetary costs of these newer modes of travel, it could easily be argued that such improvements have offset the impact of population growth – leading to the Echoltz results. While population growth and spatial expansion shift the price gradient upward, transportation improvements “flatten” it from the edge inward. Virtually all empirical studies of long term changes in land price gradients, such as Mills, or Atack and Margo find strong evidence of “flattening” – in most cases sufficient to generate little change in average overall values. Gin and Sonstelie demonstrate how specific transportation improvements (the development of the streetcar) are directly responsible for the declining land price gradients in the latter half of the 19<sup>th</sup> century.

The Muth model also points out that studying asset prices, we must consider the possibility of changes in the cost of housing capital – as well as the elasticity of substitution between land and capital. We know of only one systematic study on long

term changes in construction costs [Wheaton 2006] and this shows that in the US they have grown just with inflation - over the 37 year period since 1967. If this holds as well over longer spans of time, then the capital component of housing and commercial real estate should show no real increase. Added to the evidence on land values – it would seem that both “factors of production” might not grow faster than inflation. Even if land does get somewhat more expensive (for example from population growth and constant transport technology) then greater density (capital for land substitution) would mean that the sales prices of a square foot of office or commercial space still need not increase much over time. In short, given the historic changes in the parameters of a monocentric model, it is not at all clear that we should expect real estate appreciation to have outstripped inflation – over the last century or two.

Most recently, the monocentric model itself has been challenged. Fujita, Anas, and Wheaton all argue that as cities grow, the resultant increase in congestion costs generates incentives for jobs to disperse. Such job dispersal leads to shorter commuting and to land value gradients that may have little or no slope. Hence even with constant transport technology urban population growth may lead to little increase in land rent. McMillen finds empirical support for the argument that as economic growth begins to congest the transportation network firms disperse spatially and in the process significantly ameliorate these adverse impacts.

In short, the jury is clearly still out on whether we should expect appreciation above and beyond inflation. Historically, major technological advances in transportation together with constant real construction costs may have been sufficient to offset rapid urban growth. Going forward, there is the prospect that employment dispersal may do likewise.

## **II. Collecting transaction data for Manhattan Office Property.**

We began the present study with an inventory of currently standing office buildings in Manhattan courtesy of the Costar Group, and Torto Wheaton Research. In both of these data bases there is information only on building age, stories and square feet – nothing on “quality”, “prestige” or architectural value. We restricted ourselves to institutional grade properties, 10 or more stories, with elevators and whose total square

feet is at least 250,000. This initial filter ruled out most of the truly older properties in Manhattan (built prior to 1880). This sample contained 253 properties in “Midtown” Manhattan and 82 “Downtown” office buildings.

The Costar data base contains an estimate of the date that the building was originally constructed. These dates were mostly clustered in two distinct periods 1890-1929 and 1960-1989. For each property the building address was matched with the building data base in the New York City Construction Record Guide and the New York City Building Records Office. These data bases contained all original construction documents and contracts for most properties in the city. By in large the Costar dates were quite accurate, and we were able to obtain a firm estimate of all original tendered construction costs for the building. These costs were in the range of \$10-\$20 per square foot for the first cluster of properties (1910-1929) and \$60-\$240 for the more recent period. To determine “total” development costs, we used a conservative “rule of thumb” in the industry that land and soft costs constitute slightly more than half of the total development of a property. Thus increasing the original construction costs by a factor of 1.2 provided an estimate of the property’s initial “value” –at the time of development.

With this initial “transaction”, we then searched the sales and transfers contained in the data base of the New York City Real Estate Board. This data base is organized by address and contains a huge range of “exchanges” and “transfers of interest” (total or partial) in addition to full title transfers. For each transaction, in addition to a date, there is a dollar value based on the transfer tax rate that was then in effect. These dollar values were then inflated into 1999 (constant dollar) values. We restricted our definition of a “sale” only to transfers that met all of the following criteria.

- The buyer and seller had different last names or were different entities.
- Bank or other “foreclosures” were excluded.
- A full property title was transferred with no residual claims or partial interests.

Another consideration is whether the property was significantly altered or renovated. Of course over this time period, many properties built in the early period would have had renovations to windows, HVAC systems, etc. What we wanted to do was exclude major property redevelopments. Such changes are often noted in the Costar data base (along with a date). Hence any pair of transactions that spanned a Costar

“redeveloped” date was excluded. With all of these various filters, the final data base contained only 86 transaction pairs. 32 pairs occurred in 17 downtown properties and 54 pairs were observed in 28 midtown properties. Several properties have numerous “sales”. Table 1 contains a list of the 45 properties and their sale dates.

**Table 1: Property Transactions**

1466 Broadway	1907, 1997
730 Fifth Ave.	1921, 1939, 1946, 1948, 1966, 1991, 1999
535 Fifth Ave.	1925, 1963, 1984
220 East 42 <sup>nd</sup> St	1922, 1982
275 Madison Ave	1950,1952, 1965, 1980, 1984, 1988
1450 Broadway	1939, 1946, 1964 , 1988, 1999
500 Fifth Ave.	1938, 1988, 1996
640 Fifth Ave.	1941, 1961, 1964, 1989, 1997
1740 Broadway	1950, 1990
1120 Ave. Americas	1964, 1978
150 East 42 <sup>nd</sup> St.	1951, 1955, 1987
530 Fifth Ave.	1952, 1978, 1994
666 Fifth Ave.	1953, 1977, 1987
717 Fifth Ave.	1952, 1978, 1993
1285 Ave. Americas	1960, 1989
685 3 <sup>rd</sup> Ave.	1989, 1993
1180 Ave. Americas	1968, 1995
1301 Ave. Americas	1967, 1988
6 East 43 <sup>rd</sup> St.	1962, 1994
1250 Broadway	1962, 1999
150 East 58 <sup>th</sup> St.	1962, 1983, 1998
1500 Broadway	1971, 1979, 1996
10 East 53 <sup>rd</sup> St.	1970, 1975, 1982, 1993
600 3 <sup>rd</sup> Avenue	1970, 1977
1211 Ave. Americas	1970, 1978, 1999
825 8 <sup>th</sup> Avenue	1983, 1998
750 Lexington Ave.	1984, 1997
1177 Ave. Americas	1988, 1991
100 Broadway	1968, 1981

37 Wall St.	1904, 1956, 1968, 1984
90 West St.	1905, 1981, 1984
115 Broadway	1907, 1960, 1986, 1988, 1994, 1997, 1999
14 Wall St.	1912, 1987, 1999
233 Broadway	1903, 1998
61 Broadway	1916, 1973, 1988, 1997
25 Broadway	1928, 1962
110 William St.	1952, 1970, 1981
222 Broadway	1968, 1984, 1988, 1997
59 Maiden Lane	1965, 1981, 1999
140 Broadway	1966, 1998
95 Wall St	1968, 1999
100 Wall St.	1969, 1997
100 Gold St.	1970, 1983
100 William St	1977, 1999
40 Broad St.	1987, 1998

As a final filter we removed 5 observations in which properties changed hands within 2 years at prices that were more than twice or less than half of that at the first date. Most reported indices are thus constructed with 81 sale pairs.

### **III. Estimating Decade Inflation rates with a Repeat Sales Model.**

It is clear that with the limited number of clean transaction pairs (86 or 81) we would not be able to measure price appreciation with much precision. Yearly appreciation rates would clearly be impossible, and using long intervals runs the risk of violating the assumption that appreciation within the interval is constant. As a compromise we decided to use decades – which would involve 10 degrees of freedom. The approach works as follows.

Following Bailey, Muth and Nourse, consider the model of property pricing (P) in equation (1). The vectors X and B represent property attributes and “Hedonic” coefficients there for. Then there are “fixed effect” variables for each decade  $D_j$ , along with corresponding coefficients  $\alpha_j$ . We observe the property first during decade T’, and

we define  $S_{jT'}$  as equal to 1 if decade  $j$  is prior to the transaction decade  $T'$  and equal to the fraction of decade  $T'$  that has passed before the actual observed price date when  $j=T'$ . When  $j > T'$  we set  $S_{jT'}$  equal to zero. In this model rather than have a single fixed effect for the year (or in this case decade) that the property is observed we have the sum of the yearly effects (decades) leading up to the observed year from some base year ( $j=1$ ). Thus the estimated values of  $\alpha_j$  represent that decade's inferred price appreciation rate rather than its price level.

$$P_{T'} = \beta' X \exp\left(\sum_{j=1}^{T'} \alpha_j D_j S_{jT'}\right) \quad (1)$$

If this same property then sells at a later time period ( $T > T'$ ) we have a new set of variables  $S_{jT}$  and the price at that time is equal to:

$$P_T = \beta' X \exp\left(\sum_{j=1}^T \alpha_j D_j S_{jT}\right) \quad (2)$$

Taking the ratio and then logs we get:

$$\log(P_T) - \log(P_{T'}) = \alpha_{T'} D_{T'} (1 - S_{T'T'}) + \sum_{j=T'+1}^T \alpha_j D_j S_{jT} \quad (3)$$

Like any pricing methodology for real estate, the repeat sales approach is not perfect (Goetzman, Case and Pollakowski). First off, as created it is based on the assumption that price appreciation is relatively uniform during the intervals represented by the fixed effects. If quarterly or yearly fixed effects are used this is probably not too far off, but with decade intervals it is clearly a bit of a stretch. Secondly, between sales dates the values of the  $X$  covariates may change and for that matter so may the market's valuation of them as reflected in the coefficients  $B$ . If properties deteriorate over time intrinsically with age, then the model as outlined will underestimate "true" price appreciation. If improvements and renovations are made to the property between sale dates then the approach overestimates "true" price appreciation. The best that we could do was to drop those properties listed as having undergone significant renovation.

#### IV. Results.

The primary equation estimated uses 81 sale-pairs of observations and includes no other data than the 10 decadal dummy variables. This is shown in Table 2. It is clear that there is very little precision to the estimates of appreciation from 1899 through 1929. During the depression, WWII years and the early post war boom the estimates have a bit of precision, but it is only the effects for the last three decades that are truly statistically significant. It must be remembered that all estimates are of decade appreciation in real terms – after CPI inflation is accounted for.

In Table 3 we explore the issue of whether midtown and downtown Manhattan might have had systematically different overall (100 year) appreciation. To do this with two sets of dummy variables would clearly stretch the sample – particularly downtown where there were only 32 observations. Instead, we constructed a variable which was the product of a midtown (location) fixed effect and the # years that spanned each sale pair (the variable MMID in Table 3). We interpret the coefficient of this variable as the average 100 year annual difference in appreciation between midtown – relative to downtown. Its significance suggests that yearly appreciation was on average just about a percent per year greater in midtown than downtown – over the last century.

**Table 2: Base Equation**

Usable Observations	81	Degrees of Freedom	71
Total Observations	86	Skipped/Missing	5
Centered R**2	0.308698	R Bar **2	0.221068
Uncentered R**2	0.311463	T x R**2	25.228
Mean of Dependent Variable	0.0326646141		
Std Error of Dependent Variable	0.5186937116		
Standard Error of Estimate	0.4577840420		
Durbin-Watson Statistic	1.616997		

Variable	Coeff	Std Error	T-Stat	Signif
*****				
1. D1	-0.239671368	0.887744850	-0.26998	0.78796053
2. D2	-0.177990872	0.620131228	-0.28702	0.77493200
3. D3	0.415138235	0.528407052	0.78564	0.43469188
4. D4	-0.749460348	0.610548281	-1.22752	0.22368150
5. D5	0.849830584	0.553189217	1.53624	0.12892457
6. D6	-0.270387407	0.250403102	-1.07981	0.28388195
7. D7	-0.254682758	0.197519310	-1.28941	0.20144141
8. D8	0.289917011	0.155111093	1.86909	0.06573457
9. D9	0.496816493	0.178714342	2.77995	0.00695438
10. D10	-0.751664458	0.183741205	-4.09089	0.00011198

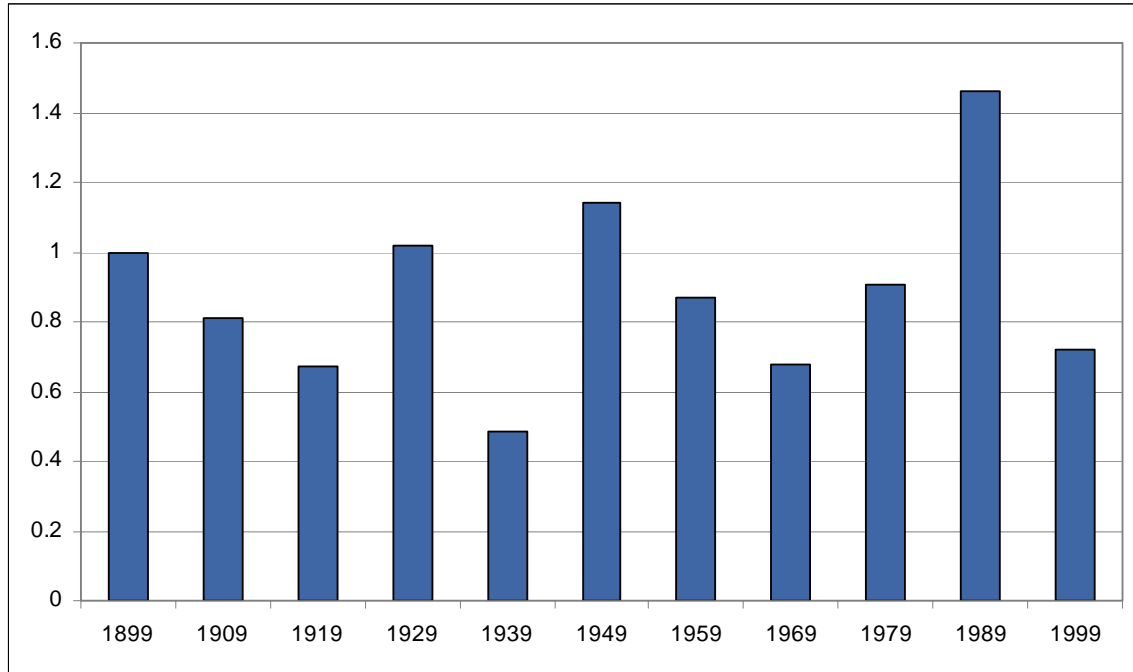
**Table 3: Separate Midtown trend**

Usable Observations	81	Degrees of Freedom	70
Total Observations	86	Skipped/Missing	5
Centered R**2	0.356249	R Bar **2	0.264284
Uncentered R**2	0.358823	T x R**2	29.065
Mean of Dependent Variable	0.0326646141		
Std Error of Dependent Variable	0.5186937116		
Standard Error of Estimate	0.4449036891		
Durbin-Watson Statistic	1.720412		

Variable	Coeff	Std Error	T-Stat	Signif
*****				
1. D1	-0.023833913	0.867972776	-0.02746	0.97817155
2. D2	-0.266088265	0.603927035	-0.44060	0.66086266
3. D3	0.797246294	0.540334296	1.47547	0.14457068
4. D4	-1.181635802	0.623065561	-1.89649	0.06202271
5. D5	1.019181852	0.542758608	1.87778	0.06457728
6. D6	-0.425252459	0.252708125	-1.68278	0.09687309
7. D7	-0.317602494	0.193945907	-1.63758	0.10599674
8. D8	0.252726674	0.151631495	1.66672	0.10003958
9. D9	0.390248732	0.179897872	2.16928	0.03345952
10. D10	-0.774134415	0.178844615	-4.32853	0.00004900
11. MMID	0.009706928	0.004268882	2.27388	0.02604253

In Figure 1 we take the estimated coefficients in the base model (Table 2) and reconstruct from equation (1) an index of Price levels. From 1899 to 1919, real prices decline a little less than 1% yearly. Then during the 1920s they rose almost 3% yearly in real terms. The depression saw real prices drop in half, and the 1940s saw them slightly more than fully recover. Real prices dropped about 2% yearly from 1949 to 1969 and then rose 3% yearly from 1969 to the famous peak in property values of 1989. From 1989 to 1999 prices dropped in half – again adjusted for inflation. Our data does not cover the widely heralded resurgence in prices of the last 6-7 years.

**Figure 1: Base Equation Office Values**



The conclusions from Figure 1 are quite clear. Just like houses in the Eicholtz study, Manhattan office space did not outpace inflation over the previous century. Similarly, over any 10-30 year period prices can rise or fall quite considerably in real terms. Real estate then has lots of risk over reasonable investor horizons.

#### **V. Why does Real estate not appreciate more?**

The results of this analysis are completely consistent with a number of stylized facts. For example it is widely known that the Empire state building was constructed for about \$22 a square foot from between 1928-1930. It is also acknowledged that the 1920's saw rampant land inflation (our data show this as well) and so we might boost our estimate of the non-construction share from 1.2 to say 1.5 times construction costs. This gives total development costs in 1929 of about \$55. Multiply by the 9 fold increase in the CPI between 1929 and 2005 and one arrives at an estimate for current price of about \$500

per square foot. This is reasonably close to transactions prices in Manhattan in the late 1990s for prime properties.

The results can also be consistent with the combination of historical population growth and transportation improvements that characterized New York since the early 1800s. From 1830 to 1900, New York City grew from a population of 300 thousand to 1.8 million and began to spill beyond Manhattan. With a tripling of average density, such growth would have necessitated a doubling of the city's radius – or equivalently of average commuting distances. It is easy to imagine that the introduction of even the inefficient streetcar doubled average commuting speeds, leaving total commute times to the urban “edge” the same. From 1899 to 1999, the City's population grew roughly four fold again, and expanded into the full tri-state area. During this period density actually began to decline. Even if the distance to New York's urban edge had increased four fold – the commensurate greater speeds of underground subways, trains and automobiles could still leave average commute times constant – and hence real land values as well! If construction costs grew only with general inflation during this century – as they have since the 1960s – then asset prices would also not increase in real terms.

Going forward the enormous improvements in transportation that characterized the last century are just not apparent. Fortunately, New York's population is expected to grow only very slowly if at all – nothing like the 6% yearly rates of the 1800s – or 4% rates of the 1900s. The largest impediment to appreciation in the future, however, would appear to be the increased suburbanization of jobs. Shilton, has shown that in most major US metropolitan areas, corporate headquarters have completely moved to suburban “edge cities”. As a result, metropolitan areas are becoming more and more “polycentric” (Guilliano and Small). In metropolitan areas with dispersed employment, population growth is accommodated not by longer commutes and rising density, but by the creation of more and newer “edge cities” (Helseley and Sullivan). If this process continues, then even in faster growing metropolitan areas, average commuting times and land values need not rise at all in the future. Thus History may in fact repeat itself – albeit for different reasons.

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