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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 very 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 historic return to New York commercial property must be mostly be comprised of yield with capital gains limited to general inflation. Other historical studies consistent with this conclusion are reviewed.

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 [1933] and later Mills [1969] 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 [1998]. Using actual land parcel transactions from New York City they determine that any price 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 20th century, such as that by Edel and Sclar [1975] again showed little gain in assessed residential prices beyond inflation in Boston over the period from 1900 to 1970. A 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, 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 [1994]) 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 [1994]). 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 our office index suggests 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 – but these decadal estimates are very imprecise. We devise a test for whether the cumulative (real) appreciation over this period is significant from zero – and our findings are upheld at wide confidence levels. Thus the long term return to owning commercial real estate in New York is composed mostly of yield plus appreciation that equals only inflation. We review some other studies of real estate investment returns that suggest the yield from real estate historically may in fact have been high enough to cover both the considerable risk and lower appreciation that is estimated in our work here.

Our paper is organized as follows. In the next section we briefly review some theoretical arguments and empirical facts about long term property values and asset pricing – 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 and section V presents our results. In Section VI we illustrate some corroborating evidence, while in Section VII we draw some concluding observations.

II. Theoretical Models of Real Estate Asset Prices.

Real estate asset price theory starts with the Ricardian Monocentric rent model (e.g. Muth [1972]). This model deals mostly with the determination of equilibrium rent (or property

income) across urban locations. The comparative static results of this model (as shown by Wheaton [1974]) are unambiguous. Population growth alone is sufficient to generate significant real increases in land or housing rent – if transportation technology remains the same. The problem is that over the last two hundred years this has not been the case. In fact relative to walking (the preferred mode in 1800) 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 empirical results of Eicholtz and others. While population growth and spatial expansion shift the rent gradient upward, transportation improvements "flatten" it from the edge inward. Virtually all studies of long term changes in land 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 [1992] demonstrate how specific transportation improvements (the development of the streetcar) are directly responsible for the declining land rent gradient in the latter half of the 19^{th} century.

Muth's version of the monocentric model also points out that in studying urban history, we must consider the role and cost of housing capital as well as the elasticity of substitution between capital and land. We know of only one systematic study on longer term changes in US construction costs (Wheaton [2006]} and this shows that they have grown just with inflation – at least since 1967. If this holds as well over longer spans of time, then the capital component real estate should show no increase beyond inflation.

Added to the evidence on land rent – it would seem that both "factors of production" might not grow faster than inflation. In short, given the historic changes in the parameters of a monocentric model, it is not al all clear that we should expect the annual rent for real estate to have grown faster than inflation over the last century or two.

In a seminal paper, Capozza and Helsley [1990] connect urban rent models with modern asset pricing theory. These authors allow population or travel costs to change over time with uncertainty and this then generates land rents that grow and fluctuate accordingly. Capozza and Helsley then derive asset prices for land at each location and the option-based rule for developing new land at the urban edge. The ratio of asset prices to current land rent varies across location exactly as Finance Theory would suggest – being higher at locations where rent is growing faster and lower at locations where there is more uncertainty about this growth.

Recently, the monocentric model itself has been modified. Ogawa and Fujita [1980], Anas [1996], and Wheaton [2005] 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 rent 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 and Smith [2003] find empirical support for the argument that as economic growth begins to congest the transportation network, firms disperse spatially and in that process this dispersal significantly ameliorates the congestion induced by growth.

In short, the jury is clearly still out on whether we should expect land or real estate rent to grow above and beyond inflation. Historically, major technological advances in transportation construction costs may have been sufficient to offset rapid urban growth. Going forward, there is the prospect that employment dispersal may do likewise. Whatever rent growth patters technology dictates should be capitalized into values with appropriate risk premiums.

III. 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). The resulting 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 contain 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 number 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. In order to be sure that we were examining true "arms length" transactions, we restricted our definition of a "sale" to include only 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 span, many properties built in the early periods 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 had numerous "sales". Table 1 contains a list of the 45 properties and their sale dates.

[Table 1]

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.

IV. Survivorship and other Biases.

The procedure used to create the repeat sales does have the possibility of an interesting bias to it – it precludes selecting properties that have not survived. There is a long literature on survivor bias in the analysis of stocks and mutual funds (e.g. Elton, Grubber, Blake [1996]), but in the case of real estate properties, we show the bias (a) tends to be very, very small and (b) can run in either of two directions – hence possibly none.

The company Emporis (emporis.com) maintains a historical building inventory for the major cities of the world. In New York they list a universe of "high rise" buildings which contains 5579 properties (of all uses). "High rise" is defined slightly more broadly than our filter: 10+ stories, but without a minimum size. A little more than 4000 of the listed buildings were built after 1899. They also list every property known to ever have been

demolished. Only 178 "high rise" properties built since 1899 have ever been demolished. Hence any survivorship bias is simply of no consequence. Surviving "high rise" properties represent more than 96% of all such properties ever constructed. The investment performance of a sample of such properties will be virtually identical to that of the property universe at large.

In addition, as discussed in Wheaton [1982], there are two conditions under which urban re-development can occur. First, buildings are more likely to be demolished and replaced (and hence not show up in the sample) when the land underneath them becomes more valuable over time. This could mean that surviving properties had lower land value growth. Second, properties are also more likely to be demolished when their capital has become outmoded or depreciated. This would mean that surviving properties had increased capital value relative to non-surviving. On net then it is just impossible to say which way the very tiny survivorship bias operates – if it exists at all.

Finally, all repeat sale indexes suffer from a more troubling set of problems, recently researched by Harding, Rosenthal, Sirmans (2007). If properties deteriorate over time intrinsically with age, then the indices 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 from our sample that were listed by Costar as having undergone significant renovation.

IV. 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 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 therefore. Then there are "fixed effect" variables for each decade D_j, along with corresponding coefficients α_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 α_j represent that decade's inferred price appreciation rate rather than its price level.

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

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:

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

Taking the ratio and then logs we get:

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

Our particular application of repeat sales methodology has a unique shortcoming (in addition to all the normal criticisms as discussed by Goetzman, Case and Pollakowski [1992]). As created it is based on the assumption that price appreciation is relatively uniform during the intervals represented by the fixed effects. In models with quarterly or yearly fixed effects, this assumption is probably not too far off, but with decade intervals it is clearly a bit of a stretch. Unfortunately that is all that is possible with our limited sample size.

V. 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 through1929. During the depression, WWII years and the early post war boom the estimates have a bit of precision, but standard errors are still almost as large as the coefficient itself. 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 slightly less than a percent per year greater in midtown than downtown – over the last century.

[Tables 2, 3]

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 New York prices of the last 7-8 years.

[Figure 1]

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 given 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.

The imprecision with which most decade inflation rates are estimated is a cause of concern. However, it is actually possible to construct a much more precise test for the *cumulative* change in the price index over the 10 decadal intervals. In some sense this is the question of most interest. The test for whether the *sum* of the decadal effects is different from zero is distributed "F", although its value involves a complicated calculation using the full VCV matrix of the individual decade effects. We find that the F value for the models in Tables 2-3 ranges from .51 to .96. With the appropriate degrees of freedom, the null hypothesis of no cumulative change in real price levels can be rejected only at a .53 to .67 confidence level – nowhere near normal test limits. Hence while we are somwhat unsure about each decade's inflation, we are quite firm ground asserting that over this century *cumulative* real price growth was not significantly different from zero.

VI. Corroborating Evidence: the Return to Real Estate.

The conclusion that in the last century, New York real estate has not outpaced inflation in terms of appreciation is fully supported in two other sources of data. The first is direct data from the long-term BLS survey of urban apartment rents – a survey conducted since 1918. Each quarter, the BLS conducts a survey of 30,000+ apartment units on a rolling

basis. Currently almost 80 MSA are part of the survey, which was started just after WWI. Originally only a handful of cities were surveyed – including New York.

The BLS survey is a repeat sample. Each period, units are resurveyed to asses any change in the rent that the current tenant is paying. When tenants change, the landlord is contacted, and the new rent (and tenant) is obtained for future surveying. Recent work has criticized the construction of such repeat-survey housing indexes. Nakurma (2007) argues that the BLS misses many rent increases that occur as tenants change, and that in addition they fail to correct for the inherent downward bias that exists in such indices due to depreciation. As discussed previously, there is also considerable upward bias in repeat transaction indices due to improvements and actual maintenance expenses. The debate on whether these two long run biases cancel out is still open.

In Figure 2 we present the CPI rent series for three cities since 1918, including New York. The indexes are deflated to constant dollars to be consistent with Figure 1. The conclusion is that rents are no higher in 1999 than 1918 when adjusted for inflation. Some of the cyclic movements in Figure 2 are also consistent with the findings displayed in Figure 1. Between 1918 and 1930 both markets experience significant real appreciation, and between 1930 and the early 1940s both show significant real depreciation. Both have increases following WWII, and there is common real price growth during the boom of the 1980s.

[Figure 2]

What emerges from both our study and the Government's CPI data is that real estate is an asset whose income and value keep pace with inflation over the long run. At the same time, it experiences considerable risk at decade or higher frequency. An important question then is whether the yield from real estate provides a reasonable return to investors. For this to be the case real estate yields must be equivalent to the market risk-free *real return* plus a commensurate risk premium. The real interest rate on treasuries (ex post) tends in the long run to be close to the real rate of economic growth (2-5%) and the Moody's risk premium for BAA bonds has ranged from 1% to 3% since WWII. As discussed by Blanchard (1993), the equity risk premium has been much higher historically, although it has declined sharply in recent decades. Thus if real estate appreciates with inflation we might expect yields to be in the 5%-10% range.

A second supporting study is by Kaiser (1997), who creates a long term series on the total investment return from office buildings. From 1977 forward, the study uses well known NCREIF national office data – which in Figure 3 has been updated through 2006. From 1926 to 1977, Kaiser develops a total return series from private portfolios and prior studies of urban office buildings. From 1977 to 2006 the NCREIF data breaks out total return into appreciation versus yield, and during this time much of the return has been yield with appreciation in fact barely keeping up with inflation. We have been quite successful at modeling the share of total return that is yield – over the NCREIF period – as a function of interest rates and office market vacancy. During periods of high vacancy, appreciation is negative and yields tend to rise (and vice-versa). We apply this model backwards from 1977 to 1926 using the well known historic BOMA series on office

vacancy in the largest US cities. This produces the estimated office yield series (for prior to 1977) that is shown in Figure 3.

Figure 3 reveal two features about office investment returns. First, yields tend to be stable, and well above risk free real interest rates. From 1940 to 1980 for example, the estimated yields range between 8%-9% while real treasuries averaged 2%-3% (excepting the period of high inflation in the late 1970s). Such yields would seem to provide an ample risk premium (500bps+). Secondly, the appreciation component (the difference between total return and yield) cumulatively aggregates up to being slightly less than CPI inflation. Appreciation is also more volatile and its timing is similar to that of Figure 2: the two major episodes of price deflation occur in the 1930s and then early 1990s in both series.

[Figure 3]

VII. 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 2000 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 speed 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 to the edge 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 in the future. Thus History may in fact repeat itself – albeit for different reasons.

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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 42nd 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 42nd 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 3rd Ave.	1989, 1993
1180 Ave. Americas	1968, 1995
1301 Ave. Americas	1967, 1988
6 East 43rd St.	1962, 1994
1250 Broadway	1962, 1999
150 East 58th St.	1962, 1983, 1998
1500 Broadway	1971, 1979, 1996
10 East 53rd St.	1970, 1975, 1982, 1993
600 3rd Avenue	1970, 1977
1211 Ave. Americas	1970, 1978, 1999
825 8th 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

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

Figure 1: Base Equation, Office Value index (constant $)

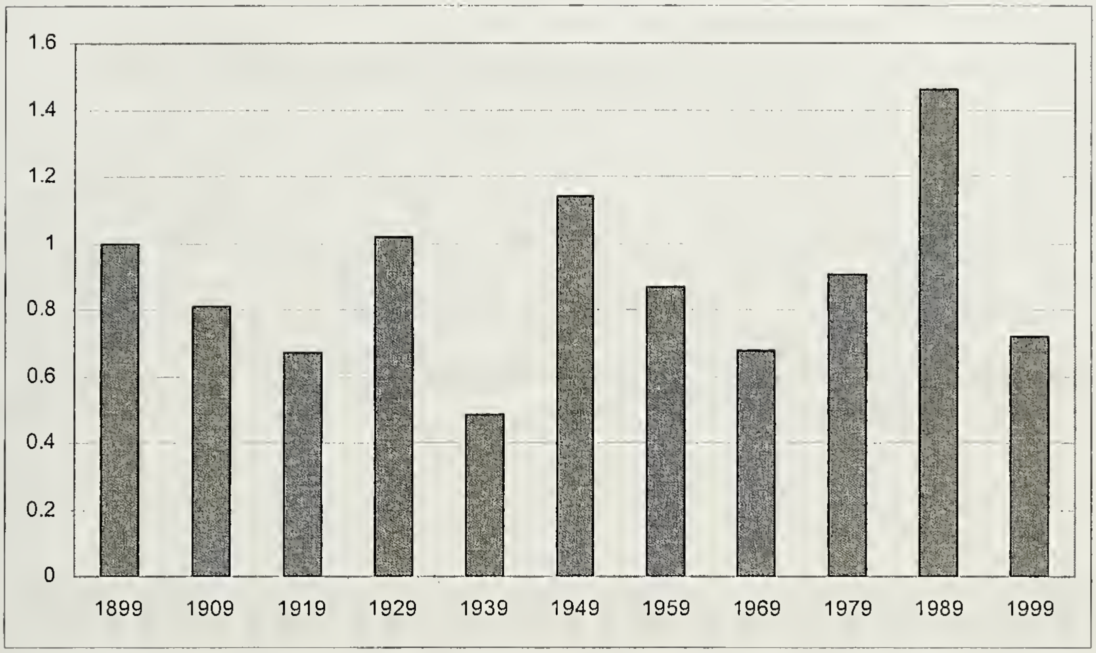

Figure 2: Apartment Rent indices (constant $)

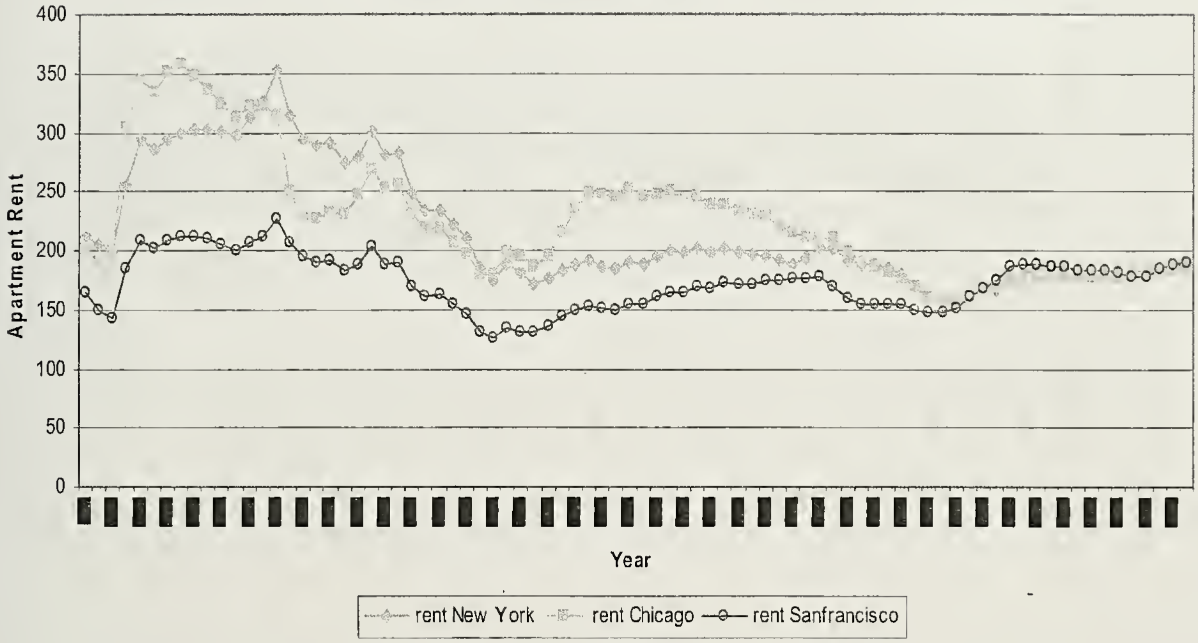

Figure 3: Office Returns: updated Kaiser (1997) study.