

# How Reliable Are Commercial Appraisals? Another Look

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This decade has seen the emergence of securitized commercial real estate markets — both debt and equity. On the equity side of the equation, there are multiple performance indices from several different sources (NAREIT, Wilshire, Morgan Stanley, etc.). Each of these performance indexes is based on public, readily available information. They vary slightly for understandable and well-documented reasons.

Conversely, on the private equity side where information is difficult to obtain, the National Council of Real Estate Investment Fiduciaries (NCREIF) is the primary source of performance information. NCREIF has compiled a unique, proprietary database of property level income and appraised values on a quarterly basis dating back to 1978. The data is reported by most of the large investment managers and plan sponsors in the private real estate industry. This information is used to construct the NCREIF Property Index (NPI) — an index that is often used as the performance benchmark for the private real estate industry.

The return characteristics of the NPI have been well researched, and it is generally accepted that the index lags and is less volatile than the underlying private transaction market. These characteristics make direct comparisons to the public market performance indexes difficult.

Much of the past work on the NPI lag

is summarized in Geltner [1998].<sup>1</sup> Geltner uses repeat measures regressions as well as an unsmoothing technique to show that the NCREIF database is quite informative and, with appropriate statistical adjustments, the NPI proxies reasonably well as a measure of quarterly private market changes. However, even with the adjustments suggested by Geltner, the NPI is based on appraisals and its accuracy is a function of the reliability of the individual property appraisals.

This article deals explicitly with the accuracy of the appraisals which underlie the NPI. The best test of the accuracy of an appraisal is the subsequent selling price of the property itself, particularly when the sale occurs only a short period after the appraisal. In using the NPI as a measure of private real estate performance over time, it is important to consider: 1) how much confidence can be placed in an individual opinion of value (with the test being what the property eventually sells for) and 2) the more complex issue of how appraisal accuracy affects the timing and the validity of the NPI over the real estate cycle.

## THE NCREIF INDEX

NCREIF was constituted in 1981, and the original data collection provides for construction of the NPI back to 1978. Most of the pension fund real estate investment managers contribute data, and the aggregate index

now represents approximately 2,000 properties totaling close to \$65 billion in value. Most people would agree that privately held and institutionally owned “core” commercial real estate is reasonably represented by the NPI.

This is not to say, however, that the NPI reasonably represents the universe of all private real estate that institutions *might* own. Concentrations in certain property types and markets in the NPI are not reflective of their significance in the U.S. real estate markets in general. In addition, there are several institutionally owned properties, particularly development projects during the construction period and those in “opportunity funds,” that are not included. These properties are not represented in the NPI because they do not satisfy one or more of the NCREIF rules for inclusion, often due to the lack of value estimates on a regular basis over time. By our estimate, the \$65 billion NPI proxies for approximately \$200 billion of institutionally controlled private commercial real estate.

At \$200 billion, privately held institutional real estate roughly equals the value of properties controlled by real estate investment trusts (REITs). For perspective, estimates of the universe of commercial real estate range as high as \$4 trillion to \$5 trillion.<sup>2</sup> Institutionally held equity investment (both private and public) accounts for less than 10% of the total universe. Commercial mortgage-backed securities account for roughly another 5% of the commercial real estate universe, so along with REITs these “securitized claims” represent roughly 10% of the overall universe as well.

### **Sold Properties**

There were few sales of properties in the NCREIF database during the early years of the NPI as investment managers were in the process of building portfolios for pension funds for the first time. By the mid-1980s, 7%-9% of the properties in the database were sold each year. The number of properties sold dropped to 4%-5% of all properties during the real estate “credit crunch” of the early 1990s. As the first round of closed-end funds have started maturing over the past three years, the number of properties sold increased to 15%-19% of all properties in the NPI. The property type breakout indicates similar degrees of transaction activity for each, with warehouse properties transacting slightly less often.

The 2,739 properties sold from the NPI over the 1978-1998 time period should provide a reasonable test

for the accuracy of the appraisals in the NPI (see Exhibit 1). Further, one would suspect that NCREIF appraisals are rigorous relative to the universe of all commercial appraisals given the facts that: 1) they are done by well known property appraisal firms, 2) the results are used in reports certified by the leading public accounting firms, and 3) the standards for such appraisals, as promulgated by NCREIF, have evolved to a high level over the last twenty years.

### **BASIC ACCURACY**

It should be noted that it is unlikely that either the appraised values or the observed prices reflect the underlying “true” market values of the individual properties. “Market value” implies the *average* of the distribution of possible prices, “appraised value” is an estimate of that average, and the observed price is a *single drawing* from the distribution that is unlikely to be the average of the distribution for any single property. Furthermore, properties sold are not necessarily a representative sample of all properties due to the possibility of a “selection bias.” For example, investment managers may be more likely to sell a property when they receive an offer that they believe to be above market value. With these caveats in mind, however, the remainder of this article treats observed prices (on average) as accurate reflections of the values that appraisers are attempting to estimate. Thus, although the difference between the appraised value and the sale price for a property is often viewed as “appraisal error,” this error can in part be due to the fact that the transaction price for a particular property is not necessarily representative of the “market value” that is being estimated by appraisers.<sup>3</sup>

When comparing sales price to appraised value, lining up the time of the appraisal with the time of the sale is obviously important. But quite often, once a property is under contract to be sold, the investment manager adjusts the appraised value to the expected sales price.<sup>4</sup> Hence the difference in the appraised value to the sales price very close to the date of sale would be biased toward zero. To avoid this problem, Exhibit 2 is produced by taking the appraised value two quarters back, and rolling that value forward using the appreciation component of the NPI.<sup>5</sup>

### **Absolute Difference**

When evaluating how much confidence can be placed in an individual property opinion of value, it is the

## EXHIBIT 1

### Properties Sold from the NPI

Time Period	All Types		Property Types							
	Properties Sold	% of Total	Office		Retail		Apartment		Warehouse	
			Properties Sold	% of Total	Properties Sold	% of Total	Properties Sold	% of Total	Properties Sold	% of Total
1980	3	0.61	0	0.00	0	0.00	0	0.00	3	0.98
1981	4	0.59	1	0.66	0	0.00	0	0.00	3	0.76
1982	19	2.43	3	1.46	7	5.56	0	0.00	7	1.62
1983	44	4.45	10	3.77	10	5.46	1	0.00	23	4.47
1984	75	7.08	27	8.97	15	8.29	0	0.00	33	6.06
1985	97	8.37	18	5.04	16	8.38	2	5.88	57	10.09
1986	115	9.18	32	8.65	26	12.75	2	4.44	37	5.96
1987	91	6.49	26	6.53	18	8.07	1	1.64	37	5.23
1988	125	8.14	26	5.95	22	9.28	9	9.18	46	6.23
1989	148	8.92	50	11.76	19	7.72	5	3.62	53	6.42
1990	106	5.65	38	7.93	10	3.12	5	2.55	39	4.57
1991	104	5.13	38	7.92	9	2.22	5	2.23	40	4.51
1992	94	4.21	30	5.80	17	3.87	10	3.32	29	3.07
1993	154	7.44	47	9.40	24	5.23	39	12.42	20	2.61
1994	174	8.84	38	8.56	23	5.36	34	10.15	56	7.55
1995	173	7.45	55	10.56	29	4.99	29	7.04	38	4.82
1996	353	14.91	105	19.96	62	10.71	57	12.36	72	9.24
1997	475	19.11	98	16.04	111	20.40	74	14.80	132	16.44
1998	385	16.51	114	17.92	94	20.84	66	12.92	80	11.36
Total	2,739		756		512		339		805	

absolute mean difference that is important. In other words, being over on one appraisal and under on another should not cancel out.<sup>6</sup> Exhibit 2 shows absolute mean differences on a value-weighted basis for all properties sold from the NPI.<sup>7</sup>

The absolute mean difference ranges from about 9%-12.5% for the entire NPI over the various time

periods examined. There appears to be a modest improvement in the mid-1980s when values were transitioning from an appreciation to depreciation mode, but otherwise has remained in the 10%-11% range with a spike in the early 1990s at the height of the credit crunch when the number of transactions were few. Differences range from 7.5%-11% for the individual property types over the various time periods, with the exception of office over the 1988-1992 time period at 15.58%. Retail and apartments have the narrowest spread, while office and warehouse have the greatest.

It is important to realize how large a 10% absolute mean difference is. This is not like saying that the sales price should be 10% in either direction of the appraised value. It is saying that the *average* miss is 10%. Exhibit 3 shows the percentage of properties that had greater absolute percentage

## EXHIBIT 2

### Absolute Mean Difference (%)

[(Price - Appraised Value)/Appraised Value]

Combined Index Type	All	Pre-1986	1986 to 1987	1988 to 1992	Post-1992
All Types	10.82	10.81	8.92	12.46	10.63
Apartment	8.16	10.17	9.37	8.47	8.10
Office	11.64	11.64	8.49	15.58	11.09
Retail	9.43	7.49	9.04	7.62	9.78
Warehouse	10.73	11.10	9.97	10.33	10.87

### EXHIBIT 3

#### Absolute Percent Differences (%)

Combined Index Type	All	Apartment	Office	Retail	Warehouse
Less than 1%	7.61	9.06	6.21	8.58	7.33
1% to 5%	28.32	34.80	25.10	33.33	26.52
Greater than 5% to 10%	22.64	25.73	19.82	22.42	23.89
Greater than 10% to 15%	14.20	10.82	14.13	12.28	16.20
Greater than 15% to 20%	9.50	9.06	10.30	7.80	9.77
Greater than 20% to 25%	6.26	4.09	7.79	6.04	5.88
Greater than 25%	11.47	6.43	16.64	9.55	10.14

error. While there is an encouraging concentration between 0% and 10%, almost 12% of the sales were at prices more than 25% different from the appraised value. It is again evident that office and industrial have a greater propensity for differences in appraisals and prices than either apartments or retail.

#### Average Difference

In a portfolio, over and under valuations cancel out, so it is the “net” difference (rather than the absolute difference) that matters. Likewise in any benchmark, if the overappraisals and underappraisals cancel out, the benchmark itself may be far more accurate than any individual opinion of value. Looking at Exhibit 4, the overall results are quite encouraging. Over the entire twenty-year period, on a value-weighted basis, properties sold for 2.64% in excess of their previous appraised value.<sup>8</sup>

While the overall results are quite encouraging, with appraisals being slightly conservative,<sup>9</sup> a different picture is presented when the overall results are decom-

posed by time period. In the up market (property values generally rising) prior to 1986, sales prices exceeded appraised value by over 4.5%. In the down market, from the beginning of 1988 to the end of 1992, prices were less than previous appraisals by almost 4.5%. As the market has improved post-1992, sales prices once again exceed appraised value by almost 4%.

While sample sizes are limited, Exhibit 5 shows the percentage error on an annual basis for the 1985 to 1998 time period.

In 1998 alone, sales prices exceeded appraised value by over 6.5%. It is quite clear that the direction of the bias changes over the cycle. It is also clear that the “speed of value change in the market” increases the error.

This can be clearly seen in Exhibit 5 which shows the percentage difference between the appraised value and transaction price [(sale price – appraised value)/ appraised value] on an annual basis versus the average quarterly capital appreciation for the same sold properties. The capital appreciation for the sold properties is an indication of whether the market was increasing or declining during that time period. The capital apprecia-

### EXHIBIT 4

#### Mean Differences (Price-Appraised Value)/Appraised Value (%)

Combined Index Type	All	Pre-1986	1986 to 1987	1988 to 1992	Post-1992
All Types	2.64	4.59	1.03	-4.45	3.83
Apartment	3.84	10.17	-9.37	-4.23	4.41
Office	2.48	5.07	0.30	-8.90	4.70
Retail	1.74	0.73	0.19	1.51	1.86
Warehouse	1.64	3.89	2.34	-2.36	2.48

## EXHIBIT 5

### Mean Error By Time Period — (Price-Appraised Value)/Appraised Value

Time Period	All Properties	Apartment	Office	Retail	Warehouse
1985	6.89%	n/a	10.67%	3.35%	-0.83%
1986	0.10%	n/a	0.38%	-2.74%	-1.95%
1987	1.89%	-2.25%	0.22%	1.81%	4.57%
1988	-3.33%	-1.50%	-8.67%	-0.04%	-0.10%
1989	-1.71%	-6.16%	-6.22%	3.26%	-2.41%
1990	-2.32%	-0.88%	-1.84%	0.73%	-6.21%
1991	-13.36%	-3.72%	-18.39%	-0.68%	-7.00%
1992	0.05%	-12.58%	6.30%	2.96%	-0.03%
1993	-3.31%	-4.16%	-2.21%	-5.62%	-1.85%
1994	-1.35%	1.80%	1.57%	-3.01%	-1.40%
1995	0.85%	2.67%	1.74%	0.67%	-5.22%
1996	3.11%	2.46%	0.43%	-0.52%	1.46%
1997	4.24%	5.02%	5.15%	2.68%	5.41%
1998	6.57%	9.54%	8.45%	3.22%	2.64%

tion is what occurred on average during the year that the property sold.

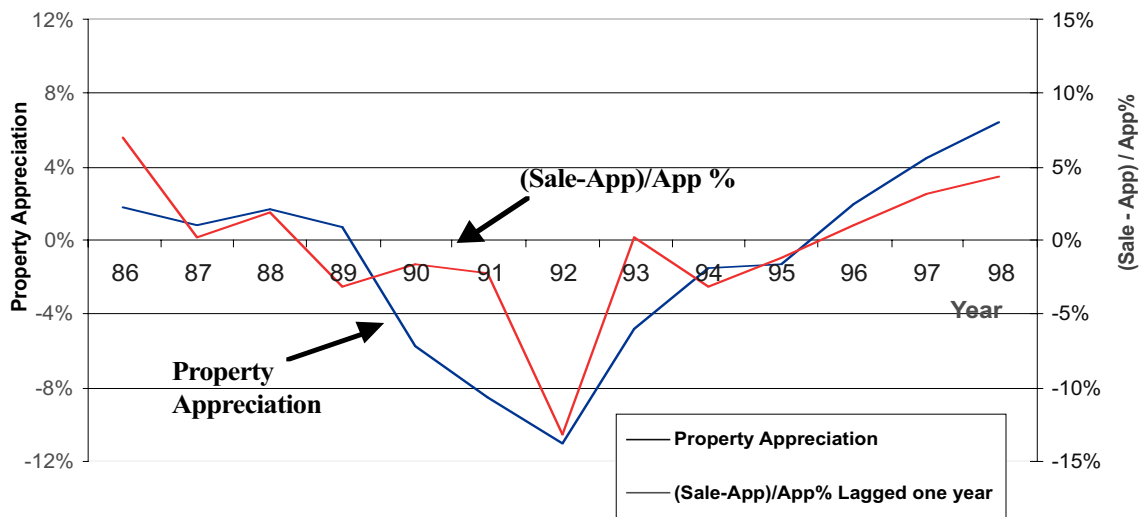
Exhibit 6 was constructed by lagging percentage difference between the sale price and the appraised value. This adjusts for the fact that there is about a one year lag between the appraised value and the sale price. Making this adjustment results in a high correlation between the

percentage difference between the sale price and the appraised value [(sale price – appraised value)/appraised value] and the expected change in the property value. That is, the difference between the sale price and the appraised value is highly correlated with the direction of the market as indicated by property appreciation.

Exhibit 6 clearly illustrates that when properties

## EXHIBIT 6

### NCREIF Index — Appraisal Lag versus Property Appreciation



are increasing in value, appraised value lags prices from below, and when properties are decreasing in value, appraised values lag prices from above. It is as though appraisals are drawing from sales comps spanning the preceding year or more, to infer the current appraisal of the property. This close relationship between the appraisal lag and property appreciation suggests that it may be possible to use the relationship for the purpose of “adjusting” the NCREIF index to “correct” for the effect of appraisal.

When interpreting the above results, it is also important to remember that the NCREIF index involves approximately a two quarter processing lag. This is the amount of time the calculation/documentation process requires. It takes the appraiser time to gather data on “comparable rents and sales,” to produce a report, to review the report at the office, to send it to the investment manager for the investment manager to review it, and for that firm to report it through their accounting system eventually to NCREIF.<sup>10</sup>

With the two quarter processing lag, the 6.57% excess of sales proceeds over previous appraised value in 1998 really refers to the year ending June 30, 1998.<sup>11</sup> This period saw a rapid run up in prices due to very attractive financing available through mortgage conduits, i.e., through securitized debt channels. Thus, the 16% return reported by NCREIF for 1998 was quite reasonable, once one appreciates the existence of the processing lag. The likelihood that commercial real estate prices dropped during the global debt crisis in the third quarter of 1998 would not be reflected in appraisals until approximately the first quarter of 1999, and would likely be averaged with price movements over preceding quarters even then.

## CONCLUSIONS

1. The volume of sales from the NCREIF database has been quite extensive, particularly over the last three years. Thus, there is “proof in the pudding” when evaluating the accuracy of the index. Overall, the index is clearly validated by this set of tests. Properties on average tend to sell at only a very slight premium (about 2.5%) over previous appraised value. Hence, over the long haul (with appropriate lag adjustments) the index is quite reliable.
2. Moving from index considerations to an assessment of the reliability of individual appraisals, our results are not as encouraging. The absolute mean error

remains greater than 10% despite the major effort to make institutional appraisals more accurate in the early nineties. It is possible that it is simply becoming evermore difficult to do appraisals and the extra effort was offset by new complexities. It is also possible that cost pressures impacted the frequency and the extent of appraisals over the last few years. It is likely that a greater percentage of properties sold in the past few years have been from closed-end funds and this may impact the magnitude of the error.

3. The absolute value error peaked in 1991 and 1992, driven by very large errors in the office sector at a time when the real estate industry was in the depths of a credit crunch. The reliability of appraisals is clearly impacted by the stability of the market which varies by property type over time.
4. For 1998 sales prices were exceeding appraised value by about 6.5. Anecdotal evidence suggests that the second half of 1998 saw a major price correction resulting from significant problems in the securitized debt and equity markets occurring during the third quarter. Since the NCREIF index lags, we went into this period with appraisals well below the sales prices at which properties were selling. Hence, the net correction reported in 1999 (actually July 1, 1998 through June 30, 1999) should be modest. For example, if prices dropped by 12% in the 3rd quarter of 1998, but appraisals were lagging the market by 8% going into the third quarter, then the adjustment which will be spread over 1999 (as properties get appraised roughly every four quarters) should be a modest 4%.

## ENDNOTES

<sup>1</sup>In addition to the lag, the appraisal-based NCREIF series has unusually low volatility which further obscures direct comparison to public market performance indexes. See Acton and Poutasse [1997]; Geltner [1998]; and Gatzlaff and Geltner [1998].

<sup>2</sup>See Miles and Tolleson [1997]. Other estimates of the total value of commercial real estate that focus on large metropolitan areas and properties of sufficient size to be considered by institutional investors place the value at closer to \$2 trillion.

<sup>3</sup>The authors disagree as to how much “cover” these caveats should provide for the appraisal profession.

<sup>4</sup>Typically appraisers use a ten-year discounted flow model that assumes sales costs in the tenth year. In this exercise, we use net sales price so commissions (which come earli-

er than anticipated in the appraiser's model) increase the likelihood that appraised value will exceed sales price.

<sup>5</sup>To be as accurate as possible, the valuation of two quarters back is rolled forward using the appropriate property type and geographic division. Capital expenditures on the property during these two quarters are added to the initial appraisal value on the basis that they add value beyond the return on capital reflected in the appreciation return. Similar tests run four quarters back, and four quarters back without rolling forward at the appreciation component of the NCREIF index, produce implications that are consistent with those shown here.

<sup>6</sup>As individual observed prices are only noisy estimates of "true" values, the absolute percentage difference is expected to be greater than zero even if appraisals are perfect estimates of value.

<sup>7</sup>Properties sold prior to 1980 are also included in the "Pre-1986" and "All" time periods. Similar tests on the original or classic NCREIF index produce very similar results. Equally weighted absolute value tests likewise produce quite similar numbers. Both sets of tables are available from the authors.

<sup>8</sup>On an equal-weighted basis, the difference is just 1.5%.

<sup>9</sup>An alternative explanation is that properties on average are being selected for sale when a price is offered that is in the upper half of the distribution.

<sup>10</sup>If the appraiser fails to properly reflect trends in price, i.e., if he or she uses comparables from preceding quarters without adjustment for trends in price, then there is an additional lag in the opinion of value beyond the processing lag. While appraisal texts are clear in the need to reflect such trends, it is not uncommon to find appraisals that use comparables without such adjustment.

<sup>11</sup>As noted earlier, Geltner's recent work shows that the database underlying the index can be used to reduce the lag, but even the technologies discussed in that article cannot overcome the processing lag.

## REFERENCES

- Acton Michael J., and Douglas M. Poutasse. "The Correlation of Publicly and Privately Traded Real Estate." *Real Estate Finance*, Summer 1997, pp. 13-19.
- Gatzlaff, D., and D. Geltner. "A Transaction-Based Index of Commercial Property and its Comparison to the NCREIF Index." *Real Estate Finance*, Spring 1998, pp. 7-22.
- Geltner, D. "How Accurate is the NCREIF Index as a Benchmark, and Who Cares?" *Real Estate Finance*, Winter 1998, pp. 25-37.
- Miles, M., and N. Tolleson. "A Revised Look at How Real Estate Compares with Other Major Components of Domestic Investment Universe." *Real Estate Finance*, Spring 1997, pp. 11-20.
- Webb, B. "On the Reliability of Commercial Appraisals." *Real Estate Finance*, Spring 1994, pp. 62-65.