Residential Properties Taken Under Eminent Domain: Do Government Appraisers Track Market Values?

Authors

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Abstract

Local governments often use powers of eminent domain to take residential properties for public use. In such cases, the local government will use their appraisers to calculate an offer on the property. If the government's goal is to avoid costly (use of administrative resources) litigation it may have an incentive to over-appraise the properties. Such over-valuation would transfer the cost to taxpayers. This study compares the appraised value of sixty properties taken through eminent domain in Clark County, Nevada to comparable properties sold in free market transactions. The findings indicate a 17% over-appraisal of the properties taken by eminent domain. The findings also indicate that a government may use simple rules for appraising the properties, whereas the market employs more complex rules.

Introduction

Local governments often take residential properties through eminent domain actions for a host of public purposes such as schools, parks, roads and utilities. The government uses either in-house or independent appraisers to place a value on the taken properties. When the government takes the property it offers the appraisal-determined value as payment to the homeowner. In such cases, well-designed appraisals should result in values that would otherwise occur in competitive markets, resulting in payments that neither under- nor over-compensate property owners.

Compensation for eminent domain takings using government appraisals may, however, deviate from market values in three ways. First, the appraisal may severely under-value the property. If homeowners suspect under-valuation, they may initiate litigation. Since litigation involves considerable time and use of administrative resources, the government has an incentive not to under-value properties. Second, there may be a small or moderate under-evaluation. Property owners are likely to accept the offer rather than incur significant litigation costs in excess of the under valuation. Third, there may be over-evaluation, obviously not a basis for litigation. Over-valuation will reduce administrative costs while shifting the expense to a third party, the taxpayers. All in all, the prospects of litigation create an incentive for governments to be willing to offer payment over and above market-determined values; and appraisers, acting as agents for the government, may respond in accordance to these wishes.

Few studies have compared appraisal and market values. One study, Kowalski and Colwell (1986), compared market and *assessed* values and found under-*assessment* of land values as a result of failure to consider such characteristics as incremental value from subdivisions and frontage. Under-assessment may reflect efforts to avoid litigation costs similar to possible over-appraisals. But, it is not clear whether the prospect of litigation systematically generates differences between assessed and market values for residential property.

This study tests the hypothesis that government appraised values of residential properties are no different from those that would be obtained in market transactions. This study tests the hypothesis both with regard to individual property characteristics, for example, characteristics such as living space area and the presence of a pool or a fireplace, and the value of the property as a whole. The study uses data gathered in eminent domain takings associated with the expansion of and noise abatement in and around McCarran International airport in Las Vegas, Nevada. Numerous market transactions also occurred within close proximity at the same time, thereby generating favorable conditions for comparing assessed and market values.

The next section briefly discusses the methods used in this study. The following section presents the data and the empirical findings. The final section concludes the study.

Methods

This study adopts the long tradition of the hedonic valuation methods (Kain and Quigley, 1970; King, 1973; Rosen, 1974; Linneman, 1980; Miller, 1982; Follain, 1985; and Cho, 1996).[1] This method assumes that the value of a residential property depends on myriad property characteristics including physical characteristics, location, and other amenities or disamenities. The hedonic method is applied to both the properties taken under eminent domain (the ‘‘takings’’ set) and those sold in the market (the ‘‘market’’ set). The dependent variable equals the appraised value for the takings set and the market price for the market set.

Data and Empirical Results

The data consist of 60 properties taken by Clark County, Nevada and 374 properties sold in market transactions. A total of 115 properties were actually taken but information on a crucial variable, distance to the airport, was available only on the smaller set. The market properties were pared from a much larger sample (2,134) to match the size, age, distance to the airport and other characteristics of the ''takings'' set.[2] Property characteristics come from the Clark County Assessor's Office. Exhibit 1 compares the property characteristics of the two sets. The distance measures the number of feet to the airport control tower.

The empirical tests include four equations, a linear and a semi-log[3] equation for the two sets. The four equations include all selected variables. Because hedonic equations frequently exhibit muticollinearity, especially between and among the size variables (square feet, rooms, bedrooms, and so on), a more parsimonious model is also tested that omits some size variables with ''incorrect'' signs. Finally, the Tiao-Goldberger statistic tests for differences in the coefficient estimates between the taking and market equations.

Exhibit 1 | Descriptive Statistics

	Market Transactions			Eminent Domain Takings		
Variable	Max.	Min.	Mean	Max.	Min.	Mean
AGE	45	1	20.9	41	2	21.70
BATHS	6.0	1	2.32	4	1	2.33
BEDROOMS	7	2	3.43	6	1	3.31
FIREPLACE	1	0	0.70	1	0	0.65
GAR0	1	0	0.25	1	0	0.33
GAR1	1	0	0.01	1	0	0.03
GAR2	1	0	0.52	1	0	0.40
GAR3	1	0	0.22	1	0	0.23
ICOM	1	0	0.06	1	0	0.20
POOL	1	0	0.46	1	0	0.22
ROOMS	12	4	6.48	12	3	6.27
SQUAREFT	4,549	920	1,901.82	4,668	972	2,113.90
SEPTIC	1	0	0.05	1	0	0.21
DISTANCE	16,613	5,184	11,393	16,640	6,751	12,396
1993	1	0	0.01	1	0	0.40
1994	1	0	0.32	1	0	0.25
1995	1	0	0.29	1	0	0.18
1996	1	0	0.39	1	0	0.17
PRICE	489,000	65,000	143,995	500,000	65,000	182,275

Notes: The sample size for market transactions is 374; the sample size for eminent domain transactions is 60.

The following general equation is estimated:

$$P = f(X, A, D, T), \tag{1}$$

where:

P = Price of the property in the market (or appraised value if a taking);
X = Vector of physical characteristics (bedrooms, fireplace, pool, square feet, etc.);
A = Age of the property;
D = Distance from the airport (in feet); and
T = Year of sale (1993, 1994, 1995 and 1996).

The physical characteristics include standard variables: square footage, number of rooms, number of baths, presence of a fireplace, pool and/or a Jacuzzi. Four dummy variables capture the type of garage: no garage, one-, two-, and three- or more car garage. The assessor's office notes that some properties were "upgraded," meaning that subsequent to original construction some improvement was made, such as an addition to the property or the conversion of a garage to living space.[4] A dummy variable captures any such upgrade effect. Also, dummy variables were included for the years in which the bulk of the properties were taken (or sold): 1993 through 1996. Next, the assessor's office reported the presence of an intercom, which may reflect the quality of the property. A dummy variable for this purpose was included. Finally, although on lot size was not included, many of the properties were built prior to extension of a sewerage system and, therefore, had a septic system. Since septic systems require, on average, a larger area, a septic system dummy variable was used to proxy for lot size.

Exhibit 2 reports the results of the two equation types applied to the market and the takings sets. The coefficients, t-values and adjusted R^2 values are consistent with previous hedonic studies. The linear and semi-log specifications also produce similar findings. Significant variables in the market but not the takings equation include age-squared, absence of a garage, presence of a fireplace, an intercom, a Jacuzzi, a septic system (lot size) and square-footage squared. Significant variables in the takings but not the market equation include square feet, upgrade and 1995 year of sale. Overall, more physical characteristics exhibit statistical significance in the market than in the takings equation.

Next, Exhibit 3 reports the regressions that omit variables likely to exhibit multicollinearity or be redundant. A test for omitted variables, which may also be used to address the issue of the appropriate functional form, yielded a statistically insignificant test statistic for the truncated model; the computed chi-square value was 1.12. Thus, parsimony gained by the truncation is not at the expense of statistical robustness.

The significant coefficients in Exhibit 3 indicate that government appraisers valued some characteristics differently than the market. For the most part, the variables that exhibit differences in significance follow those in Exhibit 2. While square footage (and not square footage squared) is significant in the takings equation, the reverse is true in the market equation. As a result, government appraisers may value each square foot the same, regardless of size, and do not consider increasing or diminishing (homeowner) marginal utility from additional square feet.

Exhibit 3 also shows the results of the Tiao-Goldberger test for differences in the coefficient estimates. This test is employed to examine differences between the

Exhibit 2 | Empirical Results: Full Equation

	Linear		Semi-Log	
Variable	Coeff.	*t*-Value	Coeff.	*t*-Value
Panel A: Market Properties				
CONSTANT	10,108.37	0.45	10.59	86.56***
AGE	−633.58	0.74	−0.00346	0.74
AGESQ	35.38	1.64*	0.00016	1.33
BATH	24,225.00	5.20***	0.11145	4.38***
BED	−318.16	0.08	0.00511	0.25
DISTANCE	4.64	6.28***	0.00003	7.89***
FP	12,657.61	2.52**	0.07921	2.89***
GAR0	−13,633.11	2.10*	−0.11025	3.11***
GAR1	1,070.45	0.04	0.03782	0.27
GAR2	−1,660.24	0.35	−0.01821	0.61
ICOM	36,197.13	3.80***	0.17331	3.33***
JAC	21,992.60	3.82***	0.09370	2.98***
POOL	9,075.81	2.05**	0.07624	3.16***
ROOMS	658.54	0.21	−0.00755	0.45
SEPTIC	33,615.42	3.48***	0.23201	4.39***
SF	5.23	0.30	0.00037	3.96***
SFSQ	0.01	2.56***	−3.96E-08	2.33**
UPGRADE	1,635.50	0.25	−0.01335	0.37
1993	−23,032.17	1.14	−0.22012	1.99**
1994	−9,952.78	2.28**	−0.09277	3.89***
1995	−1,151.58	0.26	−0.00979	0.40
Adj. R^2	0.741		0.760	
F-Statistic	50.53***		55.77***	

Exhibit 2 | (continued)

Empirical Results: Full Equation

	Linear		Semi-Log	
Variable	Coeff.	*t*-Value	Coeff.	*t*-Value
Panel B: Eminent Domain Properties				
CONSTANT	368.97	0.002	10.52560	17.06***
AGE	−1,467.51	0.35	−0.00187	0.09
AGESQ	−31.87	0.34	0.00039	0.84
BATH	56,373.45	2.50**	−0.31961	2.85***
BED	−28,831.99	1.63	−0.08490	0.96
DISTANCE	11.99	2.18**	0.00006	2.25**
FP	2,971.42	0.15	0.09378	0.94
GAR0	27,551.18	0.74	0.13288	0.72
GAR1	−8,970.89	0.17	−0.02189	0.08
GAR2	12,282.95	0.42	0.03408	0.24
ICOM	23,609.59	1.15	0.11963	1.17
JAC	47,549.58	1.37	0.24752	1.43
POOL	5,388.65	0.28	−0.04162	0.43
ROOMS	21,478.16	1.86*	0.07649	1.33
SEPTIC	14,324.97	0.51	−0.00961	0.07
SF	109.95	1.93**	0.00097	3.43***
SFSQ	−0.01	0.65	−1.09E-07	2.39**
UPGRADE	43,940.32	1.76*	−0.26591	2.14**
1993	−42,414.23	1.38	−0.11825	0.77
1994	−39,432.85	1.21	−0.11227	0.69
1995	−68,912.14	2.49***	−0.28157	2.03**
Adj. R^2	0.891		0.901	
F-Statistic	15.94***		17.81***	

Notes: All *t*-Statistics reported in absolute value.
*Significant at the 0.1 level.
**Significant at the 0.05 level.
***Significant at the 0 01 level.

Exhibit 3 | Truncated Model: Linear Model

	Market Sample		Eminent Domain Sample		
Variable	Coeff.	*t*-Value	Coeff.	*t*-Value	F-Test Statistic[a]
CONSTANT	38,822.43	1.91**	−163,413.92	1.31	4.42**
AGE	−1,308.18	1.50	960.07	0.22	0.44
AGESQ	45.11	2.05**	−18.53	0.18	0.63
DISTANCE	3.92	5.27***	13.34	2.23**	4.21***
FP	12,827.84	2.49***	11,351.65	0.52	0.05
GAR0	−15,254.05	2.30**	−12,167.11	0.31	0.01
GAR1	6,640.56	0.26	13,213.37	0.24	0.02
GAR2	−1,759.97	0.31	−11,631.85	0.38	0.17
ICOM	44,564.74	4.64***	24,703.85	1.10	1.01
JAC	22,566.27	3.85***	25,190.34	0.72	0.01
POOL	9,483.63	2.08**	9,499.91	0.45	0.00
SEPTIC	24,420.98	2.50***	−32,337.86	1.14	5.72***
SF	9.18	0.60	114.17	2.06**	5.50***
SF2	0.01	2.67***	−0.01	0.68	3.53**
UPGRADE	−1,946.78	0.287	−49,575.36	1.82*	4.80***
1993	−20,152.74	0.97	−29,149.04	0.87	0.72
1994	−9,230.86	2.05**	−34,395.33	0.99	0.88
1995	−2,419.14	0.53	−62,645.04	2.09**	7.89***
Adj. R^2	0.746		0.856		
F-Statistic	177.83***		14.78***		

Notes: The dependent variable is *Price*. All *t*-Statistics reported in absolute value.
[a] Tiao-Goldberger
*Significant at the 0.1 level.
**Significant at the 0.05 level.
***Significant at the 0 01 level.

two models. The null hypothesis for each Tiao-Goldberger test is $\beta_{i(m)} = \beta_{i(e)}$, where coefficient $i = 1$ to k, and m and e refer to the market and eminent domain model, respectively. The Tiao-Goldberger test is F-distributed with $(L - 1, N_{(m)} + N_{(e)} - Lk)$ degrees of freedom. The value is calculated as:

$$F_{TG} = \frac{\sum_{j=1}^{L} \frac{(\hat{b}_{ij} - \bar{b}_{in})^2}{P_{ij}}}{\sum_{j=1}^{L} SSE_j} \times \frac{\sum_{j=1}^{L} (T_j - k_j)}{(L - 1)}, \quad (2)$$

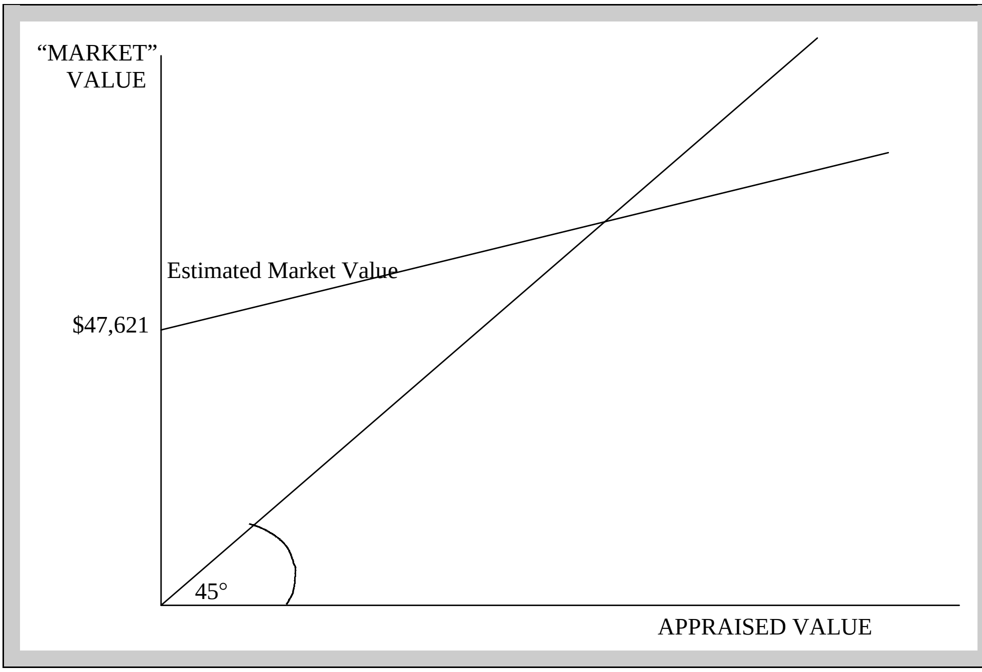
where: $\bar{b} = \frac{\sum_{j=1}^{L} \frac{\hat{b}_{ij}}{P_{ij}}}{\sum_{j=1}^{L} \frac{1}{P_{ij}}}$, L represents the number of models being compared (two in this case), T_j is the number of observations in Model j, k_j is the number of variables in Model j (including the intercept), $\hat{b}_{ij}$ is the OLS coefficient estimator for parameter i in Model j, and P_{ij} the diagonal element for the i^{th} parameter of the $(X'X)_j^{-1}$.

The results indicate that the two models value differently distance to the airport, the presence of a septic system, square feet, square feet squared and an upgrade. The Tiao-Goldberger statistic indicates that a significant difference exists in the value placed on the square footage characteristic. This suggests government appraisers may determine value primarily by assigning a value per square foot without regard to size. Also, the difference in the coefficients on the septic dummy variable indicates that the market placed greater weight on lot size than did the government.

Finally, a determination was made as to whether the government valuation of the total property was biased (either upward or downward). The coefficients in the "market" equation (Exhibit 3) were used to estimate a value for the 60 properties taken by eminent domain, estimating the value as if they were sold on the market. This estimated "market" value was then regressed against the appraised value used in the taking. Statistically significant conformity of market and appraised values will occur with an intercept coefficient insignificantly different from zero and a slope coefficient not significantly different from one. The resulting equation is:

$$\begin{aligned} MV = {} & 47621.97 \quad + .5962\ AV \\ & (488)^{***} \qquad (13.05)^{***} \\ & \text{Adjusted-}R^2 = .741 \quad F\text{-Statistic} = 170.38^{***} \end{aligned} \quad (3)$$

Exhibit 4 | Regression of the "Market" Value of a Taken Property and Its Appraised Value



where *MV* is the estimated market value of the eminent domain properties, and AV is the government-appraised values for the same properties.

The significantly positive constant term and the significantly less than one slope coefficient imply that the government under-appraised properties with low market values and over-appraised properties with higher market values.[5] In Exhibit 4, the 45-degree line represents exact conformity of appraised values with estimated market values for the 60 eminent domain properties. For lower estimated market value properties, the regression line lies above the 45-degree line. The opposite holds for higher estimated market value properties indicating that appraised value exceeds market value.

Overall, the average appraised value exceeds the average estimated market value. The mean of the appraised values equals $182,275 while that of the estimated ''market'' values equals $156,289. This represents an over-appraisal of approximately 17%.

Conclusion

The evidence from our Clark County, Nevada sample suggests that government appraisers do not value a residential property and its various characteristics equally to the market. When a hedonic model compared properties sold in the free market versus those taken by eminent domain, individual coefficients not only differ statistically, but also the total property value differs. A property's distance from the airport, square feet of living space and size of its lot, are priced differently in the market than by government appraisers. Overall, government appraisers under-appraised low value properties and over-appraised more valuable properties. On balance, they over-appraised all properties by approximately 17%. Lastly, the findings of this study point to the possible benefits of the use of hedonic valuation in takings compensation.

The findings of this study apply to a specific location, time and taking objective. Further studies comparing assessed and market values are needed before more definitive conclusions may be made about compensation for takings. In particular, the assessor as an agent, the administrative and compliance costs of litigation, and the expectations of litigation merit further study.

Endnotes

[1] In particular, King (1973) makes reference to most of the pre-1970 hedonic studies.

[2] For example, the study excluded market properties of greater distance from the airport than that of the furthest ''taking'' property.

[3] The semi-log model differs from the linear model only to the extent that the dependent variable is the log of the price.

[4] An ''upgrade'' may or may not add value to a property.

[5] This relationship is consistent with valuing properties on the basis of a constant amount per square foot. Homeowners residing in the smaller range of property size value an extra square foot with increasing marginal utility while the opposite is true for homeowners residing in the larger range of property size.

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