8-1998

Analysis of Assessment Uniformity in Relation to Favorable Mortgage Terms

James G. Strathman
Portland State University

ANALYSIS OF ASSESSMENT UNIFORMITY IN RELATION TO FAVORABLE MORTGAGE TERMS

by
James G. Strathman

August 1988

Center for Urban Studies
School of Urban and Public Affairs
Portland State University
Portland, OR 97207-0751
(503) 725-4020
(503) 725-5199 FAX
http://www.upa.pdx.edu/centers.html#CUS

Abstract

This paper examines the capitalization effect of mortgages with favorable terms on the coefficient of intra-area dispersion (COD), the statistic commonly used to measure assessment uniformity. Regression analysis using data from the 1982 Census of Governments indicates that as much as one third of the value of the 1981 state-level CODs can be attributed to the capitalization effects of financing rather than assessment performance. Post-1982 improvements in uniformity can be expected in light of the sharp decline in non-standard sources of mortgage credit.

Introduction

Uniform assessment is an essential condition for equity in property tax systems. It ensures that tax liabilities and property values are directly related. Non-uniformity, characterized by non-trivial variation of the ratio of assessments to market values, threatens the link between tax liabilities and property values and consequently, systematic tax equity. Thus, non-uniformity in property assessments has been considered "the most haunting facet of (the assessor's) arena" [8, p. 129]. A gradual erosion of uniformity from the mid-1960's to the early 1980's is evident in the coefficient of intra-area dispersion (COD) reported in the Census of Governments [15]. The COD measures the average absolute percentage deviation of assessment/sales price (A/S) ratios from the median A/S ratio in a tax district. For example, in 1966 seventy percent of all tax districts in the U.S. maintained a COD of 25 percent or better. By 1976 only 59 percent achieved this standard, and the performance in 1981 showed little change.

The decline in assessment uniformity is especially puzzling considering the range of improvements introduced in the assessment field during the same period [16], including the growing utilization of computerized mass assessment/appraisal techniques, the strengthening of professional standards for assessors and appraisers, the enlargement of assessment districts, the reduction in overlapping jurisdictions, and reforms in the appeals process. These improvements provided a rationale for gains in uniformity, not a decline. The emergence of research in the 1970's on the determinants of assessment performance can be considered a product of this anomaly.[1]

Part of the dispersion of the A/S ratios underpinning the COD is commonly attributed to uncontrollable market error resulting from the use of

nominal sales prices to represent the market value of property. Given that sales prices are stochastic estimates of market values, even the hypothetically perfect system would exhibit limited variation of A/S around A/MV. An issue here, however, is whether the departures of S from MV are indeed random. Rational departures of S from MV have been identified in transactions involving capitalization of contingencies [2], imperfect information [9, 13], seller opportunity costs [7] and favorable mortgage terms [12]. The effects of these departures have not been incorporated in uniformity analysis. Rather, they are typically viewed as "uncontrollable" sources of market error, with sufficiently inconsequential systematic influences on the COD to preclude commitment of resources to capture their effects. Changes in the mortgage credit market in the 1970's and early 1980's, however, suggest that a closer examination of this view is warranted. By 1981, for example, a substantial proportion of housing transactions involved favorable mortgage terms. The 1982 Census of Governments addressed sources of financing for the first time, revealing that nearly 48 percent of all sampled single family (nonfarm) housing transactions in 1981 involved either the assumption of an existing mortgage or a seller-financed first mortgage.

The capitalization effects associated with favorable mortgage terms were thought by Welch [17] to be a reason why the Census COD findings for California indicated less uniformity than the CODs obtained from state appraisal surveys. This disparity was initially observed in the 1972 Census following a 1971 ammendment to the state's Revenue and Taxation Code that required assessors to adjust the sale prices of transactions with favorable mortgage terms to their cash equivalent values. As a result, assessment performance in California has been subject to two distinct measures of uniformity, one based on

nominal sales prices (the Census) showing less uniformity than another based on the cash equivalent value of property. In 1986 eight other states - Arizona, Florida, Georgia, Hawaii, Illinois, Kansas, Maryland, and Minnesota - were also making systematic adjustments accounting for the captilization of favorable mortgage terms, placing them in similar circumstances as California.

This paper will examine the relationship between assessment uniformity and the utilization of mortgages with favorable terms. It addresses the hypothesis that greater utilization of non-standard financing results in a reduction in measured uniformity, given the Census reliance on nominal sales prices in calculating the COD. The effects of financing can thus distort the uniformity statistic, leading to problems of interpretation when the composition of mortgage credit varies across jurisdictions or over time. The effect of rational departures of nominal sales prices from market values on the COD is first presented for a simplified assessment environment. This is followed by a statistical analysis of interstate variations in the COD as related to the utilization of mortgages with favorable terms.

The Effect of Favorable Mortgage Terms on Uniformity

To illustrate the effect of favorable mortgage terms on assessment uniformity we portray a simplified assessment system where the assessed values of all properties are exactly representative of their full market values, i.e.,

$$AV = MV. \qquad (1)$$

Housing sales in the jurisdiction, from which the COD is calculated, are comprised of two groups, one with conventional mortgage terms and the other

with favorable mortgage terms. The relationship between nominal sales prices and market values for each group of transactions is given as follows:

$$SP_i = MV_i\ ,\ i = 1 \ldots k \quad \text{(conventional terms group);} \tag{2}$$

$$SP_j = MV_j + F_j\ ,\ j = k + 1 \ldots n \quad \text{(favorable terms group),} \tag{3}$$

where the term F_j in equation 3 represents the capitalized value of favorable mortgage terms.

The COD is defined as follows:

$$COD = (AD/MAR)\ X\ 100, \text{ where} \tag{4}$$

MAR = the median assessment ratio;

AD = the average absolute A/S deviation from the median assessment ratio,

$$= \frac{1}{n}\sum_{i}\left|\frac{AV_i}{SP_i} - MAR\right| + \frac{1}{n}\sum_{j}\left|\frac{AV_j}{SP_j} - MAR\right| \tag{5}$$

As a further simplification we limit the proportion of transactions involving favorable terms (s) to less than .5 . This gives us, as a result,

$$MAR = 1, \text{ and} \tag{6}$$

$$COD = AD\ X\ 100 \tag{7}$$

Solving for COD under these conditions gives the following:

$$COD = \frac{1}{n} \sum_{j} \left| \frac{MV_j}{MV_j + F_j} - 1 \right| \times 100 ; \quad (8)$$

$$= s \cdot \frac{1}{n-k} \sum_{j} \frac{F_j}{SP_j} \times 100; \quad (9)$$

$$= s \cdot f, \quad (10)$$

where f is defined as the average capitalized value of the favorable mortgage terms as a percentage of the nominal sales price in the transactions involving favorable terms.

Equation 10 shows the magnitude of pseudo-nonuniformity that is generated when nominal sales prices containing the capitalized values of favorable mortgage terms are used in calculating the COD. The size of this distortion is shown to depend on the extent to which non-standard financing characterizes transactions in the housing market, as well as the magnitude of capitalization of favorable terms in relation to nominal sales prices. For a given value of f the distortion in the COD is maximized when s equals .5 . When s equals zero the COD is zero, and when s equals one the magnitude of the COD is determined by the variance of F/SP.

The Model and Empirical Results

Data from the 1982 Census of Governments were selected to estimate the relationship between the COD and the utilization of non-standard mortgage credit. The following model was specified, using states as the unit of observation:[2]

$$COD = f(S, S^2, TAX, AC, AR, URB), \text{ where} \qquad (11)$$

COD = the composite coefficient of dispersion:[3]

S = the percentage of sampled transactions with first mortgages that were loan assumptions or seller contracts;

TAX = the average effective property tax rate for existing single family homes with FHA-insured mortgages;[4]

AC = an assessment cycle dummy variable (1 = periodic re- assessment is required by statute in the state);

AR = the statewide average assessment ratio for single family (nonfarm) residential properties;[5]

URB = the percentage of the state's single family (nonfarm) residential parcels located in SMSA counties.

Both the linear and quadratic forms of the financing variable are included in the specification to conform with the relationship presented in the previous section.[6] The remaining variables have been found to have an effect on the COD in other uniformity studies. Jurisdictions with higher effective tax rates tend to have more uniform assessments, given the potential for the larger benefits to be obtained from appeals [4]. Assessments are also more uniform in jurisdictions that make regular adjustments. More uniform assessments are typically associated with higher assessment ratios, because assessment at full

market value is more easily interpreted by property owners, and it offers less opportunity for assessors to fall out of conformance with state valuation standards [11]. Assessments in metropolitan jurisdictions are expected to be less uniform than those in rural areas given the greater diversity of housing characteristics and conditions found in urban housing markets [5].

The regression results[7] and descriptive statistics are presented in Table 1. The R^2 of .44 and overall F of 5.73 indicate modest explanatory power.[8] The coefficients associated with the linear and quadratic forms of the financing variable have the expected signs and are significant at the .06 level.[9] The assessment ratio also has the expected effect and is significant. The TAX and AC coefficients have the expected signs, but are not significant.

Table 1

Regression Results (Dependent Variable = COD)

Variable	Mean	S.D.	Coefficient	t-ratio
Intercept			9.230	.44
S	48.72	13.40	1.501	1.90
S^2	2549.32	1311.09	-.015	-1.88
TAX	1.27	.58	-2.360	-.71
AC	.44	.50	-2.474	-.71
AR	35.38	26.42	-.267	-3.89
URB	57.80	23.70	-.012	-.17
		R^2	.44	
		SEE	11.17	
		F	5.73	

By setting the derivative of the regression equation with respect to S equal to zero and solving for S, we can determine the point where non-standard financing is estimated to exert maximal influence on the COD. The value obtained for S is 50.03 percent, which is consistent with our expectations. The total effect of non-standard financing on the COD at this point is then determined by the range over which S is evaluated. Setting the range at two standard deviations of S (from 23.2 to 76.8), non-standard financing produces a maximum increase of 10.8 units in the COD, which represents about 35 percent of its mean value. Decomposition of the mean COD at S = 50 percent thus gives two components of uniformity, one representing the level of "latent" dispersion (equalling 19.2), and the other representing dispersion attributable to using nominal sales prices in calculating the COD (equalling 10.8). In an ideal measure of uniformity only the latent component should be represented, and the confounding effects of nominal sales prices that include the capitalized value of favorable mortgage terms should be purged. Estimates of latent COD values for states falling in the S range set above are provided in the Appendix. These estimates are based on the observed values of S and S^2 for each state.

Regarding the results presented here, caution should be exercised for several reasons. First, estimates of the total effect of S on the COD are sensitive to the choice of the range of S over which the estimates are evaluated. Had we selected a range of one standard deviation rather than two, this would have produced a 2.7 unit change in the COD attributable to financing effects, versus the 10.8 unit change noted above. Second, the model specification is relatively anemic in its representation of the professional, procedural and technical aspects of assessment systems, which Almy [3] has found to be determinants of uniformity.

Conclusions

In this paper we have examined the rational departure of nominal sales prices from market values in terms of the consequences for measuring assessment uniformity. The consequences of these rational departures were estimated to be substantial, generating an upward distortion in the COD.

The mortgage credit environment of the early 1980's provided an ideal context for uncovering the effects of non-standard financing on assessment uniformity. First, transactions were nearly evenly divided between those employing conventional financing and those relying on financing with favorable terms. In addition, the mortgages with favorable terms provided substantial debt service savings to buyers which, in turn, were partially capitalized in sales prices. Studies during this period [10, 14] found the capitalized value of favorable mortgage terms representing about 10 percent of the nominal sales prices.

The composition of the mortgage credit market has changed considerably since the early 1980's. This is evidenced in Table 2, which presents a breakdown of the sources of mortgage credit based on the Residential Mortgage Finance Panel surveys conducted by the National Association of Realtors. A sharp decline in assumption and seller financing occurs from 1982, when they comprised 59 percent of all first mortgages, through the first quarter of 1988, when they represented just 12 percent of first mortgages. This decline can be attributed to more vigorous enforcement of due-on-sale clauses in existing mortages as well as the general decline in mortgage interest rates, which reduced both benefits from assuming existing

loans and the incentive of sellers to offer below market financing to buyers who otherwise would not qualify for conventional mortgage credit.

Taking the liberty of making dynamic inferences on the basis of cross sectional analysis, the post-1982 decline in the utilization of mortgages with favorable terms should have a beneficial effect on the COD's reported in the 1987 Census of Governments, provided that other determinants of uniformity have not changed significantly in the interim.[10] Given that the forthcoming COD's will more fully reflect the latent levels of uniformity, the returns to improvements in assessment practice noted by Welch [17] may become evident. An indictment of the uniformity statistic rather than the assessment system may then be in order.

Table 2

Sources of First Mortgage Loans, 1982-88
(Percentage Distributions)

	Apr '88	Oct '87	Oct '86	Oct '85	Oct '84	Sept '83	Aug '82
Financial Institutions*	87	92	91	81	72	66	33
Assumptions	8	4	6	9	18	22	41
Sellers	4	3	2	4	8	8	18
Others**	1	1	1	6	2	4	8
	100	100	100	100	100	100	100

Source: National Association of Realtors

* Includes commercial banks, savings and loans associations, mutual savings banks and mortgage bankers

** Includes private investors, friends, relatives, etc.

Footnotes

1. This research has been reviewed by Almy [3] and Bowman and Butcher [5].
2. The choice of states as the unit of analysis was dictated by the Census reporting of mortgage financing characteristics at the state level. Ideally, the analysis should be conducted at the local tax district level. In principle, aggregation of local tax districts can be justified given that the legislative and judicial bases of assessment practices are generally determined at the state level. However, it cannot be ensured that consistent implementation of state-wide standards is achieved in practice.
3. The composite COD is the weighted average of the sampled COD's in a state, where the weights are proportional to the number of houses in the sampled jurisdictions.
4. The data was taken from ACIR [1]. The effective property tax rates for four states (New Hampshire, Rhode Island, Vermont and Alaska) were not reported for 1981. For these observations the 1980 effective tax rates were used.
5. As with the composite COD, the average assessment ratio is a weighted average of the ratios for the sampled areas in each state, with the weights set in proportion to the number of houses in each area.
6. This precludes the use of a logarithmic specification, which is the form employed in most studies of uniformity. Quadratic expansions of the other continuous variables were initially specified. These terms were not found to play a significant role in explaining the variation in the COD, and were subsequently dropped from the analysis. See Wonnacott and Wonnacott [18, pp. 87-91].

7. Correlations among independent variables were reviewed to identify the degree of colinearity. S and S^2 were highly correlated, as one would expect. Otherwise, the strongest correlation observed (-.44) was between S and TAX.
8. Studies limited to tax districts in a given state [5, 6] tend to perform better than this, while analysis at the interstate level shows about the same level of performance. Two outliers with very high COD's - North Dakota (78.9) and Texas (63.3) - were in part responsible for the modest R^2.
9. Ideally, the regression specification should also represent F/SP in the financing variables. However, this data is not available. The significance of the financing coefficients indicates that there was apparently not much interstate variation in F/SP.
10. Clearly, this inference could be drawn with greater confidence had the analysis been based on pooled cross section-time series data covering Census years prior to 1981. Unfortunately, data on non-standard mortgages were not collected prior to the 1982 Census, and data collected since 1982 (e.g., the Residential Mortgage Finance Panel surveys) lacks the spatial detail of the Census mortgage data.

References

1. ACIR. Significant Features of Fiscal Federalism, 1981-82 Edition, Washington, D.C., U.S. Government Printing Office, April 1983.
2. Allen, Paul R.; Shilling, James D.; and Sirmans, C.F. "Contracting, Contingencies and Single-Famly House Prices," Economic Inquiry, XXV:1 (1987), pp. 159-64.
3. Almy, Richard R. "The Impact of Assessment Practices on Assessment Performance," in International Association of Assessing Officers, Analyzing Assessment Equity, Chicago, IAAO, 1977, pp. 153-74.
4. Borland, Melvin and Lile, Stephen. "The Property Tax Rate and Assessment Uniformity," National Tax Journal, XXXIII:2 (1987), pp. 99-102.
5. Bowman, John H. and Butcher, William A. "Institutional Remedies and the Uniform Assessment of Property: An Update and Extension," National Tax Journal, XXXIX:2 (1986), pp. 157-69.
6. Bowman, John H. and Mikesell, John L. "Uniform Assessment of Property: Returns From Institutional Remedies," National Tax Journal, XXXI:2 (1978), pp. 137-52.
7. Cubbins, John. "Price, Quality and Selling Time in the Housing Market," Applied Economics, 6 (1974), pp. 171-87.
8. Ernst, Gerald E. "Comment on Geraci and Plourde's 'Benefits and Costs of Improved Property Tax Asessment Administration'," in International Association of Assessing Officers, Analyzing Assessment Equity, Chicago, IAAO, 1977, pp. 126-29.
9. Miller, Norman G. "The Influence of Housing Market Transaction Phenomena on Residential Property Value," Ph.D. dissertation, Ohio State University, 1977.

10. Rosen, Kenneth T. "Creative Financing and House Prices: A Study of Capitalization Effects," Housing Finance Review, 3:2 (1984), pp. 119-27.
11. Shannon, John. "Conflict Between State Assessment Law and Local Assessment Practice," in R.W. Lindholm, ed., Property Taxation - USA, Madison, University of Wisconsin Press, 1969.
12. Sirmans, G. Stacy; Sirmans, C.F.; and Smith, Stanley D. "The Issues and Implications of Creative Financing and House Prices: A Survey," Property Tax Journal, 4:4 (1985), pp. 383-415.
13. Stigler, George J. "The Economics of Information," The Journal of Political Economy, LXIX:3 (1961), pp. 213-25.
14. Strathman, James G.; DeLacy, P. Barton; and Deueker, Kenneth J. "Creative Financing 'Concessions' in Residential Sales: Effects and Implications," Housing Finance Review, 3:2 (1984), pp. 149-63.
15. U.S. Bureau of the Census, Census of Governments, 1982, Volume 2, Taxable Property Values and Assessment - Sales Price Ratios, Washington, D.C., U.S. Government Printing Office, 1984.
16. Welch, Ronald B. "Property Tax Developments: Modernization, Classification, Site Value Taxation," National Tax Journal, XXIX:3 (1976), pp. 322-27.
17. Welch, Ronald B. "Comment on Almy's 'The Impact of Assessment Practices on Assessment Performance'," in International Association of Assessing Officers, Analyzing Assessment Equity, Chicago, IAAO, 1977, pp. 197-200.
18. Wonnacott, Ronald J. and Wonnacott, Thomas H. Econometrics, New York, John Wiley & Sons, 1970.

Appendix

Estimated Latent Coefficients of Dispersion, 1981

State	S	Estimated Effect of S on COD	Reported COD	Estimated Latent COD
Alabama	57.6	9.9	53.6	43.7
Alaska	34.4	7.1	13.6	6.5
Arizona	68.4	5.7	26.8	21.1
Arkansas	62.6	9.4	36.5	27.1
California	57.6	9.9	32.4	22.5
Colorado	63.2	8.2	28.4	20.2
Delaware	39.8	9.2	26.1	16.9
Florida	57.2	10.0	17.7	7.7
Georgia	62.1	8.6	33.3	24.7
Hawaii	70.1	4.7	17.1	12.4
Illinois	35.0	7.3	23.0	15.7
Indiana	38.5	8.8	50.0	41.2
Iowa	42.0	9.8	21.4	11.6
Kansas	44.2	10.2	37.8	27.6
Kentucky	48.1	10.7	23.5	12.8
Lousiana	42.7	10.0	35.8	25.8
Maine	47.4	10.7	21.1	10.4
Maryland	47.2	10.6	21.9	11.3
Michigan	48.8	10.8	21.7	10.9
Minnesota	51.6	10.8	27.1	16.3
Mississippi	60.5	9.1	35.4	26.3
Missouri	45.9	10.5	55.4	44.9
Montana	62.4	8.5	33.5	25.0

Nebraska	44.0	10.2	20.3	10.1
Nevada	58.8	9.6	23.0	13.4
New Hampshire	34.4	7.1	15.2	8.1
New Jersey	27.6	3.2	15.4	12.2
New Mexico	57.4	10.0	38.5	28.5
New York	39.9	9.2	35.4	26.2
North Carolina	56.5	10.2	25.1	14.9
North Dakota	43.7	10.2	78.9	68.7
Ohio	34.0	6.9	22.8	15.9
Oklahoma	48.6	10.7	35.2	24.5
Oregon	59.1	9.5	13.3	3.8
Pennsylvania	30.6	5.1	42.0	36.9
Rhode Island	29.8	4.6	20.6	16.0
South Carolina	47.5	10.7	40.9	30.2
South Dakota	60.5	9.1	24.9	15.8
Tennessee	54.4	10.5	27.3	16.8
Texas	55.8	10.3	63.3	53.0
Utah	67.8	6.0	56.3	50.3
Vermont	34.0	6.9	33.9	27.0
Virginia	55.8	10.3	21.4	11.1
Washington	63.8	7.9	18.7	10.8
West Virginia	37.2	8.3	30.5	22.2
Wisconsin	26.6	2.5	12.4	9.9
Wyoming	54.7	10.4	40.9	30.5