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Evaluation of Vertical Equity in Residential Property Assessments in the Lake Oswego and West Linn Areas

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EVALUATION OF VERTICAL EQUITY IN RESIDENTIAL PROPERTY ASSESSMENTS IN THE LAKE OSWEGO AND WEST LINN AREAS

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Summary

This report presents a statistical evaluation of vertical equity in the pattern of residential property assessments in the Lake Oswego, West Linn and nearby unincorporated areas based on an application of the Paglin-Fogarty method to a sample of recent sales. A vertically regressive pattern of inequity in assessments, which is characterized by systemmatic under-assessment of higher-valued properties and over-assessment of lower-valued properties, was found. Based on the entire sample, it was estimated that a typical $75,000 property was over-assessed by about $4,700, and a typical $175,000 property was under-assessed by $8,800.

Introduction

This report presents the results of a study of vertical assessment equity for residential properties in the Lake Oswego and West Linn areas. Vertical assessment inequity, as defined by Paglin and Fogarty (1972), exists when property assessments systemmatically diverge from market values. Paglin and Fogarty identified two types of vertical inequity. The first, regressive vertical inequity, occurs when higher valued properties are systemmatically under-assessed and lower valued properties are systemmatically over-assessed in relation to the average assessment ratio. The second, progressive vertical inequity, is represented by the reverse situation where higher valued properties are over-assessed and lower valued properties are under-assessed in relation to the average assessment ratio. Paglin and Fogarty developed a regression approach with an associated statistical test for the two types of vertical inequity.

The Paglin-Fogarty method was applied to a sample of recent residential sales in the Lake Oswego and West Linn areas. This method and the results of the regression analysis are presented and discussed in the following sections.

Framework of the Study

In a perfect assessment system the ratio of the assessed value of each property to its market value will equal the average assessment ratio for all properties. Thus, if assessments are set at 100% of market value, a perfect system will be maintained if the assessed value

of each property were equal to its market value. This can be stated
in equation form as follows:

$$\frac{AV_i}{MV_i} = \frac{\overline{AV}}{\overline{MV}} \quad , \text{ where}$$

AV_i = the assessed value of the i th property;

MV_i = the market value of the i th property;

$\overline{AV}$ = the average assessed value for all properties;

$\overline{MV}$ = the average market value for all properties.

The ratio on the right hand side of the equation is termed the average
assessment ratio, and it represents the assessment proportion of market
value for the tax jurisdiction.

In order to test for the presence of systemmatic vertical inequity
in assessments Paglin and Fogarty regressed the assessed values of
recently transacted residential properties on their sale prices, using
the sale prices to represent market value. The following regression
equation was estimated:

$$AV_i = a_0 + b_1 \cdot SP_i + e_i$$

In this equation SP_i represents the sale price variable, a_0 and b_1 are
the coefficients to be estimated, and e_i is a stochasic error term. If
the assessments exhibit a vertically equitable pattern the following
null hypothesis will be satisfied:

$$H_0: b_1 = \frac{\overline{AV}}{\overline{SP}} .$$

In other words, if the estimated regression coefficient associated with the sale price variable does not differ significantly from the average assessment ratio, vertical equity is confirmed. Alternatively, if the estimated regression coefficient is found to be significantly lower than the average assessment ratio, a pattern of regressive vertical inequity is confirmed. Finally, a regression coefficient that is found to be significantly larger than the average assessment ratio confirms the presence of progressive vertical inequity.

The Paglin-Fogarty method is a generally accepted means for identifying the presence of vertical inequity in assessments. This method has been endorsed by, among others, the International Association of Assessing Officers (1977), a professional organization whose membership includes most of the assessors in the U.S. This method is applied in the next section to a sample of recent residential sales from the Lake Oswego and West Linn areas.

Regression Analysis

A sample of 385 residential property sales from the 1986 calender year was obtained from the sales reports of the Oregon Multiple Listing Service. Of the total sample, 215 observations represented sales in Lake Oswego and 170 were sales from West Linn and nearby unincorporated areas. The sale prices and assessed values for the properties in the sample were obtained from the records of the Clackamas County Department of Assessment. Properties with sale prices exceeding $250,000 were deleted from an initial sample containing approximately 415 sales. These properties were not included in the final sample because even small

percentage deviations at the high end of the market can distort analysis of assessment patterns. A general "rule-of-thumb" is to limit the upper end of the sample to a value that is twice the mean value of properties in the area (Strathman et al, 1984). Separate regression equations were then estimated for the Lake Oswego, West Linn and total sample observations.

Table 1 presents descriptive statistics for the sample. The average

Table 1

Descriptive Statistics

	Lake Oswego	West Linn	Total Sample
Average Sale Price	$121,235	$94,991	$109,647
Average Assessed Value	118,694	93,506	107,572
Assessment Ratio	.979	.984	.981

sale price for the total sample was just under $110,000, with the Lake Oswego average being about $10,000 higher and the West Linn average about $15,000 lower. These averages are representative of the general price levels observed in the respective housing markets. The average assessed values are slightly less than the average sale prices (about 98% of the average sale price in the three areas) indicating that, on average, properties are assessed at nearly full market value.

The regression results for the three components of the sample are presented in Table 2. The regression equation fits the data quite well, as evidenced by the high R^2 value and the small standard errors

associated with the sale price coefficients.

Table 2

Regression Results[*]

	Lake Oswego	West Linn	Total Sample
Intercept	$17,493	$13,560	$14,849
b_1	.835 (.020)	.842 (.028)	.846 (.016)
R^2	.89	.84	.88
SEE	$15,220	$15,897	$15,559
N	215	170	385

[*] The standard errors of the regression coefficients are
given in parentheses.

A 95% confidence interval was constructed around the estimated

coefficients for sale price in the regressions to test for the presence

of vertical inequity in the pattern of assessments. If the average

assessment ratio falls within the confidence interval the null

hypothesis of vertical equity can be accepted.

In all three regressions the average assessment ratio is found to

lie above the upper limit of the 95% confidence interval associated

with the estimated sale price coefficients. The 95% confidence interval

for the Lake Oswego regression coefficient ranges from .796 to .874,

versus the average assessment ratio of .979. For West Linn the confidence

interval ranges from .787 to .897, versus an average assessment ratio

of .984. And for the total sample the confidence interval ranges from .815 to .877, versus an average assessment ratio of .981. Given that the assessment ratio is found to lie significantly above the sale price coefficient in each of the regressions, it can be concluded that the assessments in these areas are characterized by a pattern of regressive vertical inequity - higher valued properties are being systemmatically under-assessed, while lower valued properties are being systemmatically over-assessed.

One can compare the magnitude of over or under-assessment for given classes of properties by calculating the difference between the assessed value associated with "perfect" assessment and the value estimated by the regression equations. In equation form, the divergence from perfect assessment for a typical property in a given value class is given as follows:

$$\Delta \, AV_i = \hat{AV}_i - \left(\overline{\frac{AV}{SP}} \cdot SP_i \right) \text{, where}$$

$\Delta \, AV_i$ = the difference between estimated and perfect assessment for properties in the i th value class;

$\hat{AV}_i$ = the regression estimate of assessed value for the i th value class of properties,

$\quad = a_0 + b_1 \cdot SP_i$;

SP_i = the typical market value of the i th property class.

Estimates of the magnitude of over and under-assessment were calculated for properties with sale prices of \$75,000 and \$175,000

for Lake Oswego, West Linn and the total sample, and the results are presented in Table 3. In the $75,000 property class, systemmatic over-

Table 3

Calculated Differences Between Estimated and Perfect Assessments

	Lake Oswego	West Linn	Total Sample
$75,000 Property Class			
Perfect Assessment	$73,425	$73,800	$73,575
Estimated Assessment	80,118	76,710	78,299
Over (Under)-Assessment	6,693	2,910	4,724
$175,000 Property Class			
Perfect Assessment	$171,325	$172,200	$171,675
Estimated Assessment	163,618	160,910	162,899
Over (Under)-Assessment	(7,707)	(11,290)	(8,776)

assessment averaging about $4,700 per property is estimated for the total sample, with the magnitude of over-assessment being higher in Lake Oswego than in West Linn. In the $175,000 property class, systemmatic under-assessment averaging about $8,800 is estimated for the total sample, with the magnitude of under-assessment being greater in West Linn than in Lake Oswego.

Conclusions

Our analysis indicates that a pattern of regressive vertical inequity is present in residential property assessments in the Lake Oswego and West Linn areas. According to Paglin and Fogarty

(1972, pp. 559-560), regressive vertical inequity may be the consequence

of factors associated with the appraisal process and the dynamics of

the housing market. First, houses of moderate to lower value are more

standardized and numerous, making their values easier to appraise

using mass appraisal techniques. Higher valued houses, however, tend

to contain distinguishing amenities and features that make them more

difficult to appraise, and the tendency is to under-appraise their

market value. Second, the values of properties in different classes

tend to appreciate over time at different rates. Moderate and

lower priced houses tend to appreciate at a rate below the average

market rate for all houses, while houses at the upper end of the market

tend to appreciate at higher than average market rates. The differences

in appreciation rates can be primarily attributed to differences in

maintenence expenditures and neighborhood influences. Thus an initial

appraisal gap at the upper and lower ends of the market will tend to

expand over time if properties are not re-appraised on a regular

(ideally, annually) basis. This study did not pursue the issue of

whether the underlying source of the regressivity pattern in assessments

was due more to distortions in initial appraisal or to time-related

effects (the "appraisal lag"). The study thus documents an outcome

of the assessment process, but not its cause.

References

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