Assessment Performance Analysis of the 2005 Revaluation

Residential and Condominium Properties

*****

Conducted for

City of Regina

*****

by

Robert J. Gloudemans

Almy, Gloudemans, Jacobs and Denne

October 22, 2004

Contents

Assessment Performance Analysis of the 2002 Revaluation
Residential and Condominium Properties
City of Regina

1. Executive Summary

The City of Regina requested a review of their recently completed revaluation of residential and condominium properties for the 2005 assessment year. The base date for the revaluation is June 30, 2002. The revaluation is particularly significant because for the first time the City used the sales comparison approach rather than a market-adjusted cost approach to value residential and condominium properties.

Revaluations conducted in Saskatchewan are governed by the formulas, rules, and principles adopted by the Saskatchewan Assessment Management Agency (SAMA). While generally consistent with standards adopted by the International Association of Assessing Officers (IAAO), SAMA's requirements for assessment performance are notably tighter than IAAO standards; calling for achievement of an overall assessment level of 0.98 to 1.02 (the corresponding IAAO standard is 0.90 to 1.10).

The author critically reviewed the residential and condominium models used by the City's Assessment Division and quality control analyses undertaken to ensure compliance with SAMA and professionally accepted (IAAO) standards. The author also conducted an independent sales ratio analysis using 2003 sales. Since these sales were not used in the revaluation, they serve as an independent holdout group for objectively analyzing the performance of the revaluation (sales prices were adjusted back to the valuation date so that an apples-to-apples comparison could be made).

Based on this multi-faceted analysis, the author concludes that the Assessment Division followed appropriate procedures in the revaluation and achieved the provincially mandated assessment level of 0.98 to 1.02. The models used for both residential and condominium properties are well formulated, consistent with appraisal principles, and "make sense." Although the older, low-value areas of the City are exceedingly difficult to value (regardless of approach used) and defy compliance with some accepted performance measures, the models generally achieve high levels of accuracy and uniformity.

The remainder of the report is organized into three sections. Section 2 summarizes the models developed for residential properties and results of the author's independent analyses of assessment performance. Section 3 contains parallel analyses and results for condominium properties. Section 4 contains a summary of observations, conclusions, and recommendations for future enhancements.

2. Overview of MRA

SAMA's formulas, rules, and principles were modified for the 2005 revaluation to permit adoption of sales comparison models for the residential properties of less than four units and condominiums. SAMA defines multiple regression analysis (MRA) as "a generally accepted statistical technique used in the mass appraisal of property. MRA is used to determine the relationship that exists between property characteristics in determining the anticipated sale price of a property."

MRA is widely used by North American assessment jurisdictions, particularly for the revaluation of residential and condominium properties. For example, virtually all residential and condominium properties (as well as vacant residential land) in Ontario are appraised with the method with values updated annually. Other jurisdictions using the method include the cities of Calgary, Edmonton, and Winnipeg, as well a variety of Quebec municipalities. In Saskatchewan, the City of Saskatoon is also implementing MRA for the 2005 revaluation. Many other assessment agencies across Canada are also using or developing use of the method. (Interestingly, revaluations underway in England and Northern Ireland are also using the method for the first time.)

SAMA guidelines establish June 30, 2002 as the base date of the 2005 revaluation and outline the following steps in the development and application of MRA models.

- Identify arm's length sales of improved residential properties.
- Use MRA to determine the significance of, and relationships, among property characteristics for determining value.
- Use MRA to determine adjustment amounts (coefficients) for the relevant characteristics.
- Determine adjustment factors for property characteristics not accounted for in the MRA model (this applies largely to seldom-occurring features such as swimming pools or wood basements in various market areas).
- Express the relationships in equation format.
- Test the reliability of the equations using sales from the revaluation time period.
- Test the reliability and consistency of the equation between various groups of properties.

SAMA guidelines specify that all arm's length sales used to develop the model shall also be used to test the model. Assessors are directed to undertake an array of accepted sales ratio analyses, in which the new assessments are compared against sales prices[1], to evaluate the reliability and uniformity of results. These include graphs and accepted statistical measures of assessment level and equity. The overall level of assessment for the municipality, as determined by the median assessment-to-sales ratio, must lie between 0.98 and 1.02.

The author finds that the Assessment Division complied with the above requirements, as well as other generally accepted standards for the development of mass appraisal models.

[1] SAMA's guidelines state that assessment ratios should be determined "by dividing the fair value by the sale price." The author assumes that, consistent with accepted appraisal principles, the sales prices used in sales ratio analyses are to be adjusted for time-of-sale, so that both value and prices reflect a common date (30 June 2002).

3. Residential Property

3.1 Model Results

The Assessment Division has identified six residential market areas. Market area 1 consists of the older, low-value areas north of the City's downtown. Area 2 borders area 1 on the City's north, west, east, and southeast sides. Area 3 generally lies beyond areas 1 and 2 on the City's north and northwest sides, and also includes two northeast neighborhoods. Area 4 lies on the City's south side. Area 5 includes the newest areas on the city's northwest, southeast, and far southwest sides. Area 6 lies south of the western portion of Area 1 and consists of older but often renovated homes. Each market area is comprised of a number of distinct neighbourhoods.

The models were developed from sales over the three-year period, January 2000 through December 2002. For validation purposes, every 8th sale was tagged as a "holdout" sale. These sales were used to test but not develop initial models. Time of sale was included as a variable and used to adjust all sales prices to the base date (30 June 2002). Once the model was successfully validated on the holdout sales, final models were run using all usable time-adjusted sales in order to maximize model reliability.

A "global" or citywide model was developed first. This model helped determine relevant variables, overall market relationships, and the contribution of seldom-occurring features such as swimming pools. The global model and each of the six market area models contain the following variables (in some cases coefficients in market area models were constrained based on the global model).

- Land area. In areas 2 through 5 separate rates were developed for standard and excess land.
- Living area. Separate base rates were determined for each of the City's six construction grades. Models for areas 1 and 2 also contain negative adjustments for very small homes (less than 500 square feet).
- Garage size. Relationships between attached, built-in, and detached garages were based on the global model.
- Total basement, finished basement, deck, porch, and veranda areas. Porches and decks were "linearized" into a single variable (with porches set at 70% of verandas) based on the global model.
- Age and condition.
- Multi-family properties (semi-detached properties and duplexes).
- Style. Binary variables were tested for bi-level, tri-level, and multiple-storey homes and for hillside design (significant in area 5). Bungalows constitute typical or "base" style against which variables for the other styles are compared.
- Heavy traffic. Variables were tested for collector and arterial streets (a limited number of homes adjacent to expressways were combined with those on arterial streets).
- Abutting green space (significant in areas 3 and 5).
- Abutting commercial/industrial properties (significant in all areas), abutting apartments (significant in areas 2, 3, 5, and 6), and abutting institutional properties (not significant).
- Pool. Constrained to $4,700 based on the global model.
- Wood basements. Constrained to -$7,400 based on the global model.

Area 1. This model was easily the most difficult. The average sale price in this area was only $31,345 and there are virtually no homes of good or superior quality. This is the only one of the six areas that showed no significant time trend. Such areas tend to produce poor uniformity measures due to the inconsistency of sales prices. On a percentage basis the same or similar home may sell for a wide price range, e.g., $25,000 or $35,000 (although only a $10,000 difference, notice that the $35,000 sale is 40% higher than the $25,000 sale). The initial model produced a coefficient of dispersion (average error) or "COD" of 30.7 for the model group and 25.3 for the holdout group, reasonable for such properties. The final median ratio for all sales is 1.013 and the COD is 30.0. All the model coefficients appear reasonable. The only quibble the author can find with the model is that an adjustment could have been applied for abutting intuitional (10 such sales had generally high ratios).

Area 2. This is the next lowest in value and second most difficult-to-value area in the City. The average price was $62,537. The initial model produced a COD of 18.1 for the model group and 19.2 for the holdout group. The median and COD for the final, combined model are 0.986 and 18.2, respectively. This model, as well as the model for area 1, indicates some "assessment regressivity", which is the general tendency to assess lower-value properties at a higher ratio than higher-value properties. However, the extent to which this is due to measurement imperfections (a property that sells "low" will have a higher ratio than a property of equal value that sells "high") is difficult to determine, particularly in that the problem appears confined to only the lowest value sales[2]. The coefficients are all reasonable and the model demonstrates good equity between old and new homes, small and large homes, and so forth.

Area 3. Area 3 is a more typical and easy-to-value area with more sales than any of the other areas. The large majority of homes are between 10 and 50 years old and the average price was $93,172. The initial model developed a COD of 8.0 for the model group and 7.7 for the holdout group. The final median and COD are 0.997 and 7.95. Interestingly, the lowest ratios are a cluster of eight ratios centered about 0.50 for the oldest homes (60+ years). Although it would make only minimal difference, the results could be improved somewhat by capping the age adjustment at 50 years (it was capped at 60 years in areas 1 and 2). Perhaps these homes were renovated or have unique features not accounted for in the model (such situations can be resolved during the value review process).

Area 4. This is a rather diverse area with an average price of $104,508. Most home were built in the 1950s through 1970s. Good quality homes outweigh those with below average grades. There are a variety of traffic, commercial, and green belt influences. The initial model produced a COD of 9.7 for the model group and 9.4 for the holdout sample. The final median is 0.999 and the COD is 9.7. The ratios are much more spread for the lowest-value homes (those with a value below $80,000) than for others, again likely reflecting the relative inconsistency in prices for such properties. Also, many of these homes are older homes in varying conditions and state-of-repair. There is good uniformity between various property groups and sub-groups based on size, age, style, etc.

Area 5. On the City's growing fringes, area 5 contains many of the City's newest and largest homes with an average sale price of $158,415. Ninety percent are of good or superior

[2] For a more detailed discussion, see *Mass Appraisal of Real Property*, IIAO, 1999, pages 304-306

construction quality. The initial model produced excellent CODs of 5.9 for the model group and 5.4 for the holdout group. The overall median and COD are1.003 and 5.9, respectively. Almost 95% of the ratios lie within a tight window of 0.85 to 1.15.

Area 6. This area consists of four neighbourhoods tucked to the south of the downtown area. It is the smallest area both geographically and in terms of number of sales (482). However, it is very diverse. The average sale price is $109,142 but ranges from $33,900 to $440,000. While most all of the homes are more than 50 years old, many have been renovated and, except for some notable, new upper-end homes, there is no general correlation between age and price (in fact, the highest prices are for several completely renovated 70-90 year old homes).

The initial model produced a COD of 14.6 for the model group and 12.8 for the holdout group. The final median and COD for the combined model are 0.998 and 14.3, good for an older, heterogeneous area. The model exhibits good uniformity across neighbourhoods, quality classes, and size, age, and value ranges. The only problem may be a tendency to over-value homes near commercial and industrial influences (sixteen such sales exhibit generally high ratios, likely due to combining these sales with those near apartments). Properties with commercial and industrial influences should be examined during field reviews.

Mobile Homes. The Division also built a model for mobile homes. Because there were only 10 usable sales, the model contains variables for only living area and garage size. For these sales the median is 0.997 and the COD is 7.8. Although the model appears to provide a reasonable benchmark, values will obviously have to be monitored closely due to the limited market data.

3.2 Performance Analysis with 2003 Sales

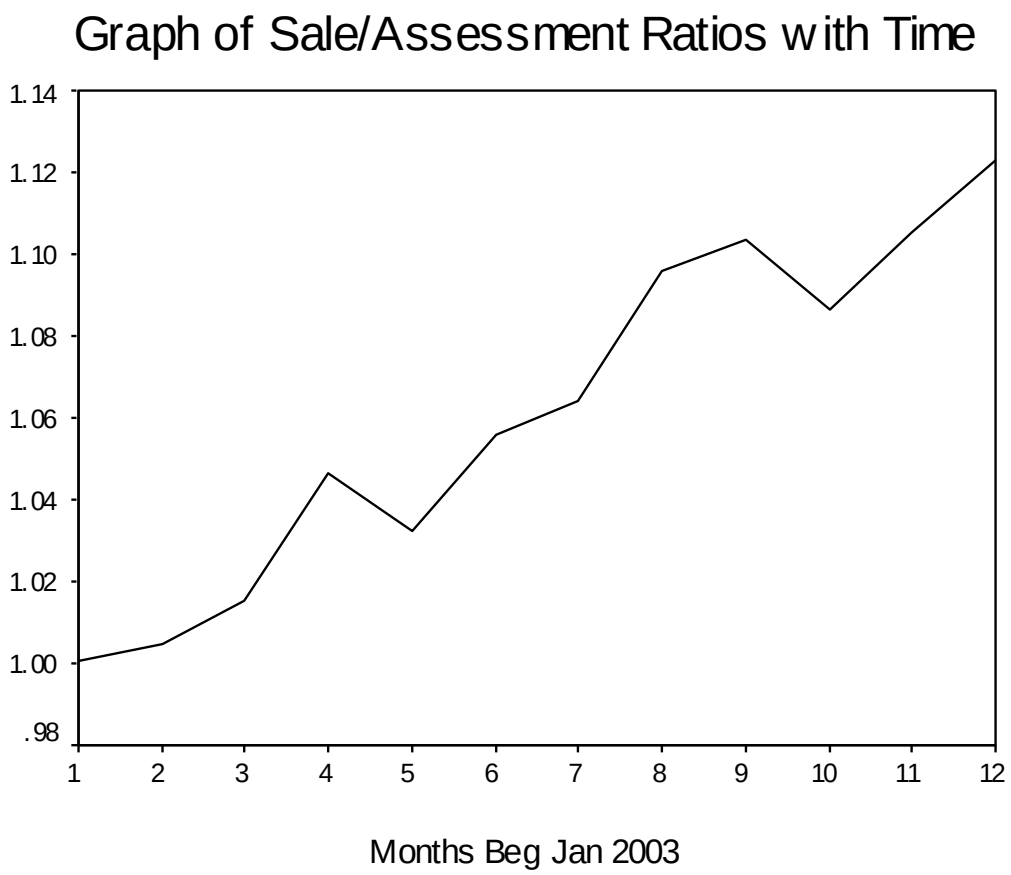
As mentioned, the Assessment Division used three years of sales, 2000 through 2002, to develop the 2005 base year models. This means that later sales are available for testing model performance. The Assessment Division provided files of these sales along with preliminary 2005 base year values and requested property characteristics. The residential file contained sales from 2003. Since these sales have not been manually screened to remove non-open market, arm's-length transfers, the author conducted an electronic review to remove duplicate sales (transfers with the same parcel number and sale date) and "outlier" ratios of less than 0.50 or greater than 2.00. Twenty-eight sales (1.1%), mostly in areas 1 and 2, were deleted as outliers.

A time trend analysis was conducted on the remaining 2,429 sales to adjust their prices to back to the base date of June 30, 2002. Although the Division had already determined time trends through December 2002, the rate of change through 2003 had to be determined. This was accomplished using the assessment ratio trend method (see *Mass Appraisal of Real Property*, IAAO, 1999, pages 265-268). The graph in exhibit 1 below shows a plot of median sale-assessment (S/A) ratios with time over calendar 2003. The graph suggests an overall price increase of approximately 12% or 1% per month over the calendar year. When broken down by market area and calibrated through a regression of S/A ratios on months (coded 1-12), the following trends are indicted[3]:

[3] The indicated rate for area 1 was actually .019 but was capped at .015 to be more consistent with other areas. The indicated trend for area 6 was .0115 but was capped at .01 for better consistency with other mid/high value areas (also its significance was marginal at .12). All other trends were significant at .005 (99.5% confidence level) or higher.

Market Area	Monthly Rate
1	.015
2	.012
3	.0095
4	.0095
5	.0085
6	.010

Exhibit 1



The above trends were combined with trends determined by the Assessment Division in order to adjust all sales back to the base assessment date of June 30, 2002. The average factor applied was 0.9324 (average downward adjustment of 6.76% to account for inflation subsequent to the base assessment date).

With prices adjusted for time, the preliminary 2005 values could then be compared to time-adjusted sales prices (as of June 30, 2002) to compute assessment-sales ratios and perform a traditional ratio study. The overall results are as set out in exhibit 2 below.

Exhibit 2.

Ratio Statistics for VALU2005 / TASP

Area	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1	151	.984	.996	.574	2.180	1.095	.275
2	363	1.008	1.003	.586	2.165	1.059	.191
3	870	1.006	1.013	.748	2.005	1.014	.087
4	363	.997	1.001	.675	1.795	1.017	.101
5	588	1.006	1.002	.690	1.846	1.008	.067
6	94	1.022	.978	.595	1.941	1.060	.169
Overall	2429	1.005	1.005	.574	2.180	1.026	.115

Notice that median assessment ratios cluster closely about 1.00, the target ratio, and the overall coefficient of dispersion is 11.5, indicating good uniformity. These results closely track and reinforce comparable statistics generated on 2000-2002 sales used in model development. As with the 2000-2002 sales, indicated uniformity is excellent to very good in areas 2-4. CODs are higher in areas 1, 2, 6, which are older, more heterogeneous, and contain the City's lowest value areas (see prior discussion).

Appendix 1 shows results in both graphical and table format by size, construction quality, year built, and other key value determinants, including neighborhoods with at least 15 usable sales. In all cases the breakouts reveal good equity among property types.

4. Condominium Properties

4.1 Model Results

As with the residential models, a global condominium model was created first. The model was first run without the holdout sales, validated on the holdout group, and then rerun using all valid sales. Valuation models were then developed for horizontal, low-rise, high-rise, and converted warehouse condos. Because of the limited number of sales, no holdout group was used for the individual models. Sales used in model development spanned the four-year period, January 1999 through December 2002 and were adjusted for time to the valuation date of June 30, 2002. In addition, a 2% adjustment was applied for chattels and a $10,000 adjustment was made for integrated parking in horizontal and low-rise units (the adjustment was market-calibrated in the high-rise model). Time adjustments were .12% per month for horizontal condos, .32% per month for low-rise condos, and 0.14% per month for high-rise condos.

Horizontal Condo Model. As in all the models, primary variables relate to quality-adjusted living area and complex. Quality adjustments were derived from the global models: 2 (low) = 0.74, 3 (fair) = 0.87, 4 (average) = 1, 5 (good) = 1.59, and 6(very good) = 1.73. Based on the residential global model, basements were linearized at 42% of main living area. There is one variable for each complex or complex group. In addition, there are variables for town house style (property use 1539) and semi-detached (property use 1569) units, one-storey and bilevel units (combined), age capped at 40 years, attached and detached garages, and finished basement area. The coefficients for these variables all appear reasonable.

The final model was developed using Method = Enter, meaning that all the final selected variables were entered regardless of statistical significance. This was done to develop an indicated adjustment for each condominium complex, some of which have few or only one sale. Given this approach, it is important to review the indicated adjustments for reasonableness and consistency.

The final model produced a median ratio of 0.997 and excellent COD of 5.8 (these statistics are biased somewhat by the inclusion of variables with few or one sale). There is good equity with respect to size, age, construction quality, style, and value range.

Low Rise Model. This model included complexes with less than four storeys plus 1210 Blackfoot Drive. Separate base rates were developed for standard and premium quality complexes. The model also included variables for style, top floor units, end and corner units (combined), and balconies. Binary variables were created for individual complexes and, again, forced into the model through Method = Enter. Some complexes had as few as two units (none had only one sale). In addition to the standard integrated parking adjustment of $10,000, a $5,000 adjustment was made for detached garages.

The model produced a median of 0.999 and a very good COD of 6.5. Aside from the lower value units, the ratios fall almost entirely between 0.80 and 1.20. Equity is good for various size, age, and value ranges.

Hi-Rise Model (5+ units). Separate size variables were created for units in standard and good quality complexes. Adjustments were also made for floor level ($550 per level), end and corner units ($2,140), integrated parking ($7,486), and complex. Again, Method = Enter was used. Happily all complexes had at least 15 usable sales. The model produced a median of 1.002 and good COD of 8.0 (good). There is good equity by size, age, value range, and complex.

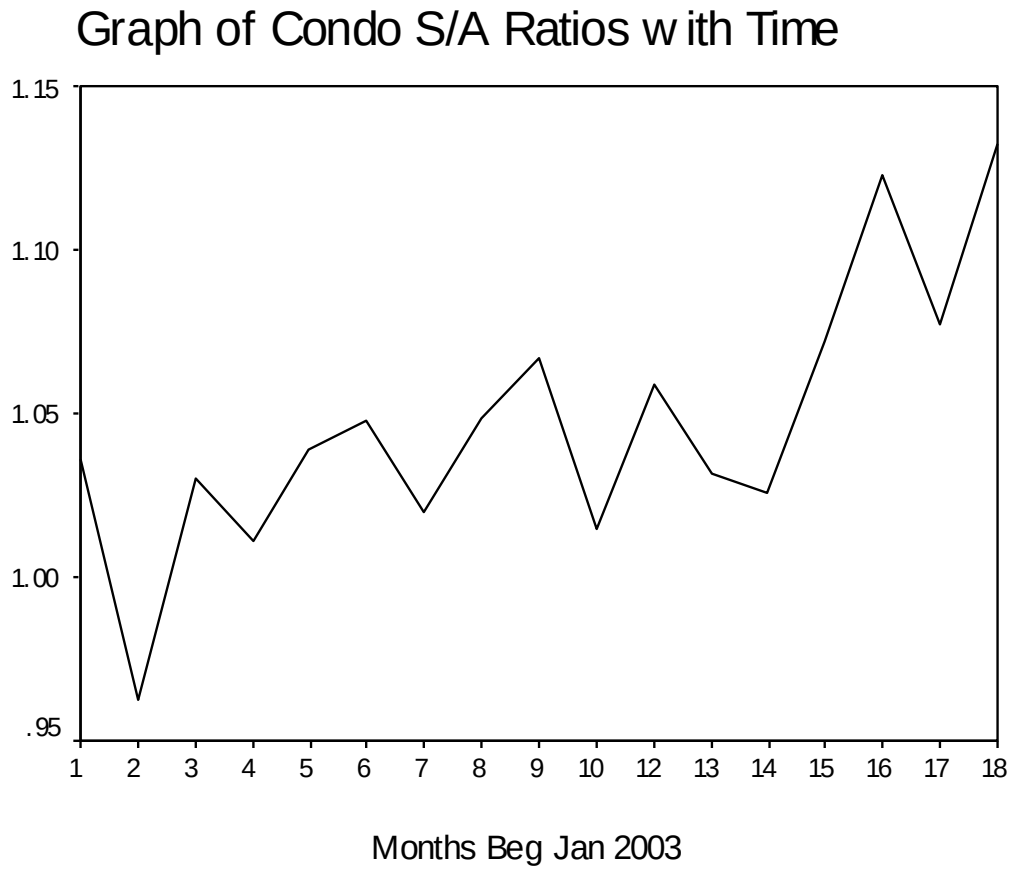
Warehouse Condo Model. The condo model applies to five buildings converted from warehouses to condominiums. While one of the buildings had 12 usable sales, the others had 5, 4, 2, and 2, respectively. There is an adjustment for living area and a binary adjustment for three of the buildings. A 47% allowance was made for unfinished units. Based on the 25 available sales, the median was 0.998 and the COD was 10.2 (good).

4.2 Performance Analysis with 2003 Sales

The Assessment Division provided a file of 522 condo sales from January 2003 through June 2004 (exclusive of warehouses with too few sales for analysis and complexes built after the legislative cutoff of 31 December 2002). The sales had not been manually screened to remove other than open market, arm's-length transfers. The author removed 17 duplicate sales, several sales missing living area and other data, one outlier sale for less than $20,000, and three outlier sales with a ratio of less than 0.50 or greater than 2.00. This left 496 sales available for analysis.

As with residential property, a time trend analysis was conducted. Exhibit 3 below shows a line graph of median sale-to-assessment (S/A) ratios over the 18-month period. Regression analysis showed the overall trend to be 0.56% per month (6.72% annually). This trend was combined with trends developed by the Division for earlier sales and all sales were adjusted at these rates to the assessment date of June 30, 2002.

Exhibit 3



With sales adjusted for time, assessment-to-sale price ratios were computed and standard ratio statistics computed. Exhibit 4 below shows the results by condominium type. Notice that the overall median and weighted mean ratios are 1.009 each and the overall COD is 8.8, well within accepted standards for good performance.

Exhibit 4

Ratio Statistics for VALU2005 / TASP

Type	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
Horizontal	151	.980	.991	.713	1.595	.999	.082
Low Rise	291	1.016	1.017	.690	1.417	1.011	.085
High Rise	54	1.058	1.034	.635	1.260	1.004	.101
Overall	496	1.009	1.009	.635	1.595	1.009	.088

Appendix 2 contains plots and tables of ratios by size, age, and value range. There is good equity between lower and higher value properties.

5. Conclusions and Recommendations

1. The City's revaluation of residential and condominium properties for the 2005 tax year complied with provincial requirements and IAAO standards. The level of assessment for such properties is within the range of 0.98 to 1.02 required by the province and well within IAAO's wider range of 0.90 to 1.00. Although CODs in areas 1, 2, and 6 are outside of IAAO's recommended range (15.0 or less), these are heterogeneous, difficult to value areas and the present models likely achieve as good or better results as other approaches would. Area 1, in particular, is a very low-value area for which conventional standards for less extreme areas are not realistic. The values exhibit good horizontal and vertical equity across various property classes and subclasses.

2. The models are realistic. The variables chosen are ones that one would expect to be relevant in terms of appraisal theory and the coefficients are intuitive and reasonable.

3. Renovations. Renovations pose a problem to many assessing jurisdictions and the City of Regina is no exception. Currently renovations are addressed through the Condition Rating and, where appropriate, adjustments to the Quality Class. In the future attention could be given to better ways to capture and account for the effects of renovations. Some jurisdictions use "effective age" while others explicitly code the extent and year of renovation, which is then analyzed and sometimes converted to effective age during modeling.

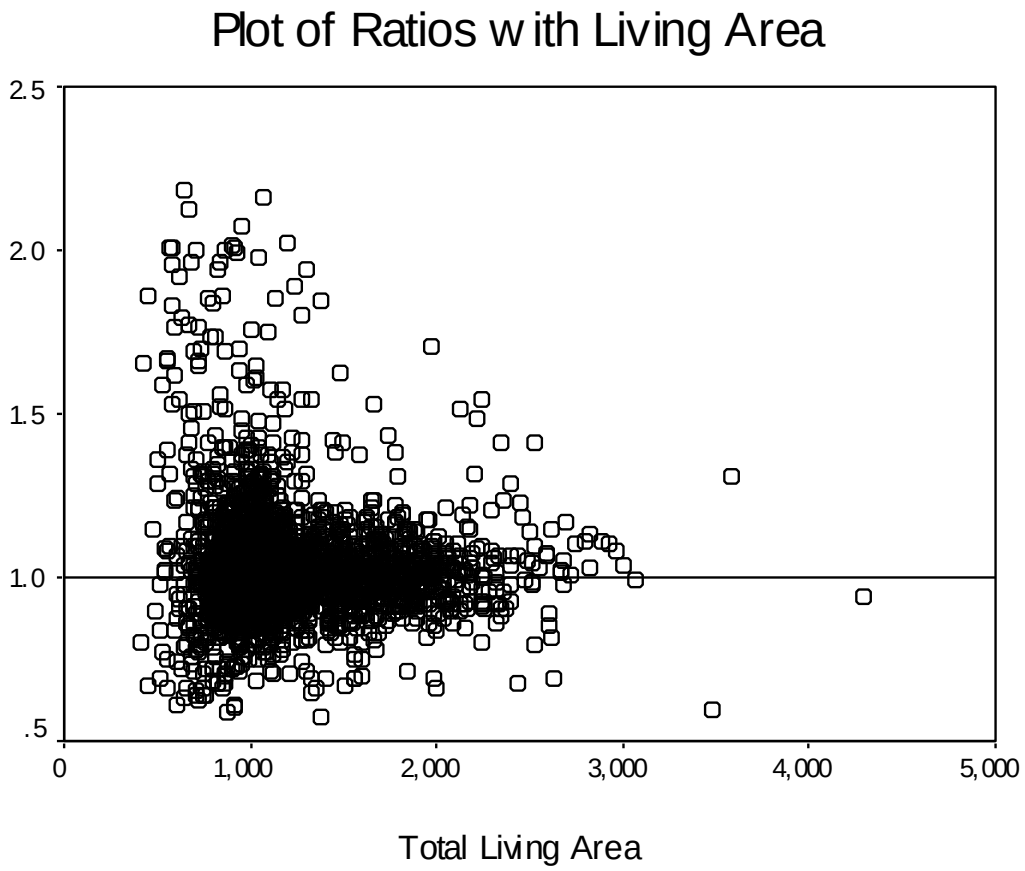
4. Field review. As in any major revaluation, values should be reviewed for reasonableness and constancy. Traditionally this is done through "drive-by" inspections, although GIS and digital photos can also be consulted. Of course, the most problematic areas should receive the greatest attention.

5. Holdout Samples. The holdout sales provided an excellent means of validating the models but, except at the global level, can be dropped in future years. The present modeling approach has been validated and, for efficiency, valuation models can begin with all valid sales. An exception would occur, however, if the City determined to test a

new valuation approach or methodology. Otherwise, as done here, later sales can be used to validate model results.

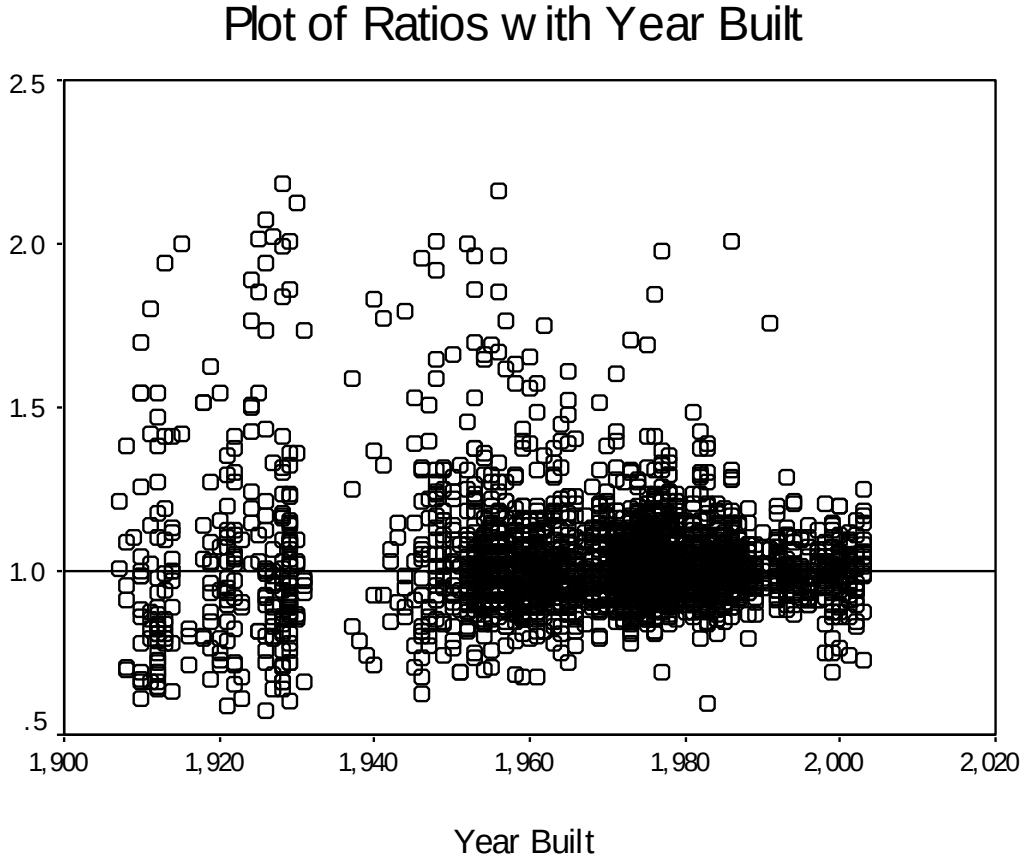
6. Future enhancements. The Assessment Division should stay abreast of and stand ready to test new or more advanced valuation methods. For example, a number of jurisdictions have found that multiplicative or nonlinear models can improve performance for condominiums and heterogeneous residential areas. The Division is off to a solid start in use of the automated sales comparison approach, but advanced techniques offer the potential for further improvements.

Appendix 1
Ratio Study Results Using 2003 Sales: Residential Properties



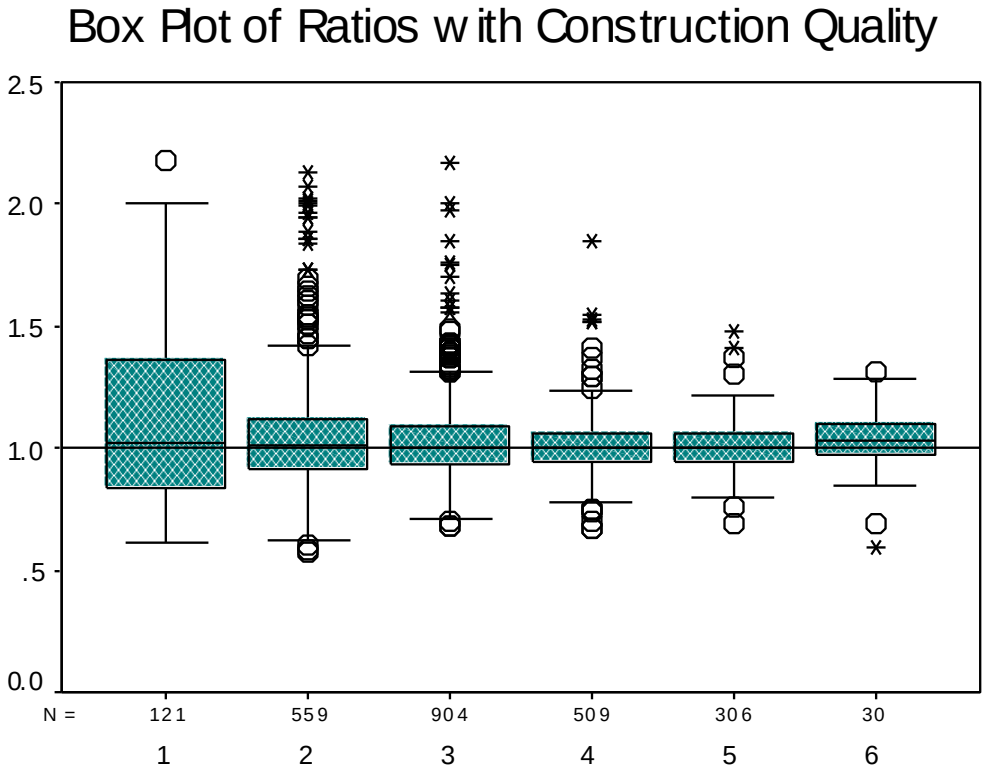
Ratio Statistics for VALU2005 / TASP

Size Range	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1 Less than 800	214	1.012	1.020	.608	2.180	1.072	.231
2 800 - 999	589	1.014	1.011	.586	2.071	1.026	.123
3 1,000 - 1,199	690	1.004	1.010	.682	2.165	1.020	.107
4 1,200 - 1,599	510	.993	.993	.574	2.022	1.016	.091
5 1600 +	426	1.010	1.004	.595	1.703	1.014	.083
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



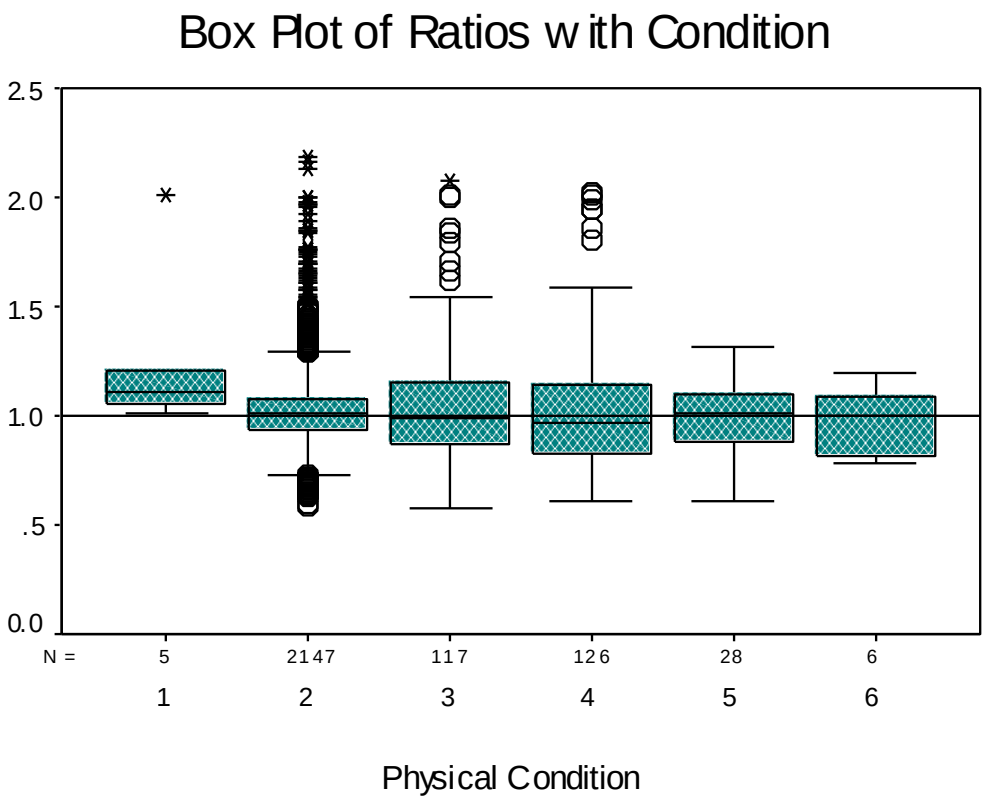
Ratio Statistics for VALU2005 / TASP

Age Range	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1 Before 1950	369	.986	.988	.574	2.180	1.073	.236
2 1950-1959	375	1.000	1.004	.675	2.165	1.038	.131
3 1960-1969	338	.991	1.004	.678	1.753	1.020	.108
4 1970-1979	683	1.018	1.017	.691	1.975	1.015	.086
5 1980-1989	418	1.004	1.005	.595	2.005	1.012	.073
6 1990+	246	.999	.995	.690	1.759	1.007	.071
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



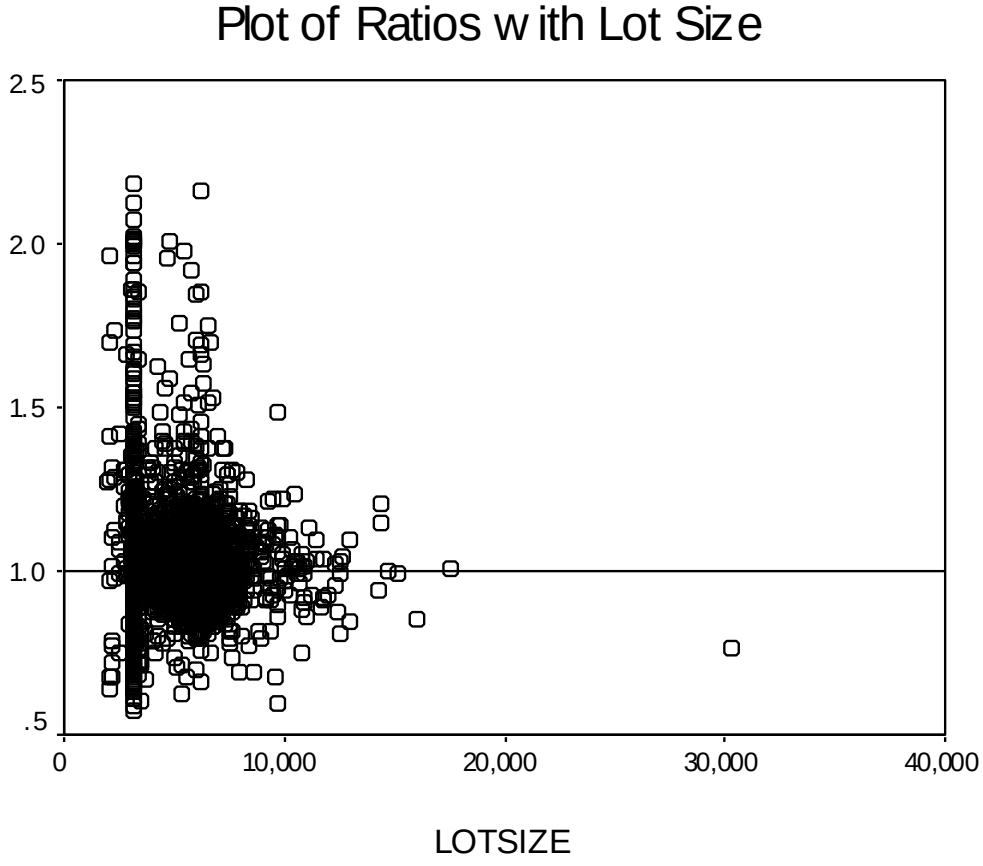
Ratio Statistics for VALU2005 / TASP

Quality	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1	121	1.026	1.038	.608	2.180	1.101	.295
2	559	1.014	1.011	.574	2.126	1.036	.151
3	904	1.000	1.008	.678	2.165	1.018	.104
4	509	1.001	1.003	.671	1.846	1.008	.076
5	306	1.004	.996	.691	1.482	1.009	.071
6	30	1.032	.993	.595	1.312	1.035	.096
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



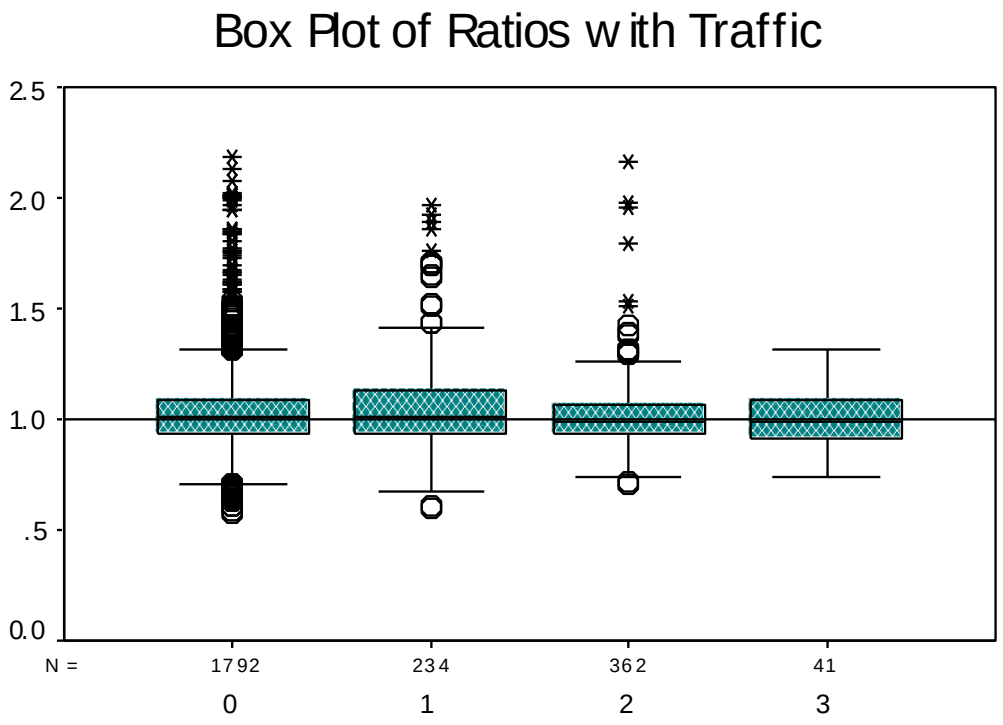
Ratio Statistics for VALU2005 / TASP

Condition	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1	5	1.109	1.113	1.010	2.007	1.148	.208
2	2147	1.005	1.006	.586	2.180	1.023	.103
3	117	.987	1.011	.574	2.071	1.048	.213
4	126	.966	.966	.603	2.022	1.071	.227
5	28	1.014	.967	.608	1.320	1.026	.128
6	6	.998	.953	.779	1.194	1.027	.123
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



Ratio Statistics for VALU2005 / TASP

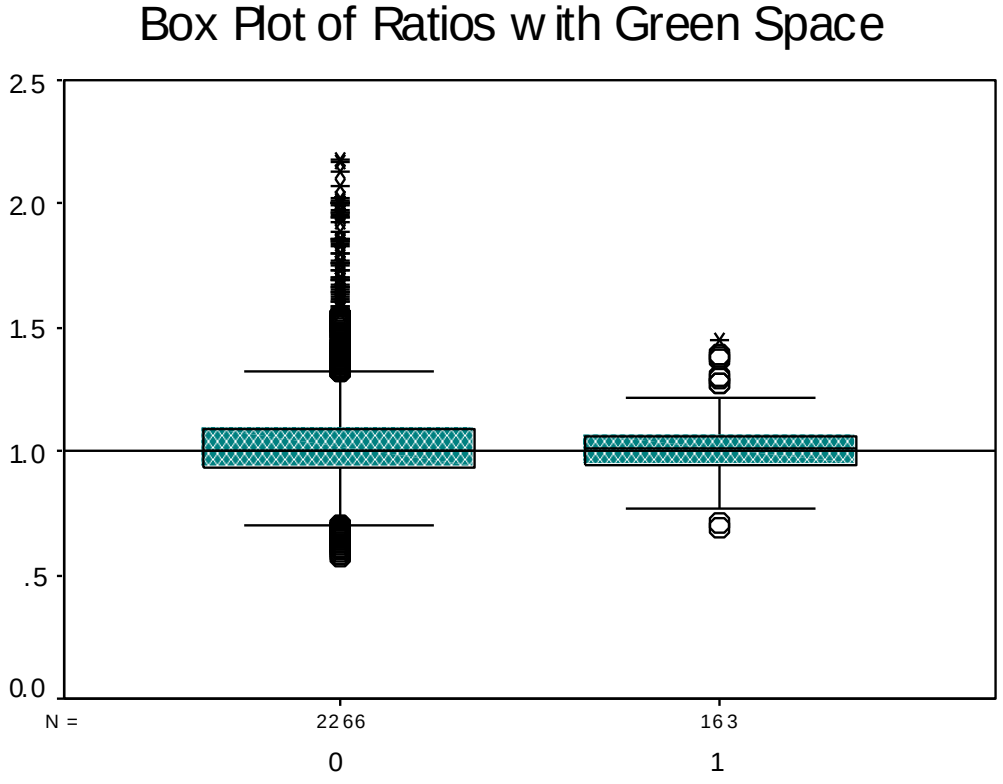
Lot Size	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1 Below 4,000	507	1.023	1.015	.574	2.180	1.060	.207
2 4,000 - 5,999	1030	1.004	1.007	.627	2.005	1.016	.086
3 6,000 - 7,999	762	1.000	1.002	.664	2.165	1.014	.094
4 8,000 +	130	1.012	.985	.595	1.482	1.021	.091
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



1 = Collector, 2 = Arterial, 3 = Expressway

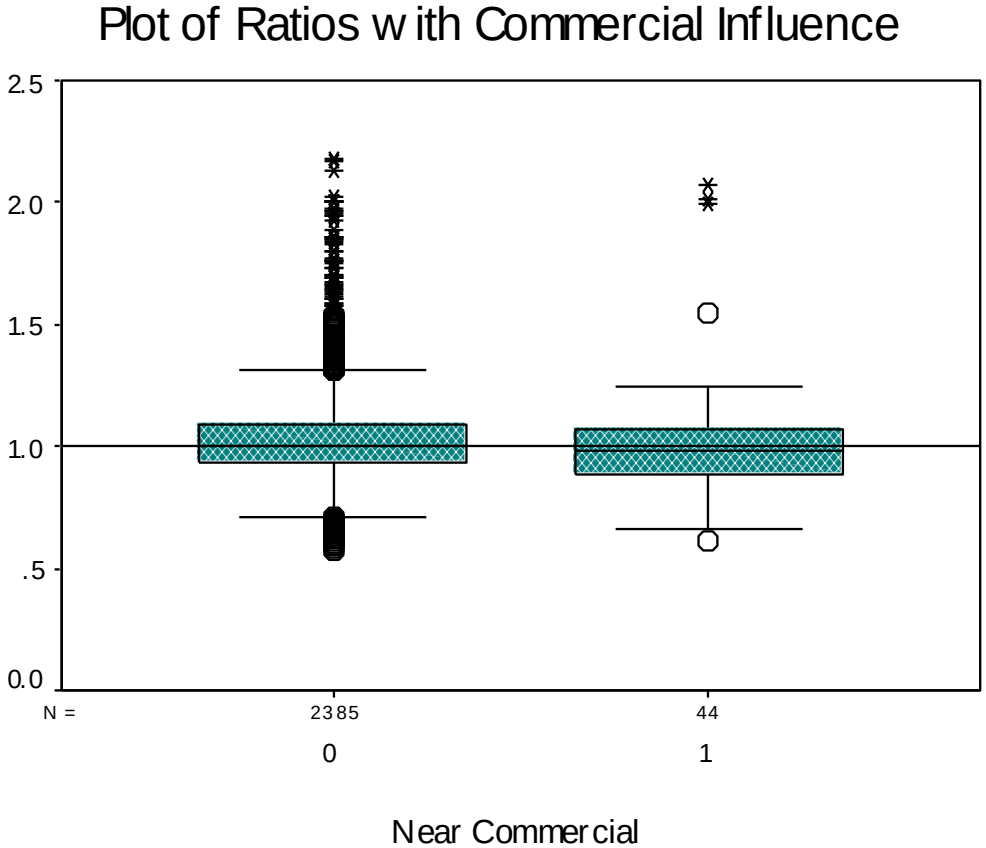
Ratio Statistics for VALU2005 / TASP

Traffic	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
0	1792	1.007	1.007	.574	2.180	1.025	.115
1	234	1.014	.999	.595	1.964	1.056	.144
2	362	.986	.999	.710	2.165	1.017	.094
3	41	.988	.994	.735	1.312	1.001	.105
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



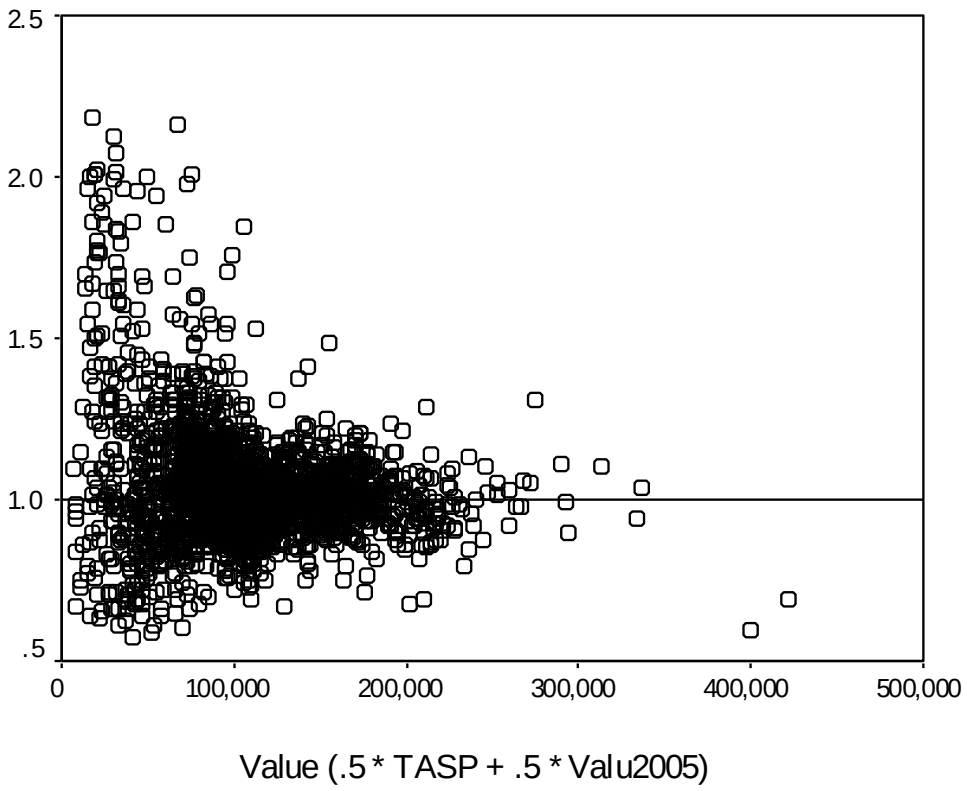
Ratio Statistics for VALU2005 / TASP

Green Space	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
0	2266	1.004	1.006	.574	2.180	1.026	.117
1	163	1.008	.990	.690	1.450	1.023	.087
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



Ratio Statistics for VALU2005 / TASP

Comm Inlfuenc	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
0	2385	1.005	1.005	.574	2.180	1.026	.113
1	44	.983	.979	.608	2.071	1.070	.184
Overall	2429	1.005	1.005	.574	2.180	1.026	.115



Ratio Statistics for VALU2005 / TASP

Value Range	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
Below $50,000	247	1.034	1.070	.574	2.180	1.078	.289
$ 50,000 - 74,999	274	1.044	1.041	.586	2.165	1.019	.154
75,000 - 99,999	738	1.024	1.032	.679	2.005	1.010	.094
100,000 - 149,999	778	.981	.983	.671	1.846	1.004	.076
150,000 +	392	1.000	.992	.595	1.482	1.009	.071
Overall	2429	1.005	1.005	.574	2.180	1.026	.115

Ratio Statistics for VALU2005 / TASP

MKTAREA	NBHD	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1	1612	17	.886	.934	.635	1.669	1.030	.213
	1613	15	1.037	1.071	.721	2.180	1.151	.333
	1614	28	1.018	1.036	.692	1.855	1.101	.275
	1615	34	.949	.915	.574	2.022	1.078	.244
	1617	25	1.001	1.044	.669	1.964	1.080	.269
2	1512	103	1.019	1.032	.759	1.860	1.026	.116
	1516	20	1.079	1.072	.681	2.007	1.075	.176
	1619	15	1.154	1.081	.835	1.587	1.035	.135
	1621	28	.963	.987	.586	2.071	1.097	.321
	1623	76	.945	.944	.603	2.126	1.070	.218
	1631	17	.891	.944	.748	1.959	1.085	.218
	1632	32	.994	1.011	.679	2.165	1.075	.215
	1633	17	.933	.956	.645	1.964	1.106	.288
3	1327	22	.973	.982	.885	1.173	1.009	.058
	1411	72	1.037	1.045	.748	1.513	1.024	.114
	1421	78	1.027	1.022	.838	1.305	1.009	.079
	1422	122	1.006	1.024	.873	1.488	1.011	.083
	1423	78	1.028	1.022	.867	1.306	1.005	.064
	1424	44	1.017	1.030	.879	1.693	1.024	.100
	1425	71	1.021	1.012	.835	1.293	1.012	.081
	1426	32	1.016	1.001	.877	1.209	1.008	.073
	1427	124	1.005	1.004	.780	1.975	1.017	.095
	1428	47	.982	.990	.838	1.413	1.004	.069
	1429	37	.989	1.013	.853	2.005	1.019	.084
	1430	29	.987	1.023	.872	1.703	1.014	.096
	1521	99	.972	.981	.800	1.432	1.012	.079
	1525	15	1.057	1.093	.920	1.479	1.029	.135
4	1522	33	33	1.003	.741	1.795	1.028	.134
	1524	91	91	.993	.734	1.426	1.018	.100
	1532	96	96	1.010	.795	1.630	1.017	.097
	1541	41	41	.988	.812	1.373	1.005	.077
	1542	77	77	1.001	.675	1.482	1.013	.092

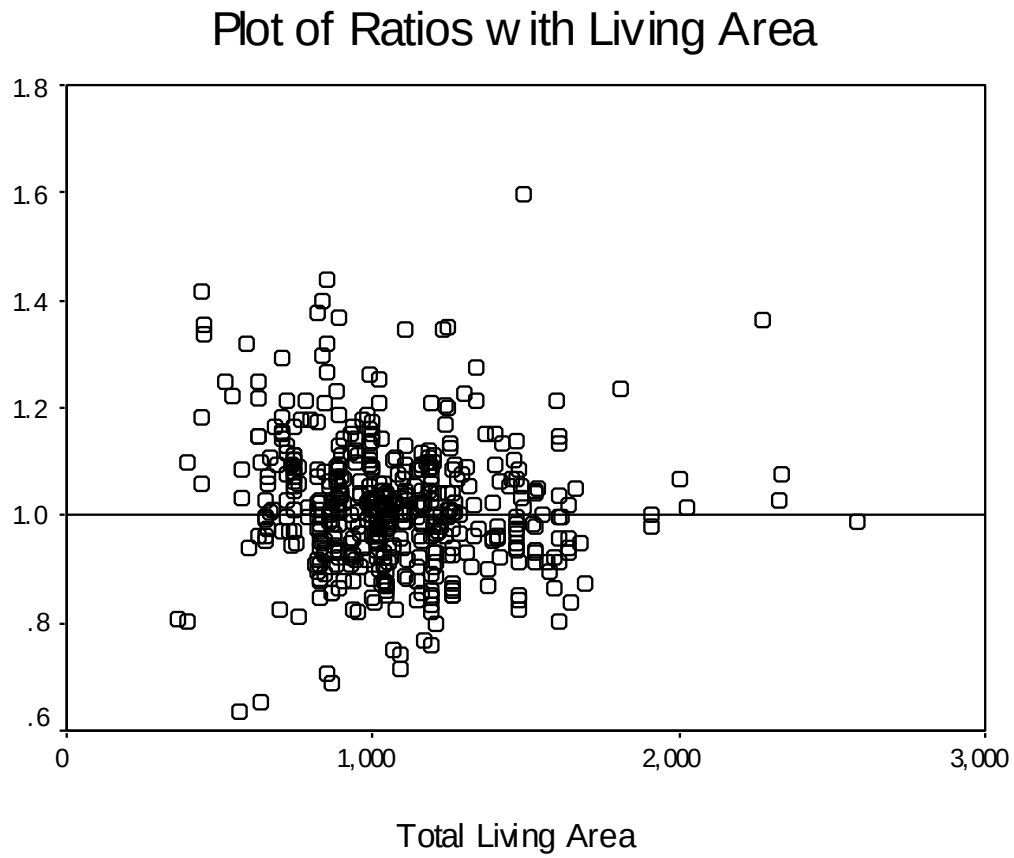
Note: includes neighourhoods with 15+ sales.

Ratio Statistics for VALU2005 / TASP

MKTAREA	NBHD	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
5	1311	32	1.007	1.031	.865	1.759	1.014	.081
	1321	51	1.008	1.021	.883	1.425	1.006	.067
	1322	28	.987	.998	.861	1.147	1.003	.063
	1323	66	1.007	1.000	.876	1.176	1.003	.051
	1324	27	.977	.969	.795	1.208	1.012	.074
	1325	31	.983	.987	.860	1.203	1.006	.062
	1326	45	1.014	1.023	.877	1.238	1.003	.065
	1331	45	1.003	1.005	.878	1.198	1.004	.049
	1332	23	.977	.975	.869	1.108	1.002	.043
	1341	57	1.025	1.013	.690	1.285	1.015	.065
	1342	49	.994	1.001	.860	1.249	1.009	.073
	1343	21	1.028	1.006	.861	1.146	1.007	.052
	1432	32	.946	.939	.691	1.143	1.007	.080
	1441	65	1.020	1.006	.813	1.846	1.013	.088
6	1641	55	1.025	1.010	.671	1.941	1.044	.165
	1662	21	.967	.937	.595	1.424	1.095	.171

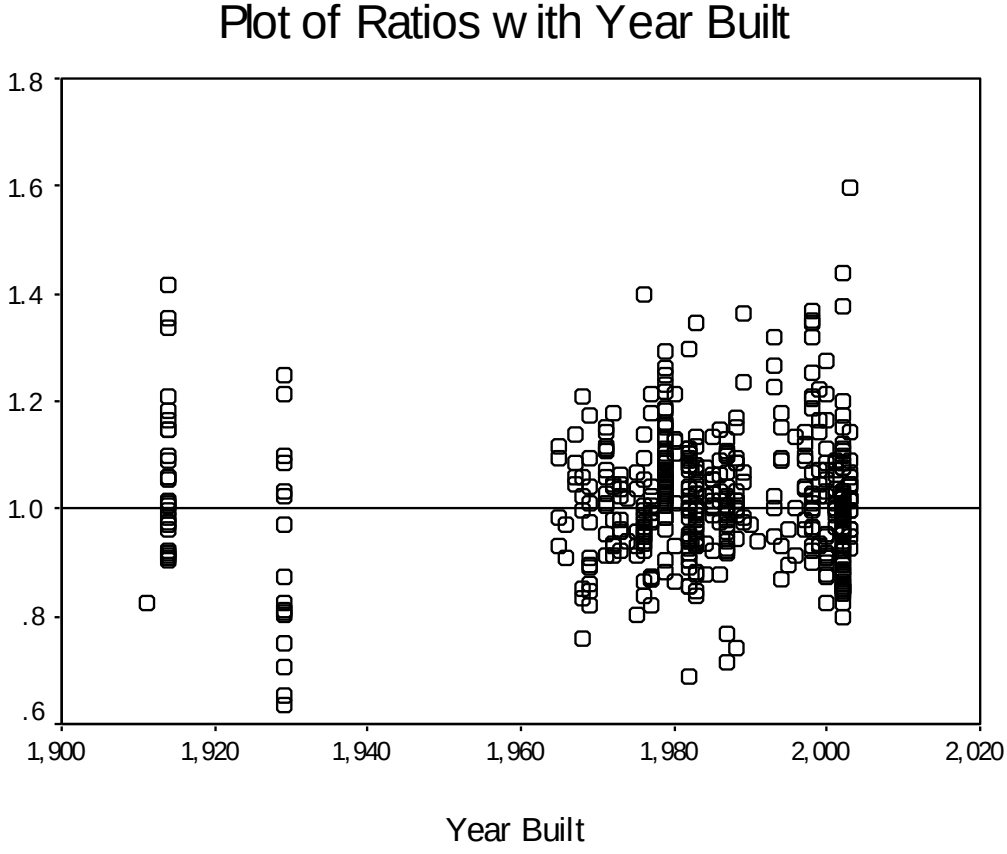
Note: includes neighourhoods with 15+ sales.

Appendix 2
Ratio Study Results Using 2003 Sales: Condominiums



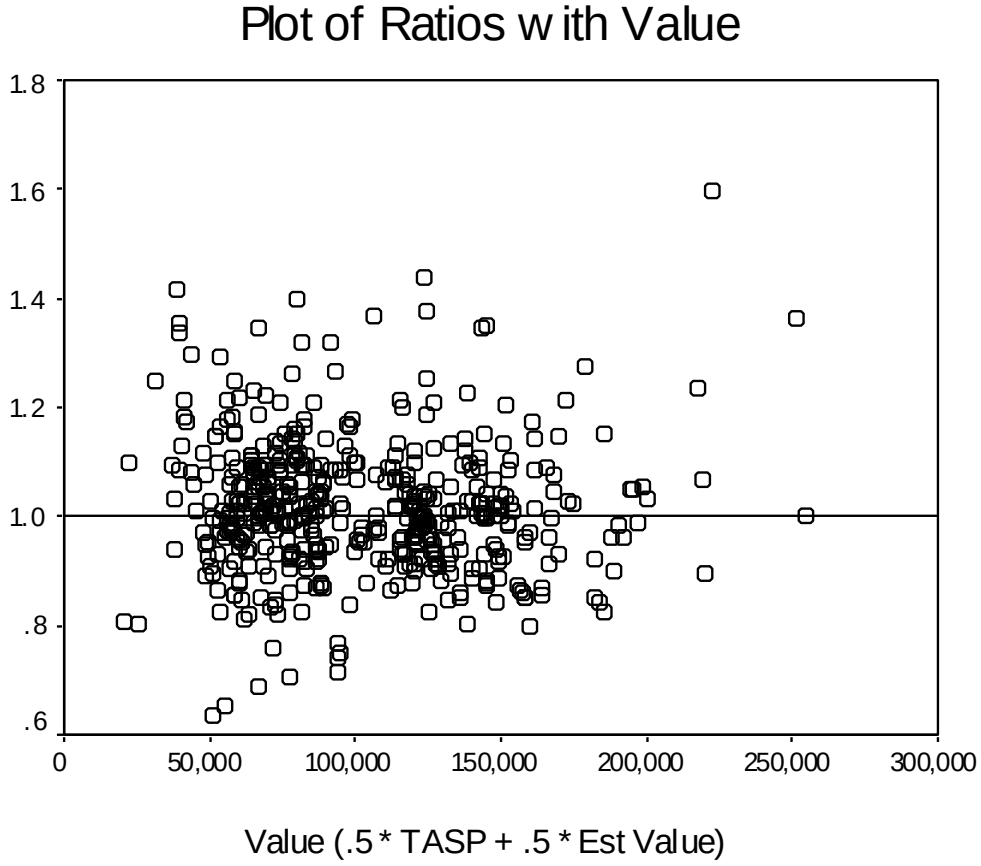
Ratio Statistics for VALU2005 / TASP

Size Range	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	COD
1 Less than 800	78	1.082	1.064	.635	1.417	1.007	.090
2 800 - 999	138	1.017	1.029	.690	1.440	.997	.089
3 1,000 - 1,299	195	.997	.985	.713	1.349	1.007	.077
4 1300 +	85	.988	1.016	.804	1.595	.997	.087
Overall	496	1.009	1.009	.635	1.595	1.009	.088



Ratio Statistics for VALU2005 / TASP

Year Built	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
1 Before 1970	71	.996	.975	.635	1.417	1.023	.122
2 1970-1979	114	1.027	1.012	.804	1.399	1.019	.077
3 1980-1989	131	1.008	1.018	.690	1.364	.994	.076
4 1990+	180	1.003	1.009	.800	1.595	1.011	.090
Overall	496	1.009	1.009	.635	1.595	1.009	.088



Ratio Statistics for VALU2005 / TASP

Value	Sales	Median	Weighted Mean	Minimum	Maximum	Price Related Differential	Coefficient of Dispersion
Less than $70,000	136	1.030	1.023	.635	1.417	1.009	.093
70,000 - 99,999	132	1.017	1.010	.706	1.399	1.007	.090
100,000 - 124,999	89	.995	1.011	.865	1.440	1.004	.069
125,000 - 149,999	80	.997	.988	.804	1.349	1.005	.080
150,000 +	59	1.008	1.015	.800	1.595	1.004	.101
Overall	496	1.009	1.009	.635	1.595	1.009	.088

ROBERT J. GLOUDEMANS - MASS APPRAISAL CONSULTANT (October 2003)

ADDRESS 7630 N. 10th Avenue, Phoenix, AZ 85021

Ph: 602-870-9368 Fax: 602-861-2114 E-mail: rgloudemans@earthlink.net

EDUCATION

B.A., Economics, 1969, St. Norbert College, West De Pere, WI

M.A., Economics, 1972, University of Iowa, Iowa City, IA

Arizona State University, Tempe, AZ. 30 semester hours (1980-82).
Areas of concentration: finance, statistics, computer science, real estate.

EMPLOYMENT HISTORY

May 91 - Present	*Partner - Almy, Gloudemans, Jacobs & Denne* (AGJD), Consultants in Property Tax and Assessment Administration. 7630, N. 10th Avenue, Phoenix, AZ 85021. Ph: 602-870-9368
Apr 89 - Present	*Independent consultant* specializing in property assessment, mass appraisal systems, modeling and quality assurance.
Jan 91 - Jun 97	*Principal, Thimgan & Associates*, Ad Valorem Valuation Consultants, La Junta, CO 81050. Phone: 719-384-7031.
Jan 87 - Apr 89	*Administrator, Research & Equalization*, Division of Property Valuation and Equalization, Arizona Department of Revenue
	Responsibilities: Supervise ratio studies, equalization programs, computer-assisted appraisal, and property tax research.
Nov 78 - Dec 86	*Head, Computer Assisted Appraisal Unit*, Division of Property Valuation, Arizona Department of Revenue
	Responsibilities: design and supervise mass appraisal models, ratio studies, and property tax research.
Feb 73 - Nov 78	*Research Associate*, International Association of Assessing Officers (IAAO), Chicago, IL
	Responsibilities: conduct research, develop workshops, assist in technical assistance projects.

TEACHING EXPERIENCE

International Association of Assessing Officers: COURSE 201, Land Appraisal (FL-85); COURSE 202, Advanced Income Approach (MI-88, WA-90, MI-91, MI-92, FL-93); COURSE 301, Mass Appraisal of Residential Property (SC-85, AL-89); COURSE 302, Mass Appraisal of Income Property (LA-84, CO-85, AL-85); COURSE 303, Computer Assisted Appraisal Systems (SC-83, MO-84, NM-85, VA-86, NV-87, IL-89, SD-89, TX-93); COURSE 305, Mass Appraisal Model Building (IL-86, IL-87, CO-89, NY-89, KY-89, KS-92, CO-92); COURSE 307, Advanced Model Building for Income Properties (NY-90);

Workshop on Depreciation Analysis (ID-84, MT-84, ME-85): Workshops on Assessment Ratio Studies (TX-82, NC-82, AL-82, TN-86, NC-87, LA-88, FL-88, GA-89, IA-89, GA-90, IL-91, SC-91, SASK-93); Workshop on Multiple Regression Analysis (SASK-93, KS-96).

Lincoln Institute of Land Policy:
World Congress on Computer Assisted Appraisal (MA-82, 85, 88); Course 224, Computer Methods for the Appraisal of Condominiums (MA-83); Technical Seminar on Contemporary Assessment Issues (CA-86, MA-88); Seminar on Market-Based Taxation of Real Property for Lithuanian (01) and the Czech Republic (02); Seminar on Market Based Mass Valuation for Transitional Economies (03)

Thimgan & Associates, Inc.:
Workshops on Time Trend Analysis (CO-93, FL-93, KS-93). Workshops on Multiple Regression Modeling (93, 95, 97, 98, 99,00,01, 02, 03).

University of British Columbia: Intensive (2 week) Course on Real Property Assessment (Feb 96, Oct 96, Feb 97, Oct 98, Dec 98, July 00, Aug 00)

Arizona Community Colleges: Workshops on using statistics in property valuation (for the AZ Department of Revenue, Jun 98 and Mar 99).

David C. Lincoln Fellow. Lincoln Institute of Land Policy (1999-2001)

Other:
Customized workshops on sales ratio studies and appraisal performance analysis for the States of Colorado (87), Utah (87), and Georgia (89-90). Workshops on market analysis and mass appraisal modeling for Business Records Corporation and clients (94); Brevard County, FL (94-98); Orange County, FL (94); City of Winnipeg (94-95); State of Wyoming (95); Johnson Co, KS (95- 96), Republic of Trinidad (96-97); Shawnee Co, KS (96); Province of Ontario (97-01); City of Calgary (97-01); Republic of Armenia (96-97); City of Edmonton (97-00); Arizona Dept of Revenue (98, 99); Iowa Association of Assessors (97); Province of Saskatchewan (98); Maricopa County, AZ (98); Province of Nova Scotia (98, 99); Cook County, IL (00); State of New York (00, 01, 02); Province of Alberta (01); Pierce Co, WA (01, 02); Republic of Montenegro (02); State of Washington assessors (02), City of Boston (03), and Louisiana assessors (03) .

CONSULTING

International Association of Assessing Officers:
Development of Standard on Assessment Ratio Studies (80); design of a sales ratio study for the State of Connecticut (80); development of a work plan for appraisal reform for the City of Philadelphia (81); evaluation of a CAMA system RFP for the State of West Virginia (84); development of an RFP for a PC-based CAMA system for Massachusetts (85); development of Student Reference Manual for the workshop, Fundamentals of Assessment Ratio Studies (85) and for Course 303, Computer Assisted Appraisal Systems (86); evaluation of potential CAMA systems for Dona Ana County, New Mexico (88); development (with Dr. Richard Ward) of Student Reference Manual for

Course 307, Advanced Model Building for Income Properties (90); coauthor and technical editor of the IAAO textbook, Property Appraisal and Assessment Administration (88-90); development of Student Reference Manual for Fundamentals of Ratio Studies (91); development of a case study for Multiple Regression Analysis Workshop (93); development of workshop on Mine and Quarry Valulation (with Don Ross, 93); development of student and instructor's manuals (with Thimgan & Associates, Inc.) for Course I, Fundamentals of Appraisal (92), Course 201, Land Appraisal (93), Course 300, Fundamentals of Mass Appraisal (94), Course 4, Assessment Management (94), Course 301, Residential Mass Appraisal (94), and Course 302, Mass Appraisal of Income Properties (95); develop and moderate First Annual Colloquium on Innovation in Mass Appraisal (AGJD, 99); author of IAAO textbook on Mass Appraisal of Real Property (99); co-author of Assessment Practices: Self-Evaluation Guide (AGJD, 02-03) and Standard on AVM Models (03).

Boulder County, CO: Evaluation of mass appraisal techniques (85).

Tulsa County, OK: Review CAMA system and provide expert witness testimony in an assessment discrimination case (85).

Colorado Division of Property Valuation: Recommendations on performance standards for rural residential parcels (87-88).

Oklahoma County, OK: Recommendations on design of a CAMA system for residential properties (86)

Utah State Tax Commission: Review sales ratio procedures and provide recommendations (87).

Guilford County, NC: Ratio study assistance in an assessment discrimination case (87-88).

Durham County, NC: Review of sales ratios and time trends in an assessment discrimination case (88).

Connecticut Conference of Municipalities: Preparation of a white paper and expert testimony on treatment of software for property taxation (89).

Florida Dept of Revenue: Expert witness on litigation with railroads under the federal 4-R Act (88-89).

Georgia Department of Revenue: Development of sales ratio rules and a PC-based sales ratio system (89).
Misssissippi State Tax Commission: Recommendations on sales ratio procedures and software design (89).

Shelby County (Memphis), TN: Recommendations and review of RFPs for a CAMA system (89).

Arizona Attorney General's Office: Consulting assistance in an assessment tax discrimination case (89).

Arizona Fiscal 2000 Study Committee: Analyses and recommendations re state's property tax system (89).

Polk County (Des Moines), Iowa: Residential modeling assistance (90).

Georgia Attorney Genera=s Office: Consultant and expert witness assistance in a federal 4-R case (90).

Virginia Department of Taxation: Expert witness on federal 4-R case (90).

Maricopa County (Phoenix, AZ) Attorney General's Office: Consultant/ expert witness in valuation and tax discrimination cases (90-92).

City of Yuma, AZ: Subcontractor on project to estimate incidence of substandard housing (90).

West Virginia Department of Tax & Revenue: Consultant & expert witness on litigation filed by railroads under the 4-R Act (91).

Alabama Department of Revenue: Review property appraisal system and equalization procedures (Thimgan & Associates, 91).

Georgia Department of Revenue: Review assessment ratio rules and procedures (91).

Peoria County, IL: Review of appraisal procedures and recommendations for a reappraisal program and CAMA system (AGJ, 91).

Arizona Dept of Revenue: Consultant & expert witness in 4-R Act case (91).

Shelby County (Memphis), TN: Develop market and income models for apartment and commercial properties for the 1991 reappraisal (90-91).

Washtenaw County (Ann Arbor), MI: Develop SPSS sales ratio software and provide staff training (92).

Florida Dept. of Revenue: Recommendations for redesign of "in-depth" study procedures (AGJ, 92).

Mississippi State Tax Commission: Recommendations for ratio studies (92).

Saskatchewan Assessment Management Agency: Review assessment system and make reappraisal recommendations (AGJ, 92).

Peoria County, IL: Evaluation of responses to a CAMA RFP (AGJ, 92).

Washington Attorney General's Office: Consultant and expert witness on litigation filed by railroads under 4-R Act (89-92).

Iowa Department of Revenue: Consultant and expert witness in a 4-R Act case (90-92).

Tennessee Division of Property Assessments: Consultant and expert witness in 4-R Act cases (91-92).

Colorado Legislative Council: Conduct ratio studies by county and class and make reappraisal recommendations (Thimgan & Associates, 86-92).

Shelby County (Memphis), TN: Defense of commercial appeals over $1,000,000 (92-93).

Arizona Dept of Revenue: Recommendations for sales ratio and equalization methods (92-93).

Johnson County, KS: Modeling assistance and development of a sales ratio system using SPSS (92-93).

Employer's Mutual Casualty Company: Review a state personal property appraisal system and provide litigation assistance (92-93).

Adams County, CO: Assistance the county at State Board hearings regarding compliance with ratio study standards (93).

Kent County (Dover), DE: CAMA system review and recommendations (AGJ, 1993).

City of Portsmouth, NH: Evaluate proposals for a reappraisal and CAMA system (AGJ, 93).

Teller County, CO: Litigation assistance regarding the appraisal of gaming properties (92-93).

Shelby County (Memphis), TN: Develop market and income models for apartment & commercial properties; prepare value defense materials (92-93).

Broward County, FL: Litigation assistance (93).

Jefferson County, CO: Recommendations for an improved mass appraisal system (93).

Massachusetts Dept. of Revenue: Review the state=s CAMA system and provide and recommendations (AGJ, 93-94).

Henry County, GA: Expert witness in an assessment discrimination case with Bell South (93-94).

Kentucky Revenue Cabinet: Recommendations for redesign of equalization studies (AGJ, 94).

Connecticut Office of Policy and Management: Develop requirements for a statewide CAMA system (AGJ, 94).

New Castle County (Wilmington), DE: Mass appraisal system review and recommendations (AGJ, 94).

Mesa County, CO: Modeling training and assistance (94)

Kansas Dept. of Revenue: Develop appraiser certification exams (Thimgan & Associates, 94).

Washington Attorney General's Office: Expert witness regarding the level of personal property assessment in a discrimination case filed by airlines (94).

Nebraska Dept. of Revenue: Ratio study recommendations (AGJ, 94).

Johnson County, Kansas: Modeling assistance (94).

Kentucky Revenue Cabinet: Expert witness assistance in cable TV case (94).

Oregon Dept. of Justice: Expert witness in discrimination case filed by the airlines (94-95).

City of Winnipeg: Revaluation planning and assistance (AGJ, 94-95).
Las Animas County, CO: Time trend analyses (95).

Minnesota Department of. Revenue: Review the state=s ratio studies and provide recommendations (AGJ, 95).

Douglas County, CO: Time trend analysis and vacant land modeling (95).

Kentucky Revenue Cabinet: Review county assessment systems and property appraiser budgets (AGJ, 95).

Johnson Co, KS: Develop a bootstrap program for calculating confidence interval for the COD (95).

Lancaster County, PA: Review a reappraisal contracted for by the county for compliance with professional standards (AGJ, 95).

Oregon Dept. Revenue: Ratio study design and litigation assistance (94-96).

New York State: Expert witness assistance in a 4-R case (94-96, 01-02).

Greenwich, CT: Review city=s assessment system & operations (AGJ, 95-96).

Arizona Dept of Revenue: Assist with a county audit and equalization procedures (95-96).

Republic of Trinidad and Tobago: Design of an ad valorem assessment and CAMA system (AGJ, 95-96).

Mississippi State Tax Commission: Ratio study assistance (96).

Rhode Island Office of Municipal Affairs: Review state=s property tax system and equalization methods and provide recommendations (AGJ, 96).

Ontario Ministry of Finance: Litigation assistance regarding time trends and assessment discrimination re waterfront properties (96).

Saskatchewan Assessment Management Authority (SAMA): Conduct reappraisal quality control studies (96).

Johnson County, KS: Modeling training and assistance (96, 01).

Wyoming State Board of Equalization: Sales ratio system review and recommendation (Thimgan & Associates, 1996).
Navajo County, AZ: Assistance in an assessment discrimination case (96).

State of Tennessee: Assistance with litigation involving equalization of personal property (96-97).

Alberta Assessment Standards Branch: Review of reappraisal preparedness of selected municipalities (AGJ, 97).

New York Office of Real Property Services (ORPS): Review and provide recommendations for improved equalization procedures (AGJ, 97).

City of St. Albert, Alberta: CAMA system review and recommendations (97).

Hernando County, FL: Provide expert witness assistance in an assessment equalization appeal (97).

Ware County, GA: Assist with sales ratio system design (97).

Bermuda Ministry of Finance: Review property tax system and make recommendations (AGJ, 97).

Connecticut Office of Policy and Management: Recommendations for value review and certification (AGJ, 97).

Public Service Company of New Hampshire: Assistance with assessment equalization issues (AGJ, 96-97).

Ontario Ministry of Finance: Assistance with standards, procedures, training, and modeling in a province-wide revaluation (96-97).

Oklahoma Tax Commission: Review of equalization procedures (AGJ, 97).

Republic of Armenia (through ICMA): Assistance in market analysis and ad-valorem tax implementation (96-97).

Pierce County, WA: Assistance in a tax discrimination case with Kaiser Aluminum (96-97).

Alberta Dept of Municipal Affairs, Assessment Standards Branch: Review equalization processes and provide recommendations (AGJ, 97).

Cook County, IL: Assist in CAMA model design, sales ratios, evaluating responses to a CAMA RFP, and assessment policy/procedures (AGJ, 91-97).

City of Winnipeg: CAMA, modeling, and litigation assistance (97-98).

Alberta Assessment Valuation Steering Committee: Assist in development of a property assessment handbook (AGJ, 98).

Cook County, IL: Review and recommendations re State of Illinois commercial/industrial ratio studies (with Alan Dornfest, 98).

Pima County, AZ Attorney=s Office: assessment litigation assistance (98).

Johnson County, KS: Development of an SPSS feedback program (with Chris Devadason, 98).

Lubbock Central Appraisal District, TX: Review MRA models (98).

Douglas County, CO: CAMA design and modeling assistance (96-99).

Vermont Division of Property Valuation: Review equalization system and provide recommendations (AGJD, 1999).

New York Office of Real Property Services (ORPS): Recommendations for regional time trend analyses and equalization procedures (AGJD, 99).

City of Two Rivers, WI: Modeling assistance (99).

Wyoming Department of Revenue: Review and recommendations regarding computer-assisted appraisal systems (AGJD, 99).

Alberta Department of Municipal Affairs, Assessment Standards Branch: Assist in preparing assessment audit and equalization manuals (AGJD, 98-00).

New Hampshire Coalition of Municipalities: Conduct a sales screening audit; provide expert assistance with equalization issues (AGJD, 99B00).

Idaho State Tax Commission. Review of assessment operations (AGJD, 00).

City of Edmonton. Expert witness assistance in a hotel valuation case (01)

Vermont Division of Property Valuation: Litigation assistance with equalization issues (00-02).

Community Justice Project. Assistance with mass appraisal issues and sales ratio analyses (01-02).

Farranta Consulting. Pilot project modeling 5 small municipalities (01-02)

Maricopa County, AZ. Modeling assistance with residential and apartment properties (01-02).

CONSAD, Inc. Assistance with a revaluation performance review (01-02)

Maricopa County, AZ. Litigation assistance in a hotel valuation case (02)

City of Anchorage. CAMA system review and recommendations (AGJD, 02)

Cape Town, South Africa. Revaluation system review and recommendations (with International Property Tax Institute, 02).

Mecklenburg Co (Charlotte), NC. Sales ratio system design (02).

Republic on Montenegro. Property tax system design (AGJD, 02)

Republic of Northern Ireland. Modeling assistance (02).

Arlington County, VA. Litigation assistance (01-03)

Shawnee County, KS. Modeling assistance (01,02)

Florida Department. of Revenue. On-going ratio study and equalization assistance (AGJD, 92 - present).

Brevard County, FL. Develop a long-range plan and provide on-going help with CAMA systems design and modeling (93-02).

Jefferson County, CO. CAMA system design, time trend, and modeling assistance (94-present).

Kavoussi & Associates (Texas). Ratio study assistance (95-present).

E. Jeannie Navarro, Attorney (Texas). Ratio study assistance (95-present).

City of Calgary Assessment Department. Revaluation planning; modeling training and assistance; assessor competency exams (AGJD, 96- present).

City of Edmonton Assessment Department. Revaluation planning, staff training, and modeling assistance (AGJD, 96-present).

Arizona Dept. Revenue. On-going assistance with mass appraisal system design, modeling, and assessment issues (97-present).

Pima County, Arizona. Mass appraisal systems design and modeling assistance (98Bpresent).

Cook County, IL. Assistance with CAMA systems enhancements, land valuation, commercial models, and related training (AGJD, 98Bpresent).

Ontario Property Assessment Corporation (OPAC). Training, revaluation, modeling and litigation assistance (AGJD, 98-present).

New York Office of Real Property Services (ORPS). Assistance with equalization, time trend, and modeling issues (00-present).

Pierce County, WA. CAMA systems, design of commercial models, staff training, and commercial modeling assistance (01-present).

Lincoln Institute of Land Policy. Develop and teach curriculum on Market-Based Property Taxation in Transitional Countries (01-present).

District of Columbia. Sales ratio and modeling assistance (01-present)

Arlington County, VA. Time trend and sales ratio analyses (02-present)

City of Regina, Saskatchewan. Modeling assistance (02-present)

Wastenaw Co (Ann Arbor, MI). Equalization modeling (02-present).

Real Estate Research Corp. Assistance with a revaluation audit and sales ratio studies (AGJD, 02-present)

City of Saskatoon, Saskatchewan. Modeling assistance (02 - present).

Indiana Fiscal Policy Institute. Sales ratio & equalization studies (AGJD, 03)

City of Boston. Modeling training, review and assistance (03)

Mohave Co, AZ. Assistance with time-share litigation (03).

Property Assessment Review, Inc. Conduct a commercial ratio study (03).

Province of Nova Scotia. Litigation assistance (03).

Shohomish Co (WA). Evaluation of MRA techniques (03).

EXPERT TESTIMONY Alberta, Arizona, Colorado, Connecticut, Florida, Georgia, Iowa, Kentucky, Manitoba, Nebraska, New Hampshire, New York, Oklahoma, Ontario, Oregon, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia.

MEMBERSHIPS International Association of Assessing Officers, American Running & Fitness Association, American Association of Individual Investors. John O'Groats Society.

NATIONAL COMMITTEES IAAO Assessment Standards Committee (1981-90 and on-going assistance); IAAO Computer-Assisted Appraisal Committee (1988-90); IAAO Ad Hoc Committee on Automated Valuation Models (2002-2003).

AWARDS IAAO's Distinguished Assistance Award for research/development (1980); Arizona Administrators Association's Professional Excellence Award (1982);

IAAO's Member of the Year Award (1983); Arizona Dept. of Revenue's Division Employee of the Year Award (1984); IAAO Presidential Citation for development of professional standards (1986); First Annual Distinguished Award in Applied Research sponsored by the National Tax Association and Wichita State University Public Utility and Transportation Taxation Committee (1989); David C. Lincoln Fellowship (Lincoln Institute of Land Policy, 99 and 2000); IAAO's B. L. Barnard Award for the best article in the Property Tax Journal (1982 and 2001).

TEACHING APPOINTMENTS

Arizona Community College Teaching Accreditation: June 98 - May 2000; Lincoln Institute of Land Policy Adjunct Faculty (2001-present).

PUBLICATIONS

Use-Value Farmland Assessments: Theory, Practice, Impact. Chicago: IAAO, 1974.

Regression Analysis Applied to Residential Property: A Study of Structural Relationships over Time. Decision Sciences, April 1976 (with Dennis Miller).

The Record of Assessment Performance in the United States. International Property Assessment Administration, vol. 8. Chicago: IAAO, 1977.

Nonparametric Statistics and the Measurement of Assessment Performance. Analyzing Assessment Equity. Chicago: IAAO, 1977.

Improving Real Property Assessment: A Reference Manual. Chicago: IAAO, 1978; principal author of chapters on Evaluating Existing Practices, Analyzing Sales Data, Measuring Assessment Performance, The Sales Comparison Approach, and The Income Approach.

Multivariate Modeling of Assessment Performance. Proceedings of the 1978 Western Regional Meeting of the American Institute of Decision Sciences.

The Potential of Income Multipliers in the Mass Appraisal of Commercial and Industrial Properties. Computer Assisted Mass Appraisal of Commercial and Industrial Properties. Cambridge, MA: Lincoln Institute of Land Policy, 1978.

Confidence Intervals and Evaluation of Regression Based Appraisal Models. Journal of American Real Estate & Urban Economics, (Spring, 1979).

Evaluating Alternative Use-Value Farmland Assessment Laws. Appraisal of Farmland: Use-Value Assessment Laws and Property Taxation. Washington, D.C.: American Society of Appraisers, 1979.

Property Tax Limits Legislation: An Evaluation. Property Tax Journal, vol. 14, no. 3 (Sep 1979) (with Richard R. Almy and Stuart W. Miller).

Simplifying MRA-Based Appraisal Models: The Base Home Approach. Property Tax Journal, vol. 16, no. 4 (Dec 1981).

Sales Ratio Analysis for Equalization. Paper presented at 50th Annual Meeting of the National Association of Tax Administrators, 1982 (with Harold Scott).

Simplified Sales-Based Models for Condominium and Townhouse Valuation. Paper presented at the First World Congress on Computer Assisted Valuation, sponsored by the Lincoln Institute, Cambridge, MA, Aug 1982.

The Base Home Approach to Explainability in Mass Appraisal. Paper presented at the Colloquium on Mathematical Methods in Computer Assisted Valuation, sponsored by the Lincoln Institute, Cambridge, MA, May 1983.

Impact of Creative Financing on Rental Residential Property. Property Tax Journal (Dec 1985; with Alex Chizewsky and James Walcutt).

Base Home Methodology. Introduction to Computer Assisted Valuation. Cambridge, MA: Lincoln Institute of Land Policy, 1985.

Standard on Application of the Three Approaches in Mass Appraisal. IAAO, 1983 (with the IAAO Assessment Standards Committee; principal author).

Standard on Mass Appraisal of Real Property. Chicago: IAAO, 1984 (with the IAAO Assessment Standard Committee; principal author).

Fundamentals of Ratio Studies. Student Reference Manual. IAAO, 1986.

Standard on Contracting for Assessment Services. Chicago: IAAO, 1986 (with the IAAO Assessment Standards Committee; principal author).

Computer Assisted Appraisal Systems. Student Reference Manual for IAAO Course 303. Chicago: IAAO, 1986 (principal author).

Adjustments for Financing in Commercial Property Valuation. Property Tax Journal (Dec 1986; with Alex Chizewsky and Sherry Beck).

Standard on Urban Land Valuation. IAAO, 1987 (with the IAAO Standards Committee; principal author).

Using General Purpose Software in Mass Appraisal: Do Your Own Thing. Assessment Digest (July/Aug 88).

A Statewide Ratio Study Using Microcomputers and Generic Software. Paper presented at the Conference on New Developments in Hardware and Software Options For CAMA sponsored by the Lincoln Institute of Land Policy and IAAO, Boston, MA, 1987 (with Garth Thimgan).

Using Generic Software for Mass Appraisal Performance Evaluation. Paper presented at the Third World Congress on Computer Assisted Appraisal sponsored by the Lincoln Institute, Boston, MA, August 8-12, 1988

A Feasibility Study of CAMA for Apartment and Commercial Property. Property Tax Journal (March 89; with Cecilia M. Fruitman).

Standard on Computers, Equipment, Facilities, Supplies. Chicago: IAAO, 1989 (with the IAAO Assessment Standards Committee; principal author).

Adjusting for Time in Mass Appraisal. Property Tax Journal (March 90).

Quantifying the Potential Accuracy of the Income Approach in Railroad and Utility Valuation. Proceedings of the Annual Conference on Appraisal of Utilities and Railroads sponsored by Wichita State University and the National Tax Association, 1990.

Standard on Ratio Studies. Chicago: IAAO, 1990 (with the IAAO Assessment Standards Committee; principal author).

Property Appraisal and Assessment Administration. Chicago: IAAO, 1991. Senior technical editor and author of chapters on Land Valuation, Mass Appraisal, Mass Appraisal Model Building, Model Calibration, Computers in Mass Appraisal. Co-author of chapters on Data Collection and Management, The Cost Approach, The Income Approach, Sales Analysis and Mass Appraisal Performance Evaluation.

The New IAAO Standard on Ratio Studies: Development, Changes, and Implications. Assessment Digest (Jan/Feb 91; with Alan Dornfest).

Modeling Commercial Property Under Various Economic Conditions. Property Tax Journal (March 91).

MRA and the Valuation of Public Service Companies. Property Tax Journal (March 1991).

Assessments Practices: Self-Evaluation Guide. Chicago: IAAO, 1991 (with Richard Almy and Garth Thimgan).

Fundamentals of Ratio Studies: Instructor's Manual. Chicago: IAAO, 1992.

The State of the Art in Computer Systems for Large Urban Assessment Jurisdictions. Background paper prepared for the Cook County Assessor's Office (Almy, Gloudemans & Jacobs, 1992).

Survey of Personal Property Valuation Methods. Paper presented at the Annual IAAO Conference on Assessment Administration, 1993.

Time Trend Analysis in Mass Appraisal. Paper presented at the IAAO Conference on Assessment Administration, 1993 (with James R. Thimgan).

Minimum Sample Sizes for Assessment and Reappraisal: Comment. Assessment Journal (March/April 1994).

An Empirical Study of the Determinants of Assessment Performance. Journal of Property Tax Assessment and Administration, vol. 1, no. 1 (1994).

State-of-the-Art PC Sales Ratio System. Annual IAAO Conference on Assessment Administration (1994).

An Evaluation of the Minnesota Sales Ratio System. Equal Eyes (Summer 1995).

Effective Appraisal in Hot Real Estate Markets. Presented at the 1995 Annual Conference of the Western States Association of Tax Administrators; also published in Assessment Journal (Nov/Dec 1995).

The Valuation of Residential Property Using Regression Analysis. Computer-Assisted Mass Appraisal: An International Review. Hampshire, England: Ashgate press, 1997 (with Richard Almy, Marjorie Cusack, and John Horbas).

Apartment Valuation with Multiple Regression Analysis. Proceedings of the 1998 IAAO Conference on Assessment Administration, 1998 (co-author).

Modeling Vacant Land B Multiplicative MRA. Proceedings of the 1999 IAAO Conference on Assessment Administration, 1999.

Mass Appraisal of Real Property (Chicago: IAAO, 1999).

An Empirical Evaluation of Central Tendency Measures. Assessment Journal (Jan/Feb 2000).

Implementing a Land Value Tax in Urban Residential Communities. Journal or Property Tax and Assessment Administration, vol. 5, no 4 (2000).

Condominium Modeling Using Multiple Regression Analysis. Assessment Journal, Jan/Feb 2001. With Leonel St. Amand.

Confidence Intervals for the COD: Limitations and Solutions. Assessment Journal, Nov/Dec 2001.

Key Issues in Urban Land Valuation. Proceedings of the 2001 IAAO Conference on Assessment Admin. With Sheldon Handel and Mike Warwa.

Comparison of Three Residential Regression Models: Additive, Hybrid, and Multiplicative. Assessment Journal, July/August 2002.

A Comparison of Citywide Additive, Multiplicative, and Hybrid Condo Models. Proceedings of the 2002 IAAO Conference on Assessment Admin.

Commercial Modeling. Ad Valorem Forum. Central Arizona Chapter of IAAO, Feb 2003.

Assessment Practices: Self-Evaluation Guide, 2d Ed. (IAAO). With Richard Almy, Bob Denne & Garth Thimgan.

Valuation of Small Industrial Properties Using MRA. Assessment Journal. Spring 2003. With Paul Campbell and Brian Guerin.