

**An Empirical Evaluation of
Alternative Land Valuation Models**

by

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Abstract

Because of the variety of market participants, differing motivations and financing methods, and relatively thin markets in built-up areas, vacant land valuation has always been one of the more difficult aspects of property valuation. On the other hand, improved residential property sales tend to be sufficiently plentiful and comparatively easy to analyze. This paper evaluates whether modern computer-assisted valuation methods can combine vacant and improved residential sales to develop more stable and reliable vacant land values. An affirmative answer to this question would enhance property assessment in general. It would also facilitate implementation of a site value or split rate tax, in which values were separated into land and building components with the land component taxed at a higher rate than buildings.

Research on the use of modern mass appraisal methods to determine land values began in 2000 under a David C. Lincoln Fellowship in Land Value Taxation. Initial work focused on the use of models that combined vacant and improved sales to decompose total property values between land and buildings and analyzed winners and losers under a shift to a site value tax. The paper analyzed data from three urban areas (Boise, Edmonton, and suburban Denver) and concluded that properly specified and calibrated models could be decomposed into land and building components. It also concluded that taxes on vacant land and land-intensive property in general could be expected to rise considerably, while taxes on building-intensive properties could be expected to fall.¹

A continuation of the research grant for 2001 permitted the investigation of the following two issues: (1) to what extent does location affect land versus building values, and (2) can vacant residential land be modeled with improved residences, avoiding the need to determine separate valuation models? Analyses and results of the first issue are reported separately.² Analyses and results for the second issue are reported here. The research concludes that vacant land can be modeled with improved property, provided that vacant land is similarly serviced and there are sufficient vacant land sales to provide benchmarks to ensure a reliable decomposition of values.

¹ A summary of the results can be found in Robert J. Gloudemans, "Implementing a Land Value Tax in Urban Residential Communities," *Journal of Property Tax and Assessment Administration* (Spring 2001). The complete report is available from the Lincoln Institute of Land Policy (Product Code WP00RG1).

² See Robert J. Gloudemans, "An Empirical Analysis of the Incidence of Location on Land and Building Values," Lincoln Institute of Land Policy, 2001.

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An Empirical Evaluation of Alternative Land Valuation Models

Introduction

The appraisal of vacant residential land tends to be comparatively difficult and studies of assessment performance consistently show values to be far less accurate or reliable than for improved residential property. This phenomenon, which presents practical complications in implementation of a site or split rate tax on land and buildings, is due to a number of reasons. First and foremost, vacant land sales in urban markets tend to be concentrated in hot spots of new development, generally the urban fringe area, and lacking in older, built-up areas. In addition, land sales involve a number of market participants, from speculators, to developers, to homebuyers with prices behaving less predictably than for improved residential sales. Methods of financing, which range from many all-cash sales to land contracts with various interest rate provisions, also make prices difficult to analyze. Thus, models that combine vacant and improved sales would seem to offer considerable advantages in terms of increased sample size and stability, particularly in largely built-up areas. However, can combined models, in which most sales are for improved property, adequately capture vacant land values and produce performance measures that are comparable to those produced by a land-only models? As well, how would performance hold up for improved properties versus a traditional approach based only on improved sales?

These issues were investigated using a database from Edmonton, Alberta. Sales from the three market areas with the most vacant land sales were split into a model group and a test or control group. Using the model group, a land model was developed for each of the three areas using only the vacant land sales. Similarly, three improved models were developed using only the improved sales. Separately, a combined model was built for each area using both vacant *and* improved sales. The models were then applied to the test group and appraisal performance measures calculated for both the model group and test group of sales. If the combined models could perform as well (or nearly as well) as the individual models, they should be able to perform even better in other (generally older) areas with fewer vacant land sales.

Edmonton Residential Models

Single-family residential properties in the City of Edmonton are divided into 11 market areas for valuation purposes³. Each year a separate single-family model is developed for each market area using the three years of sales immediately prior to the statutory valuation date. Sales from July 1997 through June 2000 were used for the 2001 assessment year, which had an assessment date of July 1, 2001. Because some market areas have too few sales to develop separate vacant land models, a citywide land model is developed using sales from the same three-year period.

³ Condominiums and town homes are modeled separately using separate market area and location variables.

The single-family models use traditional, additive multiple regression analysis (MRA) of the form,

$$V = B_0 + B_1 * X_1 + B_2 * X_2 + \dots + B_K * X_K$$

where B_0 is a constant, $X_1 \dots X_K$ are represent variables for location and improvement features (neighborhood, lot size, living area, age of structure, etc.), and $B_1 \dots B_K$ are the corresponding regression coefficients. Binary variables are used to capture neighborhood influences (one neighborhood in each market area is designated as the “base” neighborhood and not included in the model). Because of the constant, which can represent more than one-third of total value, additive models are not decomposable into separate land and building values. In recent years, single-family models have produced excellent performance with average errors, as measured by the “coefficient of dispersion” (COD), of 5 to 12 percent depending on the average age and complexity of the market area.

The vacant land model uses multiplicative MRA in which the various terms in the model are multiplied together:

$$V = B_1 * \text{LotSize}^{B_2} * B_2^{X_3} * B_3^{X_4} * \dots * B_K^{X_K}$$

where B_1 is the rate per square meter of land area, B_2 is an exponent for lot size, reflecting the curvilinear relationship between lot size and value, $X_3 \dots X_K$ are binary variables for neighborhood and location influences (golf course location, corner lot, heavy traffic, etc.), and $B_3 \dots B_K$ the corresponding regression coefficients or multipliers. Multiplicative models have the advantage of being able to capture percentage adjustments (by developing multipliers instead of dollar or dollar-per-unit adjustments), which helps produce better uniformity among low and high value properties. They are also better able to capture nonlinearities by calibrating an optimal economy-of-scale exponent (B_2 in the above formulation). On the negative side, multiplicative models require logarithms (so as to convert the model to an additive model for calibration) and thus require more advanced math than additive models. For vacant land, the model has produced extraordinarily good results in recent years with CODs of less than 10 percent. However, performance is problematic and the model difficult to support in largely built-up areas with few remaining vacant land sales.

Database and Methodology

The research used sales from the three year period used to develop the City's 2001 valuation models in the three market areas with the most vacant land sales: Clareview, West Edmonton Mall (location of North America's largest shopping mall), and Riverbend. These areas afforded the best opportunity to test alternative modeling methods. As well, if anything, the combined approach can be expected to be relatively more advantageous in other market areas with fewer vacant lot sales. Two of the areas (Clareview and West Edmonton Mall) are quite homogeneous and comparatively easy to model. The other, Riverbend, has a greater variety of housing styles and price ranges,

including many upper end homes, and is also characterized by a number of location influences.

Since the sales were the same as those used to develop the City's 2001 valuation models, they had been screened to remove other than open-market, arm's-length transfers.⁴ Both vacant and improved sales in each of the three areas were divided between a model and test group with approximately 85 percent of the sales assigned to the model group and 15 percent to the test group.⁵ This assured adequate sales for model development in all neighborhoods, as well as sufficient sales to test the models on a hold-out group (of course, some neighborhoods had no or too few vacant land sales regardless of allocation between model and test groups). The number of improved and vacant sales assigned to the model and test groups in each of the three market areas was as follows:

Improved Sales

	<u>Total Sales</u>	<u>Model Group</u>	<u>Test Group</u>
Riverbend (area 3)	926	794	132
West Edmonton Mall (area 7)	2,149	1,841	308
Clareview (area 13)	3,634	3,115	519

Vacant Sales

	<u>Total Sales</u>	<u>Model Group</u>	<u>Test Group</u>
Riverbend (area 3)	419	359	60
West Edmonton Mall (area 7)	400	343	57
Clareview (area 13)	937	803	134

The single-family improved models used the same variables as the City's 2001 valuation models, however the models were recalibrated using only sales in the test group. Thus, the regression coefficients changed slightly. All three areas showed modest inflation over the period and sales prices were adjusted as indicated to the statutory assessment date, 1 July 2000. Average errors on the model group as measured by the COD were 5.81 in Clareview, 5.96 in West Edmonton Mall, and 7.21 in Riverbend.

Exhibit 1 illustrates the single-family model for Riverbend. The model develops a constant of \$76,030, a base rate of \$623 per square meter of living area for a standard quality home (the rate varies with quality class), a rate of \$225 per square meter of basement area, and various other

⁴ Of course, as in any valuation model, some sales used may have involved unusual motivations, circumstances, and prices, thus representing less than ideal market value proxies.

⁵ The sales were sorted by land use type (single-family detached, semi-detached, etc.), neighborhood, and account number. Then every seventh sale (roughly) 15 percent were assigned to the test group and the remainder to the model group.

adjustments for lot size (raised to the .75 power), effective age, building style, neighborhood, and land characteristics (ravine/green belt influences, commercial or multi-family encroachment, and traffic).⁶ The model achieves an adjusted R-square of .824, meaning that it is able to explain 82.4% of the variation in sales prices about the average price (\$232,395 after time adjustments in the present case), and a standard error of the estimate of \$24,701 (in a normal distribution, the standard error will encompass 68% of all errors). Appendix 1 contains a complete listing of the SPSS syntax used to develop the model.⁷

The three vacant land models were patterned after the City's 2001 residential land model, but were recalibrated using only sales from the model group for that market area. Again, sales prices were time-adjusted to the valuation date (July 1, 2000). Exhibit 2 shows the model developed for Riverbend. The model includes variables for lot size, parks and ravines, traffic, overhead transmission lines, and neighborhoods. The variables all have the expected sign and the model achieves an adjusted R-square of .872 (the standard error is not readily interpretable in this case because multiplicative models are in log-linear format). For the three areas, the vacant land models produced CODs of 7.92 in Clareview, 6.91 in West Edmonton Mall, and 10.20 in Riverbend (exceptionally good for vacant land models). Appendix 2 contains the complete syntax file.

Combined Models

One combined model using both vacant and improved sales was developed for each of the three market areas. In order to accommodate both multiplicative and additive terms, "nonlinear models" were used. Nonlinear MRA allows the researcher to specify "hybrid" models that contain any reasonable combination of terms. Like traditional additive MRA models, nonlinear models minimize the sum of squared errors but proceed in an iterative fashion. The researcher specifies initial coefficients, which the model adjusts until no meaningful improvement in the R-square is possible.

The general (somewhat simplified) form of the models was as follows:

$$V = BLV * LsizeAdj * NbhdAdj * SitusAdjs * Imp_Fact \\ + (B_1 * LivArea * BsizeAdj * DesFact + B_2 * Bsmt + B_3 * Garage) * (QualAdj * PctGood) + B_0$$

⁶ All figures are in Canadian dollars (about 65% of the U.S. dollar in 2001). In addition, sales were adjusted for the following items for which the City makes standard adjustments prior to modeling: fireplaces, pools, all brick exterior, wood shake roofs, air conditioning, poor condition, and bus stops. Garage area was constrained to 80% of living area in the Riverbend model (otherwise it would have entered higher).

⁷ All models were developed with versions 9 or 10 of SPSS for Windows.

where BLV = base lot value (one per neighborhood), LsizeAdj is lot size adjustment, SitusAdjs are factors for various positive and negative location influences (green belt, traffic, etc.), Imp_Fact is a multiplier that adjusts land values for the fact that a property is improved (versus vacant), LivArea is square meters of living area, BsizeAdj is the building size adjustment, DesFact are multipliers for various design types or styles (other than the base), Bsmt is square meters of basement area, Garage is square meters of garage area, QualAdj are adjustments for construction quality, PctGood is “percent good” (depreciation adjustment), and B_0 is a lump sum adjustment for improved (versus vacant) land.⁸

Notice that the model contains two potential adjustments for improved versus vacant land: a multiplier (Imp_Fact) and a lump sum adjustment (B_0). If either of these proved insignificant, it was deleted. In both the Clareview and Riverbend models, the lump sum adjustment proved insignificant and was thus deleted. In these models, the improvement multipliers were 1.207 and 1.381, respectively (of course, these factors apply to land value only). The Riverbend model proved more complex, with a lump sum adjustment of \$32,695 and multiplier of 0.698 (for most parcels the net effect was an upward adjustment for improved land).

Exhibit 3 presents the combined Riverbend model (appendix 3 contains the complete syntax). The base rate is \$636 per square meter (basement and garage areas are percentages thereof), with higher multipliers for homes of better quality classes. There are several multipliers for various styles (two-story homes are most typical and constitute the base in the market area), a building size adjustment factor, and a depreciation adjustment (PCTGOOD). The land portion of the value encompasses a base land value for each neighborhood (e.g., \$98,221 in neighborhood 5080), a land size adjustment factor, and a series of adjustments for various positive and negative location influence.

Comparative Results

Exhibit 4 summarizes the comparative results of the models. Notice, first, that all models consistently produced median ratios near 1.00 for both the model and test groups and also held up well for the test group. For the holdout group, the values differed, on average, by only 1.70 percent for improved properties and 5.89% for vacant properties. Exhibits 5 and 6 illustrate the relationship between the two sets of values graphically. In exhibit 5, nonlinear (NLR) values from the combined model are plotted against values from the traditional, separate improved and vacant land models. Exhibit 6 shows a box plot of the ratio of NLR to traditional MRA values (the approximately 5% average difference in market area 13 can be traced to a difference in time-adjustments).

In terms of valuation uniformity, for improved property the combined model produced CODs that were virtually identical to those from the traditional, additive model. However, for vacant properties

⁸ In addition, the same standard adjustments used in the additive improved model (for fireplaces, air conditioning, etc.) were incorporated as well.

the combined model produced CODs that were somewhat worse (although still very good). Specifically, results for the holdout group of sales were as follows:

	<u>Sales</u>	<u>MRA COD</u>	<u>NLR COD</u>
Riverbend (area 3)	60	10.37	12.00
West Edmonton Mall (area 7)	57	7.09	9.37
Clareview (area 13)	134	7.76	8.24
Total	251	8.23	9.39

Exhibit 7 contains summary bar charts of CODs from the two modeling approaches. A more detailed comparison of the models revealed that, while results were generally similar, the combined models broke down (produced ratios that were consistently above or below sales prices) in certain neighborhoods. Further discussions and investigations suggested that the vacant sales may have been concentrated in specific segments of the neighborhood (that were really not comparable to the rest of the neighborhood) or that some services were lacking for vacant sites.

Conclusions

The results of the research project are encouraging, indicating that vacant land can be effectively modeled with improved properties with very little, if any loss, in accuracy for the latter. A combined approach lends stability to vacant land values and provides much needed market benchmarks where vacant land sales are lacking. However, modelers must exercise care as service levels may not be the same and vacant and improved lots may be concentrated in different areas (even within the same neighborhood). Thus, while vacant and improved land can be modeled together, modelers should compute separate sales ratios by neighborhood for each and stand ready to make indicated refinements.

Consistent with previous research under the same David C. Lincoln Fellowship (see prior references), the present results again suggest that vacant and improved land can have quite different value (the value of improved land is generally higher). Thus, modelers should be sure to include vacant/improved variables in models to allow the market to express any indicated differences.

Exhibit 1
Final Improved Model - Riverbend

Model Summary

Model: 20

R	R Square	Adjusted R Square	Std. Error of the Estimate
.910	.829	.824	24701.3746

Coefficients

Model: 20

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	76030.378	5083.853		14.955	.000
LIVAREAQ	622.759	24.004	.778	25.943	.000
LINAGE	-17.231	1.111	-.419	-15.512	.000
RAVIN_10	76958.520	6502.895	.189	11.835	.000
LSIZE75	65.517	7.730	.162	8.475	.000
ONE_STY	5794.024	4431.326	.035	1.308	.191
TRAFF234	-16655.491	2813.373	-.097	-5.920	.000
NB35230	20079.566	3164.494	.109	6.345	.000
LINSPLT	17674.749	4409.595	.069	4.008	.000
TRAFFIC1	-8636.036	2637.298	-.052	-3.275	.001
NB35090	24054.063	4715.893	.114	5.101	.000
LINBSMT	225.067	56.467	.132	3.986	.000
RAVIN_11	15299.612	6172.471	.039	2.479	.013
NB35630X	18181.264	7792.100	.036	2.333	.020
NB35190	-5374.767	3997.869	-.021	-1.344	.179
NB35080	21075.474	6134.993	.066	3.435	.001
COM_MULT	-10880.065	4192.209	-.041	-2.595	.010
NB35350	8984.576	3033.894	.059	2.961	.003
BILEVEL	11718.311	7775.234	.024	1.507	.132
NB35300	9486.272	4043.003	.041	2.346	.019
NB35340	8869.947	3915.765	.053	2.265	.024

Excluded Variables

Model: 20

	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
					Tolerance
STY2_NB	.014	.812	.417	.029	.791
LINZONE	.003	.165	.869	.006	.868
NB35130	.017	.947	.344	.034	.729
NB35610	.002	.131	.896	.005	.865
NB35640	.022	1.345	.179	.048	.818

Statistics

FINRATIO

N	Valid	794
	Missing	0
Mean		1.0081
Median		1.0041
Std. Deviation		.0930
Minimum		.6950
Maximum		1.3762
COD		7.21

Exhibit 2
Final Vacant Land Model - Riverbend

Model Summary

Model: 12

R	R Square	Adjusted R Square	Std. Error of the Estimate
.936	.876	.872	.1319

Coefficients

Model: 12

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	7.6888	.1924		39.953	.000
LSIZE	.5307	.0306	.4491	17.346	.000
RAVIN_11	.3483	.0332	.2695	10.483	.000
NB35230	.3065	.0228	.3105	13.445	.000
PARK10	.1853	.0318	.1126	5.831	.000
TRAFFIC2	-.1859	.0270	-.1418	-6.885	.000
OTL	-.3100	.0600	-.0987	-5.171	.000
TRAFFIC3	-.4194	.0488	-.1874	-8.589	.000
NB35100	.2513	.0295	.2302	8.533	.000
RAVIN_10	.3514	.0809	.0869	4.344	.000
NB35190X	.0872	.0211	.0860	4.130	.000
TRAFFIC1	-.0757	.0209	-.0706	-3.616	.000
NB35350	.0874	.0537	.0328	1.629	.104

Excluded Variables

Model: 12

	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
					Tolerance
PARK11	.014	.700	.484	.038	.941
ZON_RPSL	-.020	-.943	.346	-.051	.825
TOONTOWN	-.013	-.641	.522	-.035	.819
NB35130	-.017	-.865	.387	-.047	.909
NB35610	-.008	-.328	.743	-.018	.669
NB35640	-.027	-1.211	.227	-.065	.721

Median = 1.008

COD = 10.26

N = 359

Exhibit 3
Final Combined Model - Riverbend

Nonlinear Regression Summary Statistics Dependent Variable ADJPRICE

R squared = 1 - Residual SS / Corrected SS = .93536

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval	
			Lower	Upper
B0	32694.796720	6586.8349262	19770.858595	45618.734846
B1	636.16665607	27.810558592	581.59994194	690.73337021
Q6	1.208038729	.026532000	1.155980656	1.260096801
Q78	1.447820230	.061370828	1.327405373	1.568235086
BILEV	1.333317305	.119497453	1.098852997	1.567781613
SPLITLEV	1.102052652	.082792430	.939606765	1.264498538
SPLCRWL	1.330862624	.104317119	1.126183442	1.535541806
ONESTY	1.255756240	.026149868	1.204447943	1.307064536
PCTGOOD	1.139348389	.080804194	.980803592	1.297893186
RAV10FAC	1.756916035	.075274012	1.609221933	1.904610137
RAV11FAC	1.392922089	.046309940	1.302057994	1.483786185
PARK_FAC	1.117016553	.059238053	1.000786385	1.233246720
COMM_FAC	.783860346	.131943117	.524976573	1.042744120
MF_FAC	.949339512	.070574691	.810865884	1.087813141
INST_FAC	.720557161	.112003141	.500797340	.940316982
TRAF1FAC	.878852966	.029265682	.821431173	.936274758
TRAF_234	.743837049	.027937390	.689021481	.798652617
ZON_234	.917549715	.104283563	.712936371	1.122163058
ZON_RPL	.910291745	.130708190	.653831005	1.166752485
OTL_FAC	.678095250	.153027345	.377842404	.978348096
N5080	98221.935015	7446.3764016	83611.502394	112832.36764
N5090	106980.69135	6386.0240710	94450.761438	119510.62126
N5100	83786.259604	2694.1299362	78500.144347	89072.374861
N5130	74198.806084	3692.1718925	66954.446445	81443.165722
N5190	71290.612368	2857.8158579	65683.331217	76897.893518
N5230	94732.184870	2480.1641707	89865.888896	99598.480844
N5300	95987.594721	5021.3531438	86135.266848	105839.92259
N5340	85646.783629	4823.3725258	76182.910801	95110.656457
N5350	91770.227557	3851.9986575	84212.274023	99328.181091
N5610	71980.137896	2654.3453247	66772.083478	77188.192315
N5630	72550.280423	3187.1063733	66296.902886	78803.657960
N5640	76465.514174	7064.5383630	62604.280712	90326.747636
LSIZ_EXP	.590773638	.040905317	.510513879	.671033397
IMP_FAC	.698177329	.057584034	.585192488	.811162170

IMPROV: MEDIAN = 1.0055 COD = 7.22 N = 794
VACANT: MEDIAN = 1.0126 COD = 11.21 N = 359

**Exhibit 4
Model Summary Statistics**

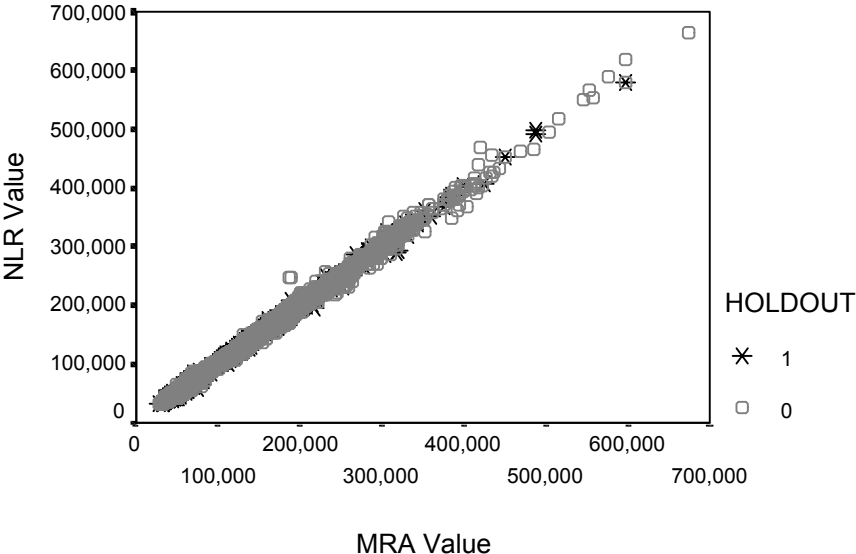
Area	Vacant	Holdout	Average Price	Ave MRA Value	Ave NLR Value	Ave Diff (%)	MRA Median	MRA COD	NLA Median	NLA COD	Sales
3	0	0	222,599	232,385	232,371	2.31	1.004	7.21	1.007	7.21	794
	1	1	224,687	232,723	232,591	1.92	.997	9.06	.999	8.64	132
7	1	0	72,545	78,441	79,067	5.31	.996	10.20	1.008	11.20	359
	0	1	72,223	77,773	78,150	5.75	.988	10.37	1.000	12.00	60
	0	0	157,883	168,270	168,263	1.52	1.003	5.96	1.003	6.00	1,841
	1	1	161,462	172,006	172,195	1.54	1.003	5.94	1.003	5.98	308
	1	0	51,871	55,572	55,941	5.69	.998	6.91	1.017	8.75	343
	1	1	51,276	56,075	55,992	5.60	1.026	7.09	1.031	9.37	57
13	0	0	125,891	133,542	133,910	1.73	1.001	5.81	.999	5.91	3,115
	1	1	126,519	133,654	134,171	1.74	.998	6.17	1.000	6.16	519
	1	0	44,673	45,254	47,421	5.50	.992	7.92	1.003	9.13	803
	1	1	45,354	46,020	48,233	6.07	.998	7.76	1.006	8.24	134
Total	0	0	149,488	158,310	158,505	1.74	1.002	6.05	1.001	6.12	5,750
	1	1	151,253	159,607	159,930	1.70	1.000	6.49	1.001	6.45	959
	1	0	52,962	55,522	56,912	5.50	.995	8.24	1.007	9.54	1,505
	1	1	53,122	55,894	57,146	5.89	1.002	8.23	1.010	9.39	251

Area 3 = Riverbend
Area 7 = West Edmonton Mall
Area 13 = Clareview

Exhibit 5
Graphs of NLR and MRA Values

Graph of MRA and NLR Values

Improved Property



Graph of MRA and NLR Values

Vacant Property

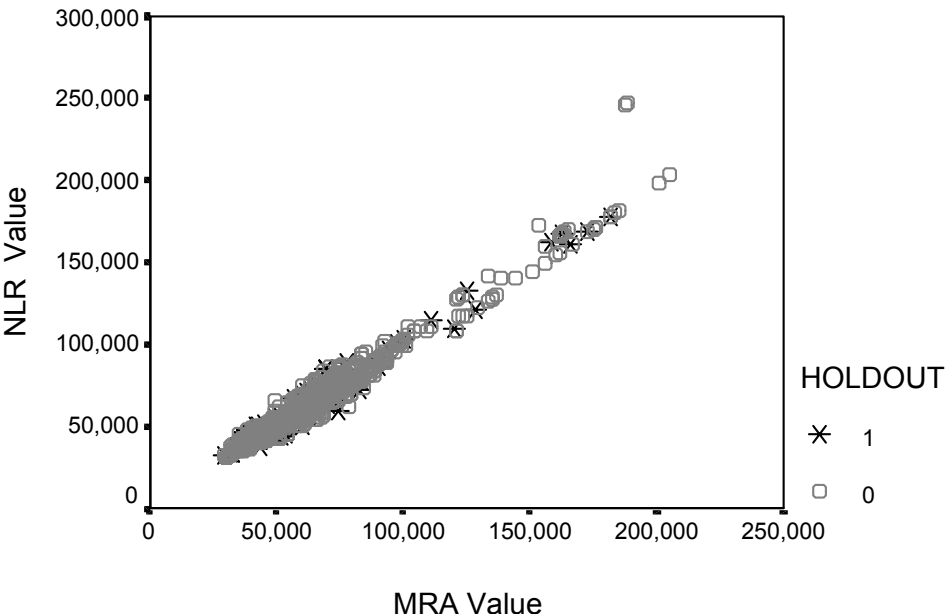
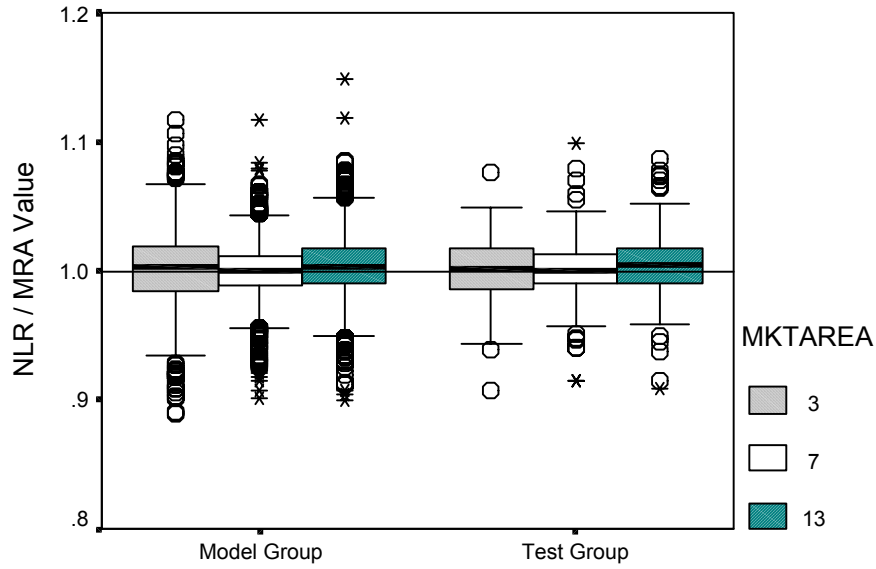


Exhibit 6
Graphs of NLR/MRA Value Ratios

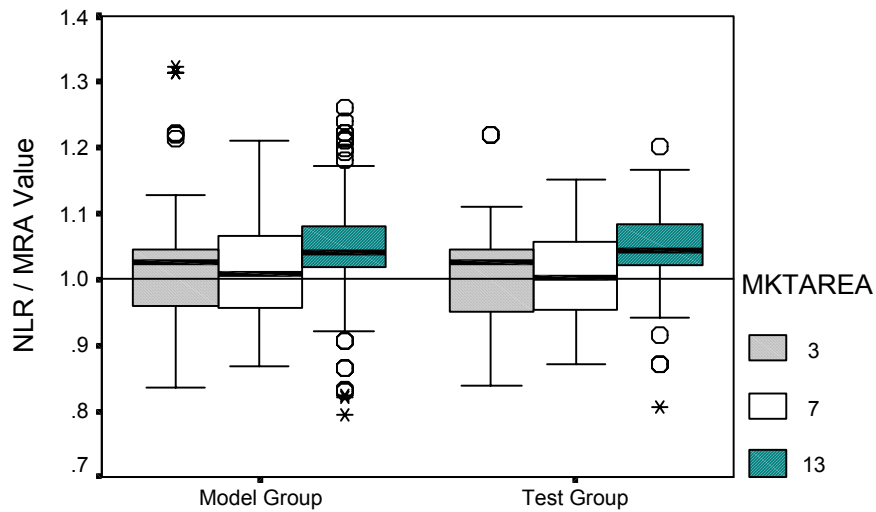
Ratio of NLR to MRA Values

Improved Property



Ratio of NLR to MRA Value

Vacant Land

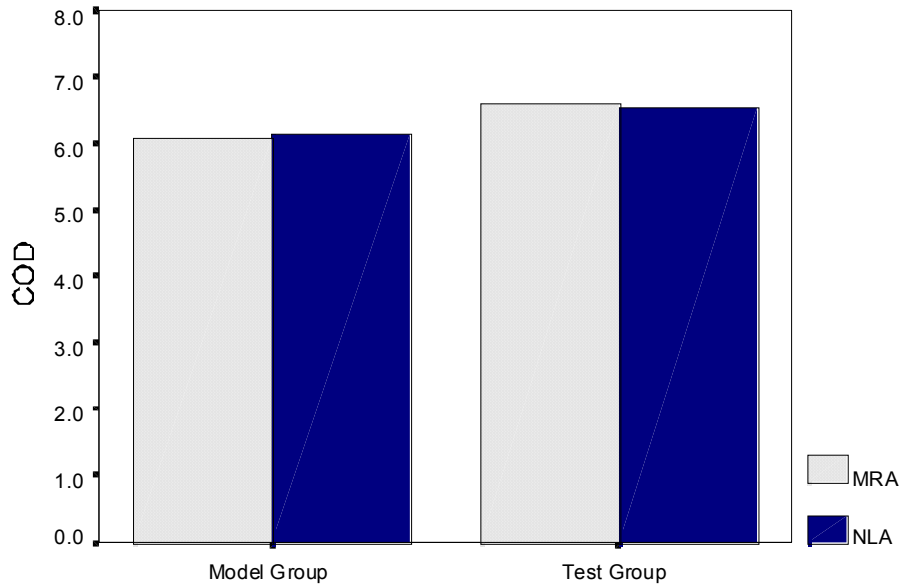


Ratios for area 13 are relatively high due to difference in time adjs

Exhibit 7
Graphs of CODs: Model vs Test Group

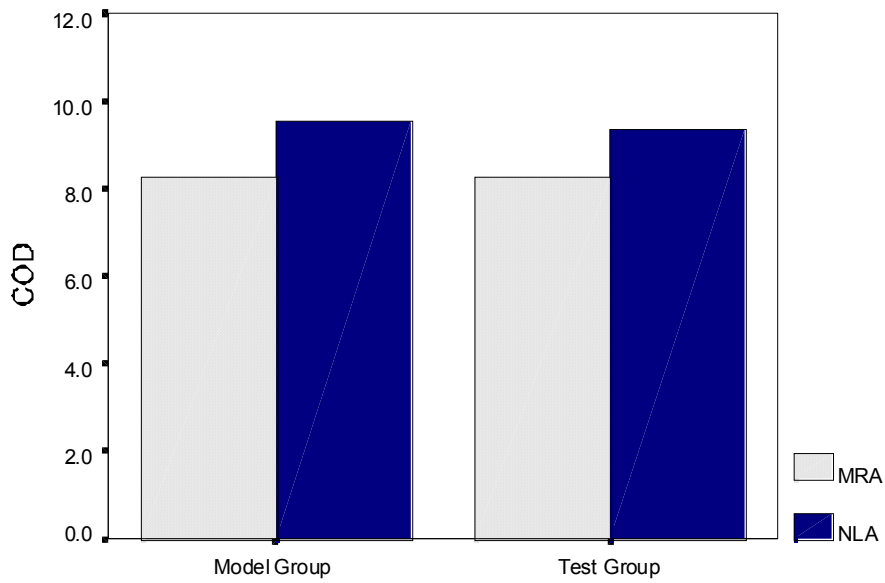
Comparison of CODs

Improved Property



Comparison of CODs

Vacant Land



Appendix 1

Syntax for Additive Improved Model - Riverbend

```
GET FILE='C:\COMBINED\RIVERBEND\IMPROVED\RIVERBENDIMP.sav'.
*THERE ARE 800 VALID SALES.
```

```
COMPUTE ALLBRICK=0.
IF (WALLFIN=1 AND QUAL=4)ALLBRICK=.6.
IF (WALLFIN=1 AND QUAL>4)ALLBRICK=1.
COMPUTE PREMROOF=0.
IF (ROOFFIN=2 AND QUAL=4)PREMROOF=.6.
IF (ROOFFIN=2 AND QUAL>4)PREMROOF=1.
```

```
FORMAT QUAL (F4).
VALUE LABELS QUAL 0 'POOR' 1 'ECONOMY' 2 'SUBSTANDARD' 3 'FAIR' 4 'STANDARD' 5
'SEMI-CUSTOM' 6 'CUSTOM' 7 'GOOD CUSTOM' 8 'EXPENSIVE' 9 'LUXURIOUS'.
```

```
FORMAT MBC (F4).
*NOTE: SXS(SIDE BY SIDE); BTOB(BACK TO BACK).
VALUE LABELS MBC 0 '1 STY & BSMT' 1 '1 STY BSMTLESS' 2 'BILEVEL' 3 'SPLIT LEVEL'
4 'SPITLEVEL & CRWL' 5 '1 1/2 STY & BSMT' 6 '1 1/2 STY BSMTLESS' 7 '1 3/4 STY &
BSMT' 8 '1 3/4 STY BSMTLESS' 9 '2 STY & BSMT' 10 '2 STY BSMTLESS' 300 '3 STY &
BSMT' 301 '3 STY BSMTLESS' 302 '3 STY & BSMT DUPLEX SXS' 303 '3 STY BSMTLESS
DUPLEX SXS' 304 '3 STY & BSMT DUPLEX BTOB' 305 '3 STY BSMTLESS DUPLEX BTOB'
320 '1 STY & BSMT DUPLEX SXS' 321 '1 STY BSMTLESS DUPLEX SXS' 322 'DUPLEX
BILEVEL SXS' 323 'SPLIT LEVEL DUPLEX SXS' 324 'SPLIT LEVEL & CRWL DUPLEX SXS' 325
'2 STY & BSMT DUPLEX SXS' 326 '2 STY & BSMTLESS DUPLEX SXS' 330 '1 STY & BSMT
DUPLEX BTOB' 331 '1 STY BSMTLESS DUPLEX BTOB' 332 'BILEVEL DUPLEX BTOB' 333 '2
STY & BSMT DUPLEX BTOB' 334 '2 STY BSMTLESS DUPLEX BTOB'.
```

```
FORMAT LUC1 (F4).
VALUE LABELS LUC1 100 'SINGLE FAMILY' 101 'SEMI-DETACHED' 103 'SEMI-DETACHED
W/SUITE' 104 'SEMI-DETACHED ADULT COMMUNITY' 105 'HOUSE 3 OR LESS RENTAL SELF-
CONT UNITS' 106 'HOUSE 4 OR MORE RENTAL SELF-CONT UNITS' 107 'ONE DWELLING UNIT
W/OTHER USE' 108 'ONE DWELLING UNIT ACCESSORY BLDG' 109 'OTHER SINGLE FAMILY' 110
'DUPLEX UP & DOWN' 111 'DUPLEX SXS' 112 'SINGLE FAMILY W/SUITE' 115 'DUPLEX UP &
DOWN LOWER LEVEL UNITS' 116 'DUPLEX SXS LOWER LEVEL UNITS' 117 'DUPLEX BTOB LOWER
LEVEL UNITS' 118 'TWO FAMILY UNIT W/OTHER USE' 119 'OTHER TWO FAMILY' 120 '2 OR
MORE UNITS ON 1 PARCEL' 121 'TRI-PLEX'.
```

```
*COMPUTING EFFECTIVE GARAGE SIZE (SO AS NOT TO CHARGE AS MUCH FOR GARAGES ON
LOWER QUALITY HOMES).
```

```
COMPUTE ATTGAR_Q=ATTGARSZ.
IF (QUAL LE 3)ATTGAR_Q=.5*ATTGARSZ.
COMPUTE BMTGAR_Q=BMTGARSZ.
IF (QUAL LE 3)BMTGAR_Q=.5*BMTGARSZ.
COMPUTE DETGAR_Q=DETGARSZ.
IF (QUAL LE 3)DETGAR_Q=.5*DETGARSZ.
```

```
COMPUTE SPPSM=CONSAMT/BDGNET.
COMPUTE ASR=PRVASMT/CONSAMT.
```

```
COMPUTE OUTLIER=0.
IF (ASR < .50 OR ASR > 2.00)OUTLIER=1.
TEMPORARY.
SELECT IF (OUTLIER=1).
LIST ACCT PRVASMT CONSAMT ASR.
SELECT IF (OUTLIER=0).
```

FREQ SYEAR.
*DELETES 0 CASES LEAVING 800 SALES.

CROSSTABS SMONTH BY SYEAR.

RECODE EFFYRBLT(1980 THRU 1999=1)(1960 THRU 1979=2)(1940 THRU 1959=3)(1920 THRU 1939=4)(LO THRU 1919=5) INTO AGEGROUP.

FORMATS COMM INSTNL MULTI OTL TRAFFIC (F4).
VALUE LABELS COMM INSTNL MULTI OTL TRAFFIC 1 'MINOR' 2 'MODERATE' 3 'MAJOR' 4 'EXTREME'.

FORMATS GOLF LAKE PARK RAVINE RIVVAL (F4).
VALUE LABELS GOLF LAKE PARK RAVINE RIVVAL 10 'ABUTTING' 11 'ACROSS'.

FORMATS COND (F4).
VALUE LABELS COND 1 'POOR' 2 'FAIR' 3 'AVERAGE' 4 'GOOD'.

FREQ MKTAREA LUC1 EFFZONE QUAL MBC COND AIRCOND PARTBSMT ALLBRICK ATTGAR ATTGAR
BSMTGAR DETCAR DETGAR POOLBLDG SOLARIUM FPFRSTD FPMASON FPZERCL LOFT POOL ROOFFIN
BUS COMM GOLF INSTNL LAKE MULTI OTL PARK RAVINE RIVER RIVVAL TRAFFIC.

MISSING VALUES LOTSIZE BDGNET BSMTAREA FBSTAREA PTBSMTSZ LOFTAREA ATTGARSZ
BMTGARSZ DETGARSZ ATTGARSZ DETGARSZ POOLSZ POOLBLDZ SOLARSZ CONSAMT SPPSM PRVASMT
ORGYRBLT EFFYRBLT (0).

DES LOTSIZE BDGNET BSMTAREA FBSTAREA PTBSMTSZ LOFTAREA ATTGARSZ BMTGARSZ DETGARSZ
ATTGARSZ DETGARSZ POOLSZ POOLBLDZ SOLARSZ CONSAMT SPPSM ASR PRVASMT ORGYRBLT
EFFYRBLT.

MISSING VALUES LOTSIZE BDGNET BSMTAREA FBSTAREA PTBSMTSZ LOFTAREA ATTGARSZ
BMTGARSZ DETGARSZ ATTGARSZ DETGARSZ POOLSZ POOLBLDZ SOLARSZ CONSAMT SPPSM ASR
PRVASMT ORGYRBLT EFFYRBLT ().

EXAMINE VARIABLES=consamt BY nbhd /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

FORMAT NBHD (F4).
VALUE LABELS NBHD 5080 'BRANDER GARDENS' 5090 'BROOKSIDE' 5100 'BULYEA HEIGHTS'
5130 'CARTER CREST' 5190 'FALCONER HEIGHTS' 5230 'HENDERSON ESTATES' 5300
'OGILVIE RIDGE' 5340 'RAMSAY HEIGHTS' 5350 'RHATIGAN RIDGE' 5610 'HADDOW' 5620
'HODGSON' 5630 'LEGER' 5640 'TERWILLEGAR TOWNE'.

MEANS CONSAMT BY NBHD/CELLS=COUNT MEDIAN MEAN STDDEV MIN MAX.

GRAPH /SCATTERPLOT(BIVAR)= BDGNET WITH CONSAMT
/TITLE='PLOT OF SALE PRICE WITH LIVING AREA'.
GRAPH /SCATTERPLOT(BIVAR)= LOTSIZE WITH CONSAMT
/TITLE='PLOT OF SALE PRICE WITH LOTSIZE'.
GRAPH /SCATTERPLOT(BIVAR)= EFFYRBLT WITH CONSAMT
/TITLE='PLOT OF SALE PRICE WITH EFFYRBLT'.
EXAMINE VARIABLES=CONSAMT BY MKTAREA/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=SPPSM BY QUAL /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=SPPSM BY MBC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY ALLBRICK/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY FPMASON/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY FPZERCL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY ROOFFIN/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY BUS/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY COMM /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

```

EXAMINE VARIABLES=CONSAMT BY GOLF/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY INSTNL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY LAKE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY MULTI/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY OTL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY PARK/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY RAVINE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY RIVAL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY TRAFFIC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY COND/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

COMPUTE POOL1=0.
IF (POOL=1)POOL1=1.
TEMPORARY.
SELECT IF (POOL1=1).
LIST ACCT CONSAMT NBHD MKTAREA ASR BDGNET POOL POOLBLDG.
*NO ACCTS NEED TO BE REMOVED LEAVING 800 SALES.

COMPUTE
LIVAREAZ=BDGNET+.95*LOFTAREA+.28*SOLARSZ+.60*POOLBLDZ+.13*FBSTAREA+.13*LLFINSZ
+.48*ATTGARSZ+.48*BMTGARSZ.

*** TIME.
*SINGLE TIME VARIABLE FOR FULL 36 MONTHS.
COMPUTE MONTHS=0.
IF (syear=1997)MONTHS=smonth-7.
IF (syear=1998)MONTHS=smonth+5.
IF (syear=1999)MONTHS=smonth+17.
IF (syear=2000)MONTHS=smonth+29.
VAR LABELS MONTHS 'MONTHS FROM Jul 97'.
COMPUTE MOSQRT=SQRT(MONTHS).
COMPUTE MOHALF=MONTHS**1.5.
COMPUTE MOSQ=MONTHS**2.
COMPUTE MONTHSSM=MONTHS*bdgnet .
COMPUTE MOSQRTSM=MOSQRT*bdgnet.
COMPUTE MOHALFSM=MOHALF*bdgnet.
COMPUTE MOSQSM=MOSQ*bdgnet.

*VARIABLES FOR CALENDAR YEAR.
COMPUTE MO97=0.
IF (syear=1997)MO97=smonth - 6.
IF (syear > 1997)MO97=6.
COMPUTE MO98=0.
IF (syear=1998)MO98=smonth.
IF (syear > 1998)MO98=12.
COMPUTE MO99=0.
IF (syear=1999)MO99=smonth.
IF (syear >1999)MO99=12.
COMPUTE MO00=0.
IF (syear=2000)MO00=smonth.
COMPUTE MO97SM=MO97* BDGNET.
COMPUTE MO98SM=MO98* BDGNET.
COMPUTE MO99SM=MO99* BDGNET.
COMPUTE MO00SM=MO00* BDGNET.

*TWO 18-MONTH PERIODS.
COMPUTE MO9798=0.
IF (syear =1997)MO9798=smonth - 6.
IF (syear =1998)MO9798=smonth + 6.

```

```

IF (SYEAR > 1998)MO9798=18. /*ADDED ON DEC 28.
VAR LABELS MO9798 'Mos After Jun 97 (capped at 18)'. /*ADDED ON DEC 28.
COMPUTE MO9900=0.
IF (syear=1999)MO9900=smonth.
IF (syear=2000)MO9900=smonth+12.
VAR LABELS MO9900 'Mos After Dec 98 (capped at 18)'. /*ADDED ON DEC 28.
COMPUTE MO9798SM=MO9798* bdgnet.
COMPUTE MO9900SM=MO9900* bdgnet.

*THREE 12-MONTH PERIODS.
COMPUTE MO1=0.
IF (SYEAR=1997 AND SMONTH GE 7)MO1=SMONTH-6.
IF ((SYEAR=1998) AND (SMONTH LE 6))MO1=6+SMONTH.
IF ((SYEAR=1998 AND SMONTH GE 7) OR (SYEAR GE 1999))MO1=12.
VAR LABELS MO1 'Mos After Jun 97 (capped at 12)'.
COMPUTE MO2=0.
IF ((SYEAR=1998) AND (SMONTH GE 7))MO2=SMONTH-6.
IF ((SYEAR=1999) AND (SMONTH LE 6))MO2=6+SMONTH.
IF ((SYEAR=1999 AND SMONTH GE 7) OR (SYEAR EQ 2000))MO2=12.
VAR LABELS MO2 'Mos After Jun 98 (capped at 12)'.
COMPUTE MO3=0.
IF ((SYEAR=1999) AND (SMONTH GE 7))MO3=SMONTH-6.
IF (SYEAR=2000)MO3=6+SMONTH.
VAR LABELS MO3 'Mos After Jun 99'.
COMPUTE MO1SM=MO1*BDGNET.
COMPUTE MO2SM=MO2*BDGNET.
COMPUTE MO3SM=MO3*BDGNET.
EXECUTE.

*SEASONALITY.
RECODE SMONTH(11,12,1,2=1)(ELSE=0) INTO WINTER.

*QUALITY/LIVING AREA VARIABLES.
COMPUTE BDGNET0=0.
COMPUTE BDGNET1=0.
COMPUTE BDGNET2=0.
COMPUTE BDGNET3=0.
COMPUTE BDGNET4=0.
COMPUTE BDGNET5=0.
COMPUTE BDGNET6=0.
COMPUTE BDGNET7=0.
COMPUTE BDGNET8=0.
COMPUTE BDGNET9=0.
IF (QUAL=0) BDGNET0=BDGNET.
IF (QUAL=1) BDGNET1=BDGNET.
IF (QUAL=2) BDGNET2=BDGNET.
IF (QUAL=3) BDGNET3=BDGNET.
IF (QUAL=4) BDGNET4=BDGNET.
IF (QUAL=5) BDGNET5=BDGNET.
IF (QUAL=6) BDGNET6=BDGNET.
IF (QUAL=7) BDGNET7=BDGNET.
IF (QUAL=8) BDGNET8=BDGNET.
IF (QUAL=9) BDGNET9=BDGNET.

*PROPERTY TYPE (BASED ON LAND USE CODE).
COMPUTE SEMI_DET=0.
IF (LUC1=101 OR LUC1=103 OR LUC1=104)SEMI_DET=1.

*MARKET BUILDING CLASS (2 STORY w BASEMENT IS BASE).

```

```

COMPUTE ONE_STY=0.
IF (MBC=0 OR MBC=320 OR MBC=330)ONE_STY=1.
COMPUTE STY1_NB=0.
IF (MBC=1 OR MBC=321 OR MBC=331)STY1_NB=1.
COMPUTE BILEVEL=0.
IF (MBC=2 OR MBC=322 OR MBC=332)BILEVEL=1.
COMPUTE SPLIT=0.
IF (MBC=3 OR MBC=323)SPLIT=1.
COMPUTE SPLTCRWL=0.
IF (MBC=4 OR MBC=324)SPLTCRWL=1.
COMPUTE STY_15=0.
IF (MBC=5)STY_15=1.
COMPUTE STY15_NB=0.
IF (MBC=6)STY15_NB=1.
COMPUTE STY_175=0.
IF (MBC=7)STY_175=1.
COMPUTE STY175NB=0.
IF (MBC=8)STY175NB=1.
*COMPUTE TWO_STY=0.
*IF (MBC=9 OR MBC=325 OR MBC=333)TWO_STY=1.
COMPUTE STY2_NB=0.
IF (MBC=10 OR MBC=326 OR MBC=334)STY2_NB=1.
COMPUTE STY_3=0.
IF (MBC=300 OR MBC=302 OR MBC=304)STY_3=1.
COMPUTE STY3_NB=0.
IF (MBC=301 OR MBC=303 OR MBC=305)STY3_NB=1.

*AIR CONDITIONING.
COMPUTE AIRCONSM=AIRCOND*BDGNET.

*FIREPLACES.
RECODE FPMASON(0=0)(1=1)(2=1.50)(3=2)(4 THRU HI=2.5) INTO LINFPMAS.
RECODE FPZERCL(0=0)(1=1)(2=1.50)(3=2)(4 THRU HI=2.5) INTO LINFPZER.

*DEPRECIATION.
COMPUTE AGE=2000-ORGYRBLT.
COMPUTE EFFAGE=2000-EFFYRBLT.
IF (SYSMIS(EFFYRBLT))EFFAGE=AGE.
COMPUTE SQRAGE=SQRT(EFFAGE).
COMPUTE ADJAGE=EFFAGE.
IF (EFFAGE GE 11 AND EFFAGE LE 20)ADJAGE=10+.9*(EFFAGE-10).
IF (EFFAGE GE 21 AND EFFAGE LE 30)ADJAGE=19+.8*(EFFAGE-20).
IF (EFFAGE GE 31 AND EFFAGE LE 40)ADJAGE=27+.7*(EFFAGE-30).
IF (EFFAGE GE 41 AND EFFAGE LE 50)ADJAGE=34+.6*(EFFAGE-40).
IF (EFFAGE GE 51 AND EFFAGE LE 60)ADJAGE=40+.5*(EFFAGE-50).
IF (EFFAGE GE 61 AND EFFAGE LE 70)ADJAGE=45+.4*(EFFAGE-60).
IF (EFFAGE GE 71 AND EFFAGE LE 80)ADJAGE=49+.3*(EFFAGE-70).
IF (EFFAGE GE 81 AND EFFAGE LE 90)ADJAGE=52+.2*(EFFAGE-80).
IF (EFFAGE GE 91)ADJAGE=54+.1*(EFFAGE-90).
COMPUTE EFFAGESM=EFFAGE*LIVAREAZ.
COMPUTE SQRAGESM=SQRAGE*LIVAREAZ.
COMPUTE ADJAGESM=ADJAGE*LIVAREAZ .
GRAPH /SCATTERPLOT(BIVAR)=EFFAGE WITH SPPSM.

*SPLINE VARIABLES FOR DEPRECIATION - 20 YEAR INCREMENTS.
COMPUTE EFFAGE1=EFFAGE.
IF (EFFAGE GE 20)EFFAGE1=20.
COMPUTE EFFAGE2=0.
IF (EFFAGE GE 21 AND EFFAGE LE 40)EFFAGE2=EFFAGE-20.

```

```

IF (EFFAGE GT 40)EFFAGE2=20.
COMPUTE EFFAGE3=0.
IF (EFFAGE GE 41 AND EFFAGE LE 60)EFFAGE3=EFFAGE-40.
IF (EFFAGE GT 60)EFFAGE3=20.
COMPUTE EFFAGE4=0.
IF (EFFAGE GE 61 AND EFFAGE LE 80)EFFAGE4=EFFAGE-60.
IF (EFFAGE GT 80)EFFAGE4=20.
COMPUTE EFFAGE5=0.
IF (EFFAGE GE 81)EFFAGE5=EFFAGE-80.
COMPUTE EFAGE1SM=EFFAGE1*LIVAREAZ.
COMPUTE EFAGE2SM=EFFAGE2*LIVAREAZ.
COMPUTE EFAGE3SM=EFFAGE3*LIVAREAZ.
COMPUTE EFAGE4SM=EFFAGE4*LIVAREAZ.
COMPUTE EFAGE5SM=EFFAGE5*LIVAREAZ.

*CONDITION.
RECODE COND (1=1)(ELSE=0) INTO CON_POOR.
RECODE COND (2=1)(ELSE=0) INTO CON_FAIR.

COMPUTE OUTPOOLZ=0.
IF (POOL=2)OUTPOOLZ=POOLSZ.
COMPUTE ATTPOOLZ=0.
IF (POOLBLDG=1)ATTPOOLZ=POOLBLDZ.
COMPUTE DETPOOLZ=0.
IF (POOLBLDG=2)DETPOOLZ=POOLBLDZ.

*LOT SIZE.
FREQUENCIES VARIABLES=lotsize/STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN.

COMPUTE SQRLSIZE=SQRT(LOTSIZE)*(675/SQRT(675))-675.
COMPUTE LSIZE75=(LOTSIZE**.75)*675/675**.75-675.
COMPUTE LSIZE25=(LOTSIZE**.25)*675/675**.25-675.
COMPUTE LOGLSIZE=LN(LOTSIZE)*(675/LN(675))-675.

*SITE VARS.

COMPUTE BUS_YN=0.
IF (BUS=1)BUS_YN=1.

COMPUTE COMM_YN=0.
IF (COMM GE 1)COMM_YN=1.

COMPUTE INSTL_YN=0.
IF (INSTNL GE 1)INSTL_YN=1.

COMPUTE MULTI_YN=0.
IF (MULTI GE 1)MULTI_YN=1.

*WILL GO WITH THE LINEARIZATION FOR PARK AS IT IS PRETTY CONSISTENT THROUGHOUT.
RECODE PARK(0=0)(10=1)(11=.76) INTO LINPARK.

*WILL ANALYZE RAVINES SEPERATELY AS THERE APPEARS TO BE STRONG DIFFERENCES.
RECODE RAVINE(10=1)(ELSE=0) INTO RAVIN_10.
RECODE RAVINE (11=1)(ELSE=0) INTO RAVIN_11.

*ONLY 3 SALES OF ABUTTING RIVER VALLEY INFLUENCE AND 3 SALES OF ACROSS
FROM VALLEY INFLUENCE. WILL SIMPLY REMOVE FOR THIS EXERCISE.
TEMPORARY.
SELECT IF (RIVVAL GE 10).

```



```

LIST ACCT NBHD MBC BDGNET RIVVAL LUC1.
SELECT IF (RIVVAL= 0).
*REMOVES 6 SALES LEAVING 794.

```

```

RECODE TRAFFIC (1=1)(ELSE=0) INTO TRAFFIC1.
RECODE TRAFFIC (2=1)(ELSE=0) INTO TRAFFIC2.
RECODE TRAFFIC (3,4=1)(ELSE=0) INTO TRAFF_34.

```

```

MEANS CONSAMT BY EFFZONE/CELLS=COUNT MEDIAN MEAN STDDEV MIN MAX.
*WILL NOT ANALYZE TTSDR AND TTSLR AS THEY ARE BOTH IN THE SAME NBHD - TOO FEW SALES.
*ZERO LOT LINES AND ZONING (RF1 IS BASE).
COMPUTE ZONE234=0.
IF (EFFZONE='RF2' OR EFFZONE='RF3' OR EFFZONE='RF4')ZONE234=1.
COMPUTE ZONE_RPL=0.
IF (EFFZONE='RPL')ZONE_RPL=1.

```

```

*NBHDs (MKT AREA 3, NBHD 5100 IS BASE).
COMPUTE MKTNBHD=10000*MKTAREA+NBHD.
RECODE MKTNBHD(35080=1)(ELSE=0) INTO NB35080.
RECODE MKTNBHD(35090=1)(ELSE=0) INTO NB35090.
*RECODE MKTNBHD(35100=1)(ELSE=0) INTO NB35100. /* BASE NBHD.
RECODE MKTNBHD(35130=1)(ELSE=0) INTO NB35130.
RECODE MKTNBHD(35190=1)(ELSE=0) INTO NB35190.
RECODE MKTNBHD(35230=1)(ELSE=0) INTO NB35230.
RECODE MKTNBHD(35300=1)(ELSE=0) INTO NB35300.
RECODE MKTNBHD(35340=1)(ELSE=0) INTO NB35340.
RECODE MKTNBHD(35350=1)(ELSE=0) INTO NB35350.
RECODE MKTNBHD(35610=1)(ELSE=0) INTO NB35610.
RECODE MKTNBHD(35630,35620=1)(ELSE=0) INTO NB35630x. /*WITH 35630.
RECODE MKTNBHD(35640=1)(ELSE=0) INTO NB35640.
EXECUTE.

```

```

*BASE MODEL.
REGRESSION VARS=CONSAMT BDGNET4
BDGNET5 BDGNET6 BDGNET7 EFAGE1SM TO EFAGE5SM LSIZE75
MO1SM MO2SM MO3SM NB35080 TO NB35640 WINTER
/CRITERIA=PIN(.05) POUT (.10)
/DEPENDENT=CONSAMT
/METHOD=ENTER .
*THE ADJUSTED R-SQUARED WAS .723.

```

```

*EXPLORATORY MODEL. PHASE 1.
REGRESSION VARS=CONSAMT BDGNET4 BDGNET5 BDGNET6 BDGNET7 EFAGE1SM TO EFAGE5SM
LSIZE75 ONE_STY BILEVEL SPLIT SPLTCRWL STY_15 STY2_NB STY_3 SEMI_DET AIRCONSM
ALLBRICK PREMROOF LINFPMAS LINFPZER BSMTAREA FBSTAREA ATTGAR_Q BMTGAR_Q DETGAR_Q
BUS_YN COMM_YN INSTL_YN MULTI_YN LINPARK RAVIN_10 RAVIN_11 TRAFFIC1 TRAFFIC2
TRAFF_34 ZONE234 ZONE_RPL MO1SM MO2SM MO3SM NB35080 TO NB35640 WINTER
/CRITERIA=PIN(.10) POUT (.15)
/DEPENDENT=CONSAMT
/METHOD=ENTER.
/SAVE PREDIC.

```

```

*EXPLORATORY MODEL. PHASE 2.
*WILL REMOVE STY_15 (1 SALE), STY_3 (2 SALES).
REGRESSION VARS=CONSAMT BDGNET4
BDGNET5 BDGNET6 BDGNET7 EFAGE1SM TO EFAGE5SM LSIZE75 ONE_STY BILEVEL SPLIT
SPLTCRWL STY2_NB SEMI_DET AIRCONSM ALLBRICK PREMROOF LINFPMAS LINFPZER BSMTAREA
FBSTAREA ATTGAR_Q BMTGAR_Q DETGAR_Q BUS_YN COMM_YN INSTL_YN MULTI_YN LINPARK

```

RAVIN_10 RAVIN_11 TRAFFIC1 TRAFFIC2 TRAFF_34 ZONE234 ZONE_RPL MO1SM MO2SM MO3SM
 NB35080 TO NB35640 WINTER
 /CRITERIA=PIN(.10) POUT (.15)
 /DEPENDENT=CONSAMT
 /METHOD=ENTER.
 /SAVE PREDIC.

*EXPLORATORY MODEL. PHASE 3.
 *WILL USE GLOBAL LINQUALS FOR THOSE WITH NO SALES.
 *WILL GROUP SPLITS AND COM_MULT AS PER GLOBAL MODEL.
 *WILL LINEARIZE GARAGES.
 *WILL GROUP FP'S.
 *WILL GROUP TRAFFIC2 & TRAFF_34.
 *WILL LINEARIZE ZONE234 AND ZONE_RPL INTO LINZONE.
 *WILL REMOVE PARK AS THEY CAME IN NEGATIVE.
 *FIRST RAN AS LINGAR BUT WAS GREATER THAN 80% OF THE BASE QUALITY RATE THEREFORE
 CAPPED AT 80% IN LIVAREAQ.

COMPUTE LINQUAL=QUAL.
 RECODE LINQUAL(0=.55)(1=.56)(2=.70)(3=.83)(4=.96)(5=1)(6=1.18)(7=1.43)(8=1.58).
 COMPUTE LINGAR=ATTGAR_Q+BMTGAR_Q+.55*DETGAR_Q.
 COMPUTE
 LIVAREAQ=LINQUAL*(BDGNET+.95*LOFTAREA+.28*SOLARSZ+.60*POOLBLDZ+.13*LLFINSZ)
 +.13*FBSTAREA+.80*LINGAR.
 COMPUTE LINBSMT=BSMTAREA+.86*PTBSMTSZ.
 COMPUTE LINSPLT=SPLIT+1.10*SPLTCRWL.
 COMPUTE LINFP=LINFPMAS+.30*LINFPZER.
 COMPUTE COM_MULT=INSTL_YN+.95*MULTI_YN+.90*COMM_YN.
 COMPUTE COND_LOW=CON_POOR +.25*CON_FAIR.
 RECODE TRAFFIC(2,3,4=1)(ELSE=0) INTO TRAFF234.
 COMPUTE LINZONE=ZONE_RPL+.50*ZONE234.

COMPUTE PRICE=CONSAMT+.018*CONSAMT*WINTER-150*OUTPOOLZ-16000*ALLBRICK
 -10000*PREMROOF-30*AIRCONSM+3500*BUS_YN+22000*COND_LOW.
 *CONSTRAINTS BASED ON GLOBAL MODEL.

*OPENED THE PIN AND POUT AT THIS POINT TO GET MO3SM TO COME IN. MO1SM DID NOT
 ENTER
 THEREFORE NO TIME ADJUSTMENT WILL BE MADE FOR THIS TIME FRAME.

REGRESSION VARS=PRICE LIVAREAQ EFAGE1SM TO EFAGE5SM LSIZE75 ONE_STY BILEVEL
 LINSPLT STY2_NB SEMI_DET LINFP LINBSMT COM_MULT RAVIN_10 RAVIN_11 TRAFFIC1
 TRAFF234 LINZONE MO1SM MO2SM MO3SM NB35080 TO NB35640
 /CRITERIA=PIN(.15) POUT (.25)
 /DEPENDENT=PRICE
 /METHOD=STEPWISE
 /SAVE=PREDIC.

DES BDGNET CONSAMT.
 RECODE MONTHS(0 THRU 11=1)(12 THRU 23=2)(24 THRU 35=3) INTO PERIOD.
 MEANS BDGNET CONSAMT BY PERIOD.

*THIS IS THE 1997-1998 TIME ADJUSTMENT (PERIOD 1).
 *NO ADJUSTMENT THIS THIS TIME PERIOD.

*THIS IS THE 1998-1999 TIME ADJUSTMENT (PERIOD 2).
 *(3.326*200.56) / 220594 = 0.0030. 12*0.0030 = 3.60 %.

*THIS IS THE 1999-2000 TIME ADJUSTMENT (PERIOD 3).

```

*(2.439*205.40) / 229901 = 0.0022.          12*0.0022 = 2.64 %.

*COMPUTING TIME VARIABLES AGAINST WHICH TO APPLY ADJUSTMENTS.
COMPUTE MONTHS1=0.
IF (PERIOD=1)MONTHS1=11.5-MONTHS.
VAR LABELS MONTHS1 'MOs BEFORE JULY 98'.
COMPUTE MONTHS2=0.
IF (PERIOD=2)MONTHS2=23.5-MONTHS.
IF (PERIOD=1)MONTHS2=12.
VAR LABELS MONTHS2 'MOs BEFORE JULY 99'.
COMPUTE MONTHS3=0.
IF (PERIOD=3)MONTHS3=35.5-MONTHS.
IF (PERIOD < 3)MONTHS3=12.
VAR LABELS MONTHS3 'MONTHS BEFORE 1 JULY 2000'.
GRAPH/SCATTERPLOT=MONTHS WITH MONTHS1.
GRAPH/SCATTERPLOT=MONTHS WITH MONTHS2.
GRAPH/SCATTERPLOT=MONTHS WITH MONTHS3.

COMPUTE TASP=CONSAMT+.018*WINTER*CONSAMT+(.0030*MONTHS2+.0022*MONTHS3)*CONSAMT.
COMPUTE TIMEFACT=TASP/CONSAMT.
DES TIMEFACT.
*AVERAGE ADJ=4.45% .

*WILL NOT REMOVE ANY OUTLIERS.

*FINAL MODEL.
COMPUTE PRICE=TASP-150*OUTPOOLZ-16000*ALLBRICK-10000*PREMROOF-30*AIRCONSM
+3500*BUS_YN+22000*COND_LOW-4000*LINFP.

*CONSTRAINING LINFP (ENTERED TOO HIGH).

COMPUTE
LIVAREAQ=LINQUAL*(BDGNET+.95*LOFTAREA+.28*SOLARSZ+.60*POOLBLDZ+.13*LLFINSZ)
+.13*FBSTAREA+.80*LINGAR.

*GLOBAL ADJUSTMENTS.
COMPUTE LINAGE=EFAGE1SM+.10*EFAGE2SM+.10*EFAGE3SM+.10*EFAGE4SM+0.10*EFAGE5SM.

FINAL MODEL 1.
REGRESSION VARS=PRICE LIVAREAQ LINAGE LSIZE75 ONE_STY BILEVEL LINSPLT STY2_NB
SEMI_DET LINBSMT COM_MULT RAVIN_10 RAVIN_11 TRAFFIC1 TRAFF234 LINZONE
NB35080 TO NB35640 /CRITERIA=PIN(.15) POUT (.25)
/DEPENDENT=PRICE
/METHOD=STEPWISE
/SAVE=PREDIC.

*SALES RATIOS.
COMPUTE ESP=PRE_2+150*OUTPOOLZ+16000*ALLBRICK+10000*PREMROOF
+30*AIRCONSM-3500*BUS_YN-22000*COND_LOW+4000*LINFP.

COMPUTE FINRATIO=ESP/TASP.
FREQ FINRATIO/FORMAT=NOTABLE/STAT=MIN MAX MEDIAN MEAN STDDEV SUM.
COMPUTE MEDIAN=1.0042.
COMPUTE PMISS=100*ABS(FINRATIO-MEDIAN)/MEDIAN.
DES PMISS.
*THE COD = 7.21.
*NOTE: PRD = MEAN (SHOULD BE BETWEEN 0.98 TO 1.03).

GRAPH /HISTOGRAM=finratio .

```

```

EXAMINE VARIABLES=finratio BY nbhd/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY qual /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY mbc /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY linfp linfpmas
linfpzer/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY semi_det /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY LINZONE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY traffic1 /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY traff234 /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY LINPARK/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY ravin_10
ravin_11/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY COND_LOW/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
EXAMINE VARIABLES=finratio BY COM_MULT/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL .
GRAPH /SCATTERPLOT=livareaq WITH finratio.
GRAPH /SCATTERPLOT=effage WITH finratio.
GRAPH /SCATTERPLOT=months WITH finratio.
GRAPH/SCATTERPLOT(BIVAR)=LOTSIZE WITH FINRATIO.

```

```

COMPUTE MRAVALUE = 76125 +
622.91 * LIVAREAQ +
-17.27 * LINAGE +
77030 * RAVIN_10 +
65.45 * LSIZE75 +
5846 * ONE_STY +
-17072 * TRAFF234 +
20124 * NB35230 +
17395 * LINSPLT +
-8465 * TRAFFIC1 +
23953 * NB35090 +
224.68 * LINBSMT +
15351 * RAVIN_11 +
18687 * NB35630X +
-5420 * NB35190 +
21138 * NB35080 +
-10650 * COM_MULT +
11583 * BILEVEL +
8948 * NB35350 +
9478 * NB35300 +
9034 * NB35340 +
150 * OUTPOOLZ +
16000 * ALLBRICK +
10000 * PREMROOF +
30 * AIRCONSM +
-3500 * BUS_YN +
-22000 * COND_LOW +
4000 * LINFP .

```

Appendix 2

Syntax for Multiplicative Vacant Land - Riverbend

```
GET FILE='C:\LILP\2001\DATA\EDM_AREAS.sav'.
SET MXMEMORY=32000.
SELECT IF (MKTAREA=3 AND VACANT=1 AND HOLDOUT=0).
FREQ MKTAREA.
*NUMBER OF CASES BEFORE EDITS = 359.

CROSSTABS SMONTH BY SYEAR.

RECODE  LOTSIZE CONSAMT PRVASMT BUS TO VACANT (SYSMIS=0) .

FREQ MKTAREA TO VACANT.

EXAMINE VARIABLES=consamt BY nbhd /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

MEANS CONSAMT BY NBHD/CELLS=COUNT MEDIAN MEAN STDDEV MIN MAX.

COMPUTE SPPSM = CONSAMT/LOTSIZE.
COMPUTE ASR=PRVASMT/CONSAMT.

GRAPH /SCATTERPLOT(BIVAR)= CONSAMT WITH LOTSIZE.
EXAMINE VARIABLES=CONSAMT BY MKTAREA/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY EFFZONE /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY SYEAR /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY BUS /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY COMM/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY GOLF/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY INSTNL /PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY LAKE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY MULTI/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY OTL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY PARK/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY RAVINE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY RIVVAL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=consamt BY TRAFFIC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

** TIME.
*SINGLE TIME VARIABLE FOR FULL 36 MONTHS.
COMPUTE MONTHS=0.
IF (syear=1997)MONTHS=smonth-7.
IF (syear=1998)MONTHS=smonth+5.
IF (syear=1999)MONTHS=smonth+17.
IF (syear=2000)MONTHS=smonth+29.
VAR LABELS MONTHS 'MONTHS FROM Jul 97'.
COMPUTE MOSQRT=SQRT(MONTHS).
COMPUTE MOHALF=MONTHS**1.5.
COMPUTE MOSQ=MONTHS**2.

*VARIABLES FOR CALENDAR YEAR.
COMPUTE MO97=0.
IF (syear=1997)MO97=smonth - 6.
IF (syear > 1997)MO97=6.
COMPUTE MO98=0.
IF (syear=1998)MO98=smonth.
IF (syear > 1998)MO98=12.
COMPUTE MO99=0.
```

```

IF (syear=1999)MO99=smonth.
IF (syear >1999)MO99=12.
COMPUTE MO00=0.
IF (syear=2000)MO00=smonth.

*THREE 12-MONTH PERIODS.
COMPUTE MO1=0.
IF (SYEAR=1997 AND SMONTH GE 7)MO1=SMONTH-6.
IF ((SYEAR=1998) AND (SMONTH LE 6))MO1=6+SMONTH.
IF ((SYEAR=1998 AND SMONTH GE 7) OR (SYEAR GE 1999))MO1=12.
VAR LABELS MO1 'Mos After Jun 97 (capped at 12)'.
COMPUTE MO2=0.
IF ((SYEAR=1998) AND (SMONTH GE 7))MO2=SMONTH-6.
IF ((SYEAR=1999) AND (SMONTH LE 6))MO2=6+SMONTH.
IF ((SYEAR=1999 AND SMONTH GE 7) OR (SYEAR EQ 2000))MO2=12.
VAR LABELS MO2 'Mos After Jun 98 (capped at 12)'.
COMPUTE MO3=0.
IF (SYEAR=1999 AND SMONTH GE 7)MO3=SMONTH-6.
IF (SYEAR=2000)MO3=6+SMONTH.
VAR LABELS MO3 'Mos After Jun 99'.
EXECUTE.

*TIME VARIABLES FOR 98-00.
COMPUTE MO9800=0.
IF (SYEAR=1998)MO9800=SMONTH.
IF (SYEAR=1999)MO9800=SMONTH+12.
IF (SYEAR=2000)MO9800=SMONTH+24.
VAR LABELS MO9800 'MONTHS FROM 1/98'.

*SEASONALITY.
RECODE SMONTH(11,12,1,2=1)(ELSE=0) INTO WINTER.

COMPUTE BUS_YN=0.
IF (BUS=1)BUS_YN=1.

COMPUTE MULTI_YN=0.
IF (MULTI GE 1)MULTI_YN=1.

*OTL (OVERHEAD TRANSMISSION LINES) - ALREADY TRUE BINARY (0 OR 1).

RECODE PARK (10=1)(ELSE=0) INTO PARK10.
RECODE PARK (11=1)(ELSE=0) INTO PARK11.

RECODE RAVINE(10=1)(ELSE=0) INTO RAVIN_10.
RECODE RAVINE (11=1)(ELSE=0) INTO RAVIN_11.

RECODE TRAFFIC (1=1)(ELSE=0) INTO TRAFFIC1.
RECODE TRAFFIC (2=1)(ELSE=0) INTO TRAFFIC2.
RECODE TRAFFIC (3,4=1)(ELSE=0) INTO TRAFFIC3.

*ZERO LOT LINES AND ZONING (RF1 IS BASE).
COMPUTE ZON_RPSL=0.
IF (EFFZONE='RPL' OR EFFZONE='RSL')ZON_RPSL=1.
COMPUTE TOONTOWN=0.
IF (EFFZONE='TTSR' OR EFFZONE='TTSLR')TOONTOWN=1.

*NBHDS (MKT AREA 3, NBHD 5630 IS BASE).
COMPUTE MKTNBHD=10000*MKTAREA+NBHD.
RECODE MKTNBHD(35100=1)(ELSE=0) INTO NB35100.

```

```

RECODE MKTNBHD(35130=1)(ELSE=0) INTO NB35130.
RECODE MKTNBHD(35190,35300=1)(ELSE=0) INTO NB35190X.
RECODE MKTNBHD(35230=1)(ELSE=0) INTO NB35230.
RECODE MKTNBHD(35350=1)(ELSE=0) INTO NB35350.
RECODE MKTNBHD(35610=1)(ELSE=0) INTO NB35610.
*RECODE MKTNBHD(35630=1)(ELSE=0) INTO NB35630.          /*BASE NBHD.
RECODE MKTNBHD(35640=1)(ELSE=0) INTO NB35640.
EXECUTE.

COMPUTE LPRICE=LN(CONSAMT).
COMPUTE LSIZE=LN(LOTSIZE).

*BASE MODEL.
REGRESSION
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /DEPENDENT LPRICE
  /METHOD=ENTER LSIZE MONTHS NB35100 TO NB35640 WINTER.
*adjusted R2 is .735.

EXPLORATORY MODEL 1.
REGRESSION
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.10) POUT(.15)
  /DEPENDENT LPRICE
  /METHOD=ENTER LSIZE MONTHS BUS_YN MULTI_YN OTL PARK10 PARK11 RAVIN_10 RAVIN_11
  TRAFFIC1 TRAFFIC2 TRAFFIC3 ZON_RPSL TOONTOWN NB35100 TO NB35640 WINTER.

*EXPLORATORY 2 .
*WILL REMOVE BUS_YN AS THERE IS ONLY 1 SALE.
*WILL REMOVE MULTI_YN AS IT IS COMING IN POSITIVE.

REGRESSION
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.10) POUT(.15)
  /DEPENDENT LPRICE
  /METHOD=ENTER LSIZE MONTHS OTL PARK10 PARK11 RAVIN_10 RAVIN_11 TRAFFIC1
  TRAFFIC2 TRAFFIC3 ZON_RPSL TOONTOWN NB35100 TO NB35640 WINTER.

*COMPUTING TIME ADJUSTMENT.
*TAKE ANTI LOG OF COEFFICIENT FOR MONTHS FROM EXPLORATORY 2.
*ANTI LOG OF .005037.

COMPUTE TFACTOR=1.0050.
COMPUTE MOS=35.5-MONTHS.
VAR LABELS MOS 'MONTHS BEFORE 1 JULY 00'.
GRAPH/SCATTERPLOT=MONTHS WITH MOS.
COMPUTE TASP=CONSAMT*TFACTOR**MOS.
COMPUTE TAF=TASP/CONSAMT.
DES CONSAMT TASP TAF.
*AVERAGE ADJ=8.98 % .

*WILL NOT REMOVE ANY OUTLIERS.

*FINAL MODEL WITH TASPs.

COMPUTE LTASP=LN(TASP).

REGRESSION

```

```

/STATISTICS COEFF OUTS R ANOVA
/CRITERIA=PIN(.20) POUT(.25)
/DEPENDENT LTASP
/METHOD=STEPWISE LSIZE OTL PARK10 PARK11 RAVIN_10 RAVIN_11 TRAFFIC1 TRAFFIC2
TRAFFIC3 ZON_RPSL TOONTOWN NB35100 TO NB35640
/SAVE=PRED.
*adj R2 is .872.

COMPUTE ESP=EXP(PRE_1).
COMPUTE FINRATIO=ESP/TASP.

COMPUTE FINRATIO=ESP/TASP.
FREQ FINRATIO/FORMAT=NOTABLE/STAT=ALL.
COMPUTE MED=.9940.
COMPUTE PMISS=100*ABS(FINRATIO-MED)/MED.
DES PMISS.
*COD OF 10.20.

GRAPH /HISTOGRAM=FINRATIO .
EXAMINE VARIABLES=FINRATIO BY NBHD/PLOT =BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=FINRATIO BY MULTI_YN/PLOT =BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=FINRATIO BY OTL/PLOT =BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=FINRATIO BY PARK10 PARK11/PLOT
=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=FINRATIO BY RAVIN_10 RAVIN_11/PLOT
=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=FINRATIO BY TRAFFIC1 TRAFFIC2
TRAFFIC3/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=FINRATIO BY ZON_RPSL TOONTOWN/PLOT
=BOXPLOT/STATISTICS=NONE/NOTOTAL.

*PREDICT PROGRAM.
*LOT SIZE.
FREQUENCIES VARIABLES=lotsize /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN
MODE SUM .

*BASE LOT = 591 SQM. (MEDIAN BASE LOT SIZE).
*BASE LOT VALUE = EXP(7.689) * 591**.531 = 2184 * 591**.531 = 64710 (109.49 PER
SQM).
COMPUTE SIZEFACT=(LOTSIZE**.531) / 29.629.

COMPUTE MRAVALUE = 64710 * SIZEFACT
*      1.416 **      RAVIN_11
*      1.358 **      NB35230
*      1.203 **      PARK10
*      0.831 **      TRAFFIC2
*      0.733 **      OTL
*      0.658 **      TRAFFIC3
*      1.285 **      NB35100
*      1.420 **      RAVIN_10
*      1.091 **      NB35190X
*      0.927 **      TRAFFIC1
*      1.091 **      NB35350.

```


Appendix 3

Syntax for Nonlinear (NLR) Combined Riverbend Model

```
GET FILE='C:\LILP\2001\DATA\EDM_AREAS.SAV'.
*INCLUDES VAR/VALUE LABELS.
RENAME VARS (BUS=BUS_YN).
SELECT IF (MKTAREA=3).
SELECT IF (HOLDOUT=0).
SELECT IF (RIVVAL=0).
*DELETED IN UNCOMBINED MODELS AND NONE IN HOLDOUT GROUP.
FREQ VACANT.
*THERE ARE 1153 CASES (794 IMPROVED AND 359 VACANT).

COMPUTE SPSSM=CONSAMT/BDGNET.
VAR LABELS SPSSM 'Sale Price PSM'.
RECODE VACANT(0=1)(ELSE=0) INTO IMPROV.
SET MXMEMORY=32000.

*DESCRIPTIVE STATS.
CROSSTABS SMONTH BY SYEAR.
FREQ LUC EFFZONE QUAL EFFYRBLT COND MBC ALLBRICK ROFFIN AIRCOND FPMASON FPZERCL
  FPFRSTD LAKE RIVER RIVVAL GOLF RAVINE PARK COMM MULTI INSTNL OTL BUS_YN TRAFFIC.
MISSING VALUES CONSAMT LOTSIZE BDGNET FBSTAREA PTBSMTSZ LLFINSZ LOFTAREA SOLARSZ
  ATTGARSZ BMTGARSZ DETGARSZ ATTCARSZ DETCARSZ POOLSZ POOLBLDZ ORGYRBLT EFFYRBLT
  (0).
DES CONSAMT CONSAMT LOTSIZE BDGNET FBSTAREA PTBSMTSZ LLFINSZ LOFTAREA SOLARSZ
  ATTGARSZ BMTGARSZ DETGARSZ ATTCARSZ DETCARSZ POOLSZ POOLBLDZ ORGYRBLT EFFYRBLT.
MISSING VALUES CONSAMT LOTSIZE BDGNET FBSTAREA PTBSMTSZ LLFINSZ LOFTAREA SOLARSZ
  ATTGARSZ BMTGARSZ DETGARSZ ATTCARSZ DETCARSZ POOLSZ POOLBLDZ ORGYRBLT EFFYRBLT
  ().
MEANS CONSAMT SPSSM BY NBHD.

GRAPH/SCATTER=BDGNET WITH CONSAMT BY QUAL
  /TITLE='PLOT OF PRICE & LIVING AREA'.
GRAPH/SCATTER=LOTSIZE WITH CONSAMT BY VACANT
  /TITLE='PLOT OF PRICE & LOT SIZE'.
GRAPH/SCATTERPLOT=EFFYRBLT WITH CONSAMT
  /TITLE='PLOT OF PRICE & EFFYRBLT'.
FILTER BY IMPROVED.
EXAMINE VARIABLES=SPSSM BY QUAL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=SPSSM BY LUC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=SPSSM BY EFFZONE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=SPSSM BY MBC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY GOLF/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY RAVINE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY PARK/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY COMM/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY MULTI/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY INSTNL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY OTL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=CONSAMT BY TRAFFIC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=SPSSM BY NBHD/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
FILTER OFF.
TEMPORARY.
SELECT IF (VACANT=1).
EXAMINE VARIABLES=CONSAMT BY NBHD/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
```

```

*LAND USE CODE.
RECODE LUC (101,103,104=1)(ELSE=0) INTO SEMI_DET.

*ZONING.
COMPUTE ZONE234=0.
IF (EFFZONE='RF2' OR EFFZONE='RF3' OR EFFZONE='RF4')ZONE234=1.
COMPUTE ZONE_RSL=0.
IF (EFFZONE='RSL') ZONE_RSL=1.
COMPUTE ZONE_RPL=0.
IF (EFFZONE='RPL')ZONE_RPL=1.
RECODE EFFZONE ('TTSDR' 'TTSLR'=1)(ELSE=0)INTO TOONTOWN.

*CONSTRUCTION QUALITY (QUAL 5 IS BASE).
RECODE QUAL (4=1)(ELSE=0) INTO QUAL4.
RECODE QUAL (6=1)(ELSE=0) INTO QUAL6.
RECODE QUAL (7=1)(8=1.205)(ELSE=0) INTO QUAL78.
*ONLY ONE 8 - LINEARIZED PER ADDITIVE MODEL.

*BUILDING STYLE (2 STORY IS BASE).
RECODE MBC(0,1,320,321,330,331=1)(ELSE=0) INTO ONE_STY.
RECODE MBC(2,322,332=1)(ELSE=0) INTO BILEVEL.
RECODE MBC(3=1)(ELSE=0) INTO SPLIT.
RECODE MBC(4=1)(ELSE=0) INTO SPLTCRWL.
*RECODE MBC(5,6=1)(ELSE=0) INTO STY_15.
*RECODE MBC(7,8=1)(ELSE=0) INTO STY_175.
*RECODE MBC(9,10=1)(ELSE=0) INTO TWO_STY
*RECODE MBC(300,302,304)(ELSE=0) INTO STY_3.
*RECODE MBC(9,10,300,302,303=1)(ELSE=0) INTO STY_23.
*WILL RELY ON SEMI_DET TO DISTINGUISH SFR AND DUPLEX.

*FIREPLACES.
RECODE FPMASON(0=0)(1=1)(2=1.50)(3=2)(4 THRU HI=2.5) INTO LINFPMAS.
RECODE FPZERCL(0=0)(1=1)(2=1.50)(3=2)(4 THRU HI=2.5) INTO LINFPZER.
COMPUTE LINFP=LINFPMAS+.30*LINFPZER.
*CONSTRAINING PER ADDITIVE MODEL
*NOTE: UPPER CONSTRAINT = 4000 (PER ADDITIVE MODEL).

*DEPRECIATION.
COMPUTE AGE=2000-ORGYRBLT.
COMPUTE EFFAGE=2000-EFFYRBLT.
IF (SYSMIS(EFFYRBLT))EFFAGE=AGE.
COMPUTE PERGOOD=1-EFFAGE/100.
IF (VACANT=1)PERGOOD=1.
COMPUTE SQREFAGE=SQRT(EFFAGE).
COMPUTE PGOODSQR=1-SQREFAGE/25.
IF (VACANT=1)PGOODSQR=1.
COMPUTE EFFAGE20=EFFAGE.
IF (EFFAGE>20)EFFAGE20=20+.10*(EFFAGE-20).
COMPUTE PGOOD20=1-EFFAGE20/50.
IF (VACANT=1)PGOOD20=1.
RECODE COND(1=1)(2=.25)(ELSE=0) INTO COND_LOW.
*WILL CONSTRAIN TO -22000 PER BASE MODEL.
*LIVING AREA.
COMPUTE LIVAREAZ=BDGNET+.95*LOFTAREA+.28*SOLARSZ+.60*POOLBLDZ+.13*LLFINSZ.
FREQ LIVAREAZ/FORMAT=NOTABLE/STAT=MEDIAN.
COMPUTE BSIZ_FAC=LIVAREAZ/175.
IF (VACANT=1)BSIZ_FAC=1.

*BASEMENT AREAS.

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```

COMPUTE LINBSMT=BSMTAREA+.86*PTBSMTSZ.

*GARARE AREAS (NO CHARGE FOR CARPORTS).
COMPUTE LINGAR=ATTGARSZ+BMTGARSZ+.45*DETGARSZ.

*POOLS.
COMPUTE OUTPOOLZ=0.
IF (POOL=2)OUTPOOLZ=POOLSZ.

*LOT SIZE.
COMPUTE LSIZERAT=LOTSIZE/655.
*BASE SIZE.

*LAND/SITUS VARS.
RECODE RAVINE (10=1)(ELSE=0) INTO RAVIN_10.
RECODE RAVINE (11=1)(ELSE=0) INTO RAVIN_11.
RECODE PARK (10=1)(ELSE=0) INTO PARK_10.
RECODE PARK (11=1)(ELSE=0) INTO PARK_11.
RECODE COMM (0=0)(ELSE=1) INTO COMM_YN.
RECODE MULTI (0=0)(ELSE=1) INTO MULTI_YN.
RECODE INSTNL (0=0)(ELSE=1) INTO INSTL_YN.
RECODE TRAFFIC (1=1)(ELSE=0) INTO TRAFFIC1.
RECODE TRAFFIC (2=1)(ELSE=0) INTO TRAFFIC2.
RECODE TRAFFIC (3,4=1)(ELSE=0) INTO TRAFF_34.
RECODE TRAFFIC (2,3,4=1)(ELSE=0) INTO TRAF234.

*NBHDS (5100 IS BASE).
COMPUTE MKTNBHD=10000*MKTAREA+NBHD.
RECODE MKTNBHD(35080=1)(ELSE=0) INTO NB5080.
RECODE MKTNBHD(35090=1)(ELSE=0) INTO NB5090.
RECODE MKTNBHD(35100=1)(ELSE=0) INTO NB5100.
RECODE MKTNBHD(35130=1)(ELSE=0) INTO NB5130.
RECODE MKTNBHD(35190=1)(ELSE=0) INTO NB5190.
RECODE MKTNBHD(35230=1)(ELSE=0) INTO NB5230.
RECODE MKTNBHD(35300=1)(ELSE=0) INTO NB5300.
RECODE MKTNBHD(35340=1)(ELSE=0) INTO NB5340.
RECODE MKTNBHD(35350=1)(ELSE=0) INTO NB5350.
RECODE MKTNBHD(35610=1)(ELSE=0) INTO NB5610.
RECODE MKTNBHD(35630,35620=1)(ELSE=0) INTO NB5630x.
*NO VACANT OR IMPROVED SALES IN 5620.
RECODE MKTNBHD(35640=1)(ELSE=0) INTO NB5640.

*TIME ADJUSTED SALE PRICE (PER UNCOMBINED MODELS).
*IMPROVED SALES (PER ADDITIVE MODEL).
COMPUTE MONTHS=0.
IF (syear=1997)MONTHS=smonth-7.
IF (syear=1998)MONTHS=smonth+5.
IF (syear=1999)MONTHS=smonth+17.
IF (syear=2000)MONTHS=smonth+29.
VAR LABELS MONTHS 'MONTHS FROM Jul 97'.
RECODE MONTHS(0 THRU 11=1)(12 THRU 23=2)(24 THRU 35=3) INTO PERIOD.
COMPUTE MONTHS1=0.
IF (PERIOD=1)MONTHS1=11.5-MONTHS.
VAR LABELS MONTHS1 'MOs BEFORE JULY 98'.
COMPUTE MONTHS2=0.
IF (PERIOD=2)MONTHS2=23.5-MONTHS.
IF (PERIOD=1)MONTHS2=12.
VAR LABELS MONTHS2 'MOs BEFORE JULY 99'.
COMPUTE MONTHS3=0.

```

```

IF (PERIOD=3)MONTHS3=35.5-MONTHS.
IF (PERIOD < 3)MONTHS3=12.
VAR LABELS MONTHS3 'MONTHS BEFORE 1 JULY 2000'.
RECODE SMONTH(11,12,1,2=1)(ELSE=0) INTO WINTER.
COMPUTE TASP=CONSAMT.
IF
(VACANT=0)TASP=CONSAMT+.018*WINTER*CONSAMT+(.0030*MONTHS2+.0022*MONTHS3)*CONSAMT.
*VACANT LAND (PER VACANT ONLY MODEL).
COMPUTE MOS=35.5-MONTHS.
VAR LABELS MOS 'MONTHS BEFORE 1 JULY 00'.
IF (VACANT=1)TASP=CONSAMT*1.0050**MOS.
COMPUTE TIMEFACT=TASP/CONSAMT.
MEANS TIMEFACT BY VACANT/CELLS=COUNT MEAN MIN MAX.
*AVERAGE ADJs=4.45 AND 8.98 (6.88% (MAX=8% AND 19%).

```

```

*ADJUSTED PRICE (PER ADDITIVE MODEL).
RECODE ROOFFIN (2=1)(ELSE=0) INTO PREMROOF.
COMPUTE AIRCONSM=AIRCOND*BDGNET.
RECODE OUTPOOLZ ALLBRICK PREMROOF AIRCONSM COND_LOW BUS_YN(SYSMOS=0).
COMPUTE ADJPRICE=TASP-150*OUTPOOLZ-16000*ALLBRICK-10000*PREMROOF-30*AIRCONSM
+22000*COND_LOW+3500*BUS_YN*IMPROV.

```

*** COMBINED NLR MODEL WITH TASP.

```

RECODE LIVAREAZ BSMTAREA FBSTAREA LINBSMT LINGAR LINFP (SYSMIS=0).
*CONSTRAINING BASEMENT AND GARAGES AREAS PER ADDITIVE MODEL.
*CONSTRAINING LINFP TO 4000 PER ADDITIVE MODEL.
*CONSTRAINING Q4 TO .96 PER ADDITIVE MODEL (ENTERS SLIGHTLY HIGHER, INSIG).
*OMITTING BSIZ_FAC (INSIG).
*OMITTING SEMI_DET (INSIG).
*DELETING PARK_11 (ABUTTING) - INSIG NEG.

```

```

MODEL PROGRAM B0=0 B1=600
Q6=1 Q78=1 BILEV=1 SPLITLEV=1 SPLCRWL=1 ONESTY=1 PCTGOOD=1
RAV10FAC=1 RAV11FAC=1 PARK_FAC=1 COMM_FAC=1 MF_FAC=1 INST_FAC=1
TRAF1FAC=1 TRAF_234=1 ZON_234=1 ZON_RPL=1 OTL_FAC=1
N5080=40000 N5090=40000 N5100=40000 N5130=40000 N5190=40000 N5230=40000
N5300=40000 N5340=40000 N5350=40000 N5610=40000 N5630=40000 N5640=40000
LSIZ_EXP=.50 IMP_FAC=1.

```

```

COMPUTE PRE_ = (N5080*NB5080 + N5090*NB5090 + N5100*NB5100 + N5130*NB5130
+ N5190*NB5190 + N5230*NB5230 + N5300*NB5300 + N5340*NB5340 + N5350*NB5350
+ N5610*NB5610 + N5630*NB5630x + N5640*NB5640)
* (LSIZERAT**LSIZ_EXP * RAV10FAC**RAVIN_10 * RAV11FAC**RAVIN_11
* PARK_FAC**PARK_10 * COMM_FAC**COMM_YN * MF_FAC**MULTI_YN * INST_FAC**INSTL_YN
* TRAF1FAC**TRAFFIC1 * TRAF_234**TRAF234 * ZON_234**ZONE234 * ZON_RPL**ZONE_RPL
* OTL_FAC**OTL *IMP_FAC**IMPROV)
+ (B1*LIVAREAZ * BILEV**BILEVEL * SPLITLEV**SPLIT * SPLCRWL**SPLTCRWL
* ONESTY**ONE_STY + .13*B1*LINBSMT + .80*B1*LINGAR + 4000*LINFP)
* (.96**QUAL4 * Q6**QUAL6 * Q78**QUAL78 * PGOOD20**PCTGOOD)
+ B0*IMPROV.

```

```

NLR ADJPRICE /OUTFILE='C:\WINDOWS\TEMP\SPSSFNLR.TMP' /PRED=PRE_/SAVE=PRED
/CRITERIA=ITER(100) SCON(.0001).

```

*** MODEL WITH BSIZ_FAC AND NOT B0.

```

*MODEL PROGRAM B1=600

```

```

Q6=1 Q78=1 BILEV=1 SPLITLEV=1 SPLCRWL=1 ONESTY=1 PCTGOOD=1
RAV10FAC=1 RAV11FAC=1 PARK_FAC=1 COMM_FAC=1 MF_FAC=1 INST_FAC=1
TRAF1FAC=1 TRAF_234=1 ZON_234=1 ZON_RPL=1 OTL_FAC=1
N5080=40000 N5090=40000 N5100=40000 N5130=40000 N5190=40000 N5230=40000
N5300=40000 N5340=40000 N5350=40000 N5610=40000 N5630=40000 N5640=40000
LSIZ_EXP=.50 BSIZ_EXP=0 IMP_FAC=1.

*COMPUTE PRE_ = (N5080*NB5080 + N5090*NB5090 + N5100*NB5100 + N5130*NB5130
+ N5190*NB5190 + N5230*NB5230 + N5300*NB5300 + N5340*NB5340 + N5350*NB5350
+ N5610*NB5610 + N5630*NB5630x + N5640*NB5640)
* (LSIZERAT**LSIZ_EXP * RAV10FAC**RAVIN_10 * RAV11FAC**RAVIN_11
* PARK_FAC**PARK_10
* COMM_FAC**COMM_YN * MF_FAC**MULTI_YN * INST_FAC**INSTL_YN * TRAF1FAC**TRAFFIC1
* TRAF_234**TRAF234 * ZON_234**ZONE234 * ZON_RPL**ZONE_RPL * OTL_FAC**OTL
* IMP_FAC**IMPROV)
+ (B1*LIVAREAZ * BSIZ_FAC**BSIZ_EXP * BILEV**BILEVEL * SPLITLEV**SPLIT
* SPLCRWL**SPLTCRWL * ONESTY**ONE_STY + .13*B1*LINBSMT + .80*B1*LINGAR
+ 4000*LINFP)
* (.96**QUAL4 * Q6**QUAL6 * Q78**QUAL78 * PGOOD20**PCTGOOD).

*NLR ADJPRICE /OUTFILE='C:\WINDOWS\TEMP\SPSSFNLR.TMP' /PRED=PRE_/SAVE=PRED
/CRITERIA=ITER(100) SCON(.0001).

*** SALES RATIOS.

*OVERALL RESULTS.
COMPUTE ESP=PRE_6+150*OUTPOOLZ+16000*ALLBRICK+10000*PREMROOF+30*AIRCONSM
-22000*COND_LOW-3500*BUS_YN*IMPROV.
COMPUTE RATIO=ESP/TASP.
MEANS RATIO BY IMPROV/CELLS=MIN MAX MEDIAN MEAN STDDEV COUNT.
RECODE IMPROV (0=1.0071)(1=1.0079) INTO MEDIAN.
COMPUTE PMISS=100*ABS(RATIO-MEDIAN)/MEDIAN.
MEANS PMISS BY IMPROV/CELLS=MEAN COUNT.
*ADJ R-SQUARE = .93536.
*IMPROV: MEDIAN = 1.0055 COD = 7.22 N = 794.
*VACANT: MEDIAN = 1.0126 COD = 11.21 N = 359.

*IMPROVED SALES.
COMPUTE VALUE=.50*ADJPRICE+.50*ESP.
FILTER BY IMPROV.
GRAPH/SCATTER=BDGNET WITH RATIO BY QUAL
/TITLE='PLOT OF RATIO & LIVING AREA'.
GRAPH/SCATTER=LOTSIZE WITH RATIO
/TITLE='PLOT OF RATIO & LOT SIZE'.
GRAPH/SCATTERPLOT=EFFYRBLT WITH RATIO
/TITLE='PLOT OF RATIO & EFFYRBLT'.
GRAPH/SCATTERPLOT=BSMTAREA WITH RATIO
/TITLE='PLOT OF RATIO & BASEMENT'.
GRAPH/SCATTERPLOT=LINGAR WITH RATIO
/TITLE='PLOT OF RATIO & GARAGE'.
GRAPH/SCATTERPLOT=VALUE WITH RATIO
/TITLE='PLOT OF RATIO & VALUE'.
EXAMINE VARIABLES=RATIO BY QUAL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY LUC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY EFFZONE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY MBC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY GOLF/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY RAVINE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

```

```

EXAMINE VARIABLES=RATIO BY PARK/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY COMM/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY MULTI/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY INSTNL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY OTL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY TRAFFIC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY NBHD/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

*LOOKS GOOD.
*RAV_11 IS HIGH (1.10) ON 19 SALES (OF 50).
*PARK_10 IS HIGH (1.08) ON 13 SALES (OF 32).
*NBHD 5630 IS LOW (.95) ON 11 SALES (OF 75).

*VACANT LAND.
FILTER BY VACANT.
GRAPH/SCATTER=LOTSIZE WITH RATIO
/TITLE='PLOT OF RATIO & LOT SIZE'.
GRAPH/SCATTERPLOT=VALUE WITH RATIO
/TITLE='PLOT OF RATIO & VALUE'.
EXAMINE VARIABLES=RATIO BY GOLF/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY RIVAL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY RAVINE/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY PARK/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY COMM/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY MULTI/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY INSTNL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY OTL/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY TRAFFIC/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.
EXAMINE VARIABLES=RATIO BY NBHD/PLOT=BOXPLOT/STATISTICS=NONE/NOTOTAL.

*LOOKS GOOD (NO REGRESSIVITY).
*GOLF HIGH (1.15) - 13 SALES.
*ABUTS PARK LITTLE LOW (.95) - 19 SALES (OF 32).
*NBHDS WITH MOST SALES RIGHT ON.
*NBHD 5130 LITTLE HIGH (1.08) - 21 SALES (OF 93).
*NBHD 5350 HIGH (1.20) - 7 SALES (OF 154).

FILTER OFF.

*** PREDIC.

COMPUTE BLV=NBHD.
RECODE BLV
(5080=98222)(5090=106980)(5100=83786)(5130=74198)(5190=71291)(5230=94732)
(5300=95788)(5340=85647)(5350=91770)(5610=71980)(5630=72550)(5640=76465).
COMPUTE LV = BLV * LSIZERAT**.59077 * 1.757**RAVIN_10 * 1.393**RAVIN_11 *
1.117**PARK_10 * .784**COMM_YN * .949**MULTI_YN * .721**INSTL_YN * .879**TRAFFIC1
* .744**TRAF234 * .918**ZONE234 * .910**ZONE_RPL * .678**OTL * .698**IMPROV.
COMPUTE BV = (636.16*LIVAREAZ * 1.255**ONE_STY * 1.333**BILEVEL * 1.102**SPLIT
* 1.331**SPLTCRWL + 82.70*LINBSMT + 508.93*LINGAR + 4000*LINFP) * (.960**QUAL4
* 1.208**QUAL6 * 1.447**QUAL78 * PGOOD20**1.139)
+ 32695*IMPROV.
COMPUTE MISC = 150*OUTPOOLZ+16000*ALLBRICK+10000*PREMROOF+30*AIRCONSM
-22000*COND_LOW-3500*BUS_YN*IMPROV.
RECODE BV MISC (SYSMIS=0).
COMPUTE NLRVALUE = LV + BV + MISC.

COMPUTE VRATIO=NLRVALUE/ESP.
COMPUTE LRATIO=LV/NLRVALUE.

```

```
DES TASP ESP LV BV MISC NLRVALUE VRATIO LRATIO.  
MEANS TASP ESP LV BV MISC NLRVALUE VRATIO LRATIO BY VACANT/CELLS=MEAN MIN MAX  
COUNT.  
GRAPH SCATTER=NLRVALUE WITH ESP BY VACANT.
```