

Mass Appraisal Today: Trends, Challenges & Issues

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13 April 2009

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 ALMY, GLOUDEMANS, JACOBS & DENNE
Property Taxation and Assessment Consultants

Almy, Gloude-mans, Jacobs & Denne

- Provides consulting services in property valuation internationally
- Over 100 clients (mostly governments)
- Review operations, recommend valuation methodology, develop mass appraisal models, help design property tax policy and systems
- Goal: help clients operate at the forefront of our profession

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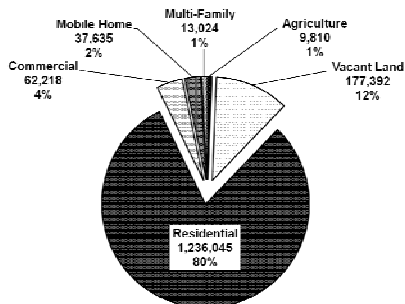
Trends in Mass Appraisal

- Continued use and emphasis on market data over cost data
- Automated valuation models (AVMs) and multiple regression analysis (MRA)
- GIS and photo imagery (e.g., street and aerial photos)
- Improved accuracy – and transparency
- Reduced costs and efficiency

Current Market Conditions

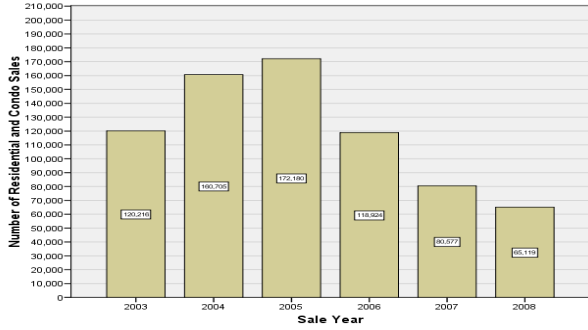
- Oversupply and decreased demand
- Tight credit (albeit at low interest rates)
- Declining prices (10 – 50% overall)
- Bank repossessions for nonpayment (“foreclosure” or “REO” sales)
-- such sales now constitute the majority of sales in some markets

Maricopa County Property Types



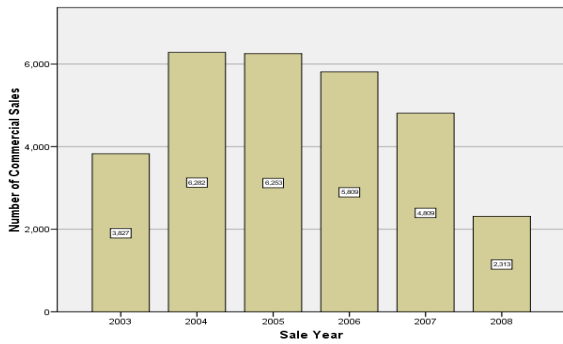
Residential/Condo

Maricopa County Residential/Condo Sale Counts 2003-2008



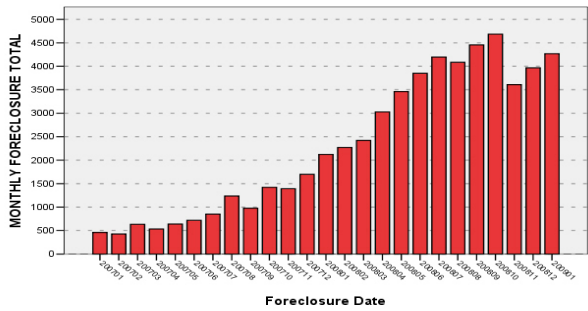
Commercial

Maricopa County Improved Sale Counts 2003-2008



Residential/Condo

MARICOPA COUNTY FORECLOSURES



REO Sales

SYEAR	SMONTH	Median Sale Price	Median FCV of Sold Parcels	Sale Count	Non Reo	REO	% REO
2008	1	235,000	166,000	3,907	2,946	561	16.00%
	2	239,000	161,900	3,876	3,191	686	17.67%
	3	230,000	169,300	4,379	3,417	962	21.97%
	4	229,000	161,150	4,938	3,397	1,541	31.21%
	5	224,975	160,900	5,202	3,394	1,808	34.76%
	6	218,000	157,900	5,398	3,139	2,219	41.41%
	7	207,000	151,300	4,990	2,647	2,343	46.95%
	8	195,000	145,200	5,103	2,664	2,439	47.80%
	9	184,000	140,100	5,184	2,519	2,666	51.41%
	10	179,900	142,800	4,393	2,033	2,360	53.72%
	11	160,000	136,700	3,737	1,464	2,273	60.82%
	12	150,000	131,300	3,936	1,419	2,517	63.96%
2009	1	135,000	124,150	2,198	759	1,440	65.51%

Challenges Posed by Declining Markets

- Fewer sales (less market data)
- Greater percentage of non-conventional sales (e.g., foreclosure or REO sales)
- Less predictability/consistency in prices – even among traditional sales
- Greater difficulty in tracking price trends
- Harder to keep values current and accurate

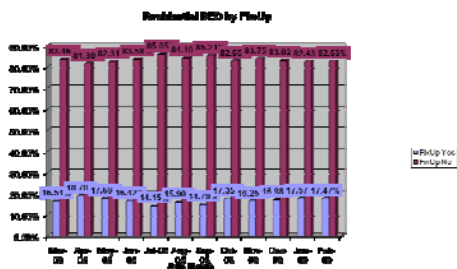
Maintaining Perspective

- Appraisal methods still sound
- But market data is reduced – and may be less reliable or consistent
- Hence the need for sound market research: screening sales, tracking price trends, etc.
- Likely also need to “stretch” and/or supplement traditional/conventional sales

Methods of Augmenting Sales

- Use prior, time-adjusted sales
- Consider adding appraisals
- Consider adding listings (asking prices)
- Possibility of including sales by financial institutions (REO sales)
 - condition should be typical
 - must meet other requirements of market sales
 - prices can be adjusted (controversial)

REO Sales: Important Issue of Condition When Sold

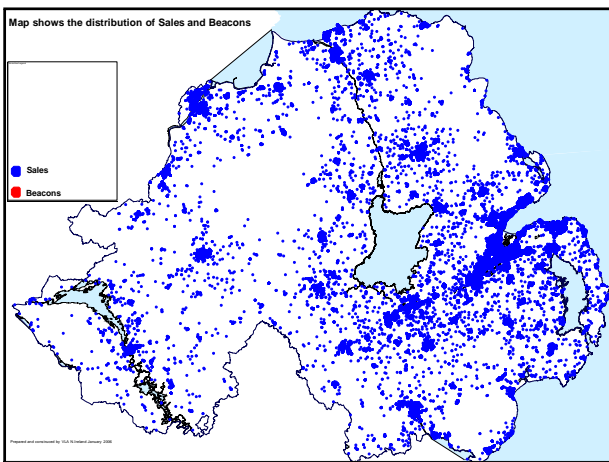


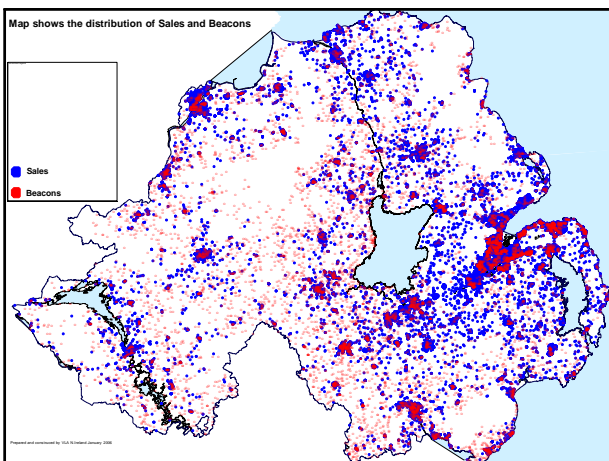
Supplementing Sales with Appraisals

- Appraisals can be targeted to where most needed (areas with fewest sales)
- Appraisals must be consistent and should reflect market value
- Mass appraisal models can include variable to adjust for any significant difference from sales prices

Role of Appraisals in Northern Ireland Reappraisal (2006)

- Appraisals (“beacons”) made by senior valuers
- Targeted areas where sales were scarce (e.g., upper-end construction grades, coastal, and rural areas)
- Supplemented sales in MRA models
- Binary variable included in models





Supplementing Sales with Listings

- Can considerably enhance sample size
e.g., if typical time on market is 6 months ...like adding another 6 months of sales
- Must determine typical % difference between list price and sale price
 - can be based on market study (e.g., MLS)
 - can be derived from MRA analysis by including binary variable(s) for list prices

Time Trend Methods

- Paired Sales Analysis
- Repeat Sales (“Resales”)
- Value per-unit analyses
- Sales ratio trend analyses
- Include time variables in MRA models

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Caveats in Time Adjustments

- Be objective – plot data to visualize trend and select time variables to fit that trend
- Check statistical significance
- Adjustments can vary among property types and geographic areas
- Take care in applying trends; ensure reasonability by
 - plotting indicated price trend
 - comparing unadjusted and adjusted prices

Paired Sales Analysis

- Identify highly comparable sales
- Adjust for differences other than time to isolate the impact of time
- Example: Sale 1 (after adjustment for physical differences) sold for \$200,000 in July 08. Sale 2 sold for \$188,000 in March 09
- $-12,000 / 200,000 = -.06 / 8 = -.0075/\text{month}$
- Method too tedious for mass analysis

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Repeat Sales Analysis

- Involves the analysis of repeat sales of the same property
- Determine the rate of change per month (or quarter) for each pair of sales; then find the median or average rate of change
- Invalid if property has physically changed
- Limited by number of repeat sales

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Example of Repeat Sales Analysis

- Initial Sale. April 07. \$400,000
- Resale. October 08. \$320,000
- Difference = -\$80,000
- Percent Difference = -20%
- Months Between Sales: 18
- Monthly Change = $-20\% \div 18 = -1.1\%$

Value Per-Unit Analysis

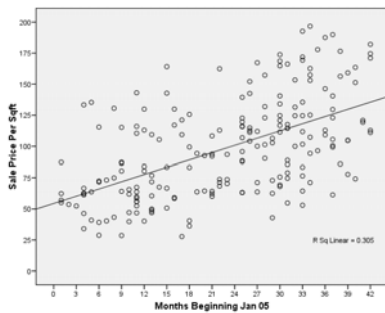
- Divide sale price by appropriate size variable
- Plot price per unit (e.g., per sqm) against time
- Determine the median or average rate of change per month
 - by fitting a straight line to the data and “eyeballing” the rate of change
 - by regression analysis:

$$\text{Price/sqm} = B_0 + B_1 * \text{Months, or}$$

$$\text{Ln (Price/sqm)} = B_0 + B_1 * \text{Months}$$

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Example of Value Per Unit Analysis Industrial Property - Edmonton



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Descriptive Statistics

	Mean	Std. Deviation	N
SPPSF	98.3116	39.82020	204
MONTHS MONTHS BEG JAN 05	22.72	11.385	204

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.552	.305	.301	33.28262

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	54.436	5.212		10.445	.000
	MONTHS MONTHS BEG JAN 05	1.931	.205	.552	9.412	.000

a. Dependent Variable: SPPSF

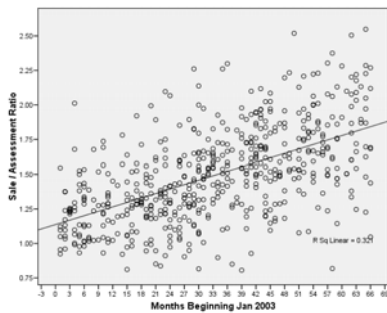
$$r = 1.931 \div 98.31 = 1.96\% \text{ per month}$$

Sales Ratio Trend Analysis

- Divide price by existing appraised value:
$$\text{S/A Ratio} = \text{Price} / \text{Appraised Value}$$
- Plot S/A Ratio against time
- Extract the rate of change
-- by “eyeball” or MRA
- Can be very effective if appraised values exhibit good consistency/uniformity
- Simple; applies to all property types

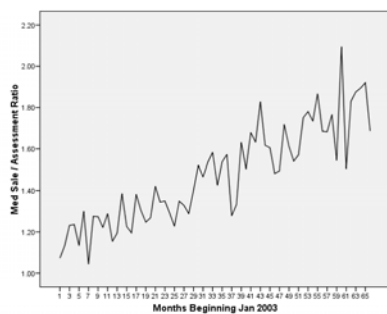
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Example of S/R Trend Analysis Billings, MT – Pre WWII Homes



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Example of S/R Trend Analysis Billings, MT – Pre WWII Homes



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Descriptive Statistics

	Mean	Std. Deviation	N
SAR Sale / Assessment Ratio	1.4925	.33472	556
MONTHS Months Beginning Jan 2003	33.28	17.768	556

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.567	.321	.320	.27599

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.137	.025		45.716	.000
	MONTHS Months Beginning Jan 2003	.011	.001	.567	16.198	.000

^a. Dependent Variable: SAR Sale / Assessment Ratio

$r = .011 \div 1.49 = 0.74\%$ per month

MRA Analysis

- Include time variables in MRA Models
- Controls for other factors in order to isolate the impact of time on price
- Preferred method if you are using MRA for valuation (otherwise may not be practical)

Example 1

- Coefficient for Months = - \$850
- Average Sale Price = \$200,000
- Time Trend = -0.425% per month

Example 2

- Coefficient for (Months x LivArea) = - \$16.60
- Average LivArea = 150 sqm
- Average Sale Price = \$290,000
- Average Decline per Month
= $-16.60 \times 150 = -2,490$
- Time Trend = $-2,490 \div 290,000 = 0.86\%$ per month

Handling Nonlinear Trends

- Splines
- Exponential (power) transformations
- Quadratic transformation
- Cubic transformation

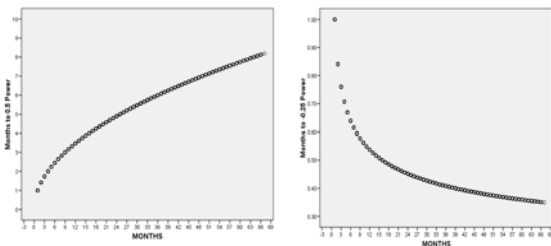
Handling Nonlinear Trends: Through Splines

- Plot data
- Construct 2+ straight lines that reasonably approximate the trend
 - e.g, Months in 2004-2005
 - Months in 2006
 - Months in 2007-2008
- Flat segments can be ignored (trend = 0)

Handling Nonlinear Trends: Exponential Transformations

- Involves raising time variable to power, e.g., Months⁻⁵⁰, Months^{1.5}, Months²
- Assumes one upward or downward curve
 - powers >1 capture accelerating trends
 - powers < 1 capture decelerating trends

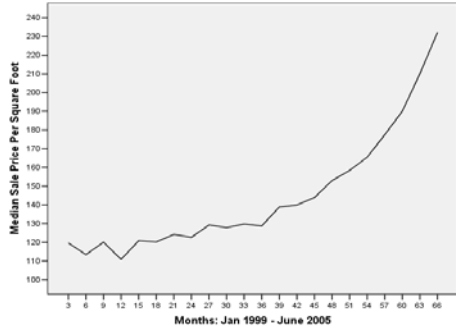
Examples of Power Transformations



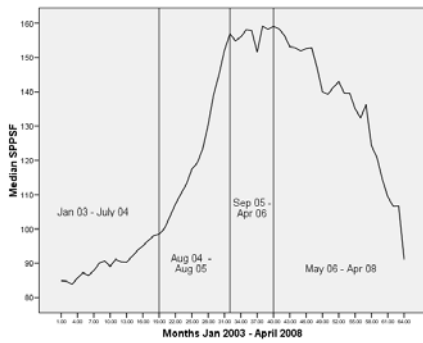
Handling Nonlinear Trends: Other Transformations

- “Quadratic” transformation:
 - Two variables: Months and Months²
 - Effective in capturing a single curve with one bend; can change direction once
- “Cubic” Transformation:
 - Three variables: Months, Months², Months³
 - Effective in capturing a curve with two changes in direction

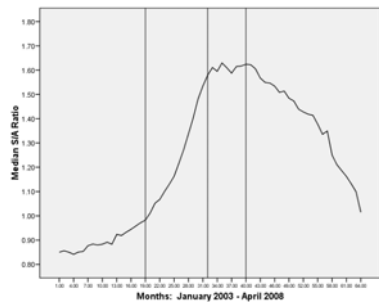
Example of Nonlinear Trend Maricopa County – Far Westside



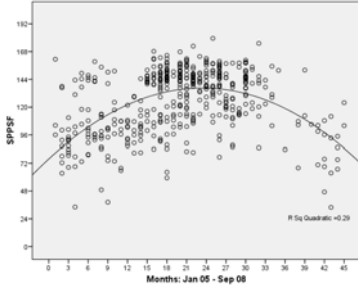
Example of Nonlinear Trend Maricopa County – Far Westside



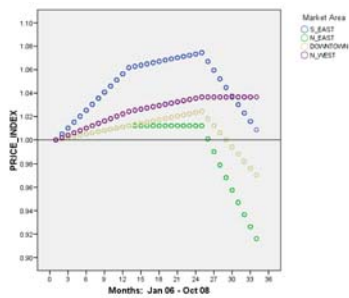
Example of Nonlinear Trend Maricopa County – Far Westside



Example on Nonlinear Trend Pima County Town Homes



Washington, D.C. Time Trends



Summary of Key Points

- Research and market analysis is paramount
- If markets are flux, sales must be adjusted for price changes to the valuation date
- Consider expanding the sales period
- Effective time trend techniques are available; first step is to plot data; then capture trend
- Trends may vary by property type and area
- Supplemental market data can be considered
