VALUATION REVIEW
There is no comparable

Regression analysis: Risk avoidance management and forensic analysis
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Eugene Pasymowski, chief valuation officer from EMC2 Data, describes how using regression analysis can help protect appraisers from coming to faulty valuations of residential property.

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Regression Analysis: Risk Avoidance Management & Forensic Analysis

By Eugene Pasymowski, MAI
Chief Valuation Officer
EMC^2 Data
www.EMC2Data.com

Realtors have confidence, but appraisers need evidence.

When valuations and subsequent mortgage loans are generated by insufficient means, the impacts can be widespread.

The savings and loan (S&L) crisis of the 1980s and 1990s was the result of over-confidence by real estate brokers and mortgage lending officers who generated high-risk mortgage backed securities with little regulatory oversight. The result was an estimated total loss of $153 billion.

To use a quote from Timothy Curry and Lynn Shibut's *The Cost of the Savings and Loan Crisis: Truth and Consequences*:

"The savings and loan crisis of the 1980s and early 1990s produced the greatest collapse of U.S. financial institutions since the Great Depression. Over the 1986–1995 period, 1,043 thrifts with total assets of over $500 billion failed. The large number of failures overwhelmed the resources of the FSLIC, so U.S. taxpayers were required to back up the commitment extended to insured depositors of the failed institutions. As of Dec. 31, 1999, the thrift crisis had cost taxpayers approximately $124 billion and the thrift industry another $29 billion, for an estimated total loss of approximately $153 billion."

More recently, the bailouts of major Wall Street banks paid out in the midst of the Great Recession make the S&L crisis look insignificant.

The *U.S. Taxpayer Exposure - Financial Bailouts of 2008* published in the quarterly reports of the Special Inspector General for the Troubled Asset Relief Program (SIGTARP) as of March 31, 2012 were as follows:

Housing Related "Bailouts" as of March 31, 2012	%	Trillion $
FHFA – Fannie Mae/Freddie Mac Conservatorship	32.5%	$ 5.50
Federal Home Loan Bank guarantees	7.7%	$ 1.30
National Credit Union Association (NCUA) – Homeowners Affordability Relief Program and Credit Union System Investment Program (CU SIP)	0.2%	$ 0.04
Government National Mortgage Association (GNMA) guarantees	2.4%	$ 0.40
TOTAL for residential housing bailouts	42.8%	$ 7.24
Other Bailouts	57.2%	$ 9.66
Total US Government Bailout Guarantees	100.0%	$ 16.90

According to the SIGTARP report, $7.24 trillion, or 43 percent of the bailouts and guarantees, were attributable to the housing market.

Therefore, the financial bailout escalated from $153 billion for the S&L crisis to $16.9 trillion in the latest recession— a whopping increase.

This financial history should never be repeated.

How to ensure proper valuations in the future?

The previous examples show how systematic inaccuracies in the formulation of valuations and loans can have far-reaching consequences. But even on a smaller scale, accuracy in appraisals should be the rule, not the exception.

Too often real estate appraisers wrongfully assume that the sale price of the property they are appraising is equivalent to market value, causing appraisal reports to conclude a “market value” that is identical to the sale price. Since real estate is an imperfect market that contains an inherent variance, this is improbable. Meaning, when sale price is equated to market value, appraisal reports can lack credible market-derived evidence to help an appraiser arrive at an independent, objective estimate of market value.

We are now at the threshold of applying sophisticated quantitative analytics (regression analysis) that can generate inferential statistics that test and verify the significance of comparable data and the credibility of the market value conclusion.

The typical residential appraisal report has three comparable sales with more than three dollar adjustments for factors such as number of bedrooms, number of bathrooms, gross living area in square feet, lot size and garage spaces, and the respective formula is sample size + adjustment factors = adjusted sample size; adjusted sample size –

constant = net sample size; and net sample size – adjustment factors = residual degrees of freedom.

		Typical Residential Form Report *	Regression Analysis Sample Size		
	Sample Size	3	25	100	200
+	Adjustment Factors	0	5	5	5
=	Adjusted Sample Size	3	30	105	205
-	Constant (point where the regression line crosses the Y axis)	1	1	1	1
=	Net Sample Size	2	29	104	204
-	Adjustment Factors	5	5	5	5
=	Residual Degrees of Freedom (what is left)	-3	24	99	199
* It is mathematically impossible to calculate five adjustment factors from a sample of three sales. A vast majority of residential appraisal reports are based on fabricated adjustments that are not market derived and hence the estimates of market values are not credible.					

Applying this formula to the majority of typical residential appraisal reports that only rely on a sample size of three comparable sales, the result is: 3 - 1 = 2 and 2 - 5 = -3 (negative residual degrees of freedom). It is impossible to calculate five adjustments from a sample of three sales. Meaning, the reported estimate of market value is not based on market-derived adjustments and hence, is not credible.

Quantitative analytics using automated regression analysis requires a larger sampling of home sales located in neighborhoods that are comparable to, or competitive with, the subject property. The general sample size rule is using a minimum of 25 sales, plus an additional sale for each adjustment factor. So, using the previous formula: 25 (sample size) + 5 (adjustment factors) = 30 (adjusted sample size); 30 – 1 (constant) = 29 (net sample size) - 5 (adjustment factors) = 24 (positive residual degrees of freedom).

A larger sample size of 100 spreads the risk of inadvertently including a sale with an incorrect sale price and/or wrong comparable data, for example: 100 + 5 factors = 105; 105 – 1 (constant) = 104; 104 - 5 = 99 (positive residual degrees of freedom).

Consequently, using regression analysis with a large sample size helps identify a sale that is an outlier (not comparable) that can be deleted and the regression analysis can be re-run to find a more reliable estimate of market value.

Costs and benefits of regression analysis

Computers have the capacity to perform complex algorithms within seconds and have access to websites that contain data that can be downloaded instantly.

Over the past 30 years, there has been a dramatic reduction in the price of computers, software and data acquisition — this saves time for users, especially real estate appraisers.

Regression analysis software can import market data from the Internet and calculate market value in a few seconds. This eliminates the time-consuming drudgery of manually inputting data and allows the appraiser ample time to properly analyze data and make informed decisions. The result is a fast and accurate turnaround in the appraisal process that benefits the client (individuals, financial intuitions, attorneys and realtors).

Regression analysis requires a large number of randomly selected comparable sales. This eliminates “cherry picking” to utilize comparable sales to support a pre-determined (biased) estimate of market value. This can reduce incidences of incompetence and/or fraud. Additionally, incompetence and fraud in appraisal reports can more easily be identified via peer review replication utilizing regression analysis as a reliable and effective forensic analytical tool.

In today’s market, it is imperative that the real estate appraisal profession maintains its competence consistent with current standards as required by the Uniform Standards of Professional Appraisal Practice (USPAP). The Appraisal Institute has several courses, seminars and books on regression analysis and automated valuation modeling.

Risk avoidance management and forensic analysis, coupled with regression analysis, are key management tools that can safeguard the integrity of the appraisal profession and the security of real estate market financing, both now and in the future.