



QUANTIFYING STIGMA

BY KEVIN ZAREM, MAI

A primer for addressing damage claims in court

One of the more daunting assignments for real estate appraisers is measuring the value impacts due to stigma.

As defined by the Dictionary of Real Estate Appraisal Fifth Edition, stigma is considered an adverse public perception regarding a property. In the right of way arena, stigma damage claims are commonly associated with fear. One common example is the fear of contaminated drinking water that results from a gasoline pipeline spill. Someone living near an electric transmission line may fear detrimental health effects, while someone else might be afraid of an explosion from an underground natural gas pipeline.

Under the Uniform Standards of Professional Appraisal Practice, the appraiser is responsible for applying the appropriate valuation techniques and methodologies and reporting the results in a way that is not misleading. These requirements are particularly difficult in the analysis of stigma.

Criteria for Expert Witnesses

Having worked on several projects where plaintiffs have claimed stigma damages, I believe it is essential for appraisers who are employed as expert witnesses to take guidance from federal cases and state statutes that may apply.

A specific criterion for scientific expert testimony was established in the 1993 U.S. Supreme Court case, *Daubert v. Merrell Dow Pharmaceuticals*. The case produced best practices for expert witnesses, now called the Daubert Criteria. Using the criteria, the suitability of a scientific methodology is assessed by the court on these five factors:

1. Can the theory or technique be tested or has it been tested?
2. Has it been subjected to peer review and publication?
3. Is there a known or potential rate of error?
4. Are there standards and controls that exist and are maintained?
5. Does it have widespread acceptance in the relevant scientific community?

In Wisconsin, for example, the relevant criteria for expert testimony is defined in the Wisconsin Statute under Chapter 907.02 as follows, “If scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise, if the testimony is based upon sufficient facts or data, the testimony is the product of reliable principles and methods, and the witness has applied the principles and methods reliably to the facts of the case.”

This statute is an example of how the Daubert Criteria is applied at the state level. A key point in its application for appraisers is that appropriate market data analysis is necessary regardless of the experience and knowledge of the expert.

Measuring the Effects

In the field of real estate appraisal, methods for measuring the effects of stigma with market data have been well established. The most commonly used and accepted techniques include multiple regression analysis, comparative market analysis, before and after value appraisals, paired sales analysis and case study comparison.

a probability value (p-value) that rates the quality of the coefficient's predictions. Low p-values indicate low data variability or good predictability and vice versa. For a given analysis, an expert will use industry standards to determine the appropriate p-value. In a stigma analysis, the coefficient for location inside or outside of the study area represents the effect on the sale

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Multiple Regression Analysis

Multiple regression analysis is a statistical method for studying the relationship between a single dependent variable and multiple independent variables. While this is considered a complex mathematical process, fortunately, there are statistical programs available on software like Excel.

In stigma analysis, the location of the sales data inside or outside of the geographic area subject to a detrimental condition (study area) is one of the independent variables. Others often include property characteristics such as gross building area, age and lot size. The multiple regression generates a coefficient for each independent variable. An algorithm finds the coefficient that produces the smallest variability between each independent variable and the dependent variable, sales price.

In addition to the coefficient, each independent variable receives

price. If this coefficient shows a negative effect on price with a low corresponding p-value, the appraiser can make a good case for the existence of stigma assuming the analysis properly addresses all the necessary independent variables affecting price.

Multiple regression is the only valuation technique that can satisfy the Daubert Criteria specifying a known rate of error. Unfortunately, a large amount of data is typically necessary to achieve statistically meaningful results. However, regression of small data sets can also provide meaningful information.

Multiple regression generates statistics for the study area as a whole. Property-specific effects may exist that are inconsistent with the regression statistics and must be analyzed using different techniques.

Comparative Market Analysis

In a comparative market analysis, the study area is compared to similar markets with large numbers of transactions to see whether value impacts due to stigma exist.

The comparative larger markets represent control areas that are not impacted by the detrimental condition or are too large to be impacted in a material way. The primary consideration is whether there appears to be any change in the value trends between the study area and the comparative areas after the market becomes aware of the detrimental condition. Like multiple regression analysis, comparative market analysis produces conclusions about the study area as a whole. Property-specific effects may exist that are inconsistent with the aggregate data and must be analyzed using different techniques.

Using comparative market analysis, one project we analyzed included a single-family residential market that had been impacted by environmental contamination resulting from an underground gasoline pipeline release. Numerous sales within the impacted study area were researched during a pre-release period encompassing two years prior to the release, as well as a post-release period encompassing two years after the release. The study area was compared to county sales data and village area sales data. The changes from the pre-release to the post-release period were compared between markets across the following categories: total sales, mean sale price, mean sale price to initial list price ratio, and mean cumulative days on market (CDOM). Table 1 highlights the comparisons.

The study area compared favorably to the county and village area based on the increase in total number of sales, increase in mean price, and increase in mean sales price to initial list price ratio. It was noted that the increase in mean sales price was not considered to be a reliable measure, as the number of sales in the study area was relatively small, and the varying physical characteristics between the pool of sold properties significantly impacted the differentials.

On the other hand, the study area compared unfavorably to the county and village area based on the decrease in mean CDOM. Overall, the comparative market analysis did not indicate the presence of stigma in the study area.

Before and After Values

In the environmental contamination case mentioned, numerous plaintiff properties were also appraised at two points in time, the day before the release (before value) and the date of our analysis approximately two years after the release (after value). The before value was adjusted forward in time to the after value date based on a market conditions adjustment index derived from careful review of multiple residential home value indexes. The indexed before value, which was not affected by the release, was compared to the after value, which was affected by the release. The aggregate differential resulting from this analysis was expected to be zero if there was no stigma in the market. To better isolate for stigma, only appraisals that required few overall adjustments were considered in the analysis. This technique is similar to the process followed in condemnation appraisals for individual properties. The technique also has many similarities to paired sales analysis as discussed below.

A primary advantage of before and after value appraisals is that they allow the appraiser to identify specific property effects that may not show up in an aggregate data analysis. A primary disadvantage of the technique is that individual appraisals invariably require some level of subjective adjustments.

Paired Sales Analysis

Paired sales analysis is also a preferred analytical technique, as it utilizes actual sales data to estimate damages. The technique involves comparison between properties that differ on the characteristic being tested but are very similar otherwise. In this way, the test characteristic can be isolated from other variables affecting price.

Table 1: Comparative Market Analysis

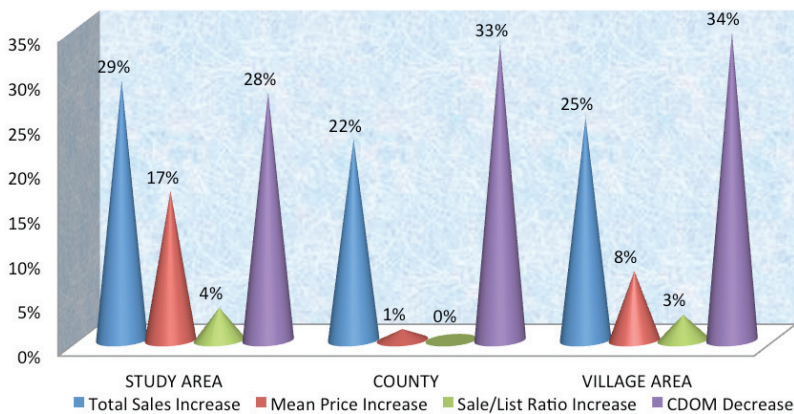


Table 2: Paired Sales Analysis

Sub-Division	Unencumbered Sales			Encumbered Sales			Difference		
	Mean Sq. Ft.	Mean Date	Mean Price/SF	Mean Sq. Ft.	Mean Date	Mean Price/SF	Mean Sq. Ft.	Mean Date Days	Mean Price/SF
1	13,504	Apr-03	\$4.33	13,809	Jan-03	\$4.36	305	-90	\$0.03
2	16,486	Oct-98	\$2.92	16,084	Jan-99	\$2.99	-402	92	\$0.07
3	75,794	Jan-99	\$0.91	75,359	Feb-99	\$0.93	-435	31	\$0.02
4	227,283	Feb-95	\$0.18	228,690	Apr-95	\$0.16	1,407	59	-\$0.02
5	32,173	Dec-96	\$1.72	29,125	Sep-96	\$1.73	-3,048	-91	\$0.01

Paired sales can be used to target specific property effects. In the previously discussed environmental contamination project, a few properties located close to the release area sold for below market prices. We were able to isolate this impact by paired sales with similar properties that sold outside of the study area.

We have also used this methodology to analyze land sales in developed residential subdivisions with utility corridors for underground pipelines or above-ground electrical structures. The benefit of a land sales analysis versus an improved sales analysis is that the land sales differ in far fewer categories, and the stigma and/or proximity impacts, if applicable, are easier to isolate. As the cost of the residential building improvements is not impacted by stigma or proximity to utilities, the full impact of the utility corridor is accounted for in the land sales.

For one project, we analyzed the data collected from five single-family residential subdivisions encumbered by an underground, natural gas transmission pipeline easement. Table 2 highlights the mean lot size, mean sale date and mean price per square foot for groups of similar encumbered sales and unencumbered sales within each subdivision.

In this case, after addressing secondary factors, it was determined that the differences between the encumbered sales and the unencumbered sales did not indicate stigma.

Case Study Comparison

When stigma analysis is required, a literature review for relevant case studies should be performed. Generally, case studies are used to evaluate stigma when actual market data in the study area is unavailable or to provide secondary support for market data analysis conclusions. There are many credible peer-reviewed sources for stigma impact analysis that are available in the appraisal and right of way industry archives. The best supporting case studies involve multiple regression analysis with a known rate of error.

However, one of the primary issues associated with using case studies is that they may not directly relate to the problem at hand. So many variables exist between detrimental conditions, land use and real estate markets that direct comparison is often unreliable. Careful attention to these variables is required for a case study comparison to be effective.

Even without a previous incident, the fear of natural gas pipeline explosions can be enough to generate a stigma claim.



Summary

In identifying and quantifying stigma, I have found that the most appropriate real estate appraisal methodology is multiple regression analysis. This is the only technique that fulfills the Daubert Criteria for a known rate of error. However, quite a bit of data is necessary to achieve statistically meaningful results, and the technique only addresses the study area as a whole. Other commonly used and accepted techniques include comparative market analysis, before and after value appraisals, paired sales analysis, and case study comparison. Each of these techniques is capable of making a strong, well-supported argument but cannot provide a known rate of error. A combination of techniques is best if the data allows.

Stigma analysis is rigorous. The valuation techniques discussed require a significant investment in time and resources to properly meet the standards of the appraisal profession and the expectations for an expert witness in federal and state courts. ★

Kevin is the owner of Metropolitan Appraisal in Cedarburg, Wisconsin. He has testified as an expert witness



in utility and transportation right of way cases and has provided litigation support for cases involving environmental contamination, construction defects and criminal fraud.

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