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CONTAMINATION

A growing number of courts have addressed the applicability of methodologies that attempt to predict the impact of alleged contamination on property values through models that are not based on actual sales in the relevant market, attorney Kathy K. Condo and economist Louis L. Wilde say.

The authors discuss this trend, and examine in depth a July ruling by the Western District of Oklahoma that rejected an expert's proposed meta-analysis—a process that ''attempts systematically to integrate the results of various published and unpublished studies on a specific research topic.'' That exclusion was correct, the authors say, because the rejected models didn't fit the facts of the case and weren't based on the relevant market.

Expert Opinion Based on Meta-Analysis Rejected as Basis For Determining Property Value Diminution Due to Alleged Contamination

By Kathy K. Condo and Louis L. Wilde

In a recent case in federal court in Oklahoma, *Alexander v. Halliburton Energy Services, Inc.*,[1] Plaintiffs alleged that their properties were diminished in value due to present contamination or potential future contamination of groundwater beneath their properties by perchlorate. Plaintiffs' damages expert, Dr. Kevin J. Boyle, an economist, opined about the resulting diminution of property values based on the use of a meta-analysis and the prices paid for various properties purchased by Halliburton.[2] As discussed below, the specific meta-analysis relied upon by Dr. Boyle is one of four meta-analyses presented in an article published by Simons and Saginor.[3]

After considering Dr. Boyle's expert report and deposition testimony, the court excluded his opinions, stating:

> Thus, it is clear that Dr. Boyle's model does not give the value of the properties immediately after the injuries, as re-

[1] *Alexander v. Halliburton Energy Services, Inc.*, No. CIV–11–1343–M, 2015 BL 233828 (W.D. Okla. July 22, 2015).

[2] Dr. Boyle based his opinions on property value diminution for properties that were alleged to be presently contaminated on both methodologies but based his opinions on property value diminution for properties that were alleged only to be potentially contaminated in the future solely on meta-analysis. We focus herein on issues related to the meta-analysis upon which Dr. Boyle relied for each set of properties.

[3] Robert A. Simons and Jesse D. Saginor, ''A Meta-Analysis of the Effect of Environmental Contamination and Positive Amenities on Residential Real Estate Values,'' 28 J. Real Est. Res., No. 1 (2006).

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quired by Oklahoma law. In fact, based upon his deposition testimony, Dr. Boyle's model does not even give the value of the properties more than three years after the announcement of the potential contamination. Accordingly, the court finds that Dr. Boyle's opinions are not relevant to the issues of damages in these cases and should be excluded.[4]

Traditional Appraisal Methodology

Under traditional appraisal methodology, the value of a property alleged to be contaminated is determined based on actual sales prices using sales comparisons, paired sales, or trend analyses.[5] In addition, economic methodologies such as hedonic regression models and repeat sales models can be applied to actual sales prices to determine whether an allegedly impacted real estate market has actually suffered diminished value due to the contamination.[6] Despite the existence of these methodologies which are based on actual sales data, Plaintiffs' experts often offer damages opinions that are not based on actual sales data from the allegedly impacted real estate market, such as the so-called ''case studies'' approach,[7] hypothetical surveys, and meta-analysis.[8] In support of the use of such methodologies, these experts argue that they are necessary because the actual market is not informed of the property impact, and therefore actual sales data does not reflect the true diminution in value.[9]

A growing number of courts have addressed the applicability of methodologies that attempt to predict value impacts on properties through use of methodologies that are not based on actual sales in the market at issue at the relevant time. The court in *Exxon Mobil Corp. v. Albright,*[10] reversed the trial court's admission of the expert opinion of Dr. John Kilpatrick which disregarded actual sales data. The court rejected Dr. Kilpatrick's rationale for disregarding the actual sales data recognizing that ''the level of speculation attendant to that conclusion [ignoring comparable sales data] is, as the United States District Court for the Northern District of California noted in reviewing Dr. Kilpatrick's proposed testimony in another case, 'seriously concerning.' ''[11] The court held that the ''the market prices represented by actual sales in the community still represent the highest and best price for the property—even if the buyers are paying, as Dr. Kilpatrick asserts, too much.''[12] Similarly, the court in *Patrick v. FirstEnergy Generation Corp*., No. 08-cv-01025, 2014 BL 88642 (W.D. Pa. March 31, 2014), recognized the unreliability of the ''uninformed market theory'' advanced by Dr. Kilpatrick as a rationale for disregarding actual sales data.[13]

Alexander v. Halliburton

In *Alexander*, Dr. Boyle based his opinions on property value diminution on a meta-analysis article authored by Simons and Saginor. In seeking to preclude Dr. Boyle's diminution of property value opinion, defendant Halliburton argued that his opinions relied on calculations that did not fit the facts of the case because they were based on an economic model that ignores the actual real estate market at issue.

Instead, Dr. Boyle's opinion was based on data from a wide variety of studies which were included in Simons and Saginor's meta-analysis, which involved different locations, different time frames, and different types of contamination—none of which was shown to be comparable to conditions in the real estate market at issue.

The court granted Defendant's *Daubert* motion to preclude Dr. Boyle's expert opinions, recognizing that under Oklahoma law, ''the measure of damages for permanent injuries to land is the difference between the reasonable market value of the land immediately before

[4] *Alexander*, 2015 BL 233828.

[5] Randall Bell, *Real Estate Damages: An Analysis of Detrimental Conditions* (The Appraisal Institute 1999).

[6] There is extensive literature on hedonic regression models of property values. *See, e.g*., the citations in Louis Wilde, Jack Williamson, and Gail Wurtzler, ''Keeping the Gate Redux: More Valuation Methodologies Come Under Fire in Property Value Diminution Cases,'' 30 BNA, Inc. Toxics Law Reporter, No. 19, n.4 (2015). For a recent example of a repeat sales model and citations to the literature *see* Bradford Case, Peter F. Colwell, Chris Leishman, and Craig Watkins, ''The Impact of Environmental Contamination on Condo Prices: A Hybrid Repeat-Sale/Hedonic Approach,'' 34 Real Est. Econ., No. 1, 77-107 (2006).

[7] *See* Thomas O. Jackson and Randall Bell, ''The Analysis of Environmental Case Studies,'' The Appraisal J. 8695 (Jan. 2002).

[8] While hypothetical survey techniques, such as contingent valuation method surveys (''CVM''), and meta-analyses are primarily economic methodologies, they also have been adopted by appraisers, especially in the context of litigation regarding the effects of contamination on property values. On the former, *see* Louis Wilde, ''Keeping the Gate: Damages Testimony in Cases Alleging Property Value Diminution Due to Contamination,'' 9 BNA, Inc. Expert Evidence Report, No. 5, n.4 (2009).

[9] Louis Wilde, Gail Wurtzler, and Jack Williamson, ''Real Estate Markets are Informationally Efficient: Evidence from Buyer and Agent/Broker Surveys,'' 26(3) Environmental Claims Journal 215 (2014).

[10] 71 A.3d 30, 99-105 (Md. 2013).

[11] *Exxon Mobil Corp.*, 71 A.3d at 103 (*quoting Palmisano v Olin Corp.*, No. C-03-01607, (N.D. Cal. July 5, 2005)).

[12] *Id*. at 103-104.

[13] In addition to *Exxon Mobil* and *Patrick*, *infra*, *see*, *e.g.*, *The Ponca Indian Tribe of Oklahoma v. Continental Carbon Co.*, 439 F. Supp. 2d 1171 (W.D. Okla. 2006)(diminution of property value expert's testimony precluded because his calculations were not temporally related to the emission events at issue); *Abicht v. Republic Services of Ohio, Inc.*, No. 2008 CT 100741 (Tuscarawas Co. Ohio, Feb. 11, 2013) (diminution of property value expert's opinion precluded because the damages based on real estate trends analysis and a survey were not individualized to each of the plaintiffs); *Cannon v. BP Products North America*, No. 3:10-cv-00622, 2013 WL 5514284 (S.D. Tex. Sept. 30, 2013) (diminution of property value expert's opinion which was based on a real estate trends analysis, a hedonic regression analysis, and a survey precluded because of a number of methodologic flaws).

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the injuries and the reasonable market value of the land immediately after the injuries.''[14]

Meta-Analysis

As the court in *Alexander* recognized, meta-analysis is not actually a market-based property valuation methodology. A meta-analysis is a form of literature review which attempts systematically to integrate the results of various published and unpublished studies on a specific research topic.

> Meta-analysis is a body of statistical methods that have been found useful in reviewing and evaluating empirical research results. If a number of independent studies have been conducted on a particular subject, using different data sets and methods, then combining their results can furnish more insight and greater explanatory power than the mere listing of the individual results.[15]

A meta-analysis typically consists of a regression model in which the dependent variable (that which is meant to be explained) is a specific result from a set of related studies, and the independent variables (those which are meant to explain the specific result of each study) can include such characteristics as the methodology used, the design of the model, and/or descriptions of the data used.[16] Typically, a meta-analysis is based on a set of studies with some common theme, for instance, the treatment efficacy of a particular drug.[17] ''Implicit in any meta-analysis is the assumption that the primary studies are similar enough that they can be usefully combined or analyzed.''[18]

Meta-analysis has been applied to issues in environmental and natural resource economics to determine, for example, the effect of air pollution on property values using hedonic regression models, the effect of air pollution on morbidity risks using contingent valuation studies, the effect of proximity to Superfund sites on property values using hedonic regression models, and the value of water quality using contingent valuation studies. But meta-analyses must be conducted in a methodologically sound way. Four fundamental flaws can call into question the results of a meta-analysis.

1. Logical conclusions cannot be drawn by comparing and aggregating studies that include different measuring techniques, definitions of variables (e.g., treatments, outcomes), and subjects because they are too dissimilar.
2. Results of meta-analyses are uninterpretable because results from ''poorly'' designed studies are included along with results from ''good'' studies.
3. Published research is biased in favor of significant findings because nonsignificant findings are rarely published; this in turn leads to biased meta-analysis results.
4. Multiple results from the same study are often used which may bias or invalidate the meta-analysis and make the results appear more reliable than they really are, because those results are not independent.[19]

The use of meta-analysis based on studies that analyze the property value impacts of grossly dissimilar situations suffers from every one of the flaws that can render a meta-analysis unreliable. The meta-analyses offered by Simons and Saginor, one of which was relied upon by Dr. Boyle in *Alexander*, and the similar meta-analysis offered by Lipscomb,[20] provide prototypical examples of those flaws.[21]

Simons and Saginor

In Simons and Saginor, the authors claim to have selected 58 articles or studies dealing with the effects of so-called negative amenities and 17 articles or studies dealing with the effects of so-called positive amenities on property values. From these they gleaned 228 observations about impacts from negative amenities and 62 observations about impacts from positive amenities. They then subjectively coded characteristics for each observation, and performed four meta-regression analyses based on those observations. Three of these analyses (the ''full model,'' the ''outlier-free model,'' and the ''five observations max model'') include observations from articles about effects on property values from negative amenities. The fourth analysis (the ''full model including positive amenities'') also includes observations from articles about effects on property values from positive amenities.

Although Simons and Saginor claim that their meta-analyses address how proximity to sources of environmental contamination affects residential property values, a preponderance of the observations in their models have nothing to do with contamination. For example, they include studies of the effects on residential property values of proximity to sex offenders, shopping centers, rental properties, and airports. They also include studies of the effects on residential property values of mere proximity to nuclear power plants, refineries, high voltage power lines, railroads, and other industrial and manufacturing facilities. Furthermore, not only do most of the studies included in their models have nothing to do with actual contamination, there is

[14] *Alexander*, 2015 BL 233828.

[15] Frederic Wolf, *Meta-Analysis; Quantitative Methods for Research Synthesis* 11 (Sage Publications, 1986) (quoting Gene Glass, ''Primary, Secondary, and Meta-Analysis of Research,'' 5 Educ. Res. 351 (1976)).

[16] *See*, *e.g.*, T.D. Stanley, ''Wheat From Chaff: Meta-Analysis as Quantitative Literature Review,'' 15(3) Journal of Economic Perspectives 31-150 (Summer 2001).

[17] *See*, *e.g.*, *In re Avandia Marketing, Sales Practices and Products Liability Litigation*, 817 F. Supp. 2d 535 (E.D. Pa. 2011); *Miller v. Pfizer, Inc.*, 196 F. Supp. 2d 1062 (D. Kan. 2002); *Deutsch v. Novartis Pharmaceuticals Corp.*, 768 F. Supp. 2d 420 (E.D.N.Y. 2011); *In re Pfizer Inc. Securities Litigation*, No. 04 Civ. 9866, (S.D.N.Y. Mar. 22, 2010); *In re Baycol Products Litigation*, 532 F.Supp. 2d 1029 (D.Minn. 2007).

[18] Jon Nelson and Peter Kennedy, ''The Use (and Abuse) of Meta-Analysis in Environmental and Natural Resource Economics: An Assessment,'' 42 Environmental Resource Economics 345-77 (2009).

[19] Wolf, *supra* note 15.

[20] Clifford A. Lipscomb, Abigail Mooney, and John A. Kilpatrick, ''Do CV Results Systematically Differ from Hedonic Regression Results? Evidence from a Residential Property Meta-Analysis'' 21(2) Journal of Real Estate Literature 233-53 (2013).

[21] *Id.* Nelson and Kennedy discuss the issues with meta-analyses at length and provide a number of examples of what they consider to be methodologically sound meta-analyses dealing with environmental and natural resource issues. *See*, *e.g.*, their Table 3.

no economic basis for trying to combine such disparate studies into a single meta-regression model. Thus, Simons and Saginor provide a classic example of a meta-analysis that falls prey to the first of the Wolf critiques—the ''apples and oranges'' problem.[22]

In addition, even those observations that do relate to a particular type of contamination tend to be lumped together with other observations that do not relate to that type of contamination, making it impossible to ascribe any meaning to the results of the meta-analysis. For example, the variable ''*GROUNDWATER*'' is described as being ''focused on [groundwater] contamination . . . [including] general water pollution studies, effects from LUSTs, water bound PCBs and other sources.''[23] In fact, out of 24 observations coded as *GROUNDWATER*, only roughly one-third actually involve groundwater contamination, all of which show no effect on property values. The remaining roughly two-thirds of the observations coded as *GROUNDWATER* include ones gleaned from studies of the effects on residential property values of proximity to contaminated bodies of water (e.g., New Bedford Harbor and the Chesapeake Bay), potentially hazardous or noxious sites (e.g., incinerators and landfills), or leaking underground storage tanks (LUSTS), and do not involve residential properties actually subject to groundwater contamination.

As a result, any attempt to apply the models reported in Simons and Saginor to predict the property value diminution effects of groundwater contamination in a specific situation is useless. The same is true of other types of negative amenities and is especially problematic for the model that includes positive amenities.[24]

In summary, the models reported in Simons and Saginor cannot be used to estimate damages to a particular property or a real estate market because they can never fit the facts of either, such as the type of property and/or real estate market, the source, type and extent of the contamination, the stage of remediation, if any, and the presence of other disamenities or amenities.[25]

Lipscomb

Lipscomb reports on a meta-regression model in which the dependent variable is the percentage reduction in property value for some number of properties that range from one to over ten thousand. The model includes both amenities and disamenities and is similar to the ''full model including positive amenities'' in Simons and Saginor. It thus fails to pass the ''apples and oranges'' test and suffers from many of the same conceptual and technical issues as the models described in that paper.[26]

The authors of Lipscomb claim that their model can be used ''to predict the property value diminution of a given situation,''[27] and provide two examples. The first example involves 100 rural properties with an average unimpaired value of $47,300. The source of the contamination is ''linear,'' which means it could be a pipeline, high voltage power line, railroad tracks, or something else. The affected resource is ''water,'' which could mean groundwater or surface water and could include any number of toxic substances as well as simple eutrophication. The maximum distance from the source of the contamination to any of the properties is one mile. It is assumed that there was a public announcement of the ''contamination in the area,'' that the properties are involved in some way with litigation, data were ''collected as of 2008'' and the unemployment rate was 6.5 percent. According to the Lipscomb meta-analysis, these inputs yield an average property value diminution of 40.8 percent.[28]

The second example in Lipscomb is remarkably similar to the first example. It again involves 100 rural properties but now with a much higher average unimpaired value, $350,000. The source of the contamination again is ''linear.'' The affected resource is ''soil'' as opposed to ''water,''[29] and the maximum distance from the source of the contamination to any of the properties is one-half mile as opposed to one mile. It is again assumed that there was a public announcement of the ''contamination in the area,'' and the properties were involved in some way with litigation. Data were assumed to have been ''collected as of 2006'' as opposed to 2008 and the unemployment rate was 4.5 percent as opposed to 6.5 percent. According to the Lipscomb meta-analysis, these inputs yield an average property value diminution for the second example of 27 percent as opposed to 40.8 percent for the first example.

These results are meaningless because each applies to a wide range of potential contamination scenarios, all for which they produce the same estimate of property value diminution, 40.8 percent or 27 percent.[30] In other words, as with the meta-analyses offered in Simons and Saginor, there simply is no way to make the meta-

[22] Dr. Boyle acknowledges that the full model including positive amenities in Simons and Saginor is ''inappropriate'' because assuming that the effects of negative and positive amenities on property values are ''symmetric'' is ''just not a logical assumption.'' Videotaped Deposition of Kevin John Boyle, Ph.D., *Alexander v. Halliburton*, October 2, 2014, page 92.

[23] Simons and Saginor, *supra* note 3, pp. 77-78.

[24] There are numerous other conceptual and technical problems with the meta-analyses reported in Simons and Saginor, but a discussion of them goes beyond the scope of this paper.

[25] *See*, *e.g.*, Jackson and Bell, *supra* note 7.

[26] In particular, as observed by Dr. Boyle, it is simply inappropriate to combine observations involving negative amenities with observations involving positive amenities in the same meta-analysis. *See* note 22 and text, *supra*.

[27] The stated purpose of the research reported in Lipscomb is to determine, using a meta-analysis, whether ''survey results systematically differ from hedonic regression results.'' However, their results fail to offer any basis for reaching such a determination because only one paper in their meta-analysis includes a contingent valuation type survey, and that paper yields only two observations.

[28] Lipscomb, *supra* note 20, at 245.

[29] None of the variables defined in Lipscomb mention soil contamination so it must be included in a baseline category against which variables such as ''WATER'' and ''AIRCAFO are measured.

[30] Lipscomb does not report the 95 percent prediction intervals for these estimates but the adjusted r-squared statistic for their meta-regression model is very low, 0.245, so it is reasonable to presume that the 95 percent prediction intervals are large. As a technical matter, these examples are also meaningless because the only variables included in them that are statistically significant are LITIGATION, YEAR, and UNEMPLOYMENT.

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analysis in Lipscomb match the facts of any specific case.

Conclusion

Meta-analysis of the effect of contamination on property value has been rejected by courts, including the court in *Alexander*, because the models used can never fit the facts of a specific case and because they are not based on the relevant market.

As the above discussion reflects, the two publications that attempt to use meta-analysis to combine the results of articles to predict property value diminution due to contamination, Simons and Saginor and Lipscomb, also fail because of their conceptual and technical flaws. In particular, the studies underlying the meta-analysis are too disparate and the variable definitions are too broad to produce reliable estimates of property value diminution due to a specific contamination event.