features

Proximity Stigma: Testing the Hypothesis

by Albert R. Wilson

abstract

Missing from much of the literature on proximity stigma is an explicit test of the null hypothesis of "no effect on value" among homes likely to be influenced by a detrimental condition. This article reports the results of tests of the null hypothesis on repeat sales of residential properties over a period of 12 years. The theory of proximity stigma would suggest that the detrimental conditions present would have had an impact on property values, but no impact was identified. Anecdotal interviews with market participants suggest that as long as the use and enjoyment of the homes were not impaired by the conditions, the number of market participants who would require or accept a discount were insufficient to determine the market.

Beginning with the 1967 article by Ridker and Henning,[1] a common assumption in the literature on detrimental condition impacts on market values has been that the presence of certain conditions–such as ground water contamination, leaking underground storage tanks, high voltage power lines, landfills, radioactive waste disposal, superfund sites and air pollution–result in a diminution in property values for property near to the condition. This has generally been referred to as proximity stigma and may not involve actual contamination on the subject property. In a weak real estate market the proximity stigma impact is expected to be exacerbated.

Only recently with the article by Wolverton and Bottemiller[2] has a formal statistical test of this assumption been reported. Wolverton and Bottemiller tested the null hypothesis of no difference in property sale prices near to high-voltage transmission lines against similar properties not nearby and found that the null hypothesis could not be rejected; that is, there was no basis to conclude that a difference in sale price existed.

This result is contrary to the assertions put forth in much of the literature. However, a careful examination of many of the leading papers on the subject finds no explicit test of the null hypothesis of no effect on value. Apparently the researchers concluded, without testing, that an impact must exist and proceeded in attempts to measure the alleged impact. The Appendix includes a list of the papers examined that do not indicate that there was a test of the null hypothesis or do not report any results of such a test.

The primary technique used in attempting to measure an impact has been an econometric technique known as hedonic modeling. Hedonic modeling relies on regression mathematics and assumptions by the economist that (1) the coefficients of the predictor (independent[3]) variables hypothesized by the regression model are quantitatively meaningful; (2) the value of a predictor vari-

1. Ronald G. Ridker and John A. Henning, "The Determinants of Residential Property Values with Special Reference to Air Pollution," *Review of Economics and Statistics* 49, no. 2 (May 1967): 246–257.
2. Marvin L. Wolverton and Steven C. Bottemiller, "Further Analysis of Transmission Line Impact on Residential Property Values," *The Appraisal Journal* (July 2003): 244–252.
3. The more current and precise mathematical language of predictor (or explanatory) variables and response variables are used in place of the less precise independent and dependent variables. In a regression using real-world observational data, it is highly unlikely that the variables hypothesized as contributing to the overall prediction of the response will be mathematically independent.

able coefficient represents the marginal contribution of that specific predictor variable to the response; and (3) a positive result of a test of significance of a specific predictor variable indicates a meaningful cause and effect relationship between the hypothesized predictor variable and the response variable.[4]

Unfortunately, none of these economic assertions are generally supportable by regression mathematics for observational (real world) data.[5] Of particular importance here is the last assertion that a cause-effect relationship can be demonstrated by a test of significance within the regression–an assertion that is not correct.[6] One of the reasons for this is that a regression relationship–the hedonic model–is itself a hypothesized relationship. One cannot test a hypothesis with a hypothesis. A separate and explicit test or tests must be undertaken to determine if the null hypothesis can be rejected.

This article reports the results of tests of the null hypothesis of "no influence on value" for a situation where current real estate valuation thinking would strongly indicate the probable presence of proximity stigma.[7] The results indicate that the null hypothesis cannot be rejected and that there is no basis for an assumption of a proximity stigma impact on value resulting from the detrimental conditions examined.

While the results of the specific case examined here are important in their own right, the primary significance of this research is the fact that an explicit test or tests of the null hypothesis of no effect on value must be undertaken prior to attempting to measure an alleged diminution in value. Even in the case presented, where conditions that would lead one to strongly suspect the presence of proximity stigma, no such diminution in value could be detected. If the null hypothesis cannot be rejected, then further statistical efforts to measure a diminution are meaningless, if not misleading.

The Detrimental Conditions

This study examines the price performance of properties proximate to the Wyman-Gordon plant in Grafton, Massachusetts, over a twelve-year period, from 1986 through 1998. During this period the Massachusetts real estate market underwent a major recession and a recovery. The Wyman-Gordon plant was subject to allegations of disposal on site of radioactive materials and chlorinated solvents and contamination of the groundwater from these materials and solvents. In addition, a nitric acid spill into local surface waters resulted in allegations of surface water and groundwater contamination. Beginning in 1990, there was significant publicity regarding the plant, including more than 23 reports in the local press, numerous other media reports, and public meetings called by environmental and plant authorities and others. In 1996, Wyman-Gordon assisted Grafton in extending municipal water to nearby residential and commercial properties with domestic potable wells as a part of a program to address contamination concerns. Most of the residential property within 2,000 feet of the plant boundaries (and most of Grafton) had long been on municipal water.

Typical real estate valuation thinking would expect the existence of a proximity stigma influence on housing prices near the plant under these conditions.

The plant involved in this case was a former defense plant constructed during the Korean War to forge metal parts for aircraft, and until recently it had the largest forge in the world. Its primary work was with nonferrous metals. The plant is located on a large parcel of land. The area surrounding the plant on three sides is primarily middle-class residential. The property on the fourth side is primarily commercial. Properties lying within approximately 2,000 feet of the plant boundaries either have a direct view of the plant or are most likely to use streets that lead past the plant.

The topography of this portion of west/central Massachusetts is generally hilly; this affects the street pattern. Consequently, residents of homes outside the approximately 2,000-foot distance from the plant boundaries generally do not have a direct sightline to the plant and generally do not come into daily proximity to the plant, as compared to those within the 2,000-foot distance. In addition, as with any old industrial area, other sources of possible disseminates

4. It should be noted that 21 leading texts written by statisticians for either the teaching of statistical techniques or for attorneys were examined, and the phrase "hedonic modeling" did not appear once in any variant. It is not a mathematically recognized technique of regression mathematics.
5. These assumptions are realized if, and only if the predictor (explanatory) variables are independent. This condition is highly unlikely for observational data and almost certainly not for complex phenomena such as real estate prices or values.
6. These mathematical facts and the reasons for them are clearly stated in many leading texts on regression mathematics. With respect to the last assumption, see for example John Neter et al., *Applied Linear Regression Models*, 3rd ed. (Chicago: Irwin, 1996), 9, "The existence of a statistical relation between the response variable Y and the explanatory or predictor variable X does not imply in any way that Y depends causally on X. No matter how strong is the statistical relation between X and Y, no cause-and-effect pattern is necessarily implied by the regression model."
7. This article is based on data collected by the author for a major oil company as part of a litigation matter (now resolved). The article has not been subject to any form of review or editorial input by that client, and the analysis and conclusions are solely the author's.

may be influential. For these reasons, the approximately 2,000-foot distance was believed most appropriate for analytical purposes.

Methodology

There are many ways to develop a testable difference between two sets of real estate data; probably one of the most obvious is use of paired sales. Where the information is accessible and of sufficiently recent origin, paired sales may be one of the best approaches available. However, that was not the case here, where some of the pairs would have been more than a decade old, with limited means of identification of pairs or of determining if the pairs were indeed very similar. In this circumstance, time series may yield a testable difference, as may other methods.

The reliable, publicly available real estate data covering the entire period was limited to the sale date, buyer/seller names, address of sale, sale price, mortgage amount, mortgage holder, and several other minor pieces of information. Due to these limitations it was decided to investigate the rate of appreciation in sale price on repeat sales of homes; a repeat sale was defined as more than one sale of the same property during the study period. This required that the probable condition of the property between sale dates be investigated to ensure to the extent possible that no major alternations had occurred during the period between sales. Further, it was necessary to identify competitive properties in areas removed from the Wyman-Gordon area. The Wyman-Gordon area was defined as being those residential properties within approximately 2,000 feet of the plant boundaries for the reasons stated previously.

The original data list contained thousands of sales. This list was sorted to obtain a list of properties with the same physical address and more than one recorded transfer of ownership during the study period. The sorted list was then further refined by eliminating all pairs that involved buyers/sellers with the same surname, buyers/sellers other than individuals (banks, corporations, etc.), purchases/sales occurring within 12 months (to prevent flipping transactions from entering the data), unusually high loan-to-value ratios (to eliminate sales with noncash consideration or sales of homes with damage such that purchase and repair financing might be included in the loan amount), and undisclosed financing terms. After this refined list was compiled, it was reexamined and any sale more than two standard deviations from the mean for the price range was eliminated.[8]

The refined list contained approximately 500 repeat sale properties in competitive areas and over 35 repeat sale properties within the Wyman-Gordon area. Using this refined list, exterior examinations were performed of the Wyman-Gordon area properties and of a sample of the competitive properties. The tax and building department records were consulted, and in cases where they were available, the listing data for the sales were examined in an effort to ensure that the properties had not undergone significant, sale price altering changes between sale dates.[9] This eliminated some properties, and a final list was prepared for analysis.

The data was then processed to determine the annual compound rate of appreciation/depreciation for each pair of sales. This rate was assigned to the midyear between sales as the compound annual appreciation rate for that property between the sale dates. These midyear rates were then averaged for each year in the study period for each of the areas–the Wyman-Gordon area, the Grafton area other than the Wyman-Gordon area, and the competitive areas outside Grafton in the Worchester County market area.

In choosing to use mean appreciation rates, it was assumed that the past is prolog, that is, whatever occurred before the events of interest, will have been capitalized into the market value of the property, provided there has been sufficient time for the marketplace to adjust. Here the interest is whether or not a new event or events alter the value performance of the property. Any such alteration should result in a discontinuity (abrupt change) or a different rate of appreciation/depreciation compared to other properties not likely to have been influenced by those events. This allows recognition that general market conditions—such as the recession in property values in Massachusetts in the early 1990s with a subsequent recovery—will influence rates. It also makes it possible to detect a localized change as a departure from the general area-wide rate, if such change has occurred.

The null hypothesis to be tested was "There is no difference in mean rates of appreciation for repeat sales

8. In a significant number of papers, the editing of the database used in an analysis has been poor or nonexistent, leading to serious analytical errors. For example, a failure to eliminate outliers (in this case through the two standard deviation criteria) ignores the fact that means are extremely vulnerable to distortion by an outlier value. Unless one were willing to assume that outliers were equally prevalent in number and magnitude on both sides of a mean, an extremely unlikely event with real estate values, allowing the presence of outliers would generate misleading results. See Albert R. Wilson, "The Questionable Reliability of 'Peer Reviewed' Real Estate Literature," *Bureau of National Affairs Expert Evidence Report,* 14, no. 1 (January 5, 2004): 16.

9. These examinations were performed by Calvin Hastings, SRA, an experienced appraiser who has practiced in the area for decades.

within the Wyman-Gordon area compared to competitive areas." This null was tested by a broad range of tests including parametric tests, which depend on assumptions of the normalcy of the distribution of the underlying data, and nonparametric tests, which do not. Statistical analyses were also performed on the frequency of occurrence of appreciation/depreciation rates within and outside the Wyman-Gordon area.

The conclusions of this study do not, however, rely only on formal statistical tests of the difference in magnitudes of rates of appreciation/depreciation. Those formal conclusions were further validated by reference to tax assessment data, individual (i.e., nonrepeat) home sales, lending appraisals, and anecdotal interviews, whose details are beyond the scope of this article.

Test Statistics

Statistical tests are structured on the basis of the scientific principle of falsification. This means that the negative is tested to determine if it may be tentatively rejected. The negative to be tested is usually called the "null" hypothesis. The available data is tested to determine if the null hypothesis can be rejected at some acceptable level of confidence.

A considerable variety of tests are available to test a null hypothesis. Most traditional or classical tests examine the magnitude of a difference between sample means or other statistics. The null is rejected if the probability of finding a difference of the observed magnitude or greater is sufficiently small. Typically the null is rejected if that probability is .05 or less. Stated another way, the null would be rejected and a significant difference between the treated and untreated population would be implied if the chances of being wrong in reaching that conclusion were less than 0.05.

In the typical statistical analysis the objective is to determine whether a treatment, exposure, or other perceived influence has had a significant impact. In short, has a change been observed that is sufficiently large to permit rejection of the null hypothesis and a conclusion that the observed change is a significant event, not merely a random fluctuation? When this is the case, the result is duly reported and generally accepted as evidence that the treatment had an effect. If on the other hand the data proves insufficient to reject the null hypothesis on the basis of one form of test, other tests may be tried; these are discussed below. If no significant differences are found, however, the results are generally consigned to the dustbin of scientific inquiry and not reported.

The typical statistical analysis differs from that in cases of proximity stigma because there the null hypothesis is of considerable importance to public policy and flies in the face of conventional thinking. In the subject case study, the null hypothesis is that a series of incidents of significant environmental concern had no measurable impact on housing value performance in their vicinity. Unlike most inquiries the new contribution to knowledge lies in the acceptance of the null hypothesis, not its rejection.

Because this is the case, it is incumbent to explore a variety of statistical tests to ensure to some reasonable extent that acceptance of the null hypothesis on one dimension of data is not offset by its rejection on another. To this end, three general classes of tests were used in this study. These tests include the following:

1. Classic *F*- and *t*-tests, which are based on the magnitude of the difference of means as measured by differences in sample averages. These tests assume that the data is normally distributed.
2. Rank test statistics,[10] which are based on the ordering of the magnitudes of the observations. It is a simple matter to generate samples where every observation from a sample of one population exceeds every observation from a sample from another population. This situation occurred here. In this situation it is possible to have the null hypothesis of identical means accepted by a classic *t*- or *F*-test; all that is required is that the magnitudes of the differences be small. The rank tests have the further advantage that they are independent of the underlying probability distributions from which the data was generated. Those rank tests applied and reported here are as follows:
   a. The Two-Sample Wilcoxon test, which is archetypical of this class. Samples are merged into a single vector in increasing order of the magnitude of the observations. Ranks are then assigned to all observations as the integer values of their position, or rank, in the joint vector of magnitudes. The ranks associated with one of the samples are then added together to form the test statistic. The null hypothesis is then rejected on the basis of overly large or small values of the statistic.
   b. Several variants of the Wilcoxon, which have been developed by using scores associated

10. An excellent resource for further detail on these tests is Jaroslav Hájek and Zbynek Sidák, *Theory of Rank Tests* (New York: Academic Press, 1967).

with the ranks rather than the ranks themselves. This is done to provide increased sensitivities when one is willing to assume knowledge of the form of the probability distributions from which the sample were generated. Variants include median Scores, Van Der Waerden Scores, and Savage Scores.

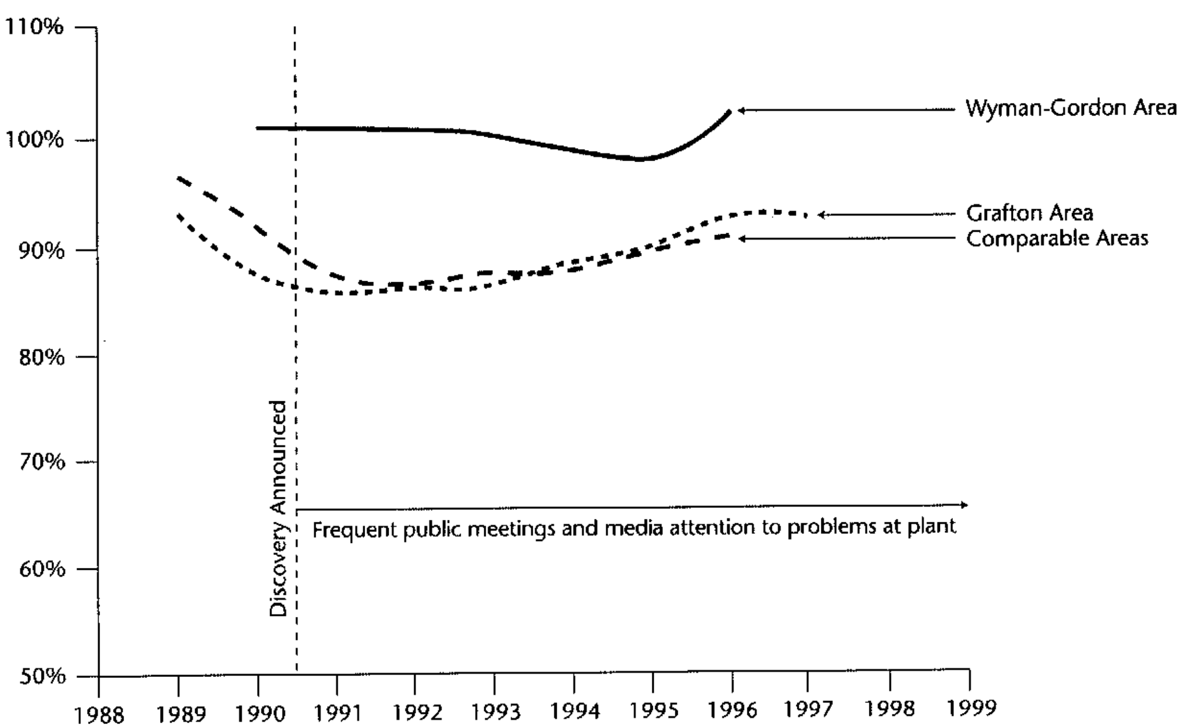
c. Goodness-of-Fit tests, which are a subset of rank tests. They differ from those above in that they measure overall differences in the probability distribution from which the samples were drawn rather than just their location and scale parameters. These tests include the Kolmogorov-Smirnov and Cramer-von Mises tests.

Note that all of the tests performed in this market study completely avoid regression and hedonic modeling. The sole objective in this study was to determine whether or not the null hypothesis should be rejected, indicating that it is likely that there is some difference between the Wyman-Gordon area residential value performance and the performance of homes in the Grafton and Comparable Areas. Only if the null were rejected would there be grounds for examining the situation further to find a cause for the difference and to attempt to measure any such difference.

Analysis of Appreciation/Depreciation Rates by Difference of Means

The first analysis conducted was a comparison-of-means test performed against the annual appreciation or depreciation rates for homes in the Wyman-Gordon Study Area compared to those of homes in Grafton that were not in the study area (Grafton Area), and homes in comparable areas (Comparable Areas). The appreciation or depreciation rate in this analysis was formed by determining the annual compound sale price growth rate for each sale pair and attributing that rate to the midpoint year between the sale dates. These rates were then averaged for each year and the means were tested using the usual difference-of-means tests appropriate to the size of the samples involved (the sample size for the subject area was necessarily small). The results are shown graphically in Figure 1 and in tabular form in Tables 1a – 1c.[11]

Figure 1 **Change In Sale Price Based on Repeat Sales (Base Year 1988 = 100%)**



11. The raw data used in the analysis is from the period 1986 through 1998. Because of the analytical technique used, the dates shown in Figure 1 and Tables 1a – 1c range only from 1988 through 1997. The reason for this is that repeat sales are used. Therefore, if a home sold in 1986 and was subsequently resold in 1990, the appreciation rate for that pair of sales would be assigned to the midyear between the dates, or 1988. The analytical dates derived from the raw data are the dates used in Figure 1 and Tables 1a – 1c.

Table 1a displays the appreciation/depreciation rate data for the Wyman-Gordon Area. Table 1b and Table 1c display similar data for the Grafton Area and the Comparable Areas. In Table 1b and Table 1c, a *t*-value column is added, giving the test statistic for the comparison of the appreciation/depreciation mean rate of that area and year to the mean rate for the corresponding year in the study area.

As can be seen, the null hypothesis of no difference in the means between the study area and the other two areas cannot be rejected at the 95% confidence level for any year from 1989 through 1996 because no *t*-value exceeds the 1.96 required for the 95% level of confidence. There was insufficient data (one repeat sale appreciation/depreciation rate) attributable to the year 1994 and none for the year 1997 in the study area and therefore no test statistic was formed for those two years. As shown in Figure 1, there was no year in which the Wyman-Gordon Area appreciation/depreciation rate did not appear to exceed the rates for the other areas.

Table 1a Test For Statistical Significance in Difference of Mean Appreciation/Depreciation Rate Base on Repeat Sales Data, Wyman-Gordon Area

Year	Mean	Std Dev	Median	n	Maximum	Minimum
1989	18.06%	25.93%	0.96%	3	54.71%	-1.48%
1990	0.99%	2.71%	0.67%	4	4.36%	-1.75%
1991	-0.11%	3.74%	0.17%	3	4.32%	-4.83%
1992	-0.09%	1.71%	0.79%	5	2.03%	-2.34%
1993	-0.45%	.094%	-0.29%	4	0.70%	-1.92%
1994	-1.49%			1		
1995	-0.67%	4.97%	-0.90%	5	6.33%	-8.99%
1996	3.56%	3.35%	3.35%	10	6.33%	0.00%
1997	NSI					

NSI = Not sufficient information

Table 1b Wyman-Gordon Area Compared to Grafton Outside the Wyman-Gordon Area

Year	Mean	Std Dev	Median	n	Maximum	Minimum	*t*-value*
1989	-6.91%	3.17%	-6.52%	6	-3.44%	-12.90%	0.9561
1990	-6.07%	11.33%	-1.25%	4	3.59%	-25.38%	0.6054
1991	-1.90%	2.13%	-1.49%	13	0.84%	-4.95%	0.4150
1992	0.48%	2.68%	0.00%	13	9.39%	-2.09%	-0.1790
1993	0.26%	2.07%	-0.14%	18	4.47%	-3.80%	-0.3144
1994	2.57%	6.69%	1.39%	19	25.12%	-7.41%	NSI
1995	1.77%	1.75%	2.07%	9	5.26%	-0.87%	-0.4624
1996	3.02%	1.79%	3.62%	7	5.14%	0.47%	0.1995
1997	0.00%	7.27%	3.63%	4	5.28%	-12.53%	NSI

*Comparison-of-means *t*-statistic is shown in *t*-value column.

NSI = Not sufficient information

Table 1c Wyman-Gordon Area Compared to Comparative Areas Not Including Grafton Area

Year	Mean	Std Dev	Median	n	Maximum	Minimum	*t*-value*
1989	0.40%	10.87%	0.00%	21	29.63%	-18.34%	0.6283
1990	-5.64%	4.35%	-5.34%	33	5.60%	-20.10%	1.2930
1991	-3.22%	4.60%	-2.47%	39	5.40%	-25.66%	0.5241
1992	-1.33%	2.83%	-1.03%	59	3.72%	-10.86%	0.3765
1993	0.49%	2.43%	0.43%	91	11.28%	-6.17%	-0.3597
1994	2.37%	3.87%	1.53%	67	19.55%	-7.56%	NSI
1995	2.30%	3.57%	2.28%	50	18.03%	-9.41%	-0.4848
1996	3.23%	3.52%	2.53%	21	13.34%	-2.36%	0.0811
1997	3.84%	5.73%	5.41%	5	9.83%	9.83%	NSI

*Comparison-of-means *t*-statistic is shown in *t*-value column.

NSI = Not sufficient information

Additional information in the form of tax assessments, lending appraisals, and individual (i.e. nonrepeat) home sales during the study period support this conclusion of no influence on appreciation/depreciation rates or market value associated with proximity to the Wyman-Gordon plant. Because the study began four years before the announcement of a problem and continued after the first announcement, additional revelations, and publicity over the subsequent eight years, the conclusion of no effect appears to be sound and well supported.

A number of additional statistical tests were performed in an effort to test the characteristics of the three populations (Wyman-Gordon, Grafton, and Comparable Areas) without reference to specific parameters.

The first of these tests looked at the question of whether or not appreciation/depreciation was more common in the Wyman-Gordon Area than outside that area. Two analyses were conducted, one on the gross data and one limited to pairs of sales where the first recorded sale took place prior to any publicity concerning an environmental problem (1990), with the subsequent sale(s) occurring during or after 1990.

The results of simple counts of houses that appreciated or depreciated by analysis area without regard to the date of the first sale are shown in Table 2.

The Wyman-Gordon Area appears to outperform the other analysis areas by having a greater percentage of homes appreciating during the period and fewer homes suffering depreciation. This becomes even more pronounced when only homes are considered where the first sale occurred before the advent of any information concerning a problem, (before 1990) with the subsequent sale(s) occurring during or after 1990, as shown in Table 3.

The overall performance of the area surrounding the Wyman-Gordon plant appears to be significantly better than the Grafton Area and Comparable Areas.

Additional tests were performed in an effort to determine the stability of the conclusion that the null could not be rejected at the 95% confidence level. The results of these tests are shown in Table 4 and Table 5. Note that when looking at Grafton Area versus Comparable Areas, the Wyman-Gordon Area and Grafton Areas data were combined.

Various other rank tests were performed using ranks designed for sensitivity to different alternatives. These tests included the median Scores, Van Der Waerden Scores, Savage Scores, Kolmogorov-Smirnov, and Cramer-von Mises; these tests yielded the same general results.

Conclusions

While the test results varied in some level of detail, they all consistently indicated the following:

- Residential property appreciations in the Wyman-Gordon Area either significantly exceeded those in the Grafton Area or were not significantly different.
- Residential property appreciations in the Grafton Area either significantly exceeded those in the Comparable Areas, or were not significantly different.
- The differences experienced in appreciation were more profound when the data considered was restricted to properties whose first sale preceded 1990 with the subsequent sale(s) occurring during or after 1990.

From the foregoing it cannot be concluded that the incidents in the Wyman-Gordon Area involving groundwater contamination and allegations including radioactivity, petroleum hydrocarbons, chlorinated solvents, and nitric acid spills, had no impact on real estate appreciation rates and consequent values. The only sustainable conclusion is that the data does not provide sufficient evidence to support a conclusion of any contamination-induced impact in a situation that—according to nearly all of the literature and expectations of the valuation community—would almost certainly have resulted in a significant negative impact.

It seems likely that ordinary, individual (i.e., personal) economics are the primary driving force in the transactions examined here. This idea is supported by anecdotal interviews of market participants as well

Table 2 Simple Appreciation/Depreciation Without Regard to Date of First Sale

Area	Percent Appreciated	Percent Depreciated
Wyman-Gordon Area	58.05%	41.95%
Grafton Area	56.18%	43.82%
Comparable Areas	54.19%	45.81%

Table 3 Simple Appreciation/Depreciation With Date of First Sale Prior to 1990

Area	Percent Appreciated	Percent Depreciated
Wyman-Gordon Area	57.89%	42.11%
Grafton Area	24.24%	75.76%
Comparable Areas	14.50%	85.50%

Table 4 Two-Way Analysis of Variance and *F*-Test for the Means of the Percentage Appreciation or Depreciation

Test Statistic	Conclusion
All Data	
Prob > F = 0.0080	Wyman-Gordon Area appreciation significantly greater than Grafton Area appreciation
Prob > F = 0.0088	Wyman-Gordon/Grafton Areas appreciation significantly greater than Comparable Areas
First Sale Prior to1990	
Prob > F = 0.0047	Wyman-Gordon Area appreciation significantly greater than Grafton Area appreciation
Prob > F = 0.0001	Wyman-Gordon/Grafton Areas appreciation significantly greater than Comparable Areas

Table 5 Wilcoxon Two-Sample Rank Test

Test Statistic	Conclusion
All Data	
Prob > /Z/ = 0.2571	No statistically significant difference between Wyman-Gordon Area and Grafton Area
Prob > /Z/ = 0.1118	No statistically significant difference between Wyman-Gordon/Grafton Areas and Comparable Areas
First Sale Prior to 1990	
Prob > /Z/ = 0.0255	Wyman-Gordon Area appreciation significantly greater than Grafton Area
Prob > /Z/ = 0.0001	Wyman-Gordon/Grafton Areas appreciation significantly greater than Comparable Areas

as tax and lending appraisals and real estate listing data. Specifically, unless there is some impact on the use and enjoyment of a home, the sellers appear unwilling to accept a discount just for proximity. Further, a sufficient number of buyers who are unimpressed by the condition exist in the marketplace to make discounts unnecessary. This suggests that valuers may have been misled by individuals concerned about the presence of the detrimental condition into believing that they represent the majority of the marketplace participants; in reality they appear to represent a minority that does not define the market.[12]

The most important conclusion is that without site-specific verification it cannot be assumed that an instance of a detrimental condition will invariably have a negative impact on real estate value performance in the vicinity.

The bottom line is that the valuer must seriously question the existence of proximity stigma as a market force, and carefully investigate each and every such claim using traditional and time-proven analytical techniques. Here, as in the Wolverton and Bottemiller study, there is simply no proximity stigma in evidence.

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12. This result has been observed by other authors, see for example G. William Page and Harvey Rabinowitz, "Groundwater Contamination: Its Effects on Property Values and Cities," *Journal of the American Planning Association* 59, no. 4 (Autumn 1993): 473–481.