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HOW LONG DOES STIGMA IMPACT PROPERTY VALUES?

(REFEREED)

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Purpose - The purpose of this paper is to determine the impact stigma has on property values and how long the stigma remains after the Not in My Back Yard (NIMBY) structure has been removed.

Design/methodology/approach - A quantitative analysis was undertaken, using a high voltage overhead transmission line (HVOTL) case study, to determine the effect on property values prior and post removal of the NIMBY structure. A repeat sales index in conjunction with the regression analysis determined the length of time, the stigma remained after removal of the NIMBY structure.

Findings - The results show that while the NIMBY is in place the impact on value is confined to those properties in close proximity. This is in contradiction to the findings, where on removal of the NIMBY the property values of the whole neighbourhood improve with the stigma remaining for 3 to 4 years.

Research Implications - The implication of this research is that property Valuers need to change the way they take into account the presence of NIMBYs when valuing property with more emphasis, being placed on the neighbourhood rather than just the properties in close proximity. While the HVOTL was in place, only properties in close proximity were negatively affected, but on removal of the HVOTL the whole neighbourhood increased in value.

Originality/value - Results expand on current knowledge by demonstrating the length of time the market takes to adjust to the removal of a NIMBY structure.

Keywords: Valuation, NIMBY, High Voltage Transmission Lines, stigma, impact on value

Article Classification: Real Estate Valuation

Introduction

There are many examples in history where an event has caused a change in perception of a property, resulting in a negative impact on the property's value. These events can include a wide spectrum of events including natural disasters (which cannot be predicted or controlled) through to man-made structures that are placed within a community, commonly referred to as a, Not in My Back Yard (NIMBY).

Property values also play an important role in the economy as a whole. They provide information for buyers and sellers, provide input in legal cases, set the rating tax base for local governments, and form the predominant wealth base for most people within the developed world. For this information to serve its purposes, first it needs to be correct, and second it needs to reflect accurately the impact of external effects? This second aspect poses a problem for Property Valuers. The research that forms the basis for this paper investigates the impact of stigma on property values and then how long the stigma remains after the NIMBY structure, in this case High Voltage Transmission Lines (HVOTLs), has been removed.

There have been a variety of papers written on NIMBYs and stigma and their impact on property values. This paper builds on that knowledge by examining the value impact that removing a stigma from the neighbourhood has on property values, in comparison to the value impact the structure had on property values while it was in place. The change in value results achieved from removing the structure can then be compared with the reduction in value that was placed on them while the structure was in place. The results from this study illustrate a disparity with the amount that Valuers place on properties in close proximity to the NIMBY structure and a lack of understanding of the impact across the wider neighbourhood.

Stigma is the negative reaction created by the NIMBY, which is a by-product of expanding population and modern technology. As cities become bigger there is a need for locating facilities such as prisons, transfer stations and other community facilities, within neighbourhoods that may not be immediately acceptable to those communities, with a subsequent impact on property values (Callanan 1999, Jaconetty 1996, Messer 2006). Technological advances have also introduced structures that have to be located close to the community that they are servicing, but residents do not want them located within close proximity or in view of their own property. These structures include mobile phone towers, telecommunication satellite dishes, high voltage overhead transmission lines (HVOTLs), wind turbines, and pipelines.

The stigma referred to in this paper concentrates on unwanted structures within the neighbourhood and how long the stigma lasts after the structure is removed. The case study area has HVOTLs within it. HVOTLs are a recognised NIMBY and this has placed a negative stigma on the area: buyers are fearful of perceived health risks, visual pollution and associated risks (Callanan 1995), which all negatively impact on property values.

A quantitative analysis was undertaken, using a HVOTL case study, to determine the effect on property values prior and post removal of the NIMBY structure. A repeat sales index in conjunction with the regression analysis determined the length of time, the stigma remained after removal of the NIMBY structure.

Literature Review

Stigma or fear is behaviour that people have which cannot be quantified and may or may not be substantiated. The presence of a NIMBY in a residential zone will invoke a certain amount of stigma or fear but may also involve an environmental visual impact.

'Stigma as it applies to real estate affected by environmental risk, is generally defined as an adverse public perception about a property that is intangible or not directly quantifiable. It is an additional impact on value, over and above the cost of clean-up or remediation' (Roddewig 1996).

As defined by (Wilson 1993) 'Stigma may be viewed as the marketplace's reaction to the perception of a problem that will impact value … stigma may be defined as being composed of objective and subjective uncertainty'. The extent and duration of the decline in marketability and value relates to the real and perceived risks associated with owning, financing or enjoying the property. Mundy (1992) offers a definition that runs on similar lines, as follows; 'An environmental stigma results from perceptions of uncertainty and risk.'

There have been an increasing number of court cases in the USA, in which fear, whether it is justified or not, has been allowed as compensation for any possible decrease in property prices. In the case of *San Diego Gas and Electric Company v Daley* (1988) the court accepted the argument that the public's fear would decrease his property value (even though Daley could not show that fear was reasonable). The judgement was upheld and the judge refused to hear any testimony on the reasonableness of the fear or the fact that no causal link between cancer and electro magnetic fields EMF had been demonstrated (Stazer & Otto 1997). In a well documented American case, *Criscuola v Power Authority of the State of New York* (188 A.D.2d 951, 81 N.Y.2d 79, 1988), the court held that claims for loss of value need not establish the reasonableness of fear or perception of danger or health risks from exposure to high voltage power lines. There is a public belief that some facilities or structures do impose a significant negative impact on property values and the USA courts are now accepting this.

As the basis of residential property valuation is based on the sales comparison approach, the existence of sales based on 'fear' is projected onto neighbouring property values. The term 'market value' is defined as the price on a specified date reached by a willing, fully informed, knowledgeable and not over anxious buyer and seller. If either party is not fully informed and knowledgeable regarding the NIMBY then the

selling price cannot be described as market value and should not be used as a comparable sale within the sales comparison approach. This information is very hard for any Valuer to determine and therefore will be overlooked in the majority of cases, and as a consequence property values in the vicinity will decline.

Research in the area of HVOTLs effects on property values is very limited, with the bulk of quantitative studies carried out in the United States of America (Kinnard 1997, Collwell 1990, and Kroll & Priestley 1991). A study has been undertaken in Canada by DesRosiers (2002); however, although this study adds value to the knowledge, it is based on a 400m wide transmission corridor, which is quite different to the New Zealand system where the HVOTLs are directly adjacent to private property. Sims et al (2009) and Gallimore and Jayne (1999) have been prominent in the UK while Callanan (1995, 1999, 2000) has undertaken hedonic studies in New Zealand.

The literature in relation to the methodology, for the statistical analysis of the property sales, identifies the most common methods as being; multiple regression analysis, comparison of means (or averages) and paired data analysis. Most researchers have used multiple regression as the preferred tool, as paired data requires a large database and for the sales to be paired in every respect, which can be difficult to achieve. Lipscomb and Gray (1995) use both techniques on the same data sets to try to understand the differences. Their conclusion: 'multiple regression analysis [MRA] does well when many observations are available. The ability of MRA to use large data sets reduces the standard error of the coefficient estimates. This is offset by the potential introduction of bias due to model specification error and outlying data. Finally, the MRA process provides a purely market derived solution for adjustment values. Paired Data Analysis can be employed when a sufficient number of paired sales is available.'

The use of paired data is highlighted by Lipscomb and Gray (1990) with the difficulty in obtaining matched sales that are identical except for the factor being analysed. A difficulty arises in analysing the sales when most sales prices are very dependent on the negotiating skills of both the vendor and the purchaser. Therefore, this technique requires careful analysis of the background to each sale, along with a large database, which is often the limitation of these studies.

Methodology

Multiple regression analysis is the most common hedonic method used to analyse property sales where you are trying to determine the impact of a single variable against the independent variable, being the sales price. Other methods identified in the literature review are; comparison of means (or averages), repeat sales and Paired Data analysis. Most researchers in the property and real estate fields have used multiple regression as the preferred analysis tool.

To carry out a reliable multiple regression analysis, sampling bias and sampling error have to be minimised or eliminated. Hanley et al (1997) recognise three sets of characteristics to be used in a hedonic pricing model when examining an environmental effect: Site characteristics (such as number of bedrooms, size and land area); neighbourhood characteristics (such as distance from work, schools); and environmental characteristics (such as air quality, noise levels). The studies to date that measure the effect of a NIMBY on property values have used site characteristics plus an incomplete list of neighbourhood characteristics, with the emphasis being placed on where in the neighbourhood the subject was placed rather than distance to work, schools and amenities. Environmental characteristics have been limited to 'distance' to the NIMBY, rather than incorporating the amenity of the neighbourhood.

The repeat sales method has a major problem in obtaining a significant number of properties sold at least twice over the study period. One of the limitations is obtaining a large enough database in close proximity to the unwanted facility/structure, having to obtain repeat sales in the study area can be difficult. To perform a repeat sales analysis, other characteristics of the property and the economic market must have remained constant over the period.

Kilpatrick (2006) uses a repeat sales analysis as the appropriate method for measuring the impact of an announcement of contamination on the housing market. By applying a repeat sales analysis, the property characteristics are maintained with the only difference from one sale to the next being the announcement of contamination. The Kilpatrick (2006), Reed (2011) and Eves (2004) reports provide the basis for using this method for analysing the impact of the removal of the HVOTLs to enable the stigma to be identified separately from the other housing variables.

DATA

The data for this study was obtained from three different sources. The bulk of the sales data has been obtained from Headway New Zealand. The data relating to number of days on the market and number of bedrooms was supplied by the Real Estate Institute New Zealand, as this information is not included in the Headway NZ database. The demographics data was obtained from the Government Census figures.

The sales database was checked for any input errors and left 2316 sales in the period 1994 to 1999, being three years prior to removal and three years after removal. These sales are broken down into two groups, with the case study area being within 300 metres of the HVOTL, and a control area being within the same suburb but further than 600 metres from HVOTLs. The variable for HVOTL was broken down to two variables being the distance to the nearest line and a separate variable for the distance to nearest tower. The inverse of the distance was used as the best transformation for calculating the variable. Distance was measured from the centre of the lot to the closest point of the tower or line.

Discussion

The case-study used for this research is a suburb in Wellington, New Zealand, as it was traversed by a 26 metre high, 110kv transmission line which was removed in 1996. The area comprises predominantly single family residential homes in the lower price category. The suburb was developed in the 1960s, well after the construction of the HVOTLs and in some cases the towers and lines traversed private property. There are no easements or transmission corridors for the HVOTLs , so when the HVOTLs were removed there was no additional land available to the residents, other than the land that was directly under the tower. The HVOTL was removed and diverted along a different route that does not affect this neighbourhood.

A series of regression analyses were carried out for the periods from 1994 onwards to determine any differences in the equation following the removal of the HVOTLs in 1996 and at what point the stigma disappeared. The results of the analysis that incorporates all sales over the total period from 1994 through to 1999 is displayed in the following table and has similarities with the pre-removal analysis in relation to land area, floor area and condition.

The results are displayed in the order that they became significant. Results show that the period 1994 had a reduction in sales price (of $7,815), which was the period before the HVOTLs were removed. Results then show the significance of the sales periods 1997, 1998 and 1999, with a positive variable of $15,599 (1997), $30,020 (1998), and $40,182 (1999). This was the period immediately following the removal of the HVOTLs and indicating that the stigma remained for three years following the removal. (Refer table 1) For the period from 1994 to 1999 there are 1986 sales within 300 metres of the HVOTLs. The equation is robust with 74% adjusted r square, and Durbin Watson test of 1.86.

Table 1 - Multiple regression analysis results for sales from 1994 to 1999

Variable	B	Std error	Beta	t
Constant	$59,462	$2,442		24.340
Floor area (M)	$454	$15	.511	29.406
Sold 1998	$30,020	$1,892	.299	15.864
Sold 1999	$40,182	$2,799	.256	14.355
Sold 1997	$15,599	$1,763	.169	8.848
Land area (M)	$11	$1	.132	7.535
Roll 16780	($11,553)	$1,539	-.134	-7.504
Roll 16710	($36,888)	$4,091	-.155	-9.016
Built 1990s	$24,215	$3,180	.132	7.615
Unknown age	$37,655	$6,113	.107	6.159
Sold 1994	($7,815)	$1,749	-.085	-4.467
Built 1980s	$7,726	$1,823	.076	4.238
Built 1910s	$17,161	$5,699	.051	3.011

The same variables were then used to calculate an analysis for each year, in isolation, with the difference between the inputs in each analysis. This analysis was carried out to determine at what point the stigma disappears from the market. The 1995 result is still showing a negative amount of -$10,247, as is 1996 with -$12,763, and then the direction of the adjustment changes to positive from 1997 onwards. There will be a lag in the sales data as the market adjusts; however, it is clear from these results that the HVOTLs had a negative impact, and on their removal in 1996 the market adjusted upwards. (Refer table 2)

Table 2 - Regression results carried out on an annual basis

Variable	1994 onwards	1995	1996	1997	1998	1999
Constant	$59,462	$63,030	$72,799	$69,058	$58,823	$68,361
Floor area (M)	$454	$465	$473	$469	$466	$469
Sold 1998	$30,020				$23,090	
Sold 1999	$40,182					$30,665
Sold 1997	$15,599					
Land area (M)	$11	$8	$8	$8	$9	$8
Roll 16780	($11,553)	($11,040)	($10,936)	($10,926)	($11,876)	($11,758)
Roll 16710	($36,888)	($34,298)	($34,405)	($34,545)	($35,897)	$35,974
Built 1990s	$24,215	$32,434	$34,889	$34,537	$29,689	$32,827
Unknown age	$37,655	$33,224	$31,746	$31,802	$32,639	$33,172
Sold 1994	($7,815)					
Built 1980s	$7,726	$9,105	$9,979	$9,804	$9,438	$9,675
Built 1910s	$17,161					
Sold 1995		($10,247)				
Avg condition		$9,537			$8,265	
Sold 1996			($12,763)			
Roll 16740				($9,488)		

By examining the frequency of the variables, a feel for the dataset can be obtained. The sales are spread fairly evenly across 1994 to 1997, with 4 per cent fewer sales in 1995 and 1998. The bulk of the houses in the area were built in the 1960s (36 per cent), and the balance spread across the 1970s and the 1980s.

Most houses within the study area are in average condition (68 per cent), and constructed with a weatherboard exterior (65 per cent) and an iron roof (62.5 per cent). This was the most popular building style for the period through the 1960s and 1970s, so is consistent with the indicated age of the houses in the area. The average size of the houses, based on the floor area rather than number of bedrooms, is between 101 and 150 sqm (56.2 per cent). If the area below 100 sqm is added in, this raises the percentage of houses under 150sqm to 70%.

The results from the regression analysis clearly indicates that the sale price from 1997 to 1999 steadily increased and was a significant positive time period in the analysis. Sales subsequent to the removal of the HVOTLs in 1997 indicate a positive amount of $15,599, increasing to $30,020 in 1998 and again to $40,182 in 1998. Whereas sales, prior to the removal of the HVOTLs, from 1994, 1995 and 1996, show a negative impact.

Next, an analysis of the sales data was carried out, using a control area to ensure any general movements in the market are eliminated. The data was analysed under the following: Number of days taken to sell, average sale price and average land area. The sales data provides an understanding of the market and the changes to the average sales price, land area, number of bedrooms, and the average days to sell.

The average sales price shows a substantial increase for the case study area compared to the control area. Over the period 1996-2010, the case study area increased by 293 per cent compared to the control area at 353 per cent. This indicates a much sharper, 60 per cent increase in sale price in the case study area following the removal of the HVOTLs. (refer table 3)

Table 3 - Sales data comparison for period 1996 -2010

	Newlands 1996	Newlands 2010	Comparison increase
Average Sale Price	$118,159	$417,565	353%
Average Government Valuation	$127,194	$403,814	317%
Average days to sell	83	73	13% shorter
List price against sale price	94.92%	99.7%	
	Johnsonville 1996	Johnsonville 2010	Change 1996/2010
Average Sale Price	$143,621	$421,090	293%
Average Government Valuation	$131,840	$414,120	314%
Average days to sell	50	103	52% longer
List price against sale price	96.78%	99.1%	

Next, a repeat sales analysis was carried out. As the regression analysis showed that only those properties in very close proximity were affected, it was important in choosing the case-study properties for the repeat sales analysis that they were also in very close proximity to a HVOTL tower. Close proximity for the purposes of this study is within fifty meters.

Six properties were chosen that have repeat sales across the period before and after the tower and line removal. To carry out the analysis, case-study properties were identified that previously were adjacent to a tower. This has narrowed the case-study options substantially; however, it is important that the properties were adjacent to a tower. An index was then constructed to analyse the movement in the sale price from before the removal to after. A control area was again used to ensure general market movement could not explain the differences.

Conclusions

The hedonic pricing model, in the form of a multiple regression prior to the removal of the HVOTLs, show a negative sale price impact of 27% on properties adjacent to the towers, reducing to 5% at 50 meters, and negligible impact from 100 meters. The lines themselves did not have an impact, just the towers. The same analysis was then carried out on data related to the period following the removal of the HVOTLs. This result showed that houses sold in the study area in 1997, 1998 and 1999 were significant within the regression analysis, showing a positive impact. Those properties sold in 1997 recorded an increase of $15,599. This increased in 1998 to $30,020, and again in 1999 to $40,182. The analysis is also consistent with the findings from the regression analysis prior to the removal, in regards to a negative impact for sales prior to 1996. The results indicate that the stigma remains for 3 years, with the market levelling out in year 4.

A further analysis was undertaken on the sales data to determine the length of time to sell, average land and building size, and average sale price. The results from this analysis show that the average time to sell in the study area reduced significantly over the two years following removal of HVOTLs, and average sales price increased by thirteen percent over the control area for the same period. This result indicates that the market took 2 years from the removal of the HVOTLs for the number of days for sale to adjust.

The final analysis undertaken was of repeat sales in the study area. The results show that the affected study area has increased in market value at a higher rate than the control area, with this levelling out after 3 years. This reinforces the findings from the hedonic model with the stigma disappearing after 3 years.

The results highlight that while the HVOTLs were in place the value impact was only on those properties within 50 metres of the towers, and that impact was between 5-27%. Once the HVOTLs were removed the positive impact was experienced across the whole area, rather than just the houses in close proximity. The positive impact was significantly greater than the negative adjustment made while the HVOTLs were in place.

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COMMERCIAL REAL ESTATE MARKET FORECASTS: COMPLEXITIES, METHODOLOGIES AND OPPORTUNITIES IN THE LAGOS MEGA CITY

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Abstract

The forecasting of real estate markets continues to be a topical issue and has attracted several research interests over the decades. This is because the real estate market is a major constituent of both the local and international economies and is not insulated from the swings that characterize the economies. Professional real estate valuers interpret market information as they affect real estate investment and aid the real estate investor in decision making. Therefore, real estate market forecast is an important tool for investment decision making. In Nigeria, however, real estate market forecast and its underlying factors are largely unexplored. This neglect is quite obvious given the data challenges and characteristics of the real estate markets. In view of the foregoing, this preliminary study is an attempt to investigate the complexities inherent in the conduct of commercial real estate market forecasts, methods adopted by Nigerian Estate Surveyors and Valuers in predicting the real estate markets. The study goes further to examine the wider implications of real estate market forecasts to commercial real estate investment in Africa's most populous and largest economy given the trend in commercial real estate investment and opportunities available in the market. The study carried out a questionnaire survey involving Estate Surveyors and Valuers and content analysis of 50 feasibility and viability reports in Lagos megacity, Nigeria's commercial capital. Adopting the Relative Important Index (RII), preliminary results indicated that in spite of the increasing availability of market data due to huge opportunities in the commercial real estate market, the Nigerian professionals are yet to fully incorporate quantitative forecasting models in their pre-investment studies. The paper