The Economic Impact of Speed Humps on Housing Values

THE STUDY DISCUSSED HERE ATTEMPTS TO MEASURE THE EFFECT OF SPEED HUMPS ON PROPERTY VALUE. USING BEFORE AND AFTER SALES DATA, THE STUDY EMPLOYED PROGRAM EVALUATION TECHNIQUES AND STATISTICAL ANALYSIS TO COMPARE NEIGHBORHOODS WITH AND WITHOUT SPEED HUMPS, MATCHING ON OTHER IMPORTANT CRITERIA.

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AS ANY PUBLIC OFFICIAL WHO has ever attended a neighborhood meeting can attest, there are two subjects that will ignite the passion of otherwise calm and rational homeowners: their children's safety and anything that negatively affects their property value. When speed humps are suggested as a measure to control speeding in the neighborhood, the normal scenario plays this way: emotional arguments about how something must be done, followed by someone who will express a concern about a perceived stigma associated with speed humps, which may result in their homes being less marketable. Do prospective home buyers view speed humps as an amenity, or as a bothersome, unattractive addition to the neighborhood? The purpose of this evaluation attempts to address this concern: Does installing speed humps cause a change in the market value of residential housing?

GWINNETT COUNTY SPEED-HUMP PROGRAM

Gwinnett County, Ga., USA, is a large, high-growth area northeast of the metropolitan Atlanta area. The makeup of the county ranges from densely populated, urban tracts in the western part of the county to large, sparsely populated, rural tracts to the east. The majority of the county, however, is made up of subdivisions built since 1972. With thousands of subdivisions, the issue of neighborhood traffic management is a major source of consternation.

With the passage of a local option sales tax approved by the voters in 1992, and renewed in 1996, funding was available that allowed property owners to petition for the installation of speed humps on residential streets. Since January 1994, the county has installed over 500 humps in 90 neighborhoods.

Speed humps are popular despite the fact that the county does not promote or market the program. The emphasis from departmental staff has been *allowing* speed humps, as opposed to *recommending* them. Homeowners who want speed humps on their street must go through a rigorous process. Before the county will install speed humps, the street must first meet a speeding criteria. Speed studies must indicate an 85th percentile speed in excess of 35 miles per hour. Then, the representatives of the homeowners' group must demonstrate via petition that 70 percent favor the humps as proposed by the county. The homeowners also are agreeing to an indefinite special assessment fee of $12 added to their annual property tax bill. Without exception, each of the 74 neighborhoods approved for speed-hump installation has completed this process.

STIGMAS ASSOCIATED WITH SPEED-HUMP INSTALLATIONS

While some clearly want speed humps, and some are probably neutral, the question of a stigma associated with speed humps always arises. The stigma is expressed in different ways. Some suggest that the humps draw attention to the fact that the neighborhood has a speeding problem, making it a less desirable place to live. Others protest that speed humps restrict their right to travel on smooth, unimpeded streets, especially if they have no other route of access to their property.

But by far, the most frequent concern is the matter of aesthetics. Because humps must be made visible, and warning signs are included, speed humps simply detract from the beauty of the neighborhood. Families with no or older children would be more likely to favor aesthetic qualities over safety features. Then, the implicit argument is that, given a choice, many potential home buyers would choose to live in a neighborhood without speed humps, given

Table 1. Criteria used for comparison neighborhoods.

	Subdivision name	Humps installed (Yes / No)	Current price range (1000)	School cluster	Year built	Predominant housing style
Case #1	Harrison Ridge	Yes	low 100s	Central Gwinnett	1986–1987	split level/siding
	Hunters Cove	No	110s	Central Gwinnett	1986–1987	split level/siding
Case #2	Eastmont Cove	Yes	120–130s	Shiloh	1987–1988	two-story/partial brick
	Parkwood Ridge	No	115–120s	Shiloh	1988–1989	two-story/partial brick
Case #3	Indian Springs, Unit 7	Yes	high 80s	Meadowcreek	1978	split level/siding
	Indian Springs, Units 1–5	No	low 90s	Meadowcreek	1982	split level/siding
Case #4	Mountain Manor; Manor Estates	Yes	low 70s	Shiloh	1979–1980	ranch/siding
	Meadow Springs; Nappa Valley	No	low 80s	Shiloh	1980	split level/siding
Case #5	Cardinal Lake Estates, Units 3–5, 9–11	Yes	120s	Duluth	1965–1970	split level/siding
	Cardinal Lake, 14 & 19; Lemon Tree	No	low 100s	Duluth	1965–1970	split level/siding
Case #6	Valley Road	Yes	90s	Berkmar	1967–1969	ranch/brick
	Lake Drive; Sweetwater Drive	No	90s	Berkmar	1969–1972	ranch/brick
Case #7	Peachtree Station, Units 4, 5 & 6	Yes	210–220s	Norcross	1980	two-story/brick traditional
	Peachtree Station, Units 1, 2 & 3	No	210–220s	Norcross	1979	two-story/brick traditional
Case #8	Waterford Park	Yes	low 100s	Berkmar	1989	two-story/partial brick
	Waterford Downs	No	120s	Berkmar	1991	two-story/partial brick
Case #9	Simpson Mill	Yes	90s	Duluth	1985	split level/siding
	Plantation Oaks	No	90s	Duluth	1985	split level/siding
Case #10	Bromolow Creek	Yes	low 100s	Duluth	1985	split level/siding
	Sugar Mill	No	110s	Duluth	1986	split level/siding

that other important criteria, such as school district, housing style, price range, etc., are held constant.

GENERALIZATIONS DO NOT SEEM TO HOLD

Conventional wisdom would seem to hold that speed humps would be most popular in entry-level neighborhoods where young families predominate and less desired in older, established neighborhoods with few small children. At first glance, however, this does not seem to be the case. Mostly older, even retired citizens occupy several speed-hump neighborhoods in Gwinnett County. In addition, some of the most vehement objections to a speed-hump proposal come from homeowners who seem to fit a profile of a young family.

Also, there does not seem to be any trend toward humps being accepted in a certain price range or age. Speed humps have been installed in neighborhoods with houses priced in the $70,000 to $300,000 range. Speed humps have been installed on streets where housing is still under construction and also on streets representing some of the county's oldest developments.

VALID COMPARISON GROUPS

Although no trends or generalizations seem to be apparent, the main focus here is on residential property value. The goal of impact analysis is to try to determine how much of a change, if any, can be attributed to a particular intervention. In the present case, the goal is to try to determine if installing speed humps on a street caused the open, free-market transaction price of abutting residential property to be different than it would have been if no humps had been installed. Fortunately, sales data are available, and there are some cases where the humps have been in place long enough for a significant number of sales to have taken place.

If it is indeed observed that properties abutting streets with humps seemingly sell at a different market price than properties abutting untreated streets, is this difference attributable to the humps, or is some other factor or factors causing the difference?

To control for these factors, valid comparison groups must be collected. A major difficulty in using comparison groups outside of the laboratory setting is that comparison groups may be different in some important ways. Furthermore, residential housing seems subject to many emotional, nonmeasurable factors. Fortunately, certain variables are readily measurable, thus comparable. For the purposes of this study, the following variables were matched when comparing before-and-after sale prices of treated cases with before-and-after sales price of comparison groups: price range, housing style, year built and school district, as shown in Table 1. To be considered a match, the test neighborhood and its comparison had to match closely on each of these criteria.

DATA COLLECTION METHODOLOGY

When this study commenced, approximately 74 neighborhoods had been treated with speed humps. Thirty-nine of the 74 projects were begun after January 1996 and, therefore, not considered potential test cases because not enough sales transactions had taken place. The remaining 35 projects, all completed before December 1995, were considered potential test cases. Of these 35 potential cases, 17 were not used because they were deemed unique. That is, no "match" could be found in the terms established for this study: price range, housing style, year built and school district.

Table 2. Before and after sales: Treated vs. untreated neighborhoods.

	Subdivision name	Date humps installed	Average resale before intervention	# of sales since humps installed	Average resale after intervention	Percentage increase
Case #1	Harrison Ridge	February 1994	$83,807	8	$93,300	11%
	Hunters Cove	n/a	$104,140	6	$115,466	11%
Case #2	Eastmont Cove	March 1994	$118,541	22	$126,590	7%
	Parkwood Ridge	n/a	$113,449	28	$120,385	6%
Case #3	Indian Springs, Unit 7	December 1994	$65,727	13	$87,007	32%
	Indian Springs, Units 1–5	n/a	$77,546	4	$93,950	21%
Case #4	Mountain Manor; Manor Estates	February 1994	$57,476	6	$72,966	27%
	Meadow Springs; Nappa Valley	n/a	$66,504	18	$83,805	26%
Case #5	Cardinal Lake Estates, Units 3–5, 9–11	July 1994	$110,321	11	$124,000	12%
	Cardinal Lake, 14 & 19; Lemon Tree	n/a	$87,334	16	$103,718	19%
Case #6	Valley Road	July 1994	$69,242	4	$89,900	30%
	Lake Drive; Sweetwater Drive	n/a	$71,358	5	$91,860	29%
Case #7	Peachtree Station, Units 4, 5 & 6	July 1994	$187,019	25	$214,664	15%
	Peachtree Station, Units 1, 2 & 3	n/a	$181,846	21	$213,942	18%
Case #8	Waterford Park	August 1996	$90,866	3	$106,300	17%
	Waterford Downs	n/a	$102,845	7	$117,628	14%
Case #9	Simpson Mill	March 1994	$80,360	13	$95,453	19%
	Plantation Oaks	n/a	$80,036	7	$93,114	16%
Case #10	Bromolow Creek	August 1994	$84,681	4	$102,925	22%
	Sugar Mill	n/a	$89,150	14	$113,928	27%

Eighteen projects that had been completed prior to 1996 were identified, and for each of these a comparison neighborhood was found that matched all four variables. Sales data were collected for the 18 speed-hump neighborhoods and the 18 comparison neighborhoods (no speed humps). The date of the intervention, hump installation, was determined. All the sales that took place in each neighborhood prior to the date of intervention were averaged. Then, the sales that took place after the date of intervention were averaged. This was done for both the test cases and comparison cases.

Ideally, if the test location and its comparison location were a good match, the average sale price for the same time period should be very close for both locations. But, because percentage change over time is being used for comparison, the *before* average sales price of the test location need not correspond precisely to the *before* average sales price of the comparison location. However, if the average *before* sales price of the test location is significantly different from the average *before* sales price of the comparison location, perhaps the groups are dissimilar regardless of the selected criteria. Fortunately, the data revealed that all 18 projects selected for comparison matched closely with their designated match in terms of average resale *before* speed humps.

The crux of this study, then, is to compare the average of the sales after the intervention: If two neighborhoods are similar in most significant characteristics, *and*, if the average home sale is very similar before a particular intervention, then any difference in values after the intervention *may* be attributable to the intervention.

Through public records of real-estate transactions, all "arms-length" sales of properties before and after hump installation were recorded. Also, all sales for properties in the comparison location for the same time period as its match were selected. Not included were transactions that involved foreclosures, distress sales, tax sales, in-kind considerations, gifts, trades, or other such transactions.

Some of the cases lacked sufficient data to draw any valid comparisons. Eight test locations and their corresponding comparison location were dropped because too few sales transactions had taken place since the speed humps were installed. To be included in the results of this study, at least four sales must have taken place in both the test case and its match. The findings of this study are based on ten neighborhoods where a suitable match was found and where a sufficient number of sales transactions had taken place since the intervention.

WHAT THE DATA SHOWED

As expected, in all cases the housing value increased. The largest percentage increase was Indian Springs, Unit 7, which increased 32 percent since having speed humps installed in December 1994. The smallest percentage increase was Parkwood Ridge, a comparison location, which increased 6 percent after March 1994. The largest discrepancy between a test location and its match was Indian Springs, Unit 7, which saw an increase of 32 percent in resale value after humps were installed, and Indian Springs, Units 1–5, which realized a 21 percent increase for the same time period. The smallest difference was between Harrison Ridge and its match, Hunters Cove, which both increased approximately 11 percent, after humps

were installed in Harrison Ridge in February 1994 (see Table 2).

Based on these cases, no trends are apparent. It is not evident that installing speed humps in a neighborhood will affect property values in any predictable way. According to the composite average, all neighborhoods, both with and without speed humps, increased approximately 19 percent, for the same time period (Figure 1). However, this cannot be interpreted that speed humps have no affect on resale value.

STATISTICAL ANALYSIS

The effect of speed humps on the real-estate value was assessed using the linear-regression method. A linear-regression model was proposed to establish the relationship between the real-estate value and the presence of speed humps. The model has a mathematical equation as the following:

$$V = C_0 + C_1 G + C_2 H + C_3 Y + C_4 Y^2$$

where

V is the resale value of the house;

G is a dummy variable to differentiate the study and control groups, $G = 0$ for the control groups and $G = 1$ for the study groups;

H is a dummy variable to represent speed humps, $H = 0$ if there are no speed humps and $H = 1$ if there are speed humps;

Y is the year during which the property was sold; and

C_i's (i = 0, 1, 2, 3, 4) are regression coefficients.

Note that when there are no speed humps, term C_2H is equal to 0. When there are speed humps, term C_2H is equal to C_2. Therefore, C_2 actually represents the effect of speed humps (H) on the real-estate value (V). A t-test can be conducted to examine if C_2 significantly deviates from 0. If C_2 is significantly greater than 0, the presence of speed humps has a positive effect on the real-estate value. If C_2 is significantly less than 0, the presence of speed humps has a negative effect on the real-estate value.

The above regression model was applied to a total of ten study cases. The real-estate data used are summarized in Table 3.

Goodness-of-fit of a linear-regression model is often measured by the coefficient of determination R^2, which indicates the percentage of variance in the data being explained by the model. R^2 ranges from 0 to 1. The larger R^2 is, the better the model fits the data. An R^2 of 1 means a perfect fit. Table 4 lists R^2 for all the cases being studied. As shown in the table, the regression model fits the data relatively well. In four out of ten cases, R^2 is greater than 0.60. In only two cases, R^2 is less than 0.40. The results of the regression analysis are shown in Table 4.

The effect of speed humps on the real-estate value appears to be fairly random as shown in Table 4. Among the ten cases being studied, five have a positive C_2, and the other five have a negative C_2. The results of a t-test indicate that the effect of speed humps on the real-estate value (C_2) is insignificant in all ten cases. Four cases

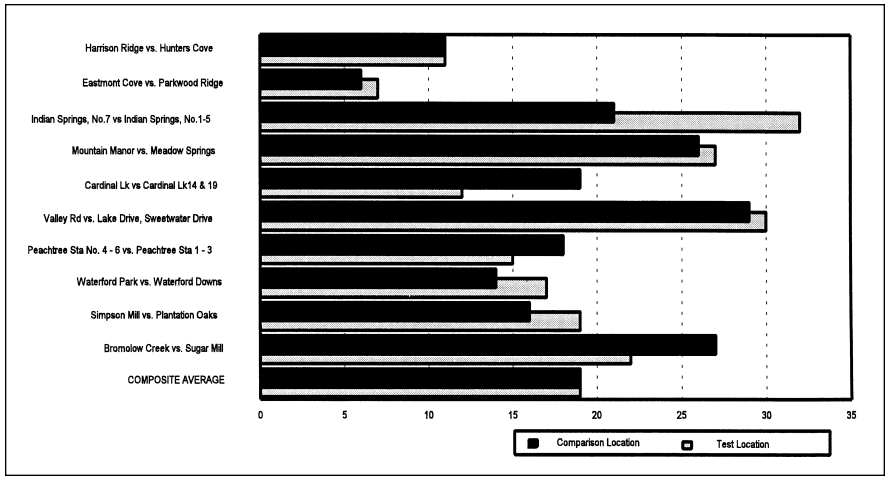

Figure 1. Percentage increase after speed-hump installation.

Table 3. Statistics of study cases.

Case	Group	Period					
		Before			After		
		# of sales	Average resale	Standard deviation	# of sales	Average resale	Standard deviation
1	Study	57	$83,807	$6,345	8	$93,300	$10,313
	Control	62	$104,140	$7,322	6	$115,467	$3,548
2	Study	136	$119,479	$8,775	22	$126,591	$7,641
	Control	142	$113,449	$9,008	28	$120,386	$8,181
3	Study	81	$65,727	$8,929	13	$87,008	$6,903
	Control	66	$76,682	$12,781	4	$93,950	$1,645
4	Study	38	$57,476	$9,330	6	$72,967	$4,288
	Control	94	$66,504	$11,586	18	$83,806	$7,463
5	Study	46	$130,487	$37,489	14	$138,264	$37,255
	Control	27	$94,226	$32,504	8	$110,113	$45,181
6	Study	7	$69,243	$18,682	4	$89,900	$9,600
	Control	24	$71,358	$12,829	5	$91,860	$6,375
7	Study	69	$187,058	$20,065	25	$214,664	$17,434
	Control	47	$181,847	$18,218	21	$213,943	$14,127
8	Study	18	$90,867	$6,736	3	$106,300	$11,571
	Control	96	$102,846	$9,264	7	$117,629	$8,061
9	Study	15	$80,360	$6,736	13	$95,454	$5,948
	Control	19	$80,037	$6,490	7	$93,114	$5,392
10	Study	74	$84,681	$10,855	4	$102,925	$6,232
	Control	96	$89,150	$9,066	14	$113,929	$12,149

Table 4. Modeling results.

Case	R^2	Coefficient C_2	Standard error	*t* statistic	Degree of freedom	Confidence level	Conclusion*
1	0.71	–731.12	3,356.17	–0.22	128	0.17	Not significant
2	0.23	102.54	2,444.59	0.04	323	0.03	Not significant
3	0.72	4,746.07	3,011.47	1.58	159	0.88	Not significant
4	0.78	4,004.26	3,029.01	1.32	151	0.81	Not significant
5	0.36	–20,856.95	14,464.06	–1.44	90	0.85	Not significant
6	0.53	707.95	8,275.04	0.09	35	0.07	Not significant
7	0.48	–1,315.17	5,206.27	–0.25	157	0.20	Not significant
8	0.52	–93.14	5,022.27	–0.02	119	0.01	Not significant
9	0.63	2,460.46	3,235.52	0.76	49	0.55	Not significant
10	0.52	–7,567.00	5,051.83	–1.50	183	0.86	Not significant

*A critical confidence level of 0.95 is used.

have a relatively high (greater than .80) level of confidence. Among these four marginal cases, two have a positive C_2, and the other two have a negative C_2.

In conclusion, it is found that the effect of speed humps on the real-estate value is fairly random and statistically insignificant.

STRENGTHS AND WEAKNESSES

The subject study has strengths and weaknesses. One strength is that only sales data from free-market transactions were used. To the economist, the free market provides a most pure laboratory setting. Actual sales were examined instead of asking homeowners and home buyers how they feel, or whether or not they like speed humps. A second strength of the study is the fact that most of the cases matched very closely on the selected criteria.

The study would be further strengthened if longer time periods could be examined along with more sales transactions. Secondly, many real-estate professionals usually consider "time on the market," a factor not considered in this study, as a strong indication of the marketability of a particular property. For example, the results of this study would be corroborated if data revealed that test neighborhoods were on the market, on average, the same as their comparison neighborhoods. Finally, the number of speed humps in the test neighborhoods was not held constant. While no test neighborhood had fewer than four speed humps, one test location had 15 humps. Perhaps properties located at the end of a long series of humps may be less marketable.

CONCLUSION

While not yet ubiquitous, speed humps are no longer a novelty in Gwinnett County. Commonly, a citizen will encounter speed humps in another neighborhood and want them for their own neighborhood. Seemingly, speed-hump proponents are not limited to frantic parents of young children. Speed humps are becoming widely requested and commonly accepted.

Despite the popularity of the speed-hump program, some feel strongly that installing speed humps will be a detriment to the neighborhood. Many homeowners would like to be able to sell their property relatively quickly, and so, they are keenly aware of property values. Trepidation about being unable to sell, or losing equity in their single largest financial obligation, is a real fear. However, is this fear valid? According to the data, when selecting speed humps as the dependent variable in such a study, it cannot be demonstrated that installing speed humps will affect property values in any predictable way. ■

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