Gated Communities and Property Values

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June 10, 2001

Previous versions of this paper were presented to the American Real Estate and Urban Economics Association's meetings in Washington, D.C. and Gävle, Sweden, and to economics workshops at Washington University-in-St.-Louis and the University of British Columbia. We thank participants at those sessions including Patricia Rudolf, Phillipe Thalmann, Brent Ambrose, Marcus Berliant, Bob Helsley, Will Strange, and Tsur Somerville. Fuat Sahin provided able research assistance on this project.

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Abstract

We empirically examine the effect of private and gated streets on housing prices in a well-established neighborhood of St. Louis, one of the first urban areas in the United States to develop private streets. A relatively homogeneous housing stock inside and outside the gated community, in which portions of the same street are sometimes inside and sometimes outside of the gates, allows a near-perfect natural experiment. Using a semi-log hedonic specification and the robust estimation procedures suggested by Tukey (1977) and Welsch (1980), we find that houses in the gated community command an economically significant price premium, other factors held constant. We further decompose the premium into two parts: (1) that part due to the privacy-security effects of gating; and (2), that part due to private subdivision and homeowner association imposed design restrictions, which operate as insurance against negative externalities. Results on gating are generally consistent with the work of Helsley and Strange (1999) on the economic geography of crime.

Key words: house prices, gated communities, hedonic regression

Introduction

The phenomenon of gated communities is reportedly on the rise in the United States and elsewhere. Some estimate that as many as 4,000,000 people reside in walled-off gated communities (Egan [1995]). Blakely and Snyder [1997] estimate that there were approximately 20,000 projects collectively containing 3,000,000 units in 1997. In these gated communities, homeowners typically own an undivided interest in streets and sidewalks in addition to their fee simple ownership of the land underneath their homes[1]. A homeowner's association manages the common area, as in condominium ownership. McKenzie (1994) reviews the rise of these private "quasi-governments". Regular, and occasionally special, assessments are imposed on property owners to fund the maintenance of common areas. Services are typically contracted with municipal providers outside of the gated area. At this cost, residents gain control of the streets in their neighborhood and can restrict access, thereby reducing traffic, noise, and, possibly, crime.

There are several possible ways gated communities might affect property values; the most commonly cited in the literature is security. The notion that gated communities may reduce the incidence of crime, at least within the gated community itself, is connected to the concept of "defensible space" developed by the urban planner Oscar Newman (1972, 1980, 1992, 1995). According to Newman, much of whose early work was done in St. Louis, even across the street from the infamous Pruitt-Igoe public housing project, a smaller scale row-house complex called Carr Square Village where residents had small yards, "remained trouble-free and fully occupied" throughout the

[1] Low income, multifamily developments that are tenant occupied have also used gated arrangements to control access and reduce crime but we do not focus on this topic here.

period when Pruitt-Igoe was open. There, residents "maintained, controlled, and identified with those areas that were clearly demarcated as their own".[2] Newman (1995) documents the positive effects of retrofitted gating on a number of deteriorating urban neighborhoods, for example, in the Five Oaks community of Dayton, Ohio, "traffic was reduced by 67% and traffic accidents by 40%. Overall crime was reduced by 26% and violent crime by 50%" within 11 months of limiting access to the neighborhood.

Others dispute the claim that gating reduces crime. Wilson-Doenges [2000] compared gated versus ungated communities in high-income and low-income areas of Southern California. While actual crime rates per capita were noticeably higher in the low-income area than in the high-income area, differences between the gated and ungated areas were statistically insignificant. Wilson-Doenges did find, however, that residents of the high-income gated area reported a sense of greater safety compared to those in the ungated area. In contrast, there was no statistically significant difference in the level of perceived safety for residents of the low-income gated neighborhood.

The phenomenon of gated communities has recently attracted the attention of urban economists as well. Helsley and Strange (1998) develop a model combining a micro-economic theory of crime with a game-theoretic model of community development. Their theory has four main results. First, gating diverts crime from the gated community to outside of the gated community. Second, when gating does not affect legitimate business, gating has an overall deterrent effect on crime. Third, the Nash equilibrium level of gating is inefficiently large. Fourth, gating may actually increase overall crime, if it adversely affects legitimate employment opportunities.

[2] Newman (1995) page 150.

Although reduction in crime, or perceptions of crime, may be a principal motivation for gating, other motivations may be at work as well. Blakely and Snyder [1997] identify three types of gated communities: lifestyle, prestige, and security zone. Lifestyle communities often cater to retirees and are generally built around a collection of recreational amenities, especially golf courses. In lifestyle communities, the common bond among residents is often appreciation of the amenities provided. In prestige communities, on the other hand, commonality is based on income and socio-economic status. Residents in prestige communities desire both security and privacy. Finally, it is apprehension of crime that unites residents of security zone communities (Blakely and Snyder label these "enclaves of fear"). Security zone communities may be observed in lower and middle-income neighborhoods and even some public housing complexes. It is primarily security zone gated communities that Newman [1995] addresses.

Lang and Danielson [1997] report results of a survey of occupants' motives for choosing gated communities. They found that many people choose to reside in gated communities because they believe that such places reduce uncertainty, ranging from the mundane (e.g., unwanted social interactions) to the high stakes (e.g., declining property values), as well as security issues. While gated communities seemed to deliver on much of what they promise, Lang and Danielson argue that benefits may entail high social costs, by reinforcing an inward-focused community culture and reducing commitment to the larger urban area.

Many authors, and of course conventional wisdom, suggest that housing prices and locational decisions can be affected by crime rates. Interestingly, despite common priors, strong relationships are not always found in the empirical literature. Follain and

Malpezzi [1981] and Bradbury Downs and Small [1982] find no significant effects of crime on house prices or urban decentralization respectively. On the other hand, Thaler [1978], Sampson and Woolridge [1986] and Cullen and Levitt [1996] do find negative relationships. It is difficult to identify precise estimates of crime's effects, since crime tends to be correlated with poverty rates and other measures of economic deprivation.[3]

This identification problem extends to our study. While our data permit us to test for price effects of various forms of neighborhood organization, our data will not permit us to differentiate between effects of increased security and other amenities, such as reduced traffic or increased privacy. Numerous studies have found that local amenities such as lower traffic flow, improved design, among others, can affect value; see Diamond and Tolley [1982], Hughes and Sirmans [1992], Li and Brown [1980], Vandell and Lane [1989] and Weicher and Zerbst [1976], for example.

In the next section, we describe the evolution of private and sometimes gated streets in St. Louis, and identify some of the benefits touted by their developers nearly a century ago.

Gated Communities in St. Louis

The St. Louis urban area, including the City of St. Louis and neighboring communities in St. Louis County[4], was among the first to develop gated communities with private streets in the United States, with 47 distinct private subdivisions complete

[3] See Becsi (1999) and references therein.

[4] The City of St. Louis is one of only a few municipalities in the United States not located in a county, having severed its relationship and fixed its corporate boundaries in 1876. Nevertheless, St. Louis County residents tend to identify their address as "St. Louis, Missouri".

prior to 1915 (Beito and Smith [1990]. Benton Place was laid out in 1867[5]; Portland Place and Westmoreland Place were developed in the late 1880s and 1890s (Fox [1995]). A number of additional private "places", as they came to be called, were developed during the early decades of the twentieth century, with the phenomenon soon spreading to the suburbs, as well. McConachie [1979] and Beito and Smith [1990] provide fascinating historical accounts of the growth of private and gated streets in the St. Louis area[6]. McConachie argues that residents were attempting to secure the benefits of zoning, e.g. exclusion of noxious uses, prior to its advent through such private arrangements. Beito and Smith counter that McConachie's argument does not explain why private streets developed in St. Louis, as opposed to other industrial cities that were rapidly growing during the 19th century. As an alternative explanation, they argue that St. Louis, compared to other cities at the time, was particularly bad at providing public infrastructure; hence, the reliance on private arrangements.

University Hills is a private gated subdivision located in University City, Missouri, a separately incorporated municipality with a current population of about 40,000, contiguous to the western border of the City of St. Louis. University Hills itself consists of 184 residential buildings on 96 acres and was originally subdivided in 1922 by Cyrus Willmore who was an active developer in the St. Louis area and a disciple of the City Beautiful movement. With its mix of housing and attractive layout, University Hills has been described as "an almost perfect realization of the architectural and planning ideals of the 1920s" (Hamilton [1990]). Adjacent to the subdivision to the east are the

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[5] Just off Lafayette Park, Benton Place was became the address of many prominent St. Louisans, including Montgomery Blair, who served in Abraham Lincoln's administration as Postmaster General.

ungated (but private) subdivision of University Heights #3, platted in 1906 by E. G. Lewis, founder of University City[7] and West Portland Place (platted in 1908), which is both ungated and public. Adjacent to University Hills on the west are the public and ungated subdivisions of Alta Dena (laid out in 1925) and Jackson Park (laid out in 1911). Alta Dena is subject to a homeowners' association, which imposes design restrictions on construction, although the streets themselves are not privately owned by property owners.

All subdivisions are bordered on the South by Pershing Avenue and Forest Park Parkway and by Delmar Boulevard on the north. Hanley Road borders the western boundary of Alta Dena and Jackson Park while Big Bend Blvd borders the eastern boundary of University Heights #3 and West Portland Place. All subdivisions consist primarily of pre-war masonry single-family homes located on attractive tree-lined streets. All are located within the same zip code and school district. The local elementary school is at the border of University Hills University Heights #3, and West Portland Place (see map in Figure 1). This is an important characteristic of our study area, since much research has shown that perceived school quality is capitalized into home prices (e.g. Black [1998])[8]. We do not have crime statistics for the private gated area versus the public area but informal conversations with the local police department indicated that there is little crime in any of these neighborhoods. To eliminate effects of traffic

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[6] Early marketing material for one of the subdivisions states "We know of no more beautifully laid out RESIDENCE PLACE anywhere than University Heights. Improvements made and paid for. No Flats, Hotels, or Boarding Houses…".

[7] Edward Gardner Lewis was a Connecticut entrepreneur, who founded University City in 1902, intended as a model city following the principles of the City Beautiful movement, which emphasized urban design and planning. Presaging the events of the 1980s, Lewis was both a real estate developer and the owner of a local bank. After incorporating the city in 1906 and serving as its first mayor, Lewis was forced to flee to California in 1912 after charges of business irregularities surfaced. There he reportedly resumed his career as a successful real estate developer in Southern California.

[8] Black [1998] finds that parents in Massachusetts are willing to pay 2.5% more for a 5% increase in student test scores, after controlling for variation in neighborhoods, taxes, and school spending.

patterns on house values, we exclude from our analysis any property fronting on any of the four major arterial roads identified above.

All of the study area, both gated and open, is contained within a single census tract[9]. As of 1990, the tract contained 8,367 people in 3,432 households. The population was 80% white, 17% black and 3% other. There were 3,555 housing units, of which 60.4% were owner-occupied, 53.5% were single-family dwelling units, and 72% were built before 1940. The median house value was $149,000; median resident age was 33.9 years, and median household income was $41,747. In general, these summary measures seem representative of older, upper-middle income residential areas of the Midwest or Northeast a decade ago.

Unlike many new lifestyle-oriented gated communities, the gates entering University Hills are not manned and there are no security devices to open and close them. Rather, the nine separate gates are simply open or closed according to a schedule made available only to neighborhood residents. Rotating signs inside the gated subdivision identify which streets are open and which closed, so that residents (but not infrequent visitors or strangers) can easily navigate in and out of the neighborhood. This system reduces through traffic dramatically but does not really prevent a determined outsider from gaining access to the neighborhood. In addition to the perceived privacy/security afforded by the gates, lots in University Hills are subject to a trust indenture that specifies, in some detail, building size, construction material, and overall quality. Exhibit 1 reproduces some of the covenants contained in the University Hills trust indenture.

[9] Missouri census tract 2162, block numbers 2, 6, and 8. The tract's eastern and western boundaries are co-terminus with those of the study area, but the tract extends beyond the boundaries of the study area to the north and south. Census tract boundaries and demographics cited were obtained from the www.census.gov web site.

The two private, but ungated, streets in our study area[10] dead-end into the gated subdivision's western boundary but are open from the east and south. While not gated, these areas are likewise subject to an indenture of trust. As in University Hills, this indenture, in the manner of deed restrictions, restricts use to single-family dwelling units, specifies construction materials and maximum height, and minimum building cost. As previously mentioned, the public subdivision Alta Dena, located to the west of University Hills, is also subject to a home owners' association, which establishes design controls on homes located within the subdivision. Generally, these provide for commonality of building materials and a maximum height of two stories. There have been several new houses on tear-down lots built in this subdivision in the last ten years.

Hedonic Price Theory

Our model is based on the well-known theory of hedonic prices and characteristic demands.[11] The theory represents housing as a composite good, a bundle of services. An individual house represents a uniquely bundled package of services. Observed house "prices" are the product of the quantity of housing services and the price of housing services summed over all physical and locational attributes.

We can motivate the model as follows. Define $\mathbf{X}=(x_1, x_2,\ldots x_N)$ to be a vector of housing characteristics, conceptually including the privacy/security afforded by gating, the control afforded by private ownership of subdivision streets, and the assurance of

[10] This is the University Heights #3 subdivision, consisting of the 7000-7100 blocks of Washington Avenue and Kingsbury Boulevard.

[11] Goodman [1998] discusses the oft-cited early hedonic automobile price study of Court [1939], although recently Colwell and Dillmore [1999] cite and re-analyze data from an even earlier unpublished hedonic model of land prices by G.C. Haas. More recently, Rosen [1974] and others put hedonic price theory on a firmer theoretical basis. Follain and Jimenez [1984] provide a critique and survey of applications to housing markets.

reasonable design homogeneity afforded by a home owners' association that restricts building design. Let P($\mathbf{X}$) be the hedonic price function, which households take as given under competitive market conditions. Household utility is U($\mathbf{X}$, NH), where NH is a non-housing numeraire good. Households maximize utility subject to a budget constraint, i.e.

max U($\mathbf{X}$, NH), subject to Y=P($\mathbf{X}$) + NH. First order conditions require that $\partial P(\mathbf{X}) / \partial x_j = p_j = u_{xj} / u_{xNH}$, j = 1, 2…N. Here we define the first $\mathbf{X}_N$ factors as the usual set of housing characteristics (lot size, rooms counts, etc).

For our application, we posit three specific level of control characteristics: x_H, indicating the presence of a subdivision homeowners' association which restricts building design, x_P, indicating privately owned streets, and x_G, an indicator of gated streets. We note that these characteristics are cumulative, in the sense that each represents an additional level of control over the immediate neighborhood. Streets may be (1) open and public without any controls; (2) open and public but subject to homeowner association restrictions; (3) open and private[12] and subject to homeowner restrictions; or (4) gated and private and subject to homeowner association restrictions.

Using a semi-log specification, our model takes the form:

$$LN(HP_{ijt}) = \alpha + b_{ijt}\mathbf{X}_{ijt} + \delta_H x_H + \delta_P x_P + \delta_G x_G \qquad (1)$$

Here $LN(HP_{ijt})$ is the natural log of jth sale price of house i at time t, $\mathbf{X}$ is a vector of property related characteristics expected to affect house prices, including date of sale, b is a vector of hedonic coefficients to be estimated, and δ terms are the effects of

[12] Presumably residents on private but ungated streets retain the option to exclude outsiders through gating at some point in the future, though, for whatever reason, they have elected not to do so at present.

homeowners' associations, private streets, or gating on house prices, after controlling for other factors. We hypothesize that δ_H, δ_P, and $\delta_G > 0$, but have no strong priors on the relative magnitudes of coefficients.

Data and Empirical Method

In order to test the hypothesis that private and/or gated streets have a positive effect on valuation, we employ the well-known hedonic regression. The method has been used frequently to address this kind of question. For example, a recent paper by Tu and Eppli (1999) uses a similar hedonic to assess whether so-called "new urbanism" housing developments command a price premium, *ceteris paribus*.

Our sample is distinguished by the fact that we are restricting ourselves to a relatively homogeneous neighborhood, some of which is public and open, some of which is private and open, and some of which is both private and gated. Thus by our sample design we already have above-average controls on housing and neighborhood quality. The hedonic index then controls for remaining variation in housing characteristics within the neighborhood.

Data was collected from publicly available information at the St. Louis County Recorder's office. Records of property sales have been maintained in computerized form since 1979, accordingly, approximately 20 years of sales data was available[13]. We have 103 unique properties selling in the public subdivisions, 64 unique properties in the HOA subdivisions, 69 unique properties on the private streets, and 145 unique property addresses within the gated limits of University Hills, for a total of 381 properties with one or more sales. For properties without sales occurring during the study period, we also have the current assessed value[14] (TVALUE) available, although we have not used that information in the empirical analyses reported here, preferring to focus on actual sales transactions[15]. Additional information available by property includes lot size and building square footage, count and type of rooms, number of stories, architectural style, whether a detached or attached garage was present and its capacity, whether the home had a swimming pool, and details on heating and cooling system. We contacted the trustees of the private subdivisions and officers of the homeowner associations to obtain information on design restrictions and assessments[16].

Summary descriptive statistics appear in Table 1. Across all subdivision types, we have a total of 602 unique property addresses, of which 381 sold at least once. Turnover rates were similar across subdivision types, 67% in the public and homeowner association only subdivisions; 58% in the private streets; and 62% in the gated streets; and 63% overall. We note that homes on private and gated streets do tend to be larger, on average, than those on public streets, however, there is a wide range of house sizes within each neighborhood type. We include among covariates the following:

SDATE: the date of sale of the property, measured in days from an arbitrary reference point. As discussed below, we also constructed a set dummy variables SALE19xx, where 19xx is the year of the sale, ranging from 1980 to 1998; 1979 is the base sale year.

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[13] The first recorded sale in our data set is in April 1979 and the last recorded sale is in October 1998.

[14] In Missouri, residential real property is assessed at 19% of its full value, with re-assessment occurring every other year. Accordingly, the assessed value we have actually represents the value as of Jan 1, 1997.

[15] We also regressed current assessed value on property and subdivision characteristics, with qualitatively similar results (not reported here in the interest in brevity).

[16] The private subdivisions assess homeowners based on front footage, whereas the homeowners' association in the public subdivisions charge a flat fee per dwelling unit. As of July 2000, the front footage charges were \$2.30 in University Hills (gated) and \$2.00 in University Heights #3 (ungated). The Alta Dena homeowner's association (open and public) charges a flat \$50 per year to property owners, regardless of lot size. We subtracted a capitalized value of these charges from sales prices prior to estimating our models. Unsurprisingly, given the minimal costs involved (at most a few hundred dollars per year), we found that whether sales prices are so adjusted makes hardly any difference in the results.

ACRE: lot size, in acres. We expect larger lots to command higher prices, so the coefficient on ACRE is expected to be positive.

STORY number of stories in the house. We have no clear prior on the sign of this coefficient.

YRBLT year the house was built. Given depreciation and functional obsolescence, we would expect normally expect a positive sign on this coefficient. However, if the older stock has been renovated to cure functional obsolescence and newer (for example, 1950s era construction) has not, this pattern may reverse.

ROOMS total room count. Since we are controlling rooms by functional use and total square footage of the home, a greater room count indicates smaller average room size; accordingly, we expect a negative sign on this coefficient.

BEDS total number of bedrooms. We expect a positive sign on this coefficient.

FAMILY indicator of a family room. We expect a positive sign on this coefficient.

REC indicator of a recreation room (these are generally finished basement rooms). We expect a positive sign on this coefficient.

BATHFULL count of number of full bathrooms. We expect a positive sign on this coefficient.

BATHHALF count of number of half baths. We expect a positive sign on this coefficient.

BATHADD count of additional bathrooms. This variable picks up bathrooms that may have added to basement recreation or family rooms, for example. We expect a positive sign on this coefficient.

TLA total living area, including first and second floor, additions, finished attics and basements (if any). We expect a positive sign on this coefficient.

AGAR an indicator variable for an attached garage. We expect a positive sign on this coefficient.

DGAR an indicator variable for a detached garage. We expect a positive sign on this coefficient, though smaller than for AGAR. No garage is the reference category.

OLSTYLE a binary variable for traditional structural design.

CAC central air conditioning. We expect a positive sign on this coefficient. The reference category is no A/C or window units only.

SPOOL an indicator for swimming pool. We have no firm priors on this coefficient, since pools are relatively rare in the Midwest and require considerable maintenance during the off season.

YREMO calendar year reported remodeled. Only a small fraction of houses reported remodeling, so we think it unlikely that this variable captures the full extent of updating, nevertheless, we expect a positive sign.

HOA indicator variables equal to one, if the house is located within a subdivision with homeowner association-imposed design restrictions

PRIVATE indicator variable equal to one, if the house is located on the private but ungated blocks contained in our study area. All private streets also have homeowner associations (HOA=1).

GATED indicator variable equal to one, if the house is located within the gated areas. All of these blocks also have homeowners' associations and private streets (HOA=1 and PRIVATE=1), so effects are cumulative.

To control for housing price inflation, we enter the year of sale as a series of dummy variables, with the omitted base year being 1979, the beginning year of our data. Housing price changes can be volatile, and such a flexible form allows for relatively unconstrained estimation of these changes.[17] In passing, we note that with this particular sample and set of years, a two-term (linear and quadratic) year of sale model worked nearly as well, with virtually no change in other coefficients; but we have sufficient degrees of freedom to estimate the more flexible model, so that is the only one we present in this paper.[18]

[17] Alternate methods for price index construction include the repeat sales method of Bailey, Muth and Nourse (1963) and Case and Shiller (1989), as well as hybrid hedonic-repeat sales models as in Case and Quigley (1991) and Quigley (1995). However several papers have found that repeat sales and hybrid models are far from robust when using small local samples like ours; see Gatzlaff and Haurin (1997) and Meese and Wallace (1997), for example.

[18] Results from these alternative specifications are available upon request. We would not generalize from this finding and argue that the quadratic form will always work well. For example, if we had data from

In preliminary work we also interacted the level of control variables (HOA, PRIVATE, and GATED) with the linear date of sale, to test the hypothesis that the rate of appreciation might be different for units on private streets. The interaction was insignificant (as was the original dummy variable when both were included). The correlation between the private street dummy and the interaction terms was over 0.95 so it is perhaps unsurprising that we obtained this result. We would hesitate to claim we had strong evidence of no difference in appreciation, since it is so difficult to disentangle the intercept and inflation effects because of this collinearity.

We estimated the model using least squares as well as a more robust estimator. Our robust estimator was constructed in two stages. First, we constructed fences based on outliers in the OLS regressions following a procedure suggested by Tukey (1977) as implemented in Malpezzi, Ozanne, and Thibodeau (1980), Chapter 4. First we compute the interquartile range of the OLS residuals. Then we locate the first and third quartiles of the residuals. The upper fence for defining an outlier is 1.5 interquartile ranges above the third quartile. The lower fence is 1.5 interquartile ranges below the first quartile of the residuals from the OLS regression. Any observation outside these fences is deemed to be an outlier. Tukey (1977) shows that the probability of being outside the fences is about one in two hundred for a well-behaved distribution.

In addition to identifying and deleting outliers, we apply Welsch's (1980) bounded influence estimator. Belsley, Ku, and Welsch (1980) showed that it is possible to have highly influential observations which are not outliers.[19] Welsch's bounded

sales in previous decades, greater volatility in nominal prices would probably require a more flexible form, or perhaps deflation of sales using a general price index.

[19] In practice, it turns out that outliers and highly influential observations are often coincident, but this is not always the case.

influence regression downweights extremely influential observations, that is, those with much higher influence than would be reasonably expected under the maintained hypothesis of correct data and model specification. From this process we identified 17 outliers (out of 650 original observations). In the next section we discuss results.

Results

Table 2 presents the hedonic results, first for OLS, second for the robust bounded influence regression, and third for a shortened specification. By the usual regression diagnostic measures, statistical fit is quite good across models. The adjusted r-squared ranges from .79-.88 and signs of coefficients generally conform to expectations. Date of sale and measures of lot and house size appear to be the predominant determinants of sales price. Table 3 presents the same specification, now stratifying by level of the control variable, which allows us to compare the effect of various attributes across areas. There are no major differences, although the smaller sample sizes increase standard errors and reduce t-ratios.

Most individual variables behave as expected. The size of the lot (ACRE) and house (TLA) have large positive and significant effects on value, as we would expect. The presence of a garage is also significant, and units with attached garages are apparently worth more than units with detached garages. If there is a history of remodeling (YREMO) the unit has a higher sales price. Figure 2 presents a housing price index for these St. Louis neighborhoods, where the base case of 1979 is set to 100. The nominal housing price index is constructed directly from the coefficients of the

SALE19xx dummy variables; the real index is deflated using the national GDP price deflator.

Some variables that we would expect to affect the value of the house are insignificant in this sample. For example, the age of the unit is insignificant, even though many studies find that age is generally negatively related to the value of the unit (Shilling, Sirmans, and Dumbrow (1991)). This could be due partly to the fact that the age variable is somewhat correlated with other variables included in the sample. We suspect it could also be due to the fact that these units are all selected from generally a high-quality neighborhood. Studies such as Malpezzi, Ozanne, and Thibodeau (1987) that find significant depreciation use market wide samples that include units in many older declining neighborhoods as well.

Not all the room variables have significant coefficients, and a few such as rooms and family room are signed incorrectly. We attribute this to the fact that we actually have many correlated measures of size, counts of rooms of different types, and different area measures (total rooms and total living area). We also note that swimming pools have no discernable effect on value. This may be due to some of the collinearity problems discussed above, or may it be the market's judgement that the high cost of maintaining a swimming pool in a four-season climate such as that of St. Louis negates its recreational value during the warmer summer months.

Examination of the coefficients in Table 3 suggests the factors that determine value across the four neighborhood types are similar; however, the measure of house size (TLA) is not statistically significant for the private streets. We note, too, that the coefficients on lot size (TLA) and height (STORY) are large and statistically significant in the public neighborhood. Regression diagnostics are quite similar across the four stratified regressions, as well.

Focusing on the bounded influence model specification in Table 2, the coefficients of primary interest are, of course, those on HOA, PRIVATE, and GATED. Recall that the subdivision-level variables HOA, PRIVATE and GATED represent cumulative levels of neighborhood control, as follows. If all three variables equal zero, then the area is public, open, and not governed by a homeowner's association. If HOA=1, the subdivision is governed by a homeowner's association; the street is public, and not gated. If PRIVATE=1, then, in addition to having a homeowner's association, the street is private, but there is no gate. If GATED=1, then, in addition to having a homeowner's association and a private street, the neighborhood is gated.

All three variables are positive and highly statistically significant across models. The estimated coefficient of HOA is 0.154, implying a ceteris paribus sales price increase of about 17%.[20] The estimated coefficient of PRIVATE, .099 is in fact somewhat lower than the coefficient of HOA, implying that street privacy by itself adds virtually no value beyond the existence of a homeownership association. But the coefficient of .228 on GATED implies an increase in sales price of 26% (as compared to public unrestricted streets) and roughly a 9% premium over a neighborhood with a HOA only. Hence, based on our best point estimates the total value premium of 26% is comprised of 17% for the homeowners' association and 9% for the gated streets themselves.

The usual t-tests presented in Table 2 confirm that each subdivision variable GATED, PRIVATE and HOA is, by itself, significantly different from zero. Table 4 presents results for four F-tests that help us further disentangle the effects of these different conditions. First, we can resoundingly reject the hypothesis that the joint effect of subdivision variables is zero (unsurprisingly, given the t-test results). Second, we can reject the hypothesis that the differences between individual coefficient estimates for GATED, PRIVATE and HOA, discussed in the preceding paragraph, could be due to chance. Using conventional significance levels, we can resoundingly reject the hypothesis that PRIVATE and GATED are equal; and that GATED and HOA are equal, whether we examine the OLS results, or the robust models. However, it is of some interest that with OLS we cannot reject the hypothesis that the PRIVATE and HOA coefficients are equal, although we can when robust estimation techniques are used. In the event, since we can resoundingly reject the hypothesis that the GATED coefficients are equal to either PRIVATE or HOA, we have strong evidence that gating a community has an effect independent from its associated homeowner's association and from creating a private street.

Sample Selection Issues

We have used actual sales transactions in the result reported so far, leading to the obvious question: what if a home didn't sell over this period? Recall that approximately one-third of all properties in our study area did not sell, even once, during the period 1979-1998. Potential sample selection bias is a criticism sometimes made of single-equation hedonic price models and repeat sales indices.[21] The criticism is particularly

[20] In the semilog functional form with a right hand side dummy variable, the estimated percentage change in dependent variable, for a dummy variable with estimated coefficient b, given that the dummy takes unit value, is approximately $e^b - 1$ (Halvorsen and Palmquist [1980]).
[21] See Clapp and Giaccotto (1992) and Zuehlke (1989), for example.

cogent if there are reasons to believe that those houses that sell are systematically different from the full population of properties.

To investigate how severe the selection problem might be, we applied the well-known Heckman two-stage correction for sample selectivity bias. To implement this procedure, we first estimate a probit regression on a dummy variable indicating a property that did not sale during our 1979-98 study period. In preliminary models (available on request), we found that most independent variables drawn from the hedonic specification were not significant. Table 5 presents results from a probit model of the statistically significant determinants of a property not selling from Table 5, i.e. lot size (ACRE), construction year (YRBLT), and the presence of central air conditioning (CAC), as well as a set of locational dummy variables. From the probit results we compute the inverse Mills ratio. Then in the second stage, we replicate the bounded influence regression of Table 2, adding the inverse Mills ratio (MILLS) to the specification. A comparison of parameter estimates appears in Table 6. As there are no substantive differences between the parameter estimates, with and without the correction, we conclude that sample selectivity bias is not an issue in this particular hedonic model.

Conclusions

Gated subdivisions are on the rise in the United States due, in part, to perceptions of greater security, privacy, and control for residents of the gated areas. We have presented evidence that these benefits (real or imagined) are capitalized into house prices. In the St. Louis case, over the 20-year period 1979-1998, houses in gated areas command a 26% price premium, after controlling for other factors, as compared to houses on completely unrestricted streets (and about a 9% premium relative to a neighborhood with just a homeowner's association). We attribute about two thirds of the total premium to the neighborhood homogeneity created by homeowner association design restrictions, which increase values in the public subdivisions compared to those that have no restrictions. The remaining portion of the premium we attribute to the gated streets themselves. The fact of a private street alone does not appear to contribute value, after controlling for the presence of a homeowner's association.

To put these differences into perspective, consider pricing a "standard" house, defined as a 3 bedroom, 2½ bath home built in 1925 with a detached garage and 2,500 square feet of space on a 0.20-acre lot. The expected sales price for this house if selling during the summer of 1998 (the end of our study period) would be approximately $235,000 in an open, public subdivision not governed by a homeowner's association. If the same house were located within a subdivision governed by a homeowner's association, the expected price would be $275,000. Finally, if the same house were located within a private gated subdivision, the expected sales price would be about $296,000. These are clearly economically significant differences.

Taken together, these results provide support for the model of Helsley and Strange, whose model predicts price premia for gated communities. However, while consistent with their model, these results cannot differentiate between Helsley and Strange's model, which focuses on the value of increased security, and other possible competing models that could be developed based on design homogeneity, reduced traffic, etc. In fact, our result that the effect of homeownership associations per se are quite large suggest externalities other than security are at work, since it is not likely that such associations *per se* have much effect on security.

A number of interesting questions arise from this research. Could homeowners in unrestricted neighborhoods increase their property values by forming more homeowner associations, taking their streets private, and gating them? If so, in addition to the rapid growth of new gated communities and neighborhoods governed by "privatopias," why do we not observe conversions of existing neighborhoods more frequently? Are there costs to gating and the formation of homeownership associations that we are not measuring? Perhaps the difficulty arises from a greater ease of forming a homeowner association *ex ante* than *ex post*, since new developments with pre-existing homeowner associations presumably attract a selected sample of consumers who desire such homogeneity, while existing neighborhoods might contain sufficient households who would chafe at such a form to successfully hold out.

How much of the gating advantage is simply due to reduced traffic density, versus real or perceived improvements in security? Are there positive externalities from design restrictions and other aesthetic considerations? While we have noted above that anecdotal evidence suggests conversion of one neighborhood type to another appears to be less common than the formation of new gated communities, in fact conversions from public-to-private and private-to-public streets have been observed in St. Louis. We hope to take advantage of these natural experiments to extend this line of research to such conversions in the future.

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Exhibit 1

Sample Restrictions from Compendium of Indenture "University Hills"

"…All building must have hip or gable roof with a pitch of at least thirty degrees. All buildings must be constructed of uniform building material on all sides and must be mat brick or some other building material approved by the said Trustees. No building shall be less than two stories in height and no building shall be more than two and one-half stories in height. Garages must conform in design and material with the principal building on each lot…"

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Housing Price Indices, Selected St. Louis Neighborhoods

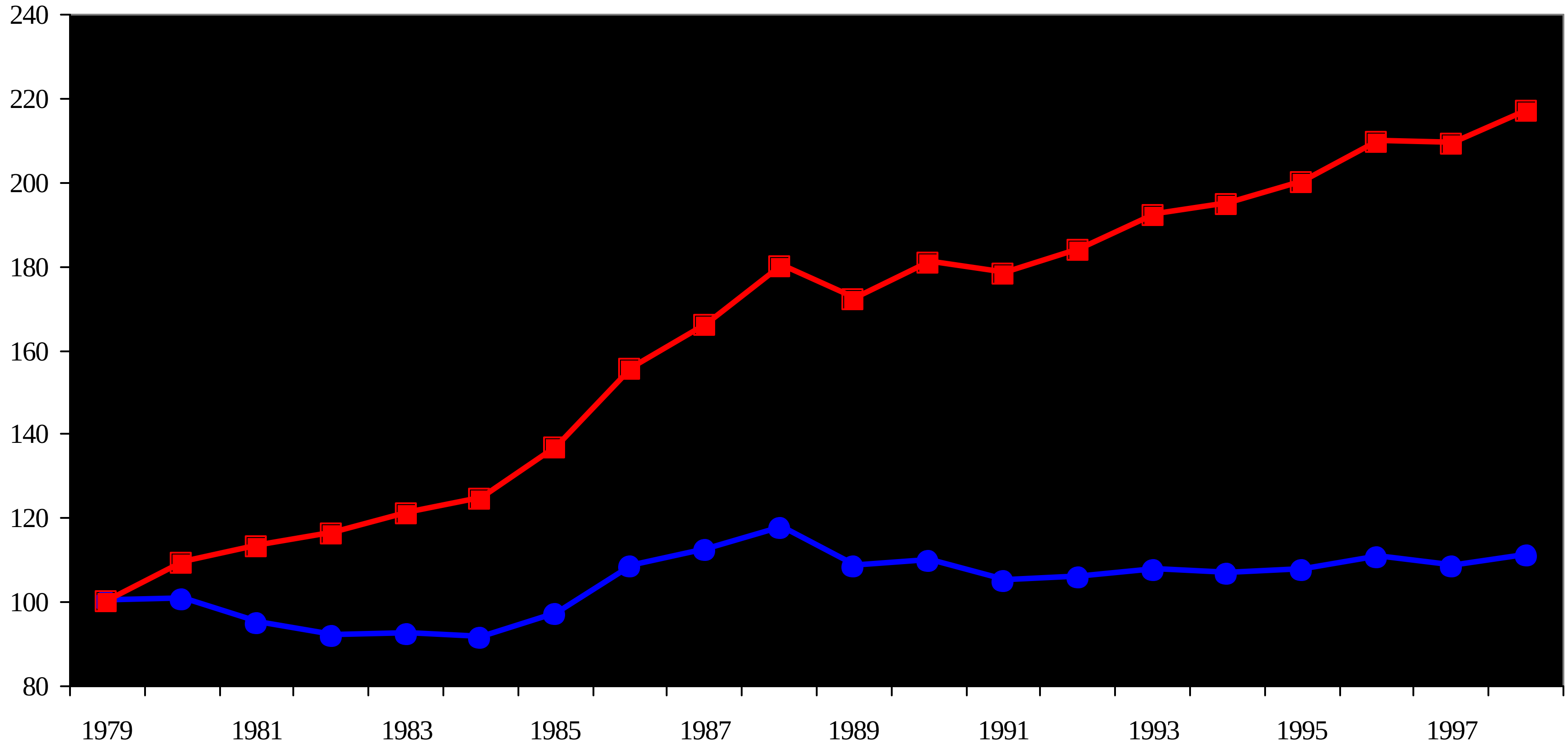

Table 1A Summary Counts and Means of House Sales Prices by Neighborhood Control Level

	NO RESTRICTIONS		HOA ONLY		HOA & PRIVATE		HOA & PRIVATE & GATED	
Year	N	Mean	N	Mean	N	Mean	N	Mean
1979	1	$ 85,000	1	$ 75,000	1	$ 92,500	5	$ 92,880
1980	3	$ 69,333	4	$ 88,125	4	$111,500	6	$110,750
1981	6	$ 75,500	4	$ 72,500	2	$107,500	6	$131,000
1981	2	$ 73,075	2	$ 89,500	3	$114,333	5	$116,150
1983	10	$ 79,090	5	$101,300	3	$131,300	13	$128,085
1984	3	$107,833	3	$115,667	7	$151,500	17	$127,903
1985	3	$ 95,967	4	$113,875	5	$137,880	8	$139,831
1986	3	$101,833	6	$139,667	4	$169,250	5	$155,880
1987	8	$111,063	5	$145,940	5	$178,260	13	$192,262
1988	9	$130,722	7	$167,964	3	$233,167	11	$213,723
1989	9	$131,944	4	$156,000	1	$268,000	11	$240,132
1990	6	$156,167	4	$166,625	7	$208,429	13	$224,846
1991	16	$131,738	8	$133,409	5	$214,700	17	$237,941
1992	15	$154,227	13	$173,952	6	$268,583	18	$214,833
1993	17	$148,097	6	$177,250	7	$252,421	15	$260,833
1994	16	$157,039	9	$219,278	13	$243,500	16	$247,814
1995	10	$190,485	12	$205,025	7	$257,929	12	$267,717
1996	8	$193,750	10	$218,378	3	$311,667	9	$269,833
1997	21	$190,417	13	$236,918	7	$337,857	20	$271,270
1998	14	$201,039	13	$235,438	5	$359,500	21	$294,712
Total	180		133		98		241	

Table 1B Descriptive Statistics by Neighborhood Control Level

		No Controls		HOA Only		HOA and Private		HOA, Private, and Gated	
Variable	Explanation	Mean	StdDev	Mean	StdDev	Mean	StdDev	Mean	StdDev
ACRE	Lot size in acres	0.17	0.05	0.15	0.05	0.27	0.09	0.22	0.09
STORY	Number of stories	1.77	0.38	1.80	0.34	2.03	0.13	1.88	0.30
YRBLT	Year built	1924	9	1929	10	1922	10	1930	9
ROOMS	Total room count	7.14	1.22	7.29	1.16	8.81	1.59	8.48	1.59
BEDS	Number of bedrooms	3.29	0.73	3.20	0.70	4.09	0.99	3.84	0.83
FAMILY	Indicator of family room	0.25	0.44	0.39	0.49	0.57	0.51	0.43	0.54
REC	Indicator of rec room	0.12	0.32	0.20	0.40	0.18	0.39	0.24	0.43
BATHFULL	Number of full baths	1.37	0.58	1.57	0.59	2.08	0.68	2.14	0.69
BATHHALF	Number of half baths	0.60	0.63	0.77	0.51	1.00	0.61	0.90	0.59
BATHADD	Number of additional baths	0.31	0.55	0.19	0.46	0.37	0.56	0.26	0.68
TLA	Total living area	1,990	460	2,135	388	2,905	681	2,795	797
AGAR	Indicator of attached garage	0.04	0.19	0.25	0.43	0.10	0.30	0.21	0.41
DGAR	Indicator of detached garage	0.72	0.45	0.42	0.49	0.61	0.49	0.32	0.47
OLDSTYLE	Indicator of traditional style	0.12	0.33	0.41	0.49	0.31	0.46	0.09	0.29
CAC	Central air conditioning	0.45	0.50	0.57	0.50	0.45	0.50	0.69	0.46
SPOOL	Swimming pool	0.06	0.24	0.02	0.14	0.08	0.28	0.09	0.29
YREMO	Year remodeled	52	315.93	62	343.67	329	733.83	76	379.87
Note: Turnover Rate	Fraction of houses selling at least once during study period	0.67		0.67		0.58		0.63	

Table 2: Hedonic Regression Results, Full Sample

Variable		OLS Estimate	OLS Std Error	OLS T-ratio	Bounded Influence Estimate	Bounded Influence Std Error	Bounded Influence T-ratio	Short Specification Variable	Short Specification Std Error	Short Specification T-ratio
INTERCEPT	Intercept	15.581	1.788	8.72	13.916	1.648	8.44	10.542	0.060	175.37
HOA	Homeowners Association	0.136	0.027	5.03	0.154	0.020	7.77	0.164	0.019	8.60
PRIVATE	Private Streets	0.093	0.034	2.71	0.099	0.025	3.94	0.148	0.026	5.75
GATED	Gated Community	0.206	0.025	8.21	0.228	0.019	12.11	0.227	0.018	12.57
ACRE	Lot Area	0.662	0.167	3.95	0.675	0.125	5.39	0.532	0.130	4.09
STORY	Number of Stories	0.108	0.029	3.69	0.114	0.022	5.22			
YRBLT	Year Built	-0.00270	0.00093	-2.93	-0.00190	0.00085	-2.19			
ROOMS	Number of Rooms	-0.004	0.009	-0.45	-0.001	0.007	-0.08			
BEDS	Number of Bedrooms	0.015	0.014	1.06	0.014	0.010	1.37			
FAMILY	Family Room	-0.006	0.018	-0.31	-0.026	0.013	-1.95			
REC	Rec Room	-0.017	0.023	-0.72	-0.040	0.017	-2.36			
BATHFULL	Full Bath	0.057	0.015	3.71	0.047	0.011	4.14			
BATHHALF	Half Bath	0.034	0.015	2.28	0.032	0.011	2.89			
BATHADD	Additional Baths	-0.00160	0.01505	-0.11	-0.00670	0.01212	-0.56			
TLA	Total Living Area	0.00013	0.00002	6.03	0.00014	0.00002	8.59	0.00020	0.00001	16.26
AGAR	Attached Garage	0.061	0.025	2.41	0.062	0.019	3.27			
DGAR	Detached Garage	0.037	0.020	1.82	0.035	0.015	2.38			
OLDSTYLE	Older Architecture	-0.008	0.023	-0.33	-0.002	0.017	-0.14			
CAC	Central Air Conditioning	0.019	0.018	1.08	0.008	0.013	0.63			
SPOOL	Swimming Pool	-0.020	0.032	-0.62	-0.012	0.024	-0.50			
YREMO	Year Remodeled	0.00005	0.00002	2.70	0.00006	0.00001	4.41			
SALE1980		0.083	0.084	0.99	0.093	0.061	1.51	0.086	0.067	1.29
SALE1981		0.091	0.083	1.09	0.130	0.061	2.11	0.148	0.067	2.22
SALE1982		0.157	0.089	1.77	0.161	0.065	2.47	0.170	0.071	2.41
SALE1983		0.210	0.078	2.71	0.209	0.057	3.69	0.211	0.062	3.42
SALE1984		0.270	0.078	3.47	0.244	0.057	4.26	0.266	0.062	4.29
SALE1985		0.361	0.081	4.44	0.366	0.060	6.14	0.349	0.065	5.38
SALE1986		0.555	0.083	6.70	0.553	0.061	9.10	0.557	0.066	8.45
SALE1987		0.630	0.077	8.15	0.657	0.057	11.56	0.660	0.062	10.70
SALE1988		0.766	0.078	9.85	0.797	0.057	13.92	0.791	0.062	12.75
SALE1989		0.713	0.080	8.92	0.718	0.059	12.27	0.732	0.064	11.52
SALE1990		0.788	0.078	10.09	0.805	0.057	14.05	0.821	0.062	13.17
SALE1991		0.749	0.075	9.97	0.783	0.055	14.20	0.792	0.060	13.18
SALE1992		0.835	0.075	11.14	0.837	0.055	15.24	0.853	0.060	14.33
SALE1993		0.903	0.075	11.96	0.921	0.056	16.59	0.921	0.061	15.21
SALE1994		0.927	0.075	12.38	0.946	0.055	17.12	0.944	0.060	15.76
SALE1995		0.991	0.077	12.87	0.999	0.056	17.73	0.998	0.061	16.35
SALE1996		1.066	0.078	13.66	1.096	0.058	18.99	1.103	0.063	17.59
SALE1997		1.088	0.074	14.71	1.091	0.054	20.11	1.094	0.059	18.58
SALE1998		1.094	0.074	14.75	1.170	0.055	21.40	1.163	0.059	19.58
MSE			0.193			0.139			0.153	
Adj R-sq			0.791			0.883			0.859	

Table 3: Regression Results, Stratified by Level of Control												
	No Controls			**HOA Only**			**HOA and Private**			**HOA, Private, and Gated**		
Variable	Estimate	Std Error	T-ratio	Estimate	Std Error	T-ratio	Estimate	Std Error	T-ratio	Estimate	Std Error	T-ratio
Intercept	15.524	2.781	5.58	7.675	7.085	1.08	17.234	5.514	3.13	16.048	3.006	5.34
ACRE	1.116	0.407	2.74	0.714	0.747	0.96	0.467	0.297	1.57	1.059	0.217	4.87
STORY	0.141	0.038	3.70	0.090	0.056	1.60	0.013	0.395	0.03	0.093	0.041	2.29
YRBLT	-0.00260	0.00144	-1.83	0.00150	0.00369	0.41	-0.00340	0.00285	-1.18	-0.00290	0.00156	-1.86
ROOMS	-0.011	0.015	-0.76	-0.005	0.022	-0.21	0.013	0.018	0.73	0.004	0.014	0.29
BEDS	-0.029	0.022	-1.29	0.006	0.034	0.18	0.013	0.026	0.50	0.022	0.018	1.23
FAMILY	0.028	0.032	0.87	-0.020	0.036	-0.54	-0.024	0.053	-0.45	-0.014	0.021	-0.67
REC	-0.029	0.037	-0.79	-0.015	0.052	-0.28	-0.047	0.053	-0.89	-0.004	0.028	-0.13
BATHFULL	0.041	0.025	1.63	0.006	0.031	0.18	0.113	0.046	2.44	0.047	0.020	2.32
BATHHALF	0.036	0.020	1.80	-0.020	0.043	-0.46	0.021	0.031	0.65	0.049	0.022	2.18
BATHADD	0.039	0.021	1.85	-0.064	0.062	-1.04	-0.015	0.036	-0.41	-0.049	0.027	-1.83
TLA	0.00020	0.00005	4.19	0.00022	0.00005	4.51	0.00000	0.00006	0.52	0.00010	0.00003	4.55
AGAR	0.170	0.072	2.35	-0.024	0.046	-0.53	0.051	0.092	0.55	0.050	0.030	1.67
DGAR	0.084	0.032	2.65	0.011	0.042	0.27	-0.010	0.052	-0.20	0.040	0.027	1.52
OLDSTYLE	-0.008	0.044	-0.18	0.035	0.034	1.02	0.028	0.054	0.52	-0.084	0.042	-2.02
CAC	0.024	0.023	1.05	0.025	0.037	0.67	0.048	0.045	1.07	-0.030	0.025	-1.21
SPOOL	0.013	0.052	0.25	0.010	0.165	0.06	-0.002	0.082	-0.02	-0.031	0.032	-0.96
YREMO	0.00020	0.00004	3.57	0.00002	0.00004	0.45	0.00000	0.00003	0.67	0.00010	0.00003	1.94
SALE1980	-0.029	0.158	-0.18	0.066	0.173	0.38	0.080	0.176	0.45	0.142	0.088	1.61
SALE1981	-0.102	0.145	-0.70	0.004	0.176	0.02	0.112	0.199	0.57	0.232	0.090	2.56
SALE1982	0.024	0.167	0.15	0.047	0.186	0.25	0.052	0.183	0.29	0.279	0.091	3.08
SALE1983	-0.021	0.141	-0.15	0.170	0.170	1.01	0.302	0.189	1.60	0.210	0.075	2.79
SALE1984	0.209	0.157	1.34	0.294	0.173	1.70	0.211	0.170	1.24	0.276	0.073	3.78
SALE1985	0.101	0.153	0.66	0.305	0.167	1.82	0.358	0.171	2.09	0.432	0.082	5.28
SALE1986	0.370	0.155	2.40	0.523	0.166	3.15	0.558	0.173	3.22	0.549	0.092	5.96
SALE1987	0.422	0.147	2.86	0.613	0.166	3.69	0.624	0.170	3.67	0.701	0.076	9.23
SALE1988	0.515	0.142	3.63	0.701	0.162	4.32	0.743	0.185	4.01	0.909	0.079	11.53
SALE1989	0.463	0.141	3.28	0.625	0.167	3.74	0.786	0.233	3.38	0.793	0.079	10.00
SALE1990	0.661	0.148	4.47	0.672	0.168	3.99	0.777	0.168	4.61	0.848	0.076	11.13
SALE1991	0.585	0.140	4.18	0.623	0.162	3.84	0.818	0.170	4.82	0.852	0.073	11.61
SALE1992	0.673	0.140	4.80	0.755	0.156	4.84	0.852	0.177	4.81	0.868	0.075	11.58
SALE1993	0.647	0.139	4.65	0.777	0.164	4.75	1.012	0.165	6.15	1.019	0.075	13.53
SALE1994	0.709	0.143	4.97	0.932	0.161	5.80	0.934	0.159	5.88	0.995	0.076	13.04
SALE1995	0.741	0.142	5.21	0.959	0.157	6.10	1.007	0.167	6.03	1.075	0.082	13.06
SALE1996	0.903	0.144	6.28	0.986	0.163	6.06	1.105	0.179	6.18	1.141	0.081	14.02
SALE1997	0.836	0.139	6.04	1.045	0.156	6.72	1.146	0.173	6.61	1.137	0.072	15.80
SALE1998	0.904	0.140	6.48	1.100	0.160	6.88	1.203	0.167	7.19	1.264	0.073	17.28
MSE		0.128			0.141			0.145			0.138	
Adj R-sq		0.863			0.839			0.878			0.887	

Table 4: Tests of Selected Hypotheses Regarding Gated and Private Streets, and Homeowner Associations

Null Hypothesis	Ordinary Least Squares F Statistic	Ordinary Least Squares Prob. > F	Robust Estimates F Statistic	Robust Estimates Prob. > F
Joint effect of Gated, Private and HOA is zero.	23.87	0.0001	52.43	0.0001
Private and HOA coefficients are equal.	1.45	0.2293	4.29	0.0387
Private and Gated coefficients are equal.	14.16	0.0002	33.06	0.0001
Gated and HOA coefficients are equal.	7.80	0.0054	15.66	0.0001
Denominator degrees of freedom:	*567*		*549*	

Table 5: Probit Model of Probability of No Sale

(dependent variable=1, if no sale observed, zero otherwise)

Variable		Estimate	Error	Chi-Square	P-value
INTERCEPT		-23.574	10.782	4.78	0.0288
ACRE		1.146	0.772	2.21	0.1375
YRBLT		0.012	0.006	4.45	0.0348
CAC		-0.484	0.113	18.47	<.0001
STREET				9.27	0.9017
	Alta Dena Co	0.760	0.534	2.03	0.1546
	Bedford Ave.	0.985	0.499	3.91	0.0481
	Creveling Dr	0.336	0.507	0.44	0.5075
	Greenway Ave	0.459	0.455	1.02	0.3124
	Kingsbury Bl	0.682	0.387	3.11	0.0779
	Midvale Ave.	0.606	0.467	1.68	0.1945
	Mission Cour	-0.065	0.575	0.01	0.9103
	Norwood Ave.	0.727	0.690	1.11	0.2914
	Overhill Dri	0.784	0.672	1.36	0.2438
	Purdue Ave.	0.677	0.428	2.50	0.1135
	Stratford Av	0.549	0.395	1.93	0.1645
	Teasdale Ave	0.425	0.406	1.10	0.2950
	Warren Ave.	0.542	0.460	1.39	0.2392
	Washington A	0.519	0.393	1.75	0.1862
	Waterman Ave	0.555	0.391	2.02	0.1556
	West Point A	0.818	0.716	1.31	0.2528
	West Point C	0.000	0.000	N/A	N/A
	-2 Log L=			757.31	
	c-statistic			0.65	
	Hosmer-Lemeshow test			3.1(p-value 0.92)	

Table 6: Hedonic Regressions with Selectivity Correction

	Bounded Influence Regression		Adding Heckman Correction			Standardized
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Difference in Estimate	Difference in Estimate
INTERCEPT	13.9161	1.6480	13.9452	1.67275	-0.0291	-0.018
HOA	0.1540	0.0198	0.1547	0.02105	-0.0007	-0.034
PRIVATE	0.0994	0.0253	0.0992	0.02537	0.0002	0.008
GATED	0.2284	0.0189	0.2282	0.01892	0.0002	0.011
ACRE	6.75E-01	1.25E-01	0.6752	0.12539	-0.0005	-0.004
STORY	1.14E-01	2.18E-02	0.1137	0.02183	0.0001	0.005
YRBLT	-0.0019	0.0009	-0.0019	0.00086	0.0000	0.000
ROOMS	-0.0006	0.0068	-0.0006	0.00678	0.0000	0.000
BEDS	0.0138	0.0100	0.0138	0.01003	0.0000	0.000
FAMILY	-0.0262	0.0134	-0.0263	0.01345	0.0001	0.007
REC	-0.0399	0.0169	-0.04	0.01696	0.0001	0.006
BATHFULL	0.0471	0.0114	0.0472	0.01144	-0.0001	-0.009
BATHHALF	0.0318	0.0110	0.0318	0.01101	0.0000	0.000
BATHADD	-0.0067	0.0121	-0.0068	0.01216	0.0001	0.008
TLA	0.0001	0.0000	0.0001	0.00002	0.0000	0.000
AGAR	0.0615	0.0188	0.0616	0.01887	-0.0001	-0.005
DGAR	3.51E-02	1.47E-02	0.0352	0.01477	-0.0001	-0.007
OLDSTYLE	-0.0023	0.0169	-0.0021	0.01705	-0.0002	-0.012
CAC	0.0082	0.0131	0.0086	0.01375	-0.0004	-0.030
SPOOL	-0.0118	0.0239	-0.0118	0.02389	0.0000	0.000
YREMO	0.0001	0.0000	0.0001	0.00001	0.0000	0.000
SALE1980	0.0925	0.0614	0.0923	0.06148	0.0002	0.003
SALE1981	1.30E-01	6.14E-02	0.1297	0.06149	0.0001	0.002
SALE1982	0.1608	0.06504	0.1609	0.06512	-0.0001	-0.002
SALE1983	0.2093	0.05674	0.2093	0.05679	0.0000	0.000
SALE1984	0.2435	0.05719	0.2434	0.05726	0.0001	0.002
SALE1985	0.3657	0.05954	0.3659	0.05962	-0.0002	-0.003
SALE1986	0.5526	0.06073	0.5526	0.06078	0.0000	0.000
SALE1987	0.6573	0.05684	0.6575	0.05693	-0.0002	-0.004
SALE1988	0.7966	0.05723	0.7965	0.05729	0.0001	0.002
SALE1989	0.7182	0.05855	0.7182	0.0586	0.0000	0.000
SALE1990	0.805	0.0573	0.8053	0.0574	-0.0003	-0.005
SALE1991	0.783	0.05512	0.7829	0.05518	0.0001	0.002
SALE1992	0.8373	0.05493	0.8373	0.05498	0.0000	0.000
SALE1993	0.9208	0.05551	0.9208	0.05556	0.0000	0.000
SALE1994	0.9457	0.05524	0.9458	0.05531	-0.0001	-0.002
SALE1995	0.9994	0.05637	0.9995	0.05644	-0.0001	-0.002
SALE1996	1.0956	0.05769	1.0957	0.05775	-0.0001	-0.002
SALE1997	1.0907	0.05423	1.0906	0.05429	0.0001	0.002
SALE1998	1.1696	0.05466	1.1696	0.05472	0.0000	0.000
MILLS*			-0.0118	0.11323		

*Inverse Mills Ratio (MILLS) computed from a probit regression of the probability of no sale on set of statistically significant covariates from Table 5