Big House, Little House: Relative Size and Value*

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Abstract

The paper examines how markets value relative house size in a neighborhood. The literature offers differing rationale: atypical houses in a neighborhood sell for less; the capitalization of property taxes penalizes larger houses and benefits smaller houses in mixed neighborhoods; and conspicuous consumption reinforces the value of relatively larger houses and reduces the value of relatively smaller houses to consumers. This paper is the first to test these alternative explanations of how neighborhood composition affects house value. The estimates reveal a dominant tax capitalization effect on price and marketing time that appears to over-ride any extant atypicality or conspicuous consumption effects.

Keywords: atypicality, capitalization, conspicuous consumption

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1 Introduction

Which does the market more highly value, the smallest house in a neighborhood of large houses or the largest house in a neighborhood of smaller houses? Real estate agents often give seemingly conflicting recommendations, arguing that the best deal is to buy into a nicer neighborhood by buying in the on the low end while also maintaining that buying the largest house in a neighborhood gives more house for the money. And regardless of one's personal view, casual conversation about the answer to this question will quickly illustrate the wide range of opinions that exists.

The academic literature also offers differing rationale on this point. One hypothesis attributable to Haurin (1988) is that atypical houses by definition do not fit the neighborhood and so are priced to sell for less; another, originally developed by Hamilton (1976), is that the capitalization of the property tax for a given public service bundle penalizes larger houses and benefits smaller houses in mixed neighborhoods, thereby leading to differential capitalization effects on each; and yet another is that conspicuous consumption reinforces the value of relatively larger houses and reduces the value of relatively smaller houses to consumers. While these separate hypotheses are not mutually exclusive, they do lead to different answers to the question of relative house size and value. Which, if any, of these notions corresponds to what we observe in the housing market?

This paper is the first to empirically examine these alternative explanations of how neighborhood composition affects house value. The study is motivated by the recognition that, while the underlying theoretical arguments generate differing comparative static predictions, the issue resolves to a simple empirical question: When comparing two otherwise identical houses, does the house surrounded by smaller houses sell for more or less than a similarly sized house in a homogeneous neighborhood? A similar question pertains to the value of houses that are smaller than those surrounding them.

The discussion is organized as follows. Section 2 summarizes the different hypotheses regarding the role of relative house size in the neighborhood context, focusing on how atypicality, fiscal capitalization, and conspicuous consumption each lead to alternative hypotheses about price and selling time differentials. The empirical analysis and results are discussed in section 3. Section 4 presents the conclusion.

2 Relative House Size and Price

In this section we summarize three alternative, though not mutually exclusive, rationale for how markets value house size relative to the surrounding neighborhood composition, atypicality, conspicuous consumption, and fiscal capitalization. Consider each, in turn.

Atypicality effect. The first model draws from Haurin's (1988) atypicality notion. Haurin's model offers and explanation for why houses with unusual attributes take longer to sell (Haurin, 1988; Jud, Seaks, and Winkler, 1996). Basically, there are fewer buyers who strongly prefer atypical houses (after all, that is why they are atypical) and so it takes longer to match these fewer buyers in the population with the atypical houses that are for sale. Our explanation here, however, abstracts from selling time to focus on price effects.

We take some liberties with Haurin's original formulation in order to cast the atypicality effect within a simple framework that can also be used to illustrate the effects of conspicuous consumption and fiscal capitalization. To begin, consider a particular neighborhood comprising a variety of house sizes. Suppose that the type of buyer most attracted to this neighborhood is the type of buyer who most prefers the average size house in the neighborhood j, $\overline{H_j}$. Let P denote this type of buyer's valuation of a particular house with size H, which may or may not differ from $\overline{H}_j$. The indirect utility function for this type of buyer is $V(P, \delta)$ where the difference in house size H from the average for the neighborhood is reflected in the parameter $\delta = H - \overline{H}_j$. The assumption of the atypicality model is $\partial V/\partial\delta \lesseqqgtr 0$ for $\delta \gtreqqless 0$, or equivalently

$$\frac{\partial V}{\partial |\delta|} < 0 \qquad (1)$$

so that both larger and smaller than average houses in the neighborhood (i.e., $|\delta| > 0$)

generate lower offers from typical buyers. The competitive pricing condition is

$$V(P, \delta) = U^o \tag{2}$$

where U^o is the buyer's opportunity cost, the expected utility from buying elsewhere in this or another market. To compare the value of a given house in a heterogenous neighborhood with an otherwise identical house in a homogenous neighborhood, implicitly differentiate the competitive pricing condition (2) and use the properties of indirect utility functions ($\partial V / \partial P = -H$). This yields the pricing effect of atypicality as

$$\frac{dP}{d\,|\delta|} = \frac{\partial V / \partial\,|\delta|}{H} < 0 \tag{3}$$

so that houses that are larger or smaller than typical for the neighborhood sell at a discount, as summarized in the first row of Table 1. Intuitively, if both larger and smaller houses in the neighborhood are considered atypical by potential buyers then it is harder to find buyers for such properties. We expect them to sell at a discount when compared with the same size houses in homogeneous neighborhoods, holding selling time constant.

Conspicuous consumption effect. The theory of conspicuous consumption also relates to the question of relative house size and value when applied to real estate. We note that this is the familiar "pride of ownership" effect associated with having the showcase house in a particular neighborhood, a pricing effect widely believed by real estate professionals.[1] This notion is popular among real estate professionals, we can construct an underlying economic rationale drawing from the ideas originally developed by Veblen (1899) and brought to the attention of mainstream economic literature by Leibenstein (1950). In the conspicuous consumption model, consumers obtain additional utility from demonstrating their (presumably) greater affluence by buying a house that is larger than surrounding houses. In terms of the capitalization model, the conspicuous consumption assumption is

$$\frac{\partial V}{\partial \delta} < 0 \tag{4}$$

[1] Interestingly, for such a widely held belief, this notion has largely escaped the attention of real estate scholars up until now.

Differentiating the competitive pricing condition (2) yields

$$\frac{dP}{d\delta} < 0 \tag{5}$$

This result shows that the greater values placed on the larger houses in a neighborhood further boost their market prices; the larger house in a neighborhood of smaller houses means $\delta > 0$ so that the larger house will sell at premium when compared with an otherwise identical house in a homogeneous neighborhood. The argument applies to smaller houses in the neighborhood as well; living in a relatively small house in a neighborhood of larger houses signals lower wealth in the conspicuous consumption model, thereby reducing the utility from such houses. As a consequence, a small house surrounded by larger houses means $\delta < 0$ and so, by (5), the small house will sell at a discount when compared with an otherwise identical house in a homogeneous neighborhood. This conspicuous consumption effect on price is summarized in the second row in Table 1.

Tax capitalization effect. Hamilton (1976) shows that the local property tax can also lead to price differentials for large or small houses in heterogeneous communities not observed for the same size houses in homogeneous communities. We label this the fiscal capitalization effect. Hamilton's original work stimulated a steady stream of criticisms, modifications, and extensions.[2] Because zoning restrictions or neighborhood covenants pertaining to house size are typically one-sided (e.g., minimum lot size or house living area), zoning or neighborhood covenants and deed restrictions do not lead to homogeneous neighborhoods. Hamilton's question is relevant to this study: How does the variety of house sizes in a given jurisdiction lead to differing capitalization effects when every household enjoys the same government services that are financed with the property tax? Although Hamilton's original formulation of the problem addresses variation in house size within a jurisdiction, the implications apply to variation in house size within a given neighborhood as well.

Initially assume that the bundle of government services supported by the property taxes, G, is the same for all households, regardless of the house size. We will discuss

[2] See Fischel (2001) for a discussion and review of the relevant issues raised in the subsequent literature.

below how differences in public service consumption across households in the same neighborhood affect our conclusions. Denote the property tax rate t and assume it is applied uniformly to all houses.[3] Adapting the above model to the fiscal capitalization question, assume that the buyer's utility for nonhousing consumption y and house H_i is $U(y, H_i, G)$. Assuming the money budget for household i is M_i, the utility for house H_i can be expressed as $U(M_i - (1+t)P_i H_i, H_i, G)$, where $(1+t)P_i$ is the gross-of-property tax unit price of house H_i. Following Hamilton (1976), assume that the jurisdiction has a fixed supply of built houses, n_i of size H_i. The property tax rate needed for government services G in the community with a mixed housing stock is, using superscript m to indicate market values in the mixed community is:

$$t^m = \frac{G}{\sum_i n_i P_i^m H_i} \tag{6}$$

At the same time, the property tax rate needed for the same level of government services in a homogeneous community comprising only H_i houses (the same number of houses as in the mixed community) is, using superscript i for values in this homogeneous property market:

$$t^i = \frac{G}{N P_i^i H_i} \tag{7}$$

where $N = \sum_i n_i$ is the total number of houses in the community. The competitive pricing condition for a buyer of a house type H_i in the mixed community is now

$$U(M_i - (1+t^m)P_i^m H_i, H_i, G) = U(M_i - (1+t^i)P_i^i H_i, H_i, G) \tag{8}$$

This pricing condition requires $(1+t^m)P_i^m H_i = (1+t^i)P_i^i H_i$ which, after substituting (6) and (7) and rearranging implies

$$(P_i^m - P_i^i)NH_i = 1 - \frac{P_i^m H_i}{\overline{PH}} \tag{9}$$

where $\overline{PH}$ is the average size house in the community with mixed housing stock. Note this result also implies that $\overline{P}$ is invariant between the community with mixed housing stock and homogeneous housing stock of $\overline{H}$. Thus, for the three sizes of houses

[3] It can be shown that differential effective tax rates favoring smaller houses, for example from homestead exemptions or property tax circuit-breakers, reinforce the capitalization relation derived below.

in the mixed community, $H_l > \overline{H} > H_s$, the above condition yields the relative unit price relationship

$$P_l^m < \overline{P} < P_s^m. \tag{10}$$

That is, large houses (H_l) have lower unit prices and small houses (H_s) have higher unit prices than the average house in the community with mixed house sizes.[4]

Intuitively, the greater taxable value of larger houses implies a greater effective property tax bill for comparable services. The capitalization of this net fiscal disadvantage for larger houses in the neighborhood leads to lower unit prices for relatively larger houses and higher unit prices for relatively smaller houses.[5] Further, the fiscal capitalization relation (10) can also be shown to hold within each neighborhood in the jurisdiction. *Thus, this fiscal capitalization model predicts that large houses have lower and small houses have higher unit prices than the average house in the surrounding neighborhood*, as summarized in the last row in Table 1.

The discussion to this point adopts the usual approach in the local public expenditure literature; the bundle of public goods G is exogenous to all but the politically pivotal household. Two variations are relevant to our main capitalization result. First, it is likely that consumers of different size houses value the public services differently. For example, those living in larger houses have more to protect from crime or fire and so may value a given level of police or fire protection more than individuals living in smaller houses. Nonetheless, the tax capitalization relation (10) does not require that all households value the public goods the same; it requires that the same public goods be *supplied* to each household.

But what happens if household consumption of the given public good varies with house size?[6] Suppose, for example, that families in larger houses have more children and so consume more education services than families in smaller houses.[7] In this case,

[4] This capitalization relation does not affect the usual house value relation: $P_l H_l > \overline{PH} > P_s H_s$ under the usual assumption that more housing is prefered to less, $\partial U / \partial H > 0$.

[5] This is the net fiscal disadvantage to larger houses that Henderson (1985), Miceli (1991), and others identify as motive for residents to adopt large lot or large house zoning.

[6] We are grateful to an anonymous reviewer for raising this education example as one possibility.

[7] An alternative might depict education consumption varying not with house size, but with the house configuration, e.g., the number of bedrooms. Nonetheless, the main point remains; variation in public good consumption across houses within a given neighborhood can lead to offsetting

we can model a given consumer's consumption of the public good, now denoted g, as a function of house size and the level of local government spending on the public good, G: $g = f(H, G)$. In the education example, G reflects the supply of education in terms of teacher quality and quantity, number of buildings and their sizes, etc. The public good consumption assumption unique to this example is $\partial f/\partial H > 0$. Replacing G with g in (8) yields

$$U(M_i - (1 + t^m)P_i^m H_i, H_i, f(H_i, G)) = U(M_i - (1 + t^i)P_i^i H_i, H_i, f(H_i, G)) \quad (11)$$

which can be expressed as the equivalent composite utility function

$$W(M_i - (1 + t^m)P_i^m H_i, H_i, G) = W(M_i - (1 + t^i)P_i^i H_i, H_i, G)$$

Employing this version of the capitalization condition along with (6) and (7) again gives the tax rate capitalization pattern identified in (10).

There are, however, public goods consumption technologies f that yield ambigous net fiscal capitalization effects.[8] In such cases, when public good consumption varies enough across house sizes it can reverse the tax rate capitalization pattern, generating a pattern like that associated with atypicality in Table 1. This clearly dilutes our ability to identify separate atypicality and public goods capitalization effects in the data. In light of this complication, we emphasize that, while the price effects pattern in the first row of Table 1 is consistent with atypicality, we are careful in our interpretations not to assert that the sign pattern is evidence of atypicality effects. Simlarly, regardless of one's maintained hypothesis regarding variation in public goods consumption across house sizes, empirical results consistent with (10) are nonetheless consistent with tax rate capitalization.

Time on the market. There are two margins upon which sellers can operate: price and marketing time. The steepness of the price and time on the market trade-off is market-specific and should also be expected to vary across the different phases of a single market as well. Sellers are nonetheless free to exploit any trade-off that might

capitalization effects.

[8] For the education example, suppose $g = f(H, G, S)$ where S is the total number of students in the jurisdiction and $\partial f/\partial S < 0$ reflects consumption congestion or binding capacity constraints.

exist in the market. Case and Shiller (1988), Genesove and Mayer (1997, 1999), Meese and Wallace (1993) and Stein (1995) argue that equity constrained or loss averse sellers may try to hold the line on their selling price. We expect that such behavior, should it occur, would dampen or eliminate observable effects of atypicality, conspicuous consumption, or tax capitalization on selling price. Downward price rigidity should not be as evident in the rising market. Nonetheless, even if price rigidity is pervasive we can ascertain how these factors affect the selling process; like Genesove and Mayer (1997), we expect binding downward rigidity in selling price to be reflected in a stronger effect on selling time. For example, if atypicality reduces the price of houses that are different from those in the surrounding locale (either larger or smaller), then sellers who adopt equity targets or similar rules of thumb that lead to downward price rigidity will have to endure longer selling times. Similar rationale applies to the effects of conspicuous consumption and fiscal capitalization; for sellers who insist on particular target prices, these effects are revealed in the marketing time for their properties.

In summary, we expect atypicality effects to lead to longer selling times for both the larger and smaller houses in a neighborhood than for similar houses in homogeneous neighborhoods, conspicuous consumption effects to lead to shorter selling time for larger houses and longer selling time for smaller houses, and tax capitalization to lead to longer selling time for larger houses and shorter selling time for smaller houses. Table 1 summarizes these relationships for each effect along with the expected price results.

3 The Empirical Results

3.1 The Data and Variable Definitions

The empirical study uses a sample of single-family, owner occupied, broker-assisted housing transactions undertaken in East Baton Rouge Parish, Louisiana. The data set covers 2111 transactions over the period January, 1992, through September, 1997. According to local real estate professionals, the Baton Rouge housing market's half decade of continual decline ended in 1988, with weak growth in nominal prices and little change in real prices over 1989-1992, trending into stronger real growth thereafter. Our sample period covers the rising phase of the local market cycle.

Parish governments in Louisiana are equivalent to counties in other US states. East Baton Rouge Parish is governed by a consolidated city-parish government, which minimizes the variation in public goods across locations in the sample. The school district is coterminous with the parish boundaries. During the sample period student were randomly assigned schools with parish-wide busing, thereby eliminating variation in expected school quality usually found across neighborhoods in other urban areas. A complete set of location dummy variables should pick up remaining locatio-specific price effects.

In order to further enhance the comparability and homogeneity of the houses, we restricted our attention to a large contiguous region within the urban area comprising approximately twenty five percent of the parish. This is a heavily residential area that accounts for roughly fifty percent of the broker-assisted single family house sales in the urban area during the sample period. We required that the sold property must have been purchased for cash or financed with a conventional mortgage, thereby avoiding introducing bias from below market financing arrangements. As a practical matter, our data source does not reveal the specific terms of alternative financing methods (other than their presence), so we cannot adequately measure their influence on price in any event. In addition, there is evidence that the prices of houses in new subdivisions may diverge significantly from the broader market until the new development reaches a critical mass (Sirmans, Turnbull, and Dombrow, 1997). Our sample avoids this pricing bias associated with new development by including houses in developments that are at least two years old. Finally, in order to avoid outlier influence on selling time estimates, our preferred model excludes from the sample houses that take more than nine months to sell, deleting approximately five percent of the total number of houses sold during the sample period.[9] Finally, we note that

[9] A Chow test rejects pooling the outlier sample (comprising houses with marketing times ranging from 9-12 months) with our sample of houses sold in 9 months or less. Given this conclusion, it is not surprising that many of the time on the market equation coefficients become insignificant when the sample is expanded to include marketing times up to one year.

the data does not identify houses that have been relisted after the expiration of an initial unsuccessful listing. Admittedly, this is a peculiarity common to virtually all studies relying on multiple listing service (MLS) sales data. Nonetheless, we do not know the extent or sign of any potential bias created by this factor.

Table 2 summarizes the means and standard deviations of the variables used in this study. All variables are drawn from or calculated from information provided in the MLS report of each sale. Sales price (*Sales Price*), the number of days on the market prior to sale (*DOM*), and the square footage of living area (*Livarea*) are drawn directly from the MLS reports. The market trend is captured by the transaction date as a monthly series (*Month*). The *Age* of the dwelling is calculated as the difference between the reported date of construction and the date of sale. The *Netarea* variable is defined as the difference between the total square footage under roof less the square footage of living area, and captures the size of storage or utility rooms without climate control, covered porches, carports, etc.[10] Binary variables indicate the MLS area and neighborhood/subdivision in which the house is situated (the sample covers 6 and 57 such designated locations, respectively). *Vacant* is a dummy variable for houses that are vacant when listed. The *Discount* variable is calculated as one minus the ratio of the selling price divided by the initial listing price.

The level of competition, measured by the number of competing houses for sale in the surrounding area, can also affect selling price and time on the market (Turnbull and Dombrow, 2005). The variables that measure this competition take into account both the number of days that the competing houses overlap on the market as well as the distance between them. Following Turnbull and Dombrow (2005), let $L(i)$ represent the listing date and $S(i)$ represent the selling date of house i so that the days on the market for house i is, $S(i) - L(i) + 1$. The days on the market for houses j and i is therefore

$$O(i, j) = \min[S(i), S(j)] - \max[L(i), L(j)] + 1$$

Even though our sample period is 1993-1997, we begin by mapping all of the houses

[10] The mild climate explains why carports are ubiquitous and traditional enclosed garages extremely rare in our sample.

sold over the 1983-1997 period for which we have data into geographic coordinates. We use the extended out-of-sample period to increase our coverage of existing houses included in our measure of competing houses in each neighborhood.[11] *D(i,j)* denotes the distance in miles between houses i and j. A competing house is defined as one that is 20 percent larger or smaller in living area than the house for sale. The set of competing houses for sale within one mile of house i is $I(i) \equiv \{j|D(i,j) \leq 1\}$. Using these definitions, the measures of competition from surrounding houses are

$$\begin{aligned} Comp_i &= \sum_{j \in I} (1 - D(i,j))^2 O(i,j) \\ Avgcomp_i &= \sum_{j \in I} \frac{(1 - D(i,j))^2 O(i,j)}{S(i) - L(i) + 1} \end{aligned}$$

These variables control for the window of opportunity to buyers who might be interested in any of the competing houses. They avoid counting as competition for the whole marketing period of house i those houses that sell before house i sells. The distance weighting reflects the assumption that houses farther away represent weaker competition than those located closer to house i. The *Comp* variable measures the cumulative competition from other houses (in house-days) over the entire marketing time for a given house. *Avgcomp* measures the average intensity of competition, as an average of competing house-days per day of time on the market.[12]

The *Newlist Comp* variable measures the competing newly listed houses (14 days or less), and is defined similar to *Comp* but for newly listed houses instead of all surrounding listings.[13] *Avgcomp Newlist* is similarly defined, following *Avgcomp.* Competing vacant houses are similarly measured by the variables *Vacant Comp* and *Avgcomp Vacant.* The construction of the competition variables includes all relevant

[11] Thus, any house that was not sold during 1983-1997 is not included in our constructed geographic picture of neighborhood composition.

[12] Motivated by the approach taken by Goodman and Thibodeau (2003), we also tried an alternative measure of competing houses in the neighborhood where competing houses were defined as houses with sales prices within a band 20% higher or lower than the house for sale. Our conclusions remain unaltered, which is not surprising, given the correlation between house size and price. In any case, the endogeneity issues associated with this alternative approach prompt us to use the Turnbull-Dombrow measure as the prefered approach.

[13] The 14 day window definition for a new listing corresponds with the time frame used for the separate new listings section of the bi-monthly MLS books that are used by the local Realtors. Similar results were also obtained from both modestly shorter and longer time frames.

out-of-sample house sales, that is, houses that are not in our estimation sample but are in areas bordering geographically on our sample areas as well as houses listed before or after the sample time period but with market times overlapping into our sample period.

The variables of central interest to this study are those that measure the size of the house relative to other houses in the immediate neighborhood. Indexing all houses within a one half mile radius of house i by J, the standardized measure of the relative house size is

$$Localsize_i = \frac{Livarea_i - \sum_{j \varepsilon J} Livarea_j/N_i}{\sum_{j \varepsilon J} Livarea_j/N_i}$$

where N_i is the number of surrounding houses in the neighborhood J. In order to capture the relative size effects on sales price, we define the relative size variables $Larger_i$ and $Smaller_i$ as the absolute values of the positive and negative values of $Localsize_i$ respectively:

$$\begin{aligned} Larger_i &= |Localsize_i| \text{ for } Localsize_i > 0 \\ &= 0 \text{ otherwise;} \\ Smaller_i &= |Localsize_i| \text{ for } Localsize_i < 0 \\ &= 0 \text{ otherwise.} \end{aligned}$$

Note that these relative size variables are not dummy variables, but are continuous variables. Our construction allows for the asymmetric size affects on price predicted by both the conspicuous consumption and fiscal capitalization hypotheses. Using the absolute value means that the variable *Smaller* is always nonnegative, a point to note when interpreting the empirical results below.

3.2 The Estimates

We estimate the effects of competing neighborhood listings on prices and marketing time using a simultaneous system utilizing a hedonic price model and a days-on-market equation. The specifications of the simultaneous system are reported in Tables 3 (for the price equations) and Table 4 (for the days-on-market equations).

The specifications are based on forms popular in the literature. As reported in the tables, sales price is a function of days on the market, house characteristics, neighborhood/location characteristics, and seasonality and time trends to capture the broad market conditions. We add to the model variables capturing neighborhood market conditions to control for an important source of spatial correlation and, of course, variables to capture house size relative to surrounding houses. The days on market equation is a function of sales price, house characteristics, neighborhood/location characteristics, and seasonality and time trends, plus variables to capture neighborhood market conditions and relative house size. The 2SLS estimates reported in Tables 3 and 4 take into account the endogeneity of price and marketing time.

We report the estimates for two models, one using dummy variables for five of the six MLS areas in the sample to control for relative location effects and one using dummy variables for 56 of the 57 subdivisions in the sample as location controls. In the price equations for both models reported in Table 3, the log of sales price is explained by the marketing time (*DOM*), house characteristics (*Livarea*, *Netarea*, *Age*, and their squares), location (subdivision or MLS area dummy variables), time trend (*Month*, $Month^2$), season dummy variables (*Summer*, *Fall*, *Winter*), competing listings in the neighborhood for each day the house is listed (*Avgcomp*, *Avgcomp Newlist*, and *Avgcomp Vacant*), and the variables indicating the size of the house relative to others in the surrounding neighborhood (*Larger*, *Smaller*, and their squares). In the days on the market (*DOM*) equations for both models reported in Table 4, the *DOM* is a function of the sales price (*lnPrice*), location (subdivision or MLS area dummy variables), variables reflecting housing market condition (*Month*, *Discount*, and their squares), season dummy variables (*Summer*, *Fall*, *Winter)*, the amount of competition from other houses in the neighborhood (*Comp*, *New Comp*, and *Vacant Comp*), whether the house is vacant or not, and the relative house size variables (*Larger*, *Smaller*, and their squares).

It is worthwhile at this point to note that *Avgcomp*, *Avgcomp Newlist*, and *Avgcomp Vacant* appear in the price equation but not in the *DOM* equation. The *Comp*, *New Comp*, and *Vacant Comp* variables are included in the *DOM* equation instead in order to avoid complications introduced by the fact that *Avgcomp*, *Avgcomp Newlist*, and *Avgcomp Vacant* include a measure of days on the market in the denominators. The methodological advantage of having to use these different competition measures in the two equations is that it ensures identification of both in the simultaneous system.

The estimated price equations reported in Table 3 exhibit the usual types of parameter estimates for house characteristics, market trend, and seasonality. In both models living area is more valuable than net area and older houses sell for less. The trend estimates show the housing market is indeed in a growth phase during our sample period; consistent with other external indicators. Selling price declines with longer marketing time in this phase of the market. Following Turnbull and Dombrow (2005), the *Avecomp* coefficient estimate reveals how local competition from surrounding houses for sale at the same time as a given house tends to affect sales price. This price effect is not significant. The negative coefficient on *Avgcomp Vacant* shows that competition from surrounding vacant houses tends to reduce sales price, while the positive *Avgcomp Newlist* coefficient reflects the shopping externality effect of surrounding newly listed houses, which attract more buyers to the neighborhood.

The relative size variables are the main variables of interest in this study. In Table 3 we find a negative coefficient on *Larger*, which indicates that larger houses in a neighborhood of smaller houses sell at a discount relative to large houses in large house neighborhoods. At the same time, the positive coefficient on *Smaller* indicates that smaller houses in a neighborhood of larger houses sell at a premium relative to small houses in small house neighborhoods. The quadratic term on this variable reveals that this price premium increases at a decreasing rate as the disparity between the small house size and its neighbors increases. Referring to Table 1, these *Larger* and *Smaller* price effects estimates are not consistent with Haurin's atypicality nor are they consistent with Veblen's conspicuous consumption. They are, however, consistent with Hamilton's fiscal capitalization hypothesis.

Turning to the *DOM* equations, the estimates reported in Table 4 show familiar patterns with respect to the standard variables in marketing time equations. Living area by itself does not appear to affect marketing time. Older houses take longer to sell in the subdivision model but not in the MLS area model. As in the price equation, summer is the hot season, with houses taking significantly shorter to sell than the other seasons. Fall and spring yield faster sales than winter, but not as fast as summer. A greater discount from selling price significantly increases marketing time in both models; this is consistent with the widely accepted notion that a higher asking price reduces the relative attractiveness of a house to searching buyers even when sellers are willing to offset their higher asking price with a greater discount. Vacant houses do not show as well as occupied houses and take longer to sell in our sample. Increasing the number of competing houses, whether new, stale, or vacant, tend to increase selling time of a given house.

The main variables of interest in the marketing time equations are the relative size variables. In both models we find that relatively larger houses in a neighborhood of smaller houses have the same marketing time as houses in homogeneous neighborhoods. On the other hand, both equations also reveal that smaller houses in mixed neighborhoods sell more quickly than their counterparts in homogeneous neighborhoods. The insignificant larger house effect on marketing time is not informative by itself. Nonetheless, we note that it does not contradict the concomitant fiscal capitalization price effect identified in Table 1. The small house effect on *DOM* is much more definitive even without considering the price effect discussed earlier. It is clearly inconsistent with both atypicality and conspicuous consumption, but is consistent with fiscal capitalization.

When taken together, the marketing time and price effects of relative house size are consistent with fiscal capitalization. While we cannot rule out the presence of atypicality or conspicuous consumption, we can conclude that, if they are present, they appear to be overshadowed by a stronger fiscal capitalization effects on prices and selling time in our sample.

4 Conclusion

This paper studied how relative house size affects selling price and marketing time. We drew upon three separate effects identified in the literature: atypicality, conspicuous consumption and fiscal capitalization. As summarized in Table 1, Haurin's

(1988) atypicality theory leads to lower prices for unusually large and small houses in the neighborhood and/or longer marketing times. The conspicuous consumption theory leads to higher prices for larger houses and lower prices from smaller houses in the neighborhood and/or shorter and longer marketing times, respectively. The fiscal capitalization theory leads to lower prices for larger houses and higher prices for smaller houses in the neighborhood and/or longer and shorter marketing times, respectively.

We used data on house sales from a single local government jurisdiction to examine these hypotheses. Of the three theories examined, the estimates are consistent with fiscal capitalization effects on both prices and selling time. Although our results cannot be used to categorically rule out atypicality or conspicuous consumption or other theories that have not been considered, the estimates clearly reveal that if these forces are present, they are dominated by local government fiscal capitalization effects.

The empirical evidence offered here, of course, pertains to one only market. There is always a need for additional empirical studies to see the extent to which relationships generalize to other locales and market phases. Nonetheless, this sample is drawn from a housing market that has been the subject of much academic study and we have no reason to reject the results as unique to this locale. It is worthwhile to emphasize that our sample market and time period presented a special opportunity with particular advantages to this study, a special opportunity that might be difficult to replicate in other markets. The unified parish government and the random school assignment policy of the coterminus parish-wide unified public school district minimizes location variation in the bundle of public goods provided to different neighborhoods in the sample. After the end of our sample period in 1997 the parish school district instituted a more traditional attendance zone method of identifying specific neighborhoods with specific schools. In 2000 the parish-wide school district began the process of deconsolidating into three independent districts. This sequence of changes in local school systems doubtlessly introduces complicated capitalization effects on house values, a subject by itself worthy of focused study. Given the well-known difficulties of empirically controlling for school quality capitalization in house prices (Black, 1999), the post-1997 changes experienced in Baton Rouge would likely influence the relative size-price relationship in unpredictable ways, making the results more difficult to interpret in terms of the three relative size hypotheses examined here.

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