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Neighboring house transaction response to assisted living facilities and nursing homes

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ABSTRACT

Senior group housing that offers services signals that its residents may have physical and/or cognitive limitations, which may be viewed as a neighborhood disamenity. Buyers may discount house values near senior living homes due to negative perception of the residents, the structure, or negative impact. We employ a system of equations to examine the influence of assisted living and nursing homes on single-family house sales prices and time-on the market in Florida. The results indicate that the presence of a senior group home, especially a nursing home, within one-half mile has a significant negative effect on single-family house prices, reducing house price by almost 10%. If the facility is a nursing home, the negative influence on price is even greater. The effect is most evident in neighborhoods with few elderly residents. A clustering effect is present in non-distressed sales. The scale of a nearby senior group home contributes to a longer marketing duration

KEYWORDS

House price; time-on-the market; senior housing

Introduction

Group housing facilities may affect surrounding single-family residential values either positively or negatively due to the type of residents they house, their scale in relation to the neighborhood and the facilities' appearance. Seniors housing developments that offer services to help with activities of daily living or health (such as assisted living facilities and nursing homes) signal that they house residents with physical and/or cognitive limitations. In addition, senior housing may be indistinguishable from other group facilities that house residents with emotional, mental or drug related problems as well as those that house former criminals. Group homes of all types operate at a higher density than traditional single-family housing. Purpose-built facilities may resemble rental multi-family buildings or institutions rather than the surrounding single-family residential structures.

Single-family houses can be converted to residential care homes that house a limited number of residents without changing the exterior of the structure and maintaining consistency with the neighborhood appearance.

The provision of a range of housing alternatives at the neighborhood level supports public policies whose goal is to allow seniors to age integrated within their communities as much as possible (Rosenberg & Everitt, 2001). In the United States, state regulatory agencies control the licensing and operation of these facilities, but local governments control their location through land use regulations. These local bodies determine in which neighborhoods to allow these facilities as well as the acceptable scale. Opposition may arise because of ageism by which younger people attempt to protect their self-image and avoid reminders of their mortality by applying negative stereotypes to older adults, distancing themselves from the threat of becoming frail and dying (Nelson, 2005). Ageism as well as concern about development affecting safety, traffic congestion, density, neighborhood appearance, service cost and property values can lead to protests of 'not in my backyard' (NIMBY), which can pressure regulators to directly or indirectly exclude senior group homes from residential neighborhoods (Kling, 2002; Scally, 2012).

In 2014, an estimated 1.16 million Americans of 65 years and older resided in 15,600 nursing homes and 776,000 in 30,200 residential care communities (assisted living, personal care homes, adult care homes, board care homes and adult foster care) (Harris-Kojetin et al., 2016). Although the share of the population of 65 years and older residing in nursing homes has been declining in recent decades, the proportion residing in other residential care facilities such as assisted living has been growing. The number of people aged 65 years and older is projected to more than double from 40.3 million in 2010 to 83.7 million in 2050, increasing the proportion of the American population aged 65 years and older from 13.0 to 20.9%. Countries throughout the world are experiencing similar demographic shifts. Although 50 countries had a higher proportion of people aged 65 years and older than the United States in 2010, by 2050, 98 countries are expected to have older populations than the United States (US Census Bureau, 2014).

Researchers in Asia, Europe and North America are examining the changing preferences and likelihood of elderly residents to move, including various types of seniors housing (Abramsson & Andersson, 2016; Bloem et al., 2008; Bohle et al., 2014; Peace et al., 2011; Robison et al., 2014; Weeks et al., 2012). Despite technological innovations that could improve the ability of residents to age in place in their own homes (Barlow & Venables, 2004), the demand for seniors housing will likely grow. Communities will increasingly be approached with applications to build or convert buildings to provide group housing for older residents.

To explore whether homebuyers value group homes for the elderly in close proximity to their houses, we employ a system of equations to examine the influence of assisted living and nursing homes on single-family house sales prices and time-on-the market in one Florida community. Florida has long been a popular destination for active early retirees, which has resulted in an older population who are the target for assisted living, nursing home and life care communities despite the residents' relatively low disability rate (Smith et al., 2012). Florida has the highest percentage of residents aged 65 years and older in the United States at about 17.3% in 2010 (US Census Bureau, 2014). Thus, Florida

communities have experienced longer and stronger demand for the development of neighborhoods that allow retirees to age in place. It, therefore, affords the opportunity to examine the effect that land use policies and the development of group homes for the aged has on neighborhood house prices. While some of the earlier studies on group homes examine several type of housing including rehabilitation homes, our study focuses on facilities that primarily house seniors. In addition, our approach overcomes some of the limitations of the previous analysis of the influence of group homes on house values by incorporating greater neighborhood controls, examining a larger number of transactions, and accounting for time-on-the-market.

Background

Research on the house price influencing both positive and negative neighborhood externalities is well established. A hedonic approach is often used to isolate the relative contribution of individual neighborhood characteristics to house prices negotiated between buyers and sellers. Among the types of developments that have been examined for the effect of proximity are correctional facilities, abandoned buildings, churches, schools, retail and commercial buildings (summarized in Sirmans et al., 2005), as well as subsidized housing for low-income residents (such as Deng, 2011; Santiago et al., 2001; Schwartz et al., 2006), mobile home parks (Munneke & Slawson Jr., 1999), multi-family rental apartments (Grether & Mieszkowski, 1980; Song & Knaap, 2004) and architecturally significant houses (Ahlfeldt & Mastro, 2012). Some neighboring uses tend to influence house prices positively and others negatively.

In one of the first studies of the influence of group homes on the surrounding housing market, Farber (1986) uses just 74 house sales to compare transaction prices within 1200 feet of nine group homes for the mentally disabled or emotionally disturbed in Shreveport-Bossier City, Louisiana with transaction prices in neighborhoods without group homes. All the group homes in the study were converted into single-family residences. Farber finds no effect of a group home on housing prices in high socioeconomic markets; however, the group home in these neighborhoods may have increased the time on the market. When group homes were located in below average socioeconomic areas where housing markets were weak, there was a significant increase in the price of houses sold nearby. These results suggest that the surrounding price increases were due to the conversions improving the quality of the structures rather than the type of group housing. Both the time-on-the-market effect in the high socioeconomic market and the price effect in the below average socioeconomic market diminish with straight line distance from the group home.

Galster and Williams' (1994) study produces mixed results. Four single-family and duplex dwellings converted to group homes for up to three severely mentally disabled tenants each in Newark and Mt. Vernon, Ohio, show no significant influence on sales prices of single-family houses within two blocks. In contrast, prices of homes proximate to newly constructed apartment complexes of one to two buildings with up to five apartments each for similar tenants were 40% lower near two of the complexes, whereas prices were unchanged near three other similar apartment complexes. Thus, it is difficult

to discern from this study whether scale of group facilities is relevant to understanding their price effect on neighboring properties.

A later study (Colwell et al., 2000) finds single-family houses experience a decline in value following the announcement of a group home for mentally handicapped tenants within sight or 200 feet. The results are based on a sample of 641 sales in an Illinois community with seven group homes. This implies a negative effect for the closest properties' prices.

Galster et al.'s (2004) examination of 11 Colorado special care homes for residents with physical, mental or behavioral disabilities includes one senior special care home with eight beds and one personal care boarding home with four beds. The homes were located in previously vacant, sometimes deteriorated properties in lower value or declining neighborhoods. Overall, they find a positive price effect within 1001–2000-foot rings around the sites; however, they do not separate out the senior special care home for individual evaluation. In addition, the price effect of the property renovations cannot be isolated from the group home use occupying the site.

Three studies that focus on subsidized group housing's effect on surrounding house prices produced mixed results. Funderburg & MacDonald (2010) find a short-lived increase in appreciation rates of housing located within one-half mile of newly constructed units (including assisted living) for elderly tenants in Iowa. They suggest that the positive effects are partially attributable to the developments being buffered from surrounding single-family houses. An earlier study (Carroll & Claretie, 1999) considers three public housing projects designated for elderly tenants. The results indicate that the projects have an initial negative impact on nearby house prices, but the effect is neither substantial nor long lasting. Rabiega et al. (1984) employ a simple regression that reveals little price effect from new elderly subsidized multi-family rental apartments on 208 single-family house transactions in Portland, Oregon.

To help understand the reason why group homes may have a negative effect on neighborhood house prices, Gerdner & Borell (2003) surveyed Swedish neighbors about their opposition to group homes for children, adolescents and adults with various social, emotional, psychiatric or substance abuse-related problems. The fears expressed by neighbors mostly center around general feelings of insecurity, fear of increased damage to property and criminal offenses, a drop in real estate values and the fear of more drugs and negative role models for the youth of the community. It is unclear if any such fears would extend to seniors housing that may contain memory units to house elderly residents with dementia; however, interviews with residents of a continuing care retirement community reveal that those living in independent units tend to avoid visiting friends who have moved to the assisted living or dementia care units (Hrybyk et al., 2012).

The studies of other types of housing that could be considered detrimental to the neighborhood have shown that not only the presence, but number or concentration of units can exacerbate the negative price effects. Galster et al. (1999) find a positive price effect associated with a small number of subsidized housing sites within 2000 feet of single-family houses that becomes negative when a certain threshold is reached. Evidence suggests that impacts of subsidized rental properties on owner-occupied house prices are often subject to cluster and threshold effects, and hence the effect can be expected to become significant only when a critical threshold in the area is reached or when a

significant number of sites cluster in the area. The critical point of these threshold effects is not constant across space but is context specific (Koschinsky, 2009).

Thus, the previous research shows little, if any, systematic and long-lasting influence of a variety of types of group homes on surrounding single-family houses. The group homes considered are generally few in number with a correspondingly small number of transactions available for analysis. Meanwhile, surveys indicate that seniors housing that caters to the frail may carry a negative stigma that could make living nearby undesirable even for other seniors. The studies of the price influence of mixing other types of housing into single-family neighborhoods have produced mixed results that may be subject to cluster and threshold effects. Analysis for a larger number of transactions taking place in an area that contains numerous group housing facilities for seniors may provide clearer results.

Method Model


The housing market consists of sellers and buyers dealing in bulky, high cost heterogeneous goods that require expensive and time-consuming searches to match buyers' preferences with available units at an agreeable price. Potential buyers must trade off the cost of an identified house with the cost of continued search and potential discovery of an alternative that provides greater utility. The seller must decide between accepting an offer or the cost of rejecting the offer and waiting to see if a better offer will emerge. Therefore, search and matching models of the housing market envision price and selling time as jointly determined outcomes so that various market and property characteristics lead to combined price and selling time effects. This argues for taking simultaneous selling time effects into account when conducting empirical hedonic price analysis.

A common way to estimate real estate prices is to employ the standard hedonic pricing model proposed by Rosen (1974). The hedonic model must be modified to incorporate the impacts of the various market imperfections on house price. One way of accounting for the impact of the search process on simultaneous determination of house selling price and selling time is to estimate a system of equations for selling price and marketing duration. A fundamental econometric problem arises, however, because the theory implies that both price and selling time are simultaneously determined by identical factors.

The empirical structure used in this study follows Turnbull & Zahirovic-Herbert (2012), framing the model with the structure implied by applied consumer demand theory; that is, the seller utility maximization model yields the seller's choice of expected sales price and selling time as functions of the same set of variables (seller preferences, property characteristics and market conditions).

Assuming a semi-log form¹ for expected sales price and for expected selling time, then adding the jointly distributed stochastic errors e_p and e_s , the realized sales price and marketing duration are:

$$\ln P_i = \alpha_0 + \alpha_1 x_i + e_p \quad (1)$$

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$$\ln s_i = \beta_0 + \beta_1 x_i + e_s \quad (2)$$

As the mathematical structure of this problem is similar to the consumer's problem in demand theory, which produces demand equations that are functions of the same variables, the sales price and selling time, Eqs. (1) and (2), are also the functions of the same set of variables for the seller search problem, summarized here as the vector x . Price and selling time are co-determined, which implies that the error terms can be correlated across the equations, which requires the two equations to be estimated as a seemingly unrelated system. The vector x can be expanded to capture all relevant variables that contribute to sales price and selling time.

The sales price of a single-family house is a function of a series of structural, locational and time-specific attributes as well as financial characteristics relevant to sales conditions during the study period (Malpezzi, 2003). The physical characteristics of the house and lot included are shown to have a systematic and significant relationship with house price in the previous studies (Sirmans et al., 2005; Zhang et al., 2016). We also include broader neighborhood characteristics and local market conditions along with our variables of interest, the location relative to senior housing. Because of the recent recession and recovery, controls are needed to account for the influence of foreclosure status on sales price. The model must also control for changing economic conditions and unobserved neighborhood characteristics. The resulting model is:

$$\ln \text{Price}_i = \alpha_0 + \alpha_1 S_i + \alpha_2 H_i + \alpha_3 N_i + \alpha_4 F_i + \alpha_5 T_i + \alpha_6 C_i + e \quad (3)$$

$$\ln \text{SellingTime}_i = \beta_0 + \beta_1 S_i + \beta_2 H_i + \beta_3 N_i + \beta_4 F_i + \beta_5 T_i + \beta_6 C_i + e \quad (4)$$

where S represents the measures for nearby seniors housing, the focus of the study; H represents a vector of house structural characteristics (including the lot); N signifies specific neighborhood and local housing market characteristics; F provides foreclosure related measures; T is a time trend variable for month and year of sale; and C provides fixed effects for geographic location.

Variables

The dependent variables in this model are the natural logarithm of house transaction price and selling time. We create a series of variables to examine the influence of the presence of group housing for seniors on single-family house transactions. Consistent with the distance of price influences found in the previous studies on group housing (Carroll & Claretie, 1999; Funderburg & MacDonald, 2010; Galster et al., 2004; Rabiega et al., 1984), we draw circle with a radius of one-half mile around each transaction to create a dummy variable that indicates if any nursing home or assisted living facility is located within that radius (GroupHome).² To account for the variety in type of facility and scale, we use a dummy variable to identify whether the closest facility within the circle is a nursing home or assisted living facility and a continuous measure of the number of beds/residents the nearest facility can house (SizeNearGroupHome). As a measure of

concentration of group homes in a neighbourhood, we calculate the number of assisted living and nursing homes within the circle (NumGroupHomes). As older residents may have a different opinion about the desirability of having alternative senior housing options nearby, there could be some age-related neighborhood selection effects, and hence we create a variable to measure the interaction of the presence of a facility within one-half mile and the percentage of the census tract population aged 65 years and older (GroupHomexAge65). Variables used in the analysis are defined in Table 1.

House size is measured by the natural logarithm of the number of square feet of heated space (SFHeated), number of bedrooms and number of full and half bathrooms (BathsFull; BathsHalf). The age of the house as well as age squared (AgeSq) are included. To account for house and lot amenities, we identify the presence of a fireplace, home security system, garage, swimming pool and deeded access to water. The size of the lot is grouped into categories.

We use a model similar to Turnbull et al. (2006) to capture the atypicality effect. We create two variables that calculate the magnitude to which the subject house is larger or smaller than the average living area in the houses for sale in the surrounding neighborhood. We index all houses within a one-quarter mile radius of house i by J . The standardized measure of relative house size is:

$$\text{LocalSize}_i = \frac{\text{LivingArea}_i - \frac{1}{N_j} \sum_{j \in J} \text{LivingArea}_j}{\sqrt{\frac{1}{N_j} \sum_{j \in J} (\text{LivingArea}_j - \frac{1}{N_j} \sum_{j \in J} \text{LivingArea}_j)^2}} \quad (5)$$

where N_j is the number of surrounding houses in the neighborhood J . To allow for asymmetric relative house size effects on selling 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.

$$\text{Larger}_i = \begin{cases} \text{LocalSize}_i & \text{if } \text{LocalSize}_i > 0 \\ 0 & \text{if } \text{LocalSize}_i \leq 0 \end{cases} \quad (6)$$

Table 1. Variable descriptions.

Variable	Description
Dependent variables	
Price	Sales price in US dollars
SellingTime	Number of days between listing contract and closing
Senior group home measures	
GroupHome	Nursing home or assisted living within $\frac{1}{2}$ mile (Yes/No)
NumGroupHomes	Number of nursing homes and assisted living within $\frac{1}{2}$ mile
NursingHome	Nearest facility within $\frac{1}{2}$ mile is nursing home (Yes/No)
SizeNearGroupHome	Number of licensed beds in nearest facility within $\frac{1}{2}$ mile
GroupHomex65	Interaction term of nursing home or assisted living within $\frac{1}{2}$ mile and percentage of the census tract population aged 65 years and older

House characteristics

SFHeated	Heated space in house in square feet
Age	Years since house constructed
Bedrooms	Number of bedrooms
BathsFull	Number of full bathrooms
BathsHalf	Number of half bathrooms
Fireplace	At least one fireplace (Yes/No)
HomeSecurity	Home security system (Yes/No)
Garage	At least one-car garage (Yes/No)
SwimPool	Private swimming pool (Yes/No)
WaterAccess	Deeded access to water such as lake (Yes/No)
LotQrtToLessHalfAcre	Lot $\frac{1}{4}$ to less than $\frac{1}{2}$ acre (Yes/No)
LotHalfToLessOneAcre	Lot $\frac{1}{2}$ to less than 1 acre (Yes/No)
LotOneToLessFiveAcre	Lot 1 acre to less than 5 acres (Yes/No)
Smaller	Negative deviations from the local mean living area (heated)
Larger	Positive deviations from the local mean living area (heated)
Neighbourhood and local market conditions	
CommunityPool	Community swimming pool (Yes/No)
HOA	Home Owners Association (Yes/No)
MallDistance	Distance to shopping mall in miles
ListingDensity	Index of competing listings weighted by days
Competition	Index of competing listings
Foreclosure measures	
BankOwned	Bank owned (Yes/No)
ShortSale	Short sale (Yes/No)

$$\text{Localize}_i = \begin{cases} 0 & \text{if } \text{Localize}_i \geq 0 \\ \text{Localize}_i & \text{if } \text{Localize}_i < 0 \end{cases} \quad (7)$$

Following Turnbull and Dombrow (2006), an atypical house is defined as one that is at least 20% larger or smaller in living area than the average house for sale in the neighborhood. Financial conditions surrounding foreclosures are accounted for by whether the sale is a bank-owned house or short sale.

Neighborhood amenities are composed of community pool and homeowner's association (HOA). Distance to the major shopping mall in the county is included as a locational variable. Turnbull and Dombrow (2006) present how local market conditions that measure spatial competition and externality effects can be applied to the housing market and, hence, control for local supply conditions in estimating price and selling time equations. For example, the sales price is explained, in part, by the concentration of competing listings in the neighborhood. The previous studies find that neighborhood competition variables such as these are typically significant in market outcomes (Turnbull & Dombrow, 2006; Turnbull et al., 2006; ZahirovicHerbert & Turnbull, 2008). To account for this influence, the price equation incorporates a measure of listing density and the selling time equation employs a modified measure of localized competition. These measures for each house are as follows:

$$\text{Listing Density}_i = \frac{1}{s_i - l_i} \sum_{j: |D(i,j)| \leq \frac{1}{4} \text{ mile}} \frac{1}{O(i,j)} \quad (8)$$

$$\text{Competition}_i = \frac{1}{s_i - l_i} \sum_{j: |D(i,j)| \leq \frac{1}{4} \text{ mile}} \frac{1}{O(i,j)} \quad (9)$$

Here, $l(i)$ and $s(i)$ are the listing date and sales date for house i , respectively, so that selling time is now, $s(i) - l(i)$. $D(i,j)$ is the distance in miles between houses i and j . $O(i,j)$ represents the overlapping marketing time for contemporaneously listed houses i and j , and is defined as: $\min(s_i - l_j, s_j - l_i)$.

Houses with overlapping listing periods located within one-quarter mile and not more than 20% larger or smaller than the subject house are used to calculate these measures of competition.

Similar to Greenstone & Gayer (2009), we choose a fixed effects approach to overcome omitted variables bias. Fixed effects analysis controls for omitted variables by including a large set of dummy variables for small groups of observations, in our case, observations that are within a small geographic area. These dummy variables pick up the effects of any time-invariant unobserved variables on house prices, allowing for unbiased estimates of

any remaining variables that differ either among houses within the chosen scope of the fixed effects or over time.

Data

Multiple listing service data for single-family detached house transactions in the cities of Lake Mary, Longwood, and Sanford, as well as in parts of unincorporated Seminole County, Florida is used in the analysis. Seminole County is part of the greater Orlando metropolitan area. Approximately, 12% of its residents in 2010 were of 65 years or older (US Census Bureau, 2018), a lower proportion than in the statewide population. The sales took place between 2008 and 2016, from the bottom of the economic cycle through the recovery period. The volume of house sales in the area and single-family house median sales price declined until 2011 and then steadily climbed during this period but remained below the peak previously reached in 2006 (Florida Housing Data Clearinghouse, 2018).

The Florida Agency for Health Care Administration provides the location and number of beds in each nursing home and assisted living facility with complete records on licensing since 2010. The study area within Seminole County contains 21 facilities that were operating within one-half mile of a house sale during the study period – 5 nursing homes and 16 assisted living facilities.³ The assisted living facilities range in size from 5 to 220 licensed beds with an average of 75, whereas the nursing homes contain from 114 to 240 licensed beds with an average of 143.

Assisted living facilities and nursing homes are defined and licensed by the State of Florida. An assisted living facility provides meals, personal care and supportive services in a residential setting for five or more disabled or older adults. To reside in a standard facility, a person must meet residency criteria, which means they cannot have conditions that require 24-h nursing supervision. Nursing homes are residential facilities where a person lives or where a person can stay temporarily for respite care or recuperation. Services include 24-h a day nursing care, personal care, meals, therapy and social activities. A doctor must authorize a nursing home admission.

In addition to obtaining an operating license from the State, assisted living facilities and nursing homes must abide by location restrictions and permitting requirements in local land use ordinances. In unincorporated Seminole County, assisted living facilities are allowed in agricultural as well as residential zoning districts (including single family), whereas nursing homes are allowed only in multiple family, commercial and office districts. The Board of Adjustment is directed to avoid approving permits for assisted living facilities that would create an overconcentration and inadvertently create an institutional setting in a neighborhood. In Lake Mary, adult congregate living facilities and nursing homes are allowed in multiple family, commercial, industrial and the downtown center district. In Sanford, the location restrictions depend on the size of the residential facility. Assisted living facilities housing up to six residents are allowed in all residential as well as mixed use, commercial, agricultural and planned development districts, whereas those with seven or more residents and nursing homes are not allowed in single-family districts. Sanford also attempts to prevent concentrations of group homes through the permitting process. Longwood allows group homes in all residential as well as neighborhood commercial mixed-use districts, but with restrictions on size and

requirements for buffering for larger facilities. Nursing homes are allowed only in infill, mixed use and public/institutional districts. The result of these land use regulations is that assisted living facilities are scattered throughout Seminole County in a variety of zoning districts and neighborhoods, whereas nursing homes are also scattered but restricted to fewer districts. The dispersed nature of the facilities increases the probability that a substantial number of single-family house transactions occur in proximity to at least one facility.

To narrow the analysis to single-family detached house sales during the study period and eliminate errors and outliers, we remove transactions from the MLS database for other types of residential structures, observations with missing values on variables used in the analysis, houses with a reported closing date before the house was constructed, those indicating no bedrooms or more than seven bedrooms, no full bathrooms or more than five full bathrooms, more than two half bathrooms and lots of five acres or more. We also remove outliers in terms of listing and selling prices, size, age and marketing time. The cleaned data set is composed of 9588 single-family detached house transactions that took place between January 2008 and March 2016 that were geocoded and merged with US Census data and senior group home data.

The average house in the cleaned sample is approximately 25 years old and contains almost 2000 square feet (183.13 square meters) with three to four bedrooms

Table 2. Summary statistics.

Variable	Mean	Std. Dev.	Min	Max
(n = 9588)				
Dependent variables				
Price	191,696.30	96,174.57	42,900.00	440,000.00
SellingTime	65.26	69.53	1.00	365.00
House characteristics				
Age	24.91	17.04	0.00	90.00
SFHeated	1971.20	643.23	680.00	4516.00
Bedrooms	3.50	0.69	1.00	7.00
BathsFull	2.20	0.60	1.00	5.00
BathsHalf	0.22	0.42	0.00	2.00
Fireplace	0.35	0.48	0.00	1.00
HomeSecurity	0.24	0.43	0.00	1.00
Garage	0.92	0.27	0.00	1.00
SwimPool	0.30	0.46	0.00	1.00
WaterAccess	0.05	0.22	0.00	1.00
LotQrtToLessHalfAcre	0.29	0.46	0.00	1.00
LotHalfToLessOneAcre	0.05	0.22	0.00	1.00
LotOneToLessFiveAcre	0.04	0.18	0.00	1.00
Neighbourhood and local market conditions				
CommunityPool	0.05	0.21	0.00	1.00
HOA	0.61	0.49	0.00	1.00
MallDistance	6.61	3.00	0.92	13.76
Foreclosure measures				
BankOwned	0.24	0.43	0.00	1.00
ShortSale	0.17	0.38	0.00	1.00
Senior group home measures				
GroupHome	0.16	0.37	0.00	1.00

NumGroupHomes	0.24	0.62	0.00	4.00
		(n = 1504)		
NursingHome	0.13	0.29	0.00	1.00
SizeNearGroupHome	68.27	55.68	5.00	240.00

and at least two bathrooms (summary statistics are provided in [Table 2](#)). The majority are located on lots containing less than one-quarter acre of land. Almost all the houses have a garage. Almost one-fourth report a home security system and just over one-third a fireplace. Only 5% have deeded access to water, most commonly a lake or pond; however, almost one-third have a private swimming pool and just fewer than 5% have access to a community pool. Almost two-thirds of the houses are located in communities with a HOA. Houses are located an average 6.61 miles (10.64km) from the shopping mall. In a reflection of the time period included in the study, almost one-fourth of the transactions are bank owned houses and 17% are short sales. The houses were marketed for an average of 65 days before selling for an average price of \$191,696.

As for the variables of interest, 1504 (13%) of the single-family houses sold during the study period have at least one senior group home located within one-half mile with a maximum of four within that distance. Because of the larger number of assisted living facilities in the area, it is more likely that the closest facility to a given transaction is an assisted living group home (87%).

Results

The full results of a regression analysis of a base model plus additional models reflecting the introduction of senior group home variables are provided in the [Appendix A](#). All the physical house characteristics in the base model contribute to price as expected with larger and newer houses selling for higher prices. Additional full bathrooms add value. Amenities such as a garage, fireplace, home security system and deeded access to water increase the price of a single-family house. Larger lots achieve higher prices. Buyers value swimming pools. Buyers place higher value on the smaller houses within a neighborhood, with the larger houses 'pulling up' the smaller houses' values; similarly, houses that are 'overbuilt' for the neighborhood do not command a proportionately higher price. Locations close to the shopping mall tend to command a higher price. The listing density variable is negative but very small, indicating that more competitive markets result in only slightly lower transaction prices. Houses being sold through a short sale or as bank owned after a foreclosure sell at a discount.

The Selling Time model reveals that older houses and those with more bathrooms sell more slowly as do those that are atypically large or small for the neighborhood or located on lots of one acre or more. The competition variable is significant but very small, indicating that more competitive markets result in only slightly longer time-on-market. Short sales take less time, whereas bank-owned properties take longer to sell than non-distressed properties.

The results for the senior group home variables of interest are summarized in [Table 3](#). Column 1 contains the model estimates for Price and column 2 Selling Time for the full sample. The price model's R^2 is 89% and the time-on-market model's is 39%. **The results in column 1 indicate that the presence of at least one assisted living facility or nursing**

home within one-half mile of house has a significant negative effect, reducing house price by almost 10%. If the facility is a nursing home, the negative influence on price is even greater. As assisted living facilities in this area may contain only five to six residents in a converted house or more than 100 in a purpose-built facility, whereas a majority of nursing homes house more than 100 residents, we also examine whether the size of the nearest facility is a factor contributing to the negative influence of group homes for seniors on house prices. As the results indicate, the size of the nearest facility has a very small, but significant effect, moderating the discount associated with proximity to a senior group home. The number of group homes within a one-half mile radius has a negative, but insignificant effect on price.

The positive sign on the interaction term indicates that houses in neighborhoods with a larger older population (more than 20% aged 65 years and older) experience a smaller negative price effect from a nearby senior group home than houses in those neighborhoods with a younger population. Looking at the time it takes to sell a house, only the size of the nearest facility within one-half mile has a significant effect, resulting in a longer time-on-market.

As our study period starts at the bottom of the economic cycle, the data includes a large number of distressed sales. Both the bank-owned and short-sale variables are significant in the equations, indicating bank-owned properties take longer to sell and [Table 3](#). SUR results for senior group home variables.

Dependent variable	Full sample		No distressed sales	
	ln(Price)	ln(SellingTime)	ln(Price)	ln(SellingTime)
GroupHome	-0.099 (0.019)	-0.087 (0.106)	-0.066 (0.023)	-0.009 (0.113)
NumGroupHomes	-0.018 (0.008)	-0.016 (0.043)	-0.023 (0.010)	0.014 (0.056)
NursingHome	-0.033 (0.017)	0.048 (0.093)	-0.038 (0.019)	0.029 (0.110)
SizeNearGroupHome	0.000 (0.000)	0.001 (0.001)	0.000 (0.000)	0.001 (0.001)
GroupHomex65	0.002 (0.001)	-0.003 (0.005)	0.002 (0.001)	-0.011 (0.006)
Observations	9588	9588	5590	5590
R ²	0.894	0.385	0.886	0.486

Notes: Columns 1 and 2 present the results for the full sample. Columns 3 and 4 present the results for the reduced sample excluding distressed sales (bank owned and short sales). Standard errors are represented in parentheses. $p < .10$, $p < .05$, $p < .01$.

eventually sell at a lower price, whereas short sales take place more quickly, but also at a lower price, on average, than the market. To examine the behavior of only the non-distressed transactions, we remove the short sales and bank-owned properties and run the regression on the reduced model with the 5590 non-distressed sales, producing the results in columns 3 and 4 of [Table 3](#). The results indicate that the relationship of sales price to the variables of interest holds with some change in the magnitude of the coefficients. Among non-distressed properties, the negative effect of the number of group homes is

sufficient to be significant. Meanwhile, the significance of the size of the nearest group home on marketing time is reduced for non-distressed sales.

Discussion and conclusion

As the US population ages, the demand for group homes for seniors is likely to grow. Although the majority of Americans would prefer to age in place in their current homes, some will need further services that cannot be offered in their homes. Communities in Florida are at the forefront of this demographic trend and have responded by creating zoning regulations that allow smaller assisted living facilities to be located in a wide range of districts subject to review to prevent geographic concentration. The permitted locations of nursing homes and larger assisted living facilities vary by jurisdiction. The implementation of these regulations in the context of public support and opposition has resulted in group housing for seniors scattered throughout these communities.

The growth in the number of senior group facilities and the dispersion of assisted living facilities into communities, while serving a growing demand, may also have unintended consequences on surrounding property values. If residents perceive that group housing is a negative influence on the neighborhood, either because of the higher occupancy than a single-family house, the size of the physical facility, or the image of frail residents, then surrounding house values will suffer.

The results of our analysis of single-family detached house sales in one Florida community indicate that the presence of a senior group home has a negative influence on house prices within one-half mile. The negative effect is felt most strongly in neighborhoods with few older residents. This negative influence is exacerbated if the facility is a nursing home. The detrimental effect of nursing homes on single-family house prices is more significant for distressed sales. Meanwhile, there is some evidence of a clustering or threshold effect on price for non-distressed properties. A larger nearby senior group home contributes to a longer time on the market, especially for short sales and bank-owned properties.

The negative price effects of locating senior group homes near single-family houses may be attributable to several sources. One possibility is the classic NIMBY response to any other use than single-family in an otherwise homogeneous neighborhood. Although everyone may want housing options to exist for aging residents, younger and healthier residents may want those options to be offered somewhere else because they do not feel it is fair that they shoulder the burden. Residents may anticipate negative externalities from the facilities such as congestion from commuting staff and visiting families as well as a high number of ambulance calls. In a youth-oriented culture, people may not perceive themselves as belonging in a neighborhood where frail older people, sometimes with diminished cognitive abilities, use walkers and wheelchairs to navigate the sidewalks. This would explain the negative influence of senior facilities on house prices and the stronger influence in neighborhoods housing more younger residents. It could also contribute to the stronger influence of nursing homes.⁴ Ageism is a societal problem that is difficult to combat on a local level. Some of the negative effect could also be due to lack of knowledge among members of the general population about the different types of seniors housing and who lives in seniors housing as compared to other types of group homes.⁵

Local governments will face increasing pressure in the future to allow the provision of a range of housing alternatives for aging residents in their communities. The communities in this study have implemented land use regulations that allow smaller facilities to be considered in a range of zoning districts with the stated objective to avoid overconcentration. However, the moderating effect of the size of a nearby facility on the negative price influence indicates that small-scale facilities dispersed in the community do not have less negative impact than larger facilities of the same type. This may encourage local governments to follow a segregation approach, grouping all types of seniors housing from independent living to nursing homes in a zoning classification separate from other residential uses. This may not be possible in the United States where the Fair Housing Act may be interpreted as requiring local governments to allow assisted living and other housing for people with disabilities in residential zones; however, courts have upheld permit denials due to site problems such as parking and inadequate access for safety vehicles (Hoffman & Landon, 2012; Menkin, 2001; Salkin, 2003). If communities use zoning to exclude group homes for elderly residents from residential neighborhoods, developers are forced to locate in commercial zones where higher land prices put upward pressure on the cost of housing and care or else to locate in green fields that do not provide connections for the residents to the broader community and contributes to sprawl (Hoffman & Landon, 2012). **Nursing homes are already restricted mostly to multiple family and commercial zoning districts. Thus, local officials must find a way to allow the development of a range of senior housing to accommodate older residents while maintaining the value of other residential properties.**

Further research is needed to develop a complete picture of the influence group homes for seniors have on single-family house prices. First, the model can be expanded to consider the location of additional types of group homes to determine if house buyers differentiate among the types of residents in each facility. Adjustments can be made for topography, natural features and street design to determine which houses are located within sight distance of a senior group home as a refinement to the group home influence measures. In addition, the model can be tested outside of Florida in communities that may apply different land use regulations to senior group housing. The study can also be replicated in other countries experiencing similar demographic changes as the United States.

Notes

1. A formal functional form test was not conducted, but the semi-log form utilized is commonly employed in this type of study (Deng, 2011; Galster et al., 2004; Koschinsky, 2009; Santiago et al., 2001; Schwartz et al., 2006; Song & Knaap, 2004; Zhang et al., 2016). A Breusch-Pagan test ($\chi^2(1) = 0.008, p = .930$) indicates that heteroscedasticity is not present, and multicollinearity does not appear to be a problem ($VIF < 10$) for all the variables except Age and AgeSq.
2. We tested the addition of a continuous distance measure, but it was insignificant in both the price and the selling time equations.
3. One assisted living facility received its initial license September 2010, another September 2011, and a third October 2014. These facilities are considered in calculating group home influences on prices within one-half mile from their date of licensure. Another assisted living

facility opened in the area in September 2017, but no sales took place within one-half mile from October 2017 through the end of the study period. No nursing homes or assisted living facilities within the study area are known to have closed during the study period.

4. As the location of nursing homes is more restricted than for assisted living facilities, some of the negative influence on house prices may reflect other uses located near the nursing home in the same zoning district.
5. For example, there is no federal definition of an assisted living facility in the United States and state standards vary widely (Kling 2002). There is even less commonality of terms internationally (Howe et al., 2013).

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Appendix A: Complete SUR results

Dependent variable	Base model		Full sample		No distressed sales	
	ln(Price)	ln(SellingTime)	ln(Price)	ln(SellingTime)	ln(Price)	ln(SellingTime)
Senior group home measur	es		−0.099	0.087	−0.066	−0.009
GroupHome			(0.019)	(0.106)	(0.023)	(0.133)
NumGroupHomes			−0.012	−0.016	−0.0238	0.014
			(0.008)	(0.043)	(0.010)	(0.056)

NursingHome			-0.033 (0.017)	0.048 (0.093)	-0.038 (0.019)	0.029 (0.110)
SizeNearGroupHome			0.000 (0.000)	0.001 (0.001)	0.000 (0.000)	0.001 (0.001)
GroupHomex65			0.002 (0.001)	-0.003 (0.005)	0.002 (0.001)	-0.011 (0.006)
House characteristics	-0.013	0.007	-0.013	0.065	-0.011	0.012
Age	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.004)
AgeSq	0.000	-0.000	0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnSFHeated	0.871	0.023	0.875	0.042	0.834	0.171
	(0.016)	(0.091)	(0.016)	(0.092)	(0.020)	(0.116)
Smaller	0.228	0.754	0.228	0.773	0.142	1.119
	(0.025)	(0.139)	(0.025)	(0.139)	(0.031)	(0.176)
Larger	-0.254	0.429	-0.254	0.420	-0.223	0.474
	(0.015)	(0.084)	(0.015)	(0.084)	(0.018)	(0.104)
Bedrooms	-0.008	0.000	-0.008	-0.024	-0.010	0.023
	(0.004)	(0.022)	(0.004)	(0.022)	(0.005)	(0.028)
BathsFull	0.031	0.123	0.031	0.123	0.034	0.146
	(0.005)	(0.027)	(0.005)	(0.027)	(0.006)	(0.034)
BathsHalf	-0.015	0.140	-0.014	0.143	-0.015	0.159
	(0.005)	(0.027)	(0.005)	(0.027)	(0.006)	(0.034)
Fireplace	0.030	-0.016	0.030	-0.017	0.040	-0.012
	(0.005)	(0.026)	(0.005)	(0.026)	(0.006)	(0.032)
HomeSecurity	0.028	-0.002	0.028	-0.028	0.037	-0.024
	(0.005)	(0.027)	(0.005)	(0.027)	(0.005)	(0.031)
Garage	0.134	-0.075	0.133	-0.073	0.136	-0.158
	(0.008)	(0.044)	(0.008)	(0.044)	(0.010)	(0.060)
SwimPool	0.093	-0.043	0.094	-0.045	0.094	-0.044
	(0.005)	(0.026)	(0.005)	(0.026)	(0.006)	(0.032)
WaterAccess	0.056	-0.022	0.057	-0.023	0.057	-0.028
	(0.009)	(0.047)	(0.008)	(0.047)	(0.009)	(0.053)

(continued)

Continued.

Dependent variable	Base model		Full sample		No distressed sales	
	ln(Price)	ln(SellingTime)	ln(Price)	ln(SellingTime)	ln(Price)	ln(SellingTime)
LotQrtToLessHalfAcre	0.055 (0.005)	0.015 (0.027)	0.055 (0.005)	0.015 (0.027)	0.052 (0.006)	-0.004 (0.033)
LotHalfToLessOneAcre	0.097 (0.010)	0.044 (0.053)	0.096 (0.010)	0.044 (0.053)	0.102 (0.011)	0.005 (0.064)
LotOneToLessFiveAcre	0.210 (0.012)	0.162 (0.066)	0.210 (0.012)	0.166 (0.067)	0.186 (0.014)	0.059 (0.080)
Neighbourhood and local market conditions						
CommunityPool	0.035 (0.010)	0.010 (0.054)	0.039 (0.010)	0.016 (0.054)	0.059 (0.012)	-0.002 (0.070)
HOA	0.081 (0.006)	-0.041 (0.034)	0.079 (0.006)	-0.042 (0.034)	0.054 (0.008)	-0.050 (0.044)

MallDistance	-0.014 (0.002)	0.020 (0.013)	-0.015 (0.002)	0.020 (0.013)	-0.012 (0.003)	0.028 (0.017)
ListingDensity	-0.000 (0.000)		-0.000 (0.000)		-0.000 (0.000)	
Competition		0.000 (0.000)		0.000 (0.000)		0.000 (0.000)
Foreclosure measures						
BankOwned	-0.225 (0.005)	0.077 (0.026)	-0.224 (0.005)	0.081 (0.027)		
ShortSale	-0.183 (0.005)	-0.638 (0.033)	-0.183 (0.005)	-0.636 (0.033)		
Month and year of sale	Yes	Yes	Yes	Yes	Yes	Yes
Census tract	Yes	Yes	Yes	Yes	Yes	Yes
Constant	5.546 (0.129)	2.565 (0.716)	5.543 (0.129)	2.444 (0.720)	6.016 (0.164)	1.472 (0.936)
Observations	9588	9588	9588	9588	5590	5590
R ₂	0.893	0.384	0.894	0.385	0.886	0.486

Notes: Columns 1 and 2 present the results for the full sample base model containing no senior group home variables. Columns 3 and 4 present the results for the full sample including senior group home variables. Columns 5 and 6 present the results for a reduced sample excluding distressed sales (bank owned and short sales). Standard errors are represented in parentheses. Coefficients for variables that capture year and date sold and census tract location are not reported here.

$p < .10$, $p < .05$, $p < .01$.