How Do Homeowners Associations Affect Housing Affordability?

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Section 1. Introduction

In the period prior to the 2007-2008 subprime housing crisis, popular press dedicated a lot of attention towards explaining why housing was seemingly becoming more and more "unaffordable." These articles noted how households with median income were increasingly unable to afford the hefty down payments, the monthly mortgage payments or the property taxes associated with owning a home.[1] Studies, such as Glaeser and Gyourko (2003) and Glaeser, Gyourko and Saks (2005), demonstrated that the sharp rise in the price of housing, relative to the cost of land and the cost of construction, was concentrated in particular metropolitan areas – particularly, California and some eastern cities. In Boston, for instance, house prices nearly doubled in the period 1998 to 2005 (Fisher, Pollakowski and Zabel, 2008). These locations were areas of fast population growth, surging demand for housing and lax lending criteria. In these markets, conventional models with a free market for land did not apply. The result was home prices that were well out of reach to households in search of starter homes, a group that is particularly sensitive to price increases.

Many studies have explored the reason for the increase in prices. Glaeser and Gyourko (2003) and Glaeser, Gyourko and Saks (2005) in particular, provide evidence that price run-ups in these areas could be in large part attributed to zoning and land use regulations. Restrictive land use regulations in the booming coastal areas add a so-called "regulatory tax" to the cost of building a

[1] An example headline from well before the housing crisis: "Priced Out of Silicon Valley: Insane Housing Market Is Pushing Away Teachers, Police", *USA Today*, 18 May 2000. In the years of the largest price increases, headlines such as "Few new buyers can afford a home: Housing affordability for first-time buyers dives as rates rise" were common. (*CNN/Money*, 8 November 2005, accessed online.)

house. This tax is estimated and demonstrated to be a substantial portion of house price increases for a set of Florida metropolitan areas in Cheung, Ihlanfeldt and Mayock (2009).

A common concern in regions that experienced the fastest price increases and the most acute concerns about affordability is the ability to build new housing to meet demand. In these areas, homeowners associations (HOAs) are increasingly becoming the principal way in which new housing is developed and constructed in fast growing areas. HOAs are found in planned developments, gated communities, condominiums and cooperatives. By purchasing a home within the boundaries of an HOA, a resident agrees to pay binding assessment fees and abide by a set of covenants and restrictions, in return for public services such as sanitation, landscaping, recreation and land-use regulation. Their popularity has boomed for three reasons: (1) developers find them cheaper, per house, to construct due to economies of scale; (2) homeowners are attracted to their amenities and their suburban/exurban locations; and (3) local governments welcome them because they can often offload the responsibility of delivering public services to the HOA.

HOAs are a compelling case with which to study the intersection of home prices, affordability and land use regulation. In addition to providing substitutable public services and amenities (such as recreation, sanitation and security), HOAs also regulate land use via underlying covenants and restrictions. Cheung and Meltzer (2013) demonstrate that the regulations imposed by HOAs often act as complements to public land use regulation, and Meltzer and Cheung (2014) show that HOA home prices reflect a premium relative to non-HOA properties. These findings suggest that HOAs may exacerbate the housing affordability problem. On the other hand, HOAs are a way for developers to provide large amounts of moderately-priced housing, and so the rapid growth of HOAs in suburban development may actually serve to reduce the run-up of home prices. This efficiency-enhancing quality of HOA development suggests that HOAs may provide a way for lower and middle income households to access the housing market (Manzi and Smith-Bowers, 2005). The theoretical ambiguities lead to a need for empirical research.

We use a novel and comprehensive parcel-level database of HOAs in Florida to address this question. We aggregate parcels to the neighborhood (census tract) level and explore how two measures of affordability of homes (the housing cost burden and the Housing Opportunity Index)

depend on the level of membership in HOAs, as well as on the size and age of the HOA. We examine whether or not HOA presence is correlated with housing affordability.

The paper proceeds as follows. Section 2 provides a brief literature review of housing affordability metrics and describes the role that HOAs can play in ameliorating or exacerbating affordability. Section 3 describes the data and Section 4 presents our model. Section 5 provides the results and analysis. Section 6 concludes.

Section 2. Literature Review

Homeownership Affordability

The years preceding the housing crisis saw annual house price increase that greatly exceeded inflation and income growth. Rodda (2005) notes that "house prices in the U.S. overall have increased by at least 6 percent annually…more than twice the rate of inflation overall." However, authors have noted that the price increases are not distributed uniformly across the country. Gyourko, Mayer and Sinai (2013) find that the ten metropolitan areas with the highest growth averaged 2.2 to 3.5 percent in annual inflation-adjusted price increases between 1950 and 2000, while the ten areas with the lowest growth averaged 0.5 to 1.1 percent. These fast growing areas, which Gyourko et al. dub "superstar cities," are characterized by a scarcity in housing units and above average growth in high-income households. As the higher-income households outbid lower-income households for scarce land and housing, prices skyrocket and affordability plummets. Thus, differences in demand and in supply for housing, as well as in the regulatory environments that can encourage or hinder new development, can translate into significant differences in affordability across space and time. A useful measure of affordability should take these into account.

There are many measures of affordability in the literature. Jewkes and Delgadillo (2010) and Rodda (2005) both provide a comprehensive review of about a dozen measures. We summarize the most commonly encountered ones here. Generally, affordability (in the context of owner-occupied housing) is defined by the ratio of the costs of owning/maintaining the home relative to the household's income. The most basic measures rely on information about how much households

spend on housing, relative to their income. For instance, the U.S. Department of Housing and Urban Development (HUD) defines a household to be housing-cost burdened if it spends more than 30 percent of its gross income on housing (including taxes, utilities and insurance), and a household to be severely burdened if it spends more than 50 percent of income. Therefore, housing is deemed "affordable" if the cost-income ratio falls under the 30 percent threshold (Belsky, Goodman and Drew, 2005). The appeal of this measure is that the thresholds for affordability are consistent with the ratios applied by mortgage lenders, and consequently they are cited often by financial counselors and educators on what a first-time homebuyer can afford. It is also a metric that can easily be compared longitudinally: by calculating the number of burdened households over time, trends in affordability can be analyzed. The simple measure, however, is often criticized because it lacks consideration for different costs of living, qualities of housing units and household sizes across the country. It also ignores the effect of higher or lower interest rates over time (Bogdon and Can, 1997).

The cost-income ratio can be extended by transforming it into an index that can be tailored to various years and to various locales. Doing so can alleviate some of the critiques listed above. A commonly-encountered index is the National Association of Realtors' Housing Affordability Index (HAI). The index is calculated first by determining the cost of a median-priced existing single-family home in the area (nation or metro area). It is then determined how much income would be required to qualify for a mortgage to purchase this home. A 20 percent down payment and prevailing interest rates are assumed, as is a principal-and-interest ratio of no more than 25 percent of gross income. The HAI is the ratio of the area's median family income to the qualifying income, multiplied by 100. Thus, a HAI of 100 indicates that a family with median income has exactly enough income to qualify for the mortgage on the median-priced home. Lower HAI numbers indicate less affordability. (National Association of Realtors, 2014) This measure can make use of local differences in home values, but does not account for differences in taxes or utilities.

Another popular index is the Housing Opportunity Index (HOI), calculated by the National Association of Home Builders and Wells Fargo. The HOI, calculated at the metropolitan area level, is the share of homes in the area for which the total monthly cost (principal and interest for a mortgage of 90 percent of the sales price, plus property taxes and property insurance) does not exceed 28 percent of the median family income (National Association of Home Builders, 2014).

Unlike the HAI, the HOI takes into account local variation in taxes and insurance. It also assumes a lower down payment, which is more realistic for first-time homebuyers and those on the margin of affordability.

Finally, indirect measures of affordability may be defined on other criteria, for example, on debt levels. Rodda (2005) notes that in the period between 1993 and 2002, the share of consumer debt payments as a percentage of disposable income increased from 12 to 14 percent, while the share of mortgage debt has remained stable at 6 percent. Homeowners did not look like they substantially increased their mortgage debt levels in order to buy more expensive houses; this is presumably due in some part to low down payment and attractive refinancing possibilities prevalent in that period. That said, it is important to remember that these statistics may not apply to the critical population for whom affordability is a binding constraint – the household with median or below-median income who is looking for a starter home in a reasonably accessible area.

Homeowners Associations and Their Impact on Affordability

HOAs have proliferated during the past three decades and are representative of a broader trend in the privatization of services at the local level. HOAs are appealing to homebuyers because they value the amenities that their assessments fund. They also may value a sense of increased local control over their community, as HOAs are governed by the homeowners themselves. Private developers and local governments view HOAs as a cost-effective way to provide local services, evade local regulations, and produce large-scale communities. Their numbers have grown explosively. Starting from less than 500 in 1962, there are now an estimated 323,000 of them across the country as of 2012. This growth is nearly entirely based in new construction; as of the present, more than 60 percent of new construction included some version of an HOA.[2] (Foundation for Community Association Research, 2012)

There is a growing literature on how HOAs affect property values and home prices, which will directly affect the affordability of homes in a market. LaCour-Little and Malpezzi (2009) and

[2] Technically, these figures refer to HOAs but Residential Community Associations (RCAs), which is a slightly broader definition of a common interest community than the one we use in this paper. The best national estimates are from the Community Associations Institutes, which tracks RCAs.

Bible and Hsieh (2001) both find cross-sectional evidence that homes in gated communities have significantly higher property values in homes outside, controlling for the characteristics of the homes. The most comprehensive study of HOAs and property values is Meltzer and Cheung (2014), who constructed a dataset with the HOA boundaries and parcel-level tax rolls (including property sales information) for cities in 49 of the 67 counties in Florida, which is second to California for the number of associations. They employed hedonic regression analysis to estimate the effect of HOA membership on property values. They found a consistently positive premium, hovering around 7 percent. The premium is also found to spill over outside the HOA's boundaries as well. The presence of an HOA premium was also found in St. Louis in Groves (2008), although the premium disappeared when controlled for finer characteristics of the HOA and non-HOA homes.

These studies of home values in HOAs seem to suggest that HOAs may exacerbate housing affordability in an area, as they raise the cost of owning a home. In addition to paying for the debt on the house and its maintenance, the homeowners have to pay fees to support the services and administration of the governing association. However, the capitalization studies do not account for the income of the buyer(s), and therefore are incomplete in their assessments of affordability. Indeed, there have been studies that have argued that without HOAs, homes would have been otherwise more unaffordable. This is because HOAs tend to be located in suburban or exurban areas, where land is more plentiful. Cheung and Meltzer (2014), in a duration analysis of HOA formation in Florida, confirm that HOA are more likely to form in neighborhoods with higher vacancy rates, with a new housing stock and in locations farther from the central business district. These are areas with cheaper land where economies of scale would favor the construction of large housing developments of affordable homes. These areas are also often located in areas where cities may be reluctant to extend public infrastructure or provide public services. Municipal officials may, through tax or land-use incentives, encourage developers to provide public services and allow them to set up HOAs to fund them.

The overlap with the land use regulatory regime may also lead to a relationship between HOAs and affordability. As Johnston and Johnston-Dodds (2002) note, a synergistic relationship formed between the developers, who sought to cram as many units into the development as they could to maximize economies of scale, and local governments, who found the opportunity to offload infrastructure and service provision responsibilities onto the HOA. Cheung and Meltzer

(2013) found evidence that Florida cities with a greater prevalence of HOAs tended to have more land use regulations that incentivize development, rather than restrict it. In a state like Florida, which according to past studies is a region with particularly stringent land-use regulation mandated statewide, the ability of HOAs to fast-track, bypass or be exempt from regulatory constraints may significantly improve affordability. (ACIR, 1989; McKenzie, 2003)

Section 3. Data

HOA Data

Our unit of analysis is the census tract with boundaries normalized to the 2000 census. We wish to relate the prevalence of HOAs in a tract to the measure of affordability in the tract; therefore we need to know how many parcels in the tract belong to an HOA. We use a novel dataset of Florida HOAs, constructed by combining a propriety list of HOAs with a statewide geographic information system (GIS) map of housing parcels. The list of HOAs comes from Sunshine List, a private Florida-based corporation that compiles the location and creation date of every HOA in the state, along with the addresses of HOA board officers.

We geocode the reported address of the officers onto the electronic parcel map, obtained from the Florida Department of Revenue. We then make the assumption that board officers live within their HOA, and that other parcels in the same subdivision as the board officer must be part of the same HOA. Overlaying a subdivision map on top of the parcels, we are able to determine all the parcels of each HOA.[3] This dataset is comprehensive, statewide and the most complete dataset on HOAs that we know of.

As our unit of analysis will be a census tract-year observation, we aggregate parcels up as follows. First, for each year in our observation, we restrict the sample to only those parcels that existed and were improved as of that year. As we have years of incorporation for each HOA, we can

[3] It is important to note that the assignment of parcels to HOAs rests on several assumptions. One particular caveat is that HOA board members' addresses are self-reported. We have developed an algorithm to remove addresses that clearly do not resemble primary residences. We discuss this and other caveats of our dataset in more detail in Meltzer and Cheung (2014).

then identify which parcels were HOA parcels as of that year. We aggregate everything up to 2000 census tract boundaries, so that we can calculate the share of parcels that belong to any HOA, as of each year in our study period (1980, 1990 and 2000). Using information on the HOAs' incorporation dates we also construct a measure of the tract's mean HOA incorporation year and mean HOA size (i.e. number of member parcels).

Census Tract Data

For the covariates, we supplement our HOA map with data on economic and demographic characteristics from the Geolytics Neighborhood Change Database. This database normalizes the census tract boundaries to their 2000 definitions, which allow us to analyze the tracts as a panel across the 1980, 1990 and 2000 census years. From this dataset we pull variables to capture both demand- and supply-side determinants of housing affordability. These, as well as the cuts to our sample, are described in more detail in the next section.

Section 4. Model

Empirical Model

Our panel allows us to estimate the following equation:

$$Affordability_{it} = \beta(\boldsymbol{HOA\ Variables}_{it}) + \gamma \boldsymbol{D}_{it} + \delta \boldsymbol{S}_{it} + \theta_i + \theta_t + \varepsilon_{it}.$$

Where the unit of analysis i is the census tract (consistent to Census 2000 boundaries), and t is year.[4] We explore three different measures of housing affordability, as described below. Our HOA variables consist first of a tract-level HOA prevalence variable, and later, we add in a set of variables specifying the age and size of the HOAs in that tract. The $\boldsymbol{D}_{it}$ is a vector of demand side covariates that are posited to affect affordability, and $\boldsymbol{S}_{it}$ is a vector of supply side covariates. All models will have tract fixed effects, $\boldsymbol{\theta}_i$, to account for idiosyncratic, time-invariant differences across tracts in the state. In some of our model, we also add in a set of year fixed effects, $\boldsymbol{\theta}_t$, for statewide, time-varying trends in affordability over the period.

[4] We are working on incorporating in 1970 and 2010 census data into our sample.

Variable construction

Dependent variable: Measures of affordability

Our first measure of housing affordability is analogous to HUD's housing cost burden. For each census tract and year, we divide the annual average housing cost by the annual average household income. We consider two ways of calculating the annual cost for a specific house, depending on the down payment. The first assumes no down payment: we amortize the price of the house over thirty years, using the prevailing mortgage rate in the year of sale. The second assumes a twenty percent down payment and a similar amortization of the remaining balance over thirty years.

We calculate this measure in two ways: using actual sales transaction data and, as a robustness check in the appendix, using housing values reported in the decennial Census. The advantage of the former approach is that we have actual prices from the homes sales, as opposed to the self-reported values from the Census data. The drawback of this approach is that the sample is comprised only of properties that sold, not only limiting the size of the sample, but skewing the coverage of the sample as well.

Our second measure of affordability is analogous to the Housing Opportunity Index calculated by the NAHB. For each census tract, we calculate the share of homes sold in the area whose housing cost does not exceed 28% of the gross average family income in the tract. Housing cost is calculated based on an assumption of a ten percent down payment, which is what the NAHB assumes. For this metric, we need to use property-level information and so we rely solely on the sales transaction data that we have at our disposal. We take household income data from the decennial Census.

Independent variables: HOA presence, demand- and supply-side factors

On the right-hand side of the model, our primary variable of interest is the metric that captures HOA presence. As described above, this is the share of parcels that lie in an HOA at any point in time. We also run regressions where we include other variables to capture the age and size

of the HOA, in order to test whether newer or larger HOAs have a differential effect on housing affordability.

In addition, we include a collection of covariates to control for demand- and supply-side determinants of housing affordability (and HOA presence). On the demand side, we include characteristics of the local population that are correlated with particular preferences for housing, such as price and amount: percent Black, Percent Hispanic, percent under 18 years old and over 65 years old, percent foreign born, percent that commute by public transit, percent living in the same house as five years ago, unemployment rate, poverty rate, and household income relative to the MSA average income.[5] We also include measures of income and population growth over the prior 10-year period, to capture any longer-term pressure (from potential homeowners) on the local housing market. We expect that faster population and income growth will result in less overall affordability, since both will push prices up (assuming constant supply). On the other hand, faster income growth could result in more affordability, as the buyers' ability to pay increases.

The remaining covariates capture the "supply side" determinants of affordability; these essentially reflect the ease of development in the neighborhood (and we presume that, holding demand constant, increasing supply will improve affordability). The model includes vacancy rate to capture the slack in the market (i.e. the potential for more development) and the share of owner-occupied units to capture the existing land use regime (i.e. whether it is single-family or multi-family oriented).[6] Other factors, such a cost of construction labor and materials and interest rates we assume are constant within the census tract or statewide and therefore do not include any direct controls.[7]

Our main sample consists of those tract-year observations in which we can calculate a housing cost burden and a housing opportunity index using *at least five* sales. In other words, only census tracts in which at least five sales occurred in a census year will be counted.[8] We also drop

[5] We exclude measures of educational attainment from the model, as they are highly correlated with income. Their exclusion/inclusion do not substantively change the results.
[6] Ideally we would like to have information on the local zoning maps, but we are unable to systematically obtain these at this fine a level.
[7] We are working on obtaining land values to include as another supply-side control.
[8] We have relaxed this assumption and calculated the affordability indices on all tracts in which at least one sale occurred in the census year. While this potentially introduces substantial noise in the reliability of the indices, it is reassuring that the qualitative results do not substantially change. Going in the other direction, we are currently

census tract-year combinations in which any of the covariates is missing. After these cuts, our sample consists of 1,452 census tract-year observations. The panel is unbalanced, representing 671 distinct tracts. These tracts are located in 20 out of 67 counties in the state.

Table 1 presents summary statistics of our sample. Note that all dollar values have been deflated using the CPI to 2008 levels. The mean housing cost burden in the panel is 0.26 without a down payment and 0.21 with a 20% down payment. The mean housing opportunity index indicates that 73% of housing in the state is affordable. The total picture is that Florida, on the whole, is a relatively affordable state, but variations clearly exist. There are tracts in which none of the housing stock is affordable, and tracts in which every unit is affordable.

Turning to the main independent variable of interest, the main sample shows that on average, 7 percent of a tract's housing units belong to an HOA. But again, there is substantial variation, with prevalence rates ranging from 0 to 1. The other demand-side and supply-side characteristics demonstrates that our sample covers a wide range of census tracts within the state.

Table 1 also provides summary statistics of HOA size and age for the 629 tract-year observations in which there are HOA units. These variables will be added to the model after the baseline regressions. They show that among the tracts, the average size of the HOAs can range from under 10 to over 2,900 housing units. As larger subdivisions may benefit from economies of scale in construction, we also collect the mean subdivision size for those tracts that have it. This number ranges from 10 to over 2,000. As for HOA ages, the difference between the mean years of incorporation of the HOA can be as much as forty years, which suggests that older and younger HOAs may influence affordability differently.

Section 5. Results

Baseline model

considering calculating the indices using sales in years close to each census year. This would dramatically increase the number of tracts in our sample, and it allows homeowners to view the affordability to purchase decision as a sequential, rather than a simultaneous, decision.

For each model, we display results for housing cost burden, or HCB, (assuming both no down payment and a 20 percent down payment) and the housing opportunity index, or HOI. We note that the indices are interpreted inversely; a higher HCB indicate a less affordable housing market and a lower HOI indicates a less affordable housing market. Table 2 displays the results for the baseline models for the HCB dependent variables. The first two columns display results for the regressions using HCB with no down payment and the dependent variable and with only demand- and supply-side variables; one without and the other with year fixed effects (all models include tract fixed effects). We see that the signs are generally consistent across the two variations and that housing affordability increases (i.e. the HCB goes down) in the presence of more black and Hispanic households (although these coefficients become insignificant when we add year fixed effects), a higher share of residents that have been in place for the past five years, higher relative income and faster income growth over the preceding 10-year period. Higher vacancy rates and higher share of homeowners increase housing cost burden, suggesting that tighter and less mixed use (or multi-family) markets are associated with less affordable housing.

In the next two columns we add in the share of HOA units. There is a negative association between HOA presence and housing cost burden, suggesting that housing is more affordable in communities with higher shares of HOA units. Column (3) suggests that a one standard deviation increase in the share of units that belongs to an HOA in a tract would decrease the housing cost burden by 0.023, assuming a zero down payment. Given that the mean of the burden is 0.26, this is a sizeable increase in affordability. While it remains negative, the magnitude of the coefficient goes down and its significance disappears in the presence of year fixed effects. The other covariates are stable in their coefficients and significance levels.

The models using HCBs that assume a 20 percent down payment produce largely the same results (the coefficients are slightly smaller in magnitude). As noted above, we also run models using an HCB measure that is derived from Census-based housing values; these results are displayed in Appendix A. The results are overwhelmingly consistent with the results using the sales-based HCB metric: an increased presence of HOA units is correlated with lower housing cost burdens (or more affordability). The magnitude is marginally smaller – Column (1) of the Appendix table implies that a one standard deviation increase in the HOA share decreases the housing cost burden by 0.022, assuming a zero down payment. Since we gain a significant number

of observations (we are limited by the number of tracts with at least five sales transactions in the sales-based HCB models), we also see more precise estimates (i.e. the HOA coefficients are consistently significant at the one percent level).

Table 3 displays analogous models using HOI as the dependent variable. As expected, the coefficients have opposite signs to the previous models (since HCB and HOI index affordability inversely). We see that affordability is associated with higher shares of black households , higher shares of Hispanic households (although this coefficient lose its significance when year fixed effects are added), a higher percentage of foreign born households, a higher percentage of households in place over the past five years, lower unemployment and poverty rates and higher relative incomes. The housing markets are also more affordable in areas that experienced faster income growth (this coefficient loses significance with the year fixed effects) and population growth. Higher vacancy rates reduce affordability, as do higher homeownership rates (although this coefficient loses significance with the year fixed effects).

When we add the share of HOA units, the other covariates are stable and we see a positive association between the HOA metric and the HOI index. Column (3) suggests that a one standard deviation increase in the share of HOA units in a tract increases the HOI by 0.055 percentage points. This, again, is a substantial increase in affordability given the HOA's mean of 0.73. In the same way as the housing cost burden models, the significance of the HOA effect goes away in the presence of year fixed effects, but the sign remains in the same direction.

Variations on HOA presence

We now discuss the results from the models that include additional HOA characteristics, specifically HOA age and size. Table 4A presents the results without year fixed effects and Table 4B presents those with year fixed effects. The firs thing to note is that across the two variations, the signs remain the same; the most meaningful difference is in the significance of the variables. We lose about half of our sample, and therefore quite a bit of precision, when we restrict to only tracts with HOAs; this could be a primary reason for the loss in significance. Overall, it appears as though bigger HOAs (controlling for the typical subdivision size in the neighborhood) are associated with lower HCBs and Higher HOIs (more affordability). Although not significant in

either variation, it suggests that the scale of the HOA might matter in making the units more affordable.

We also find that more affordable neighborhoods have, on average, newer HOAs. This coefficient, however, loses its significance when we add in the year fixed effects. While the mechanism is unclear, it could mean that cooperation between the HOA developer and the city has improved over time, such that the projects can be completed in a more cost-efficient (and therefore more affordable) way. This finding persists even when we control for HOA size at the same time (so this is not due to changes in HOA scale over time).

Section 6. Conclusion

An intuitive response to homeowners associations and other similar private residential communities is that membership is exclusive and therefore more expensive. Indeed, HOA membership requires that the households pay mandatory fees and there is empirical evidence supporting the prediction that HOA properties exhibit price premiums (Meltzer and Cheung 2014; LaCour-Little and Malpezzi 2009; Bible and Hsieh 2001). These studies, however, do not take into household income or consider the nature of HOA development, which can actually be conducive to affordable housing. Developers typically benefit from economies of scale when building out HOAs and local governments can offer zoning and other regulatory relief in exchange for HOA-funded infrastructure and services.

We combine a novel data set of HOAs in Florida with various calculated indices of home affordability into a panel of census tracts over three census years. We test for the relationship between HOA presence and housing affordability and find a consistently positive one. Specifically, whether we use housing cost burden or the housing opportunity index as our measure of affordability, the share of HOA units in a census tract is associated with a more favorable affordability index rating. A one standard deviation increase in the HOA unit share, in general, raises affordability by about ten percent.

Less clear are the impacts of HOA size and age on affordability. Affordability is positively correlated with HOA size and negatively correlated with HOA age; however our estimates are less precise due to a smaller sample and raise questions as to whether either effect is significantly different from zero. Both demand side factors, such as population and income growth, and supply side factors, such as vacancy and homeownership rates, also seem to affect affordability.

Unfortunately, our analysis cannot parse out the particular mechanism in HOA development that is most influential in generating housing affordability. The results from our analysis, however, make clear that HOA developments (and possibly bigger ones at that) can actually make owning a home in certain communities more affordable. We do not take from this that local governments should unequivocally endorse HOA developments, but rather to that they should understand what it is about their production (i.e. the scale, the cooperation with local government?) that might make housing provision more affordable. These insights can equally inform homeownership and rental housing opportunities.

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Table 1. Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
Dependent Variables					
Housing cost burden - 0% down	1452	0.263	0.187	0.06	5.738
Housing cost burden - 20% down	1452	0.211	0.15	0.048	4.591
Housing opportunity index	1452	0.727	0.312	0	1
HOA Variables					
% HOA units	1452	0.07	0.14	0.00	1.00
Mean HOA incorp year	629	1985.19	7.17	1963.00	2000.00
Mean HOA size	629	163.57	277.38	3.00	2968.00
Mean subdivision size	629	114.73	175.74	10.63	2090.13
Oldest HOA year	629	1982.79	7.59	1959.00	2000.00
Youngest HOA year	629	1988.23	7.97	1963.00	2000.00
Maximum HOA size	629	194.95	297.88	3.00	2968.00
Demand-side Variables					
% Black	1452	0.133	0.209	0.000	1.000
% Hispanic	1452	0.162	0.257	0.000	0.958
% under 18	1452	0.222	0.064	0.011	0.475
% over 65	1452	0.176	0.099	0.014	0.692
% foreign-born	1452	0.164	0.214	0.000	0.869
% commute by transit	1452	0.026	0.044	0.000	0.376
% 5-year same house	1452	0.480	0.108	0.074	0.779
Unemployment rate	1452	0.058	0.038	0.000	0.597
Poverty rate	1452	0.126	0.091	0.000	0.652
10-yr income growth	1452	0.122	0.634	-0.948	19.315
10-yr population growth	1452	0.441	1.513	-0.446	24.768
Income relative to MSA	1452	1.039	0.480	0.053	5.805
Supply-side Variables					
Vacancy rate	1452	0.107	0.096	0.000	0.750
% owner-occupied	1452	0.587	0.183	0.103	0.972

Table 2. Fixed Effects Regressions. Housing Cost Burdens

	Dep. Var. = Housing Cost Burden, 0 down				Dep. Var. = Housing Cost Burden, 20% down			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HOA Covariates								
% HOA units			-0.163*	-0.024			-0.130*	-0.019
			(0.078)	(0.077)			(0.062)	(0.061)
Demand Covariates								
% Black	-0.451**	-0.025	-0.410**	-0.023	-0.361**	-0.020	-0.328**	-0.018
	(0.121)	(0.127)	(0.123)	(0.127)	(0.097)	(0.102)	(0.098)	(0.102)
% Hispanic	-0.981**	-0.185	-0.919**	-0.183	-0.785**	-0.148	-0.735**	-0.146
	(0.167)	(0.184)	(0.169)	(0.184)	(0.134)	(0.147)	(0.135)	(0.147)
% under 18	0.307	-0.240	0.241	-0.245	0.246	-0.192	0.193	-0.196
	(0.304)	(0.296)	(0.305)	(0.296)	(0.243)	(0.236)	(0.244)	(0.237)
% over 65	0.111	0.181	0.110	0.181	0.088	0.145	0.088	0.145
	(0.176)	(0.168)	(0.176)	(0.168)	(0.141)	(0.134)	(0.141)	(0.135)
% foreign-born	0.202	-0.044	0.170	-0.047	0.162	-0.035	0.136	-0.038
	(0.224)	(0.215)	(0.224)	(0.215)	(0.179)	(0.172)	(0.179)	(0.172)
% commute by transit	0.478	0.182	0.509	0.189	0.383	0.145	0.407	0.151
	(0.436)	(0.417)	(0.436)	(0.418)	(0.349)	(0.334)	(0.349)	(0.335)
% 5-year same house	-0.351**	-0.201*	-0.339**	-0.201*	-0.281**	-0.160*	-0.271**	-0.160*
	(0.099)	(0.097)	(0.099)	(0.097)	(0.079)	(0.078)	(0.079)	(0.078)
Unemployment rate	-0.039	0.089	-0.087	0.081	-0.031	0.071	-0.070	0.065
	(0.235)	(0.225)	(0.235)	(0.226)	(0.188)	(0.180)	(0.188)	(0.181)
Poverty rate	-0.014	-0.036	-0.001	-0.033	-0.012	-0.029	-0.001	-0.026
	(0.216)	(0.207)	(0.215)	(0.207)	(0.172)	(0.165)	(0.172)	(0.165)
10-yr income growth	-0.111**	-0.106**	-0.111**	-0.106**	-0.089**	-0.084**	-0.089**	-0.084**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.006)	(0.007)	(0.006)
Income relative to MSA	-0.284**	-0.254**	-0.279**	-0.254**	-0.228**	-0.203**	-0.223**	-0.203**
	(0.043)	(0.041)	(0.043)	(0.041)	(0.034)	(0.033)	(0.034)	(0.033)
10-yr population growth	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Supply Covariates								
Vacancy rate	0.358+	0.336+	0.332+	0.333+	0.286+	0.269+	0.266+	0.267+
	(0.192)	(0.185)	(0.192)	(0.185)	(0.154)	(0.148)	(0.154)	(0.148)
% owner-occupied	0.541**	0.374**	0.550**	0.376**	0.432**	0.299**	0.440**	0.301**
	(0.128)	(0.124)	(0.128)	(0.125)	(0.103)	(0.100)	(0.103)	(0.100)
Constant	0.476**	0.558**	0.478**	0.558**	0.381**	0.446**	0.382**	0.446**
	(0.117)	(0.113)	(0.117)	(0.113)	(0.094)	(0.091)	(0.093)	(0.091)
Observations	1452	1452	1452	1452	1452	1452	1452	1452
Tract fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.37	0.43	0.37	0.43	0.37	0.43	0.37	0.43

Standard errors in parentheses. +, * and ** denote significance at the 10, 5 and 1 percent levels, respectively.

Table 3. Fixed Effects Regressions. Housing Opportunity Index

	Dep. Var. = Housing Opportunity Index			
	(1)	(2)	(3)	(4)
HOA Covariates				
% HOA units			0.390**	0.043
			(0.113)	(0.086)
Demand Covariates				
% Black	1.521**	0.421**	1.422**	0.418**
	(0.177)	(0.143)	(0.178)	(0.143)
% Hispanic	2.339**	0.136	2.190**	0.132
	(0.244)	(0.207)	(0.246)	(0.207)
% under 18	-1.672**	0.066	-1.514**	0.076
	(0.443)	(0.332)	(0.443)	(0.333)
% over 65	0.594*	0.409*	0.595*	0.411*
	(0.257)	(0.189)	(0.255)	(0.189)
% foreign-born	-0.074	0.720**	0.002	0.726**
	(0.327)	(0.241)	(0.325)	(0.242)
% commute by transit	-0.549	0.184	-0.622	0.170
	(0.637)	(0.469)	(0.633)	(0.470)
% 5-year same house	0.566**	0.256*	0.537**	0.256*
	(0.144)	(0.109)	(0.143)	(0.109)
Unemployment rate	0.110	-0.476+	0.225	-0.463+
	(0.343)	(0.253)	(0.342)	(0.254)
Poverty rate	-0.430	-0.558*	-0.463	-0.564*
	(0.315)	(0.232)	(0.313)	(0.232)
10-yr income growth	0.035**	0.008	0.035**	0.008
	(0.012)	(0.009)	(0.012)	(0.009)
Income relative to MSA	0.298**	0.190**	0.284**	0.189**
	(0.062)	(0.046)	(0.062)	(0.046)
10-yr population growth	0.013+	0.008+	0.012+	0.008+
	(0.007)	(0.005)	(0.007)	(0.005)
Supply Covariates				
Vacancy rate	-0.278	-0.455*	-0.217	-0.450*
	(0.281)	(0.208)	(0.279)	(0.208)
% owner-occupied	-0.697**	-0.064	-0.719**	-0.067
	(0.187)	(0.140)	(0.186)	(0.140)
Constant	0.334+	-0.074	0.329+	-0.075
	(0.171)	(0.127)	(0.170)	(0.127)
Observations	1452	1452	1452	1452
Tract fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	No	Yes	No	Yes
R-squared	0.41	0.69	0.42	0.69

Standard errors in parentheses. +, * and ** denote significance at the 10, 5 and 1 percent levels, respectively.

Table 4A. Fixed Effects Regressions. Additional HOA Variables, No Year Fixed Effects

	Dep. Var. = Housing Cost Burden, 0% down						Dep. Var. = Housing Opportunity Index					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
HOA Covariates												
% HOA units	-0.189**	-0.168*	-0.127+	-0.214**	-0.139*	-0.196**	0.205	0.141	0.139	0.282	0.127	0.222
	(0.070)	(0.072)	(0.071)	(0.067)	(0.069)	(0.071)	(0.180)	(0.183)	(0.184)	(0.172)	(0.177)	(0.181)
Mean HOA size	-7.43e-05	-1.81e-04					2.47e-04	5.72e-04				
	(1.37e-04)	(1.55e-04)					(3.50e-04)	(3.97e-04)				
Mean subdivision size		5.470e-04						-1.67e-03+				
		(3.797e-04)						(9.71e-04)				
Mean HOA incorp yr			-5.48e-03**						7.91e-03			
			(2.09e-03)						(5.41e-03)			
Oldest HOA year				-7.68e-03						2.29e-02		
				(8.13e-03)						(2.08e-02)		
Youngest HOA yr					-2.71e-03**						5.22e-03*	
					(9.46e-04)						(2.44e-03)	
Max HOA size						-1.82e-05						8.04e-05
						(7.65e-05)						(1.96e-04)
Demand Covariates												
% Black	-0.655**	-0.654**	-0.623**	-0.654**	-0.612**	-0.649**	1.587**	1.583**	1.522**	1.581**	1.491**	1.572**
	(0.135)	(0.135)	(0.132)	(0.134)	(0.132)	(0.135)	(0.346)	(0.344)	(0.342)	(0.343)	(0.341)	(0.346)
% Hispanic	-1.095**	-1.081**	-1.029**	-1.091**	-0.969**	-1.088**	1.426**	1.384**	1.312**	1.410**	1.169**	1.405**
	(0.160)	(0.160)	(0.158)	(0.159)	(0.162)	(0.160)	(0.410)	(0.409)	(0.410)	(0.407)	(0.417)	(0.409)
% under 18	1.239**	1.217**	1.201**	1.204**	1.162**	1.232**	-2.148**	-2.081**	-2.075**	-2.041**	-1.987**	-2.130**
	(0.261)	(0.261)	(0.257)	(0.261)	(0.257)	(0.261)	(0.668)	(0.667)	(0.665)	(0.669)	(0.664)	(0.668)
% over 65	0.404**	0.388**	0.424**	0.395**	0.432**	0.410**	0.532	0.580	0.491	0.556	0.469	0.512
	(0.142)	(0.142)	(0.139)	(0.142)	(0.139)	(0.141)	(0.363)	(0.362)	(0.360)	(0.363)	(0.359)	(0.362)
% foreign-born	0.233	0.215	0.224	0.230	0.196	0.227	0.763	0.816	0.797	0.773	0.849	0.776
	(0.228)	(0.227)	(0.224)	(0.227)	(0.223)	(0.228)	(0.583)	(0.581)	(0.578)	(0.580)	(0.576)	(0.584)

Table 4A, continued.

	Dep. Var. = Housing Cost Burden, 0% down						Dep. Var. = Housing Opportunity Index					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
% commute by transit	0.816+	0.837+	0.798+	0.834+	0.804+	0.814+	-1.003	-1.068	-0.957	-1.053	-0.964	-1.007
	(0.443)	(0.442)	(0.437)	(0.443)	(0.435)	(0.444)	(1.134)	(1.130)	(1.129)	(1.134)	(1.124)	(1.138)
% 5-yr same house	0.031	0.028	0.025	0.028	0.051	0.029	0.301	0.310	0.315	0.310	0.267	0.306
	(0.096)	(0.096)	(0.095)	(0.096)	(0.095)	(0.096)	(0.246)	(0.245)	(0.245)	(0.245)	(0.245)	(0.246)
Unemployment rate	-0.094	-0.084	-0.138	-0.060	-0.119	-0.097	0.290	0.259	0.364	0.188	0.345	0.296
	(0.261)	(0.261)	(0.258)	(0.264)	(0.257)	(0.262)	(0.670)	(0.667)	(0.668)	(0.677)	(0.664)	(0.670)
Poverty rate	0.096	0.099	0.093	0.100	0.106	0.096	-1.075+	-1.082+	-1.077+	-1.087+	-1.098+	-1.071+
	(0.230)	(0.230)	(0.227)	(0.230)	(0.227)	(0.231)	(0.590)	(0.587)	(0.588)	(0.589)	(0.585)	(0.591)
10-yr income growth	-0.008	-0.008+	-0.009+	-0.008	-0.009+	-0.008	0.010	0.011	0.012	0.010	0.012	0.010
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Income relative to MSA	-0.177**	-0.177**	-0.165**	-0.177**	-0.158**	-0.176**	0.354**	0.355**	0.336**	0.354**	0.317**	0.351**
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.077)	(0.077)	(0.078)	(0.077)	(0.078)	(0.077)
10-yr population growth	0.005	0.009	0.003	0.006	0.005	0.005	0.017	0.007	0.019	0.015	0.018	0.017
	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.019)	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
Supply Covariates												
Vacancy rate	-0.542**	-0.565**	-0.574**	-0.558**	-0.560**	-0.545**	-0.290	-0.220	-0.244	-0.244	-0.256	-0.281
	(0.164)	(0.164)	(0.162)	(0.164)	(0.161)	(0.164)	(0.419)	(0.419)	(0.419)	(0.420)	(0.416)	(0.420)
% owner-occupied	-0.278*	-0.267*	-0.246*	-0.271*	-0.250*	-0.273*	-0.082	-0.115	-0.138	-0.105	-0.144	-0.097
	(0.110)	(0.111)	(0.109)	(0.110)	(0.109)	(0.110)	(0.283)	(0.283)	(0.282)	(0.282)	(0.280)	(0.282)
Constant	0.513**	0.467**	11.338**	15.739	5.841**	0.502**	0.293	0.432	-15.315	-45.098	-9.930*	0.325
	(0.102)	(0.106)	(4.137)	(16.123)	(1.863)	(0.099)	(0.260)	(0.272)	(10.701)	(41.283)	(4.809)	(0.255)
Observations	629	629	629	629	629	629	629	629	629	629	629	629
Tract fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	No	No	No	No	No	No	No	No	No	No	No	No
R-squared	0.54	0.54	0.55	0.54	0.55	0.54	0.47	0.47	0.47	0.47	0.48	0.47

Standard errors in parentheses. +, * and ** denote significance at the 10, 5 and 1 percent levels, respectively.

Table 4B. Fixed Effects Regressions. Additional HOA Variables, with Year Fixed Effects

	Dep. Var. = Housing Cost Burden, 0% down						Dep. Var. = Housing Opportunity Index					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
HOA Covariates												
% HOA units	-0.194**	-0.193**	-0.183**	-0.205**	-0.184**	-0.221**	0.266+	0.255	0.313*	0.303*	0.270+	0.329*
	(0.063)	(0.064)	(0.064)	(0.060)	(0.062)	(0.063)	(0.157)	(0.160)	(0.159)	(0.150)	(0.153)	(0.156)
Mean HOA size	1.067e-05	5.31e-06					2.14e-05					
	(1.20e-04)	(1.38e-04)					(2.98e-04)					
Mean subdivision size		2.67e-05						-3.21e-04				
		(3.39e-04)						(8.45e-04)				
Mean HOA incorp year			-8.66e-04						-3.96e-03			
			(2.06e-03)						(5.12e-03)			
Oldest HOA year				-9.71e-03						2.61e-02		
				(7.12e-03)						(1.77e-02)		
Youngest HOA yr					-5.32e-04						-2.13e-05	
					(9.81e-04)						(2.44e-03)	
Max HOA size						9.93e-05						-2.04e-04
						(6.85e-05)						(1.71e-04)
Demand Covariates												
% Black	-0.240+	-0.241+	-0.248+	-0.249*	-0.249+	-0.202	0.512	5.203e-01	0.482	0.528+	0.508	0.425
	(0.128)	(0.129)	(0.127)	(0.126)	(0.127)	(0.129)	(0.320)	(3.211e-01)	(0.317)	(0.315)	(0.318)	(0.322)
% Hispanic	-0.616**	-0.617**	-0.620**	-0.620**	-0.613**	-0.582**	0.200	0.203	0.186	0.201	0.196	0.122
	(0.152)	(0.153)	(0.151)	(0.150)	(0.151)	(0.152)	(0.380)	(0.380)	(0.376)	(0.374)	(0.377)	(0.380)
% under 18	0.463+	0.463+	0.470+	0.431+	0.465+	0.426+	0.023	0.022	0.052	0.117	0.027	0.107
	(0.245)	(0.245)	(0.244)	(0.244)	(0.244)	(0.244)	(0.610)	(0.611)	(0.607)	(0.607)	(0.607)	(0.609)
% over 65	0.441**	0.440**	0.442**	0.420**	0.444**	0.446**	0.428	0.438	0.433	0.479	0.426	0.415
	(0.124)	(0.124)	(0.123)	(0.124)	(0.123)	(0.123)	(0.308)	(0.310)	(0.307)	(0.308)	(0.307)	(0.306)
% foreign-born	0.221	0.221	0.223	0.236	0.217	0.192	0.814	0.824+	0.815+	0.782	0.817+	0.881+
	(0.199)	(0.200)	(0.198)	(0.197)	(0.198)	(0.198)	(0.495)	(0.497)	(0.493)	(0.492)	(0.494)	(0.495)
% commute by transit	0.340	0.342	0.349	0.374	0.354	0.276	0.269	0.246	0.307	0.185	0.273	0.408
	(0.391)	(0.392)	(0.390)	(0.389)	(0.391)	(0.391)	(0.973)	(0.977)	(0.972)	(0.969)	(0.974)	(0.976)

Table 4B, continued.

	Dep. Var. = Housing Cost Burden, 0% down						Dep. Var. = Housing Opportunity Index					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
% 5-year same house	0.046	0.046	0.043	0.050	0.045	0.047	0.331	0.335	0.313	0.323	0.332	0.331
	(0.087)	(0.087)	(0.087)	(0.086)	(0.087)	(0.086)	(0.216)	(0.217)	(0.217)	(0.215)	(0.216)	(0.215)
Unemployment rate	0.031	0.031	0.028	0.079	0.033	0.014	-0.153	-0.159	-0.168	-0.280	-0.152	-0.117
	(0.231)	(0.231)	(0.231)	(0.232)	(0.231)	(0.230)	(0.575)	(0.576)	(0.574)	(0.579)	(0.575)	(0.574)
Poverty rate	0.045	0.045	0.046	0.042	0.051	0.060	-0.981+	-0.984+	-0.974+	-0.975+	-0.982+	-1.014*
	(0.202)	(0.202)	(0.202)	(0.201)	(0.202)	(0.201)	(0.503)	(0.503)	(0.502)	(0.500)	(0.503)	(0.502)
10-yr income growth	-0.007	-0.007	-0.007+	-0.007	-0.007+	-0.007+	0.006	0.006	0.005	0.006	0.006	0.006
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Income relative to MSA	-0.118**	-0.118**	-0.117**	-0.119**	-0.116**	-0.117**	0.189**	0.190**	0.193**	0.191**	0.189**	0.187**
	(0.027)	(0.027)	(0.027)	(0.027)	(0.028)	(0.027)	(0.068)	(0.068)	(0.068)	(0.067)	(0.069)	(0.067)
10-yr population growth	0.007	0.007	0.007	0.008	0.007	0.008	0.010	0.008	0.009	0.009	0.010	0.009
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.016)	(0.017)	(0.017)	(0.016)	(0.016)	(0.016)
Supply Covariates												
Vacancy rate	-0.531**	-0.532**	-0.534**	-0.552**	-0.531**	-0.524**	-0.370	-0.358	-0.383	-0.314	-0.370	-0.384
	(0.144)	(0.145)	(0.144)	(0.144)	(0.144)	(0.143)	(0.358)	(0.360)	(0.358)	(0.358)	(0.358)	(0.357)
% owner-occupied	-0.342**	-0.342**	-0.340**	-0.339**	-0.340**	-0.340**	0.138	0.131	0.152	0.126	0.137	0.130
	(0.098)	(0.098)	(0.098)	(0.097)	(0.097)	(0.097)	(0.243)	(0.244)	(0.243)	(0.242)	(0.243)	(0.242)
Constant	0.688**	0.686**	2.403	19.951	1.736	0.680**	-0.255	-0.226	7.583	-52.091	-0.209	-0.231
	(0.093)	(0.098)	(4.070)	(14.119)	(1.933)	(0.091)	(0.232)	(0.245)	(10.131)	(35.150)	(4.819)	(0.227)
Observations	629	629	629	629	629	629	629	629	629	629	629	629
Tract fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.65	0.65	0.65	0.65	0.65	0.65	0.62	0.62	0.62	0.62	0.62	0.62

Standard errors in parentheses. +, * and ** denote significance at the 10, 5 and 1 percent levels, respectively.

Appendix A. Fixed Effects Regressions. Housing Cost Burden Calculated Using Census Reported Values

	Dep. Var. = Housing Cost Burden, 0% down		Dep. Var. = Housing Cost Burden, 20% down	
	(1)	(2)	(3)	(4)
HOA Covariates				
% HOA units	-0.158**	-0.075**	-0.126**	-0.060**
	(0.022)	(0.022)	(0.017)	(0.017)
Demand Covariates				
% Black	-0.048	0.185**	-0.039	0.148**
	(0.039)	(0.040)	(0.031)	(0.032)
% Hispanic	-0.250**	0.062	-0.200**	0.050
	(0.059)	(0.060)	(0.047)	(0.048)
% under 18	-0.274**	-0.635**	-0.219**	-0.508**
	(0.096)	(0.097)	(0.077)	(0.078)
% over 65	-0.329**	-0.343**	-0.263**	-0.274**
	(0.060)	(0.057)	(0.048)	(0.046)
% foreign-born	-0.253**	-0.166*	-0.203**	-0.133*
	(0.079)	(0.076)	(0.063)	(0.060)
% commute by transit	-0.210	-0.509**	-0.168	-0.407**
	(0.162)	(0.157)	(0.130)	(0.126)
% 5-year same house	-0.307**	-0.216**	-0.246**	-0.173**
	(0.033)	(0.032)	(0.026)	(0.026)
Unemployment rate	-0.281**	-0.200+	-0.225**	-0.160+
	(0.108)	(0.105)	(0.087)	(0.084)
Poverty rate	0.081	0.083	0.064	0.066
	(0.082)	(0.078)	(0.065)	(0.063)
10-yr income growth	-0.328**	-0.325**	-0.262**	-0.260**
	(0.005)	(0.005)	(0.004)	(0.004)
Income relative to MSA	0.073**	0.109**	0.059**	0.087**
	(0.016)	(0.016)	(0.013)	(0.013)
10-yr population growth	0.003**	0.002*	0.003**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Supply Covariates				
Vacancy rate	0.843**	0.706**	0.675**	0.565**
	(0.062)	(0.060)	(0.049)	(0.048)
% owner-occupied	0.323**	0.312**	0.258**	0.250**
	(0.040)	(0.039)	(0.032)	(0.031)
Constant	0.338**	0.333**	0.270**	0.267**
	(0.038)	(0.037)	(0.030)	(0.030)
Observations	4123	4123	4123	4123
Tract fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	No	Yes	No	Yes
R-squared	0.69	0.72	0.69	0.72

Standard errors in parentheses. +, * and ** denote significance at the 10, 5 and 1 percent levels, respectively.