Residency Requirements and House Prices: A Natural Experiment from Ohio

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Abstract: In the last 20 years many US cities have removed their residency requirements in response to municipal employee demands to choose where they live. We examine the effect of Ohio's 2006 residency requirement ban on housing prices in the housing markets of Cleveland, Akron, and Dayton. These cities did not comply with the 2006 law until 2009, when the Ohio Supreme Court upheld the ban. Following the Supreme Court ruling we find increases in suburban home prices related to various school performance measures. We find also find adverse housing market effects in the cities of Akron, Cleveland, and Dayton following the 2009 ruling. Finally, to provide a counter-factual, we incorporate data from Cincinnati, which had no citywide residency requirement, into the analysis.

Keywords: Residency Requirement, Housing Prices, Hedonic Pricing Models, School Quality

INTRODUCTION

A residency requirement is a law that forces municipal employees to reside in the city they work for as a condition of employment. An employee's residence is defined in terms of where the employee normally eats, sleeps and maintains his or her personal effects (Hirsch & Rufalo, Economic Effects of Residence Laws on Muncipal Police, 1985). Residency requirements emerged during the industrial revolution at the turn of the 20th century, when it was common to staff the police force by appointing local residents (Eisinger, 1983). Today residency requirements can cover from one up to all of municipality's employees.

Over the years residency requirements have fallen in and out of favor with cities as social and economic climates have changed. Between 1920 and 1960, widespread opposition to residency laws arose, with many arguing that residency requirements prevented the most qualified candidates from being hired. Accordingly, during this time many cities abolished or stopped enforcing the laws (Eisinger, 1983). By 1960, only Buffalo, Milwaukee, Philadelphia, and a few other major cities had residency laws (Fogelson, 1977). Residency laws gained momentum again in the 1970s in response to suburbanization, which saw many middle class and wealthy denizens move out of the city to the suburbs. Cities used residency requirements to bring some of these residents back to the city in order to help raise the standard of living in the city, reduce crime, and increase the tax base and local spending. It was thought that municipal employees such as police would work harder and have a better understanding of the city and its problems if they lived within the city. Also, having emergency workers available in the city would potentially decrease response times to emergencies. Some proponents claimed residency requirements would decrease tardiness and absenteeism from work (Eisinger, 1983). Reduced energy use by city employees in their journey to work was also argued in support of residency

requirements. Finally, it was thought that residency requirements would see more minorities and unemployed hired, thus reducing the cost of some city services, while at the same time reducing competition for central city minorities against white metropolitan workers. Accordingly, the 1970s saw many US cities reenact their residency requirements, or enforce those that were already in place. By 1976, 29 of the 50 largest cities in America had residency requirements (Hirsch & Rufalo, 1985), and by 1980, two-thirds of all US cities over 250,000 had residency requirements (Eisinger, 1983).

Today, residency requirements have again fallen out of favor, with police and firefighters being the most vocal on the negative aspects of residency requirements. Many police and firefighters perceive that residency requirements hurt recruitment efforts and the ability to keep qualified staff. Moreover, forcing municipal workers to live within the city boundaries potentially decreases the labor pool from which the city can draw unless a wage premium is created (Duncan, 2005). Municipal employees oppose residency requirements because they limit housing choice. In fact, most legal cases against city residency requirements have been argued on citizens' right to commute[1]. In reference to Sugarman v. Dougall (1973) concerning the legality of residency requirements, Lamar uses city's fiscal interest as a defense. "Municipal employees who live in the city are not only subjected to its taxes but also will presumably spend a good portion of their salaries in the area which they live, thus ensuring that some, if not most of the tax revenues expended by the municipality for employees' salaries will remain within the local economy" (Lamer, 1975). Of the largest fifty cities in America today, only Milwaukee has a residency requirement.

[1] Shapiro v. Thompson, Graham v. Richardson, Dunn d. Blumstein, Donnelly v. City of Manchester, Memorial Hospital v. Maricopa County, Kent v. Dulles, Korematsu v. United States.

In 2003, 125 of the state of Ohio's 243 cities had some sort of residency requirements (Ohio Municipal League, 2003). The exact manner in which these requirements were applied varied by municipality; some cities required only the City Manager to live in the city, while other cities like Cincinnati and Columbus allowed employees to live within the county or surrounding counties respectively.[2] However, cities like Cleveland, Dayton, Akron and Toledo required all city employees to live within the municipality borders. In 2006, allegedly in an effort to get rid of some collective bargaining rights of police and firefighters, Ohio enacted a state-wide ban on the enforcement of residency requirements to give municipal workers more freedom of choice. Legislators had the power to involve themselves with residency requirements because such requirements affected the comfort and general welfare of municipal workers. After 2006, various cities began filing lawsuits against the state, including Dayton, Akron, and Cleveland. They argued the General Assembly ruling was in violation of home rule.[3] On June 11, 2009, the state ban on residency requirements was upheld by Ohio Supreme Court, with the majority opinion supporting the legislative ban.

In the time period leading up to 2009 there was good reason to believe that municipal employees in Cleveland, Dayton and Akron knew that the cities were fighting the 2006 General Assembly ban. In Cleveland, the Mayor issued a press release four months prior to the ban announcing the city would continue to enforce its residency requirements (Sweet 2008). While city employees may have tried to move moved, they did so at their own risk. Sweet (2008) notes that four city of Cleveland employees were fired in 2007 for living in suburban Cuyahoga

[2] Cincinnati requires only administrative managers, such as the city manager, police and fire chief, etc. to reside within the city.

[3] Cleveland missed the deadline to join the suit, however, the court did allow oral arguments from Cleveland. Fields, Reginald. "Cleveland Will Get to Argue in Ohio Supreme Court for Residency Requirement." *The Plain Dealer*. Cleveland.com, 18 Jan. 2009. Web. 06 Mar. 2013. However in another lawsuit Cleveland filed against the state, Cleveland argued the ban on residency requirements would do ""irreparable financial harm" to the city due to employees seeking residency in surrounding communities (Sweet).

County, where supposedly investigations into the employees began before the new state law went into effect. Employees for the City of Akron and the City of Dayton were similarly fired for being in violation of residency requirements.

We expect the change in residency requirements in the State of Ohio brought about a change in the demand for housing both within and outside city limits of affected municipalities. Indeed, concerns regarding an erosion of the municipal tax base from the ban were found in the local media outlets in Cleveland, and Dayton.[4] Because municipal workers are a non-negligible percentage of most cities' workforces, we expect the magnitude of any housing demand shock to be non-negligible.[5]

To provide some perspective on employee moves, Figure 1 shows the percent of municipal employees in Dayton, OH who filed change of address forms from 2005 – 2011.[6] A downward trend in employee moves reverses in 2009. While selling a house is not an instantaneous process, we note that these numbers include both renters and owners. Thus, it is likely the increase in the number of City of Dayton employee address changes in 2009 is caused by the ban on residency requirements July of that year. It is also striking that address changes stay up after 2009 despite the tightening of the credit markets and falling house prices that otherwise constrained the mobility of many homeowners.

This study examines the house price effects of Ohio's residency requirement ban in those major cities that required the majority of their municipal workers to live in the city. We test whether the removal of a residency requirement causes housing prices to decrease in cities and

[4] Smith, Joanne H. "Survey: City Workers Likely to Move out of Dayton." *Dayton, Ohio, News and Information*. Dayton Daily News, 4 July 2009. Web. 06 Mar. 2013. Whitley, Mary A. "Cleveland Residency Requirement's Effect on City Neighborhoods May Be Softened by Poor Housing Market." *Plain Dearler*. Cleveland.com, 10 June 2009. Web. 06 Mar. 2013.

[5] In Ohio cities with city-wide residency requirements, municipal workers are between 1.2% and 2.1% of the population (US Census, 2010).

[6] Data collected from the City of Dayton.

increase in suburbs, and whether these latter price effects relate to school quality. We examine housing transactions in Cuyahoga, Montgomery and Summit counties, within which the cities of Cleveland, Dayton and Akron, respectively, continued to enforce their residency requirements until mid-2009. Consistent with Ries and Somerville (2010) and Bayer, Ferreira and McMillan (2007), we generally find no large house price capitalization of school district quality. However, following the Supreme Court's 2009 ruling, we find suburban house prices increase in the suburbs of Dayton, Cleveland and Akron with increases in various school performance measures. We also find the relative to their surrounding suburbs, house prices decline in the cities of Cleveland, Dayton and Akron. Our results suggest that the residency requirement ban led to a housing demand shock which increased housing prices in better performing suburban school districts, and decreased prices in cities, where public schools tend to be of lower quality. Because our sample period runs from 2007-2012, the house price effects we observe are likely of a smaller magnitude than what would be realized in a healthy housing market, in which homeowner mobility is not constrained by negative equity and tightening credit standards.

The remainder of the paper is organized as follows. We next review previous literature on residency requirements. Then we discuss our data and sources. Followed by the model and empirical framework. Then we report the empirical results of our model. Finally, we conclude our paper with a discussion of policy implications.

LITERATURE

Previous literature on residency requirements has ignored its effect on home prices, instead focusing on changes in labor productivity and determinants of residency requirements. Since residency requirements determine where a municipal worker can live, if residency

requirements are bind we expect to see a change in home prices following a change in policy. The literature has produced mixed results on the effectiveness of residency requirements, with several studies concluding that residency requirements have no significant economic effect. Using data from a survey of citizens' experiences with police serving their neighborhood, as well as traditional crime and clearance data, Smith (1980) studies the re-emergence of regulations requiring municipal employees to reside in the cities they serve. Smith addresses whether police involvement in the community has a positive effect on police performance. Smith shows that residency is positively related to the percentage of citizens, who rate their police force "outstanding," who have been assisted by the police, who perceive restraint in police use of force, and who perceive fairness and courtesy in police treatment of local citizenry. Smith also finds that residency does appear to be related to crimes reported by the police, but finds positive and significant clearance rates, especially of lesser crimes. Smith also looks at residency and officer attitudes towards the community and finds resident police have a more positive view of the community. Smith then compares middle-sized versus small-size cities and finds the police perception of citizen support is higher in middle-sized cities than smaller cities, suggesting residency requirements might not be a one-size-fits-all policy.

Eisinger (1983) studies the revival of residency requirements in the 1970s and the resulting effect on local economies. Eisinger theorizes that residency laws will be passed or enforced in cities that are suffering financial distress and economic deterioration. Other the other hand, economically and fiscally healthy cities would rescind residency requirements or stop enforcing them. He measures economic distress using population changes, unemployment levels and decline in the size of public sector work, a frost-belt location (highly related to unemployment), and a dummy variable for whether the city has a mayor. Eisinger concludes that

residency laws are weak policy responses to economic decay, and that their economic effect is unproven.

Hirsch and Rufalo (1985) study the effects of residency requirements on a municipality's demand for police, police labor pool, and police wage. They also examine what city characteristics lead to a residency requirement. Their results show a significant decrease in total compensation for police subjected to a residency requirement, and insignificant results in the total number of police employed. Like Eisinger, Mehay and Seiden (1986) also study the revival of residency requirements. They research how residency requirements affect results of popular votes in municipalities. They find residency requirements bring voters to a city that will disproportionately gain from high levels of public spending. While Mehay and Seiden acknowledge that municipal employees that reside within the city they work for may be more productive or have lower information costs then workers who live outside the city, the empirical results show any gains from increased productivity are washed out by the public employees voting for increased spending.

In their examination of residency requirements, Gonzalez, Mehay, and Duffy-Deno (1991) assume that public employee labor markets are characterized by conditions of excess supply, and that public services are produced under non-competitive conditions. They find that residency requirements increase the demand for police labor and has little effect on supply, thus increasing total police employment but with no signifigant effect on wages. O'Brien, (1997) compares four different hypotheses for a residency requirement's effect on compensation and employment. O'Brien finds residency laws do not effect compensation or employment for police or firefighters, and he concludes that residency requirements have no effect on labor markets.

Finally, Duncan, (2005) examines how residency requirements affect neighborhood choice by examining municipal wages and a family's decision to enroll their children in private school. Duncan theorizes that families will either enroll their children in private school or move to neighborhoods with better schools and hence pay more in taxes and rent. Duncan's findings showed that a comprehensive residency requirement attracts middle class families and discourages urban flight, but in order for the city to achieve these desired results the city must institute a wage premium of an additional dollar an hour.

DATA

To measure the effect of Ohio's statewide residency requirement ban on house prices we use sales transaction data from January 2007 to December 2011 from several Ohio counties. This five-year window, which takes place during the housing market downturn, provides us with two and one half years of sales both before and after the mid-2009 residency requirement ruling.[7] Housing transactions are collected from the auditor's offices of Summit County, Cuyahoga County, Montgomery County, and Hamilton County, where the cities of Akron, Cleveland, Dayton and Cincinnati are located, respectively.[8] Before 2009, citywide residency requirements continued to be enforced in Cleveland, Akron and Dayton. On the other hand, the City of Cincinnati required its employees to reside within Hamilton County rather than the city of Cincinnati. We include data from Hamilton County to provide a counterfactual for the analysis that follows. The transaction data includes information on sale price, sale date, sale validity and various housing characteristics. To make sure mobile homes are not in the sample we restrict

[7] The sample period is from January 1, 2007 December 31, 2011, with the exception of Cuyahoga County, where sales are only available through September 2011.

[8] Thanks to Shirley DeCheco (Summit County), Paula Drake (Hamilton County), Bill Buckholtz (Cuyahoga County) and Elaine Johnson (Montgomery County) for helping us collect this information.

minimum lot size to be one-tenth of an acre and we eliminate any sales with less than 500 square feet of living space. We also eliminate sales of homes having a sale price of less than $10,000. In total, the four county sample contains 60,206 housing transactions.

Public school data comes from the Ohio Department of Education website, which provides school quality information by school district. School data includes average attendance in the district, graduation rates, and average ACT and SAT scores for the 2008-2009 school year.[9] The socio-economic data is obtained from the American Community Survey and the U.S. Census Bureau. Socio-economic data are the 2009 five-year estimates which the ACS weights by school district. Table 1 lists each variable and its definition. Tables 2 and 3 provide descriptive statistics for the four counties of Cuyahoga, Hamilton, Montgomery and Summit counties. Specifically, Table 2 provides summary statistics for all non-school performance variables while Table 3 provides summary statistics for school performance variables by county.

Descriptive statistics for the four counties combined are presented in Table 2; the mean house price is $138,738 with prices ranging from an imposed minimum of $10,000 to a maximum of $4,041,400.[10] Lot size (ACRES) on average is 0.40 acres, with a range from 0.10 acres to 121.53 acres. The useable square feet of the home represented by AREA is on average 1,460, with a minimum of 502 square feet and maximum of 13,914 square feet. The average number of bathrooms is 1.45 with an imposed minimum and maximum of 1 and 6 respectively. The average age of the housing stock is 60.53 years old for the four counties. For the full sample, 46% of home sales took place after the 2009 Ohio State Supreme Court ruling (POST), 27% of homes were sold in a major city (CITY) and 67% were sold in a county with a major city that

[9] We choose to use the 2008 – 2009 school year both because it is mid-sample period and because that is the most recent school year before the June 2009 Ohio State Supreme Court decision.
[10] When an imposed maximum of $400,000 was used to eliminate outliers the results on the variables of interest did not change.

had a city wide residency requirement. In total, 40% of home sales were in Cuyahoga County, 21% and 6% were in Montgomery and Summit Counties, respectively, and the remaining 33% were in Hamilton County.

The socio demographic variables in Table 2 are weighted by the number of home sales that occurred in the school district. The average percent of Latinos (not Black) in a district is 2.40%, and the percent of Blacks (not Latino) is 21.44%. The average number of households with children aged 0 to 9 years is 12.51%, and the mean number of households with an elderly person aged 65 or older is 11.64%. The average median income was $63,687, with the average number of households with a female head and children at 8.57%, and the average percent of households with a bachelor's degree at 18.10%. On average, 11.39% of households had a graduate degree, and 9.41% did not have a high school diploma.

Turning to school-performance measure, Table 3 displays school quality variable descriptive statistics by county. The county information is the average of the districts in that county, and includes both the suburban districts and the city district within that county. From Table 3 we see there is not a great deal of difference across the counties in terms of average district attendance, graduation rates, ACT and SAT score. In particular, the average attendance rate for a district ranges within a single percentage point percent (from between 94.62% and 95.15%), and the standard deviation of these distributions is less than 2. The average graduation rate ranges a bit more than this, from 87.85% to 93.11%, and has a higher standard deviation. Mean ACT and SAT scores range from 20 to 22 points and 1,001 to 1,113 points respectively. Summit County, home to Akron, has the highest average district ACT and SAT scores among the four counties.

Table 4 displays the school quality measures for each county's major city school districts, the comparable measure for that county's suburban districts (on average), and the city school district ranking within the county. Here we see that the city school districts of Cleveland, Dayton and Akron, are among the worst in their respective counties across all school quality measures. In Cuyahoga, the Cleveland Municipal City School District is ranked last in the county in both attendance and graduation rates. Its attendance is 90.7% compared to the average suburban district attendance of 95.3%. The graduation rate of the Cleveland School District is 54.3% versus the average Cuyahoga County school district of 93.6%. The Cleveland City School District also ranks near the bottom in ACT and SAT scores. Its mean ACT score is 16 as compared to 21.7, and the mean SAT score is 184 points less than Cuyahoga suburban school district's average. The Dayton City School District ranks last in the county across all four school quality measures. Attendance and graduation rates in Dayton are 3.7% and 14.6% lower, respectively, than the average Montgomery County School District. The ACT and SAT scores are also lower by 5.7 and 114.9 points, respectively. The Akron City School District is last in the county in graduation rate and ACT score, and second last in attendance and SAT scores. The graduation rate for the city of Akron is 70% as compared to the Summit County average of 95.7%. By contrast, in Hamilton County, where there was no residency requirement, the Cincinnati City School District is in the top half of Hamilton County districts in SAT scores and attendance rates (although last in the county in graduation rates). It seems reasonable that such poor performing public school districts may be a major factor in a municipal employee's decision to leave the cities of Cleveland, Akron or Dayton following the residency requirement ban.

MODEL

We employ two basic versions of a hedonic pricing model to test our main hypothesis concerning house price effects in the cities and suburbs from the Ohio Supreme Court's ruling upholding the ban on residency requirements. In the first model, we look only at suburban housing markets surrounding those cities with residency requirements, where house prices changes are related to school quality. In the second model, we look at both city and suburban housing markets to see whether house prices fell in the city housing markets after the residency requirement ruling. The first model is presented in Equation 1:

$$PRICE_i = exp\left[\beta P + \delta D + \sum_{i=1}^{2} \delta_i COUNTY_i + \sum_{i=1}^{4} \phi_i YEAR_i + (\gamma_1 + \gamma_2 POST)Q_i + \varepsilon_i\right]. \quad [1]$$

Where the dependent variable is sales price, the β's, δ's, ϕ's, and γ's are parameters to be estimated and ε is a composite error termed comprised of a white noise term and a city-specific effect. The explanatory variables are classified into two vectors which describe the physical attributes of the property, *P*, and the socio-economic characteristics of the school district in which the parcel is located, *D*. We control for the county the parcel is located with two county dummy variables, *COUNTY*, and for overall macroeconomic effects during the sample period with four year-specific dummy variables, denoted *YEAR*.

We first discuss the explanatory variables that are not related to school quality. The vector *P* includes the size of the lot in acres, *ACRES*, total living space of the house, *AREA*, the number of bathrooms, *BATHS*, and the age of the house, *AGE*.[11] Similar to Black (1999), we use

[11] We do not use number of bedrooms because it is highly correlated with both area and number of bathrooms and often has a negative coefficient (Sirmans, Macpherson and Zietz, 2005).

socio-demographic variables to control for neighborhood (district) attributes. The vector *D* includes a number of socio-economic variables that describe the school district in which the parcel is located. The variables *P_LATINO* and *P_BLACK* indicate the percent of the district that is Black or Latino, respectively. *P_AGE_0_9* and *P_AGE_65* indicate the percent of household with children aged 0 to 9 years, and the percent with adults over 65 years of age, respectively. District median income is revealed by the variable *MEDINCOME*, and the percent of female - headed households is indicated by *P_FEMHEAD*. Education attainment levels by district are measured with *P_BACHELORS* and *P_GRAD*, which indicate the percent of households with bachelor's degrees and graduate degrees, respectively. The percent of households with no high school diploma is indicated with the variable, *P_NODEGREE*.

Four variables are used to measure school quality, Q, by school district. The variable *ATTEND* indicates the average attendance rate of the school district for the 2008-2009 school year. *GRADRATE* is the graduation rate for the district for this same time period. Finally, the variables *ACT* and *SAT* denote the average district score on the American College Test and the Scholastic Aptitude Test, respectively.

To control for house price effects following the 2009 Supreme Court ruling, model 1 utilizes a *POST* dummy variable. This variable indicates that the sale occurred following the June 11, 2009 Supreme Court decision. The coefficient γ_1 is the percentage change in house price with a one unit change in the respective school quality measure. The coefficient γ_2 is the additional effect on house prices following the Ohio Supreme Court's 2009 ruling. Recent literature on the capitalization effects of school quality suggests price effects from school quality are small to non-existent. (Ries and Somerville 2010, Bayer, Ferreira and McMillan 2007) Thus, prior to the 2009 Ohio Supreme Court ruling, we expect little or no price effects of school quality

after controlling for property and socio-economic characteristics. Following the 2009 court ruling, we would expect a positive housing demand shock in higher quality suburban school districts. Accordingly, we expect γ_2, the coefficient on the interaction term between the respective school quality variable and the POST variable, to be positive.

The second model tests whether there are house price effects from the residency requirement ruling in city housing markets. The second model is presented in Equation 2:

$$PRICE_i = exp\left[\beta P + \delta D + \sum_{i=1}^{2} \delta_i COUNTY_i + \sum_{i=1}^{4} \phi_i + \gamma_1 POST + \gamma_2 CITY + \gamma_3 POSTCITY + \varepsilon_i\right]. \quad [2]$$

In model 2, house price effects are not interacted with school quality measures because there is only one school district in each city. In this model, the variable *CITY* distinguishes houses located within the city limits (and the city school district) from those in the suburbs. The coefficient reveals whether, in general, city house prices are different from suburban house prices. The interaction term *POSTCITY* denotes sales in the city that occur after the 2009 Ohio Supreme Court ruling. The coefficient γ_3 is the percentage change in house prices in the city after the residency requirement ban is upheld. If households leave the city for the suburbs after the 2009 ruling, we expect γ_3 to be negative.

It may be that house price effects in the suburbs are related to an increase in demand for better quality public schools that is unrelated to residency requirements. For example, in a weak economy private schools become less affordable so there may be an increase in demand for better quality schools. To test this hypothesis we modify Model 1 to incorporate different price

effects in housing markets that do not have residency requirements. The modified Model 1 is presented in Equation 3:

$$PRICE_i = exp\left[\beta P + \delta D + \sum_{i=1}^{3} \delta_i COUNTY_i + \sum_{i=1}^{4} \phi_i YEAR_i + (\gamma_1 + \gamma_2 POST + \gamma_3 NORRPOST)Q_i + \varepsilon_i\right]. \quad [3]$$

The variable *NORR*, which is interacted with POST, indicates sales in a housing market without a residency requirement. (Note that by adding this additional housing market the number of county dummy variable increases from 2 to 3.) The interaction term *NORRPOSTQ* indicates post-ruling sales occurring in a housing market without residency requirements. If post-ruling increases in house prices in the suburbs are due to the residency requirement ban, then we would expect γ_3 to be negative, indicating relatively lower post-ruling house price effects in the market without a residency requirement. On the other hand, if γ_3 is not significantly different than zero, this would suggest that any post-ruling house price effects found in Model 1 may be unrelated to residency requirements.

ESTIMATION

To estimate the models a logarithmic transformation is used. We also include zip code fixed effects to control for differences in neighborhood quality that may affect home values or bias the results for school quality if better schools are located in nicer neighborhoods (Black, 1999). The results from Model 1 are presented in Table 5, where regressions are run on a combined sample of suburban housing transactions in Cuyahoga, Montgomery and Summit counties. See appendix A1-A4 for individual county results. We find consistent results' concerning the housing attributes variables. House prices increase with lot size, building area and the number of baths, and decrease with building age. More specifically, a 1% change in lot area (ACRE) increases price by approximately 0.11%. The percentage increase in price from adding

one bath is approximately 10.3%, and the percentage increase in price from an additional square foot of living space (AREA) is 0.03%. These measures are consistent with previous research. We also find consistent results across models concerning the socio- demographic variables. Housing prices are lower the higher the percentage of Blacks and Latinos. We also find that housing prices are lower the higher the percentage of households with children under 10 years of age, and the higher the percentage of female-headed households. A greater percentage of households with bachelors and graduate degrees increases house prices, but, curiously, so does the percentage of households with no high school diploma. Finally, as expected, house prices are falling over the 2007-2011 sample period.

Before the residency requirement ruling we find that better schools are favorably capitalized into house prices.[12] House prices are 2% higher with an additional percentage in attendance rate, and 0.7% higher with an additional percentage on graduation rate. Similarly, house prices are 4% higher with an additional point on the district ACT score, and 7% higher with an additional 100 points on the SAT.

The results support our hypothesis that a ban on municipal residency requirements causes an increase in housing demand in the suburbs surrounding those municipalities, where house prices are increasing in school quality measures. Following the 2009 ruling, we find an additional increase in house prices of 0.13% for every additional percentage point increase in the district high school graduation rate, and by 0.15% for every additional percentage point increase in the attendance rate. We find similar results using ACT scores and SAT scores. After the 2009 ruling there is an additional 0.67% increase in house prices with each additional point on the district average ACT score, and a 1.0% increase in house prices with an additional 100 point

[12] When using robust clustered standard errors (clustering at the zip code level), the ATTEN is not significant. When regressions are run on individual counties some general school quality capitalization effects are found. Individual counties are reported in the index of this paper. See Table A1 – A3.

increase on the district's average SAT score.[13] Thus, using any of the four measures of school quality, our results suggest a positive housing demand shock in higher quality suburban school districts following the Ohio Supreme Court ruling.

The results from Model 2 are presented in Table 6. The first column shows the regression results for all the counties with residency requirements combined and the following three columns display results for each county individually. The combined results from Cuyahoga, Summit, and Montgomery Counties indicate an average post-ruling decline in these city housing markets of around 9.0% as seen by the coefficient on POSTCITY.[14] From Columns 2 and 3, we see that the Cleveland and Dayton housing markets experienced additional significant price declines after the 2009 ruling, with the largest decrease in Dayton, where house prices declined 13.3%. Interestingly, we can see from Column 5 that in Hamilton County, where there were no city-wide residency requirements, the coefficient on POSTCITY is positive. Post ruling, prices in Cincinnati increased by 3.6% relative the Hamilton County suburbs. These results support our hypothesis that a there is a negative post ruling housing demand shock to the city after residency requirements are abolished, decreasing the prices of homes within the city. [15]

As discussed earlier, it may be that house price effects in the suburbs are related to an increase in demand for better quality public schools that is unrelated to residency requirements. Indeed when Model 1 is run on the Hamilton County suburbs we find house price increases with higher school performance measures post-residency requirement ruling.[16] Thus, we must test whether these school-related post ruling house price effects in the suburbs are more pronounced

[13] Similar results are obtained when using robust clustered standard errors (clustering at the zip code level). Also similar results for PostGradeRate, PostACT & PostSAT.
[14] When using robust clustered standard errors (clustering at the zip code level) PostCity is negative and significant at the 5% level.
[15] When using robust clustered standard errors (clustering at the zip code level) Cuyahoga county PostCity is no longer significant however Montgomery and Hamilton County still are significant.
[16] See Appendix table A4.

in markets where the city had faced a residency requirement. These results, based on the combined suburban markets of Cuyahoga, Summit, Montgomery and Hamilton Counties, are presented in Table 7.

As in Table 5, we again see a post-ruling house price increase with increased graduation rates, attendance rates, and ACT and SAT scores in the suburbs. A one percentage point in attendance rates increased home prices 0.11%, and a one percentage point increase in graduation rates increased home prices 0.09%. A one point increase in ACT score increased home prices after the ruling 0.62% while a one point increase in SAT score increased home prices on average 0.01% after the ruling. However, in Hamilton County, where there was no city wide residency requirement, this effect is significantly less, regardless of which school performance measure is used.[17] These results, along with the price declines in city housing markets that had residency requirements, are consistent with a flight out of cities to better performing suburban school districts once municipal residency requirements were struck down.

CONCLUSION

We examine the 2009 Ohio Supreme Court ruling that upheld the statewide ban on all municipal residency requirements. We first examine the housing markets of Cleveland, Dayton and Akron, where the cities waited to drop their residency requirements until the 2009 ruling. Following the 2009 ruling, we find house prices increases in higher quality school districts in the suburbs of these markets, but house price declines in the cities. We then incorporate housing transaction data from Cincinnati, where there was no citywide residency requirement, into the analysis. We find post-ruling house prices in suburban Cleveland, Akron

[17] When using robust clustered standard errors (clustering at the zip code level) Hamilton County suburbs valued education at a significantly lower rate than Cuyahoga, Montgomery and Summit County suburbs combined.

and Dayton combined are significantly higher than those in the Cincinnati suburbs. Moreover, following the Supreme Court ruling upholding the state ban on residency requirements, house prices increased rather than decreased in the city of Cincinnati. As most of this literature has looked at the implementation of residency requirements rather than their abolishment, our paper provides a unique contribution to the literature by examining post-residency requirement house price effects in both the city and surrounding suburbs.

We suggest that due the weak during the sample period, our estimates of house price effects from the ruling on residency requirements are understated. House price declines, which broadly commenced in 2006, resulted in many homeowners with negative equity in their homes, and unable to move. Moreover, tightening credit standards following the housing market crash also may have prevented those homeowners with marginal credit quality wishing to leave the cities from doing so. Also, because our post-window is only 2.5 years, we are only measuring short-terms effects from the ban on residency requirements. For example, some households with school-aged children may choose to wait until their children are of a certain age before moving so as to avoid disruption in the child's school experience.

The loss to the tax base after the ban on residency requirements is substantial. While the average home in Cleveland, Dayton or Akron decreased in price after the ban on municipal residency requirement, these effects likely occurred in other Ohio cities like Toledo and Lima which also had city residency requirements. Thus, we estimate that removing residency requirements caused a significant drop in the collective tax base reduction for those communities affected by the 2009 court ruling banning residency requirements.

Our study has several policy implications. First, we show that for cities like Milwaukee, WI, a decrease in the tax base (for property taxes) from repeal of the city's residency

requirement is a valid concern. On the other hand, because most major cities have abolished residency requirements, our findings could be used to argue for their reinstatement as a means to bolster a tax base weakened by the current economic climate. However, without consideration of payroll, worker skill and worker effort, we are unable to claim whether the cities are ultimately better off with or without a residency requirement.

Figure 1
Number of Address Changes Filed by City of Dayton Employees

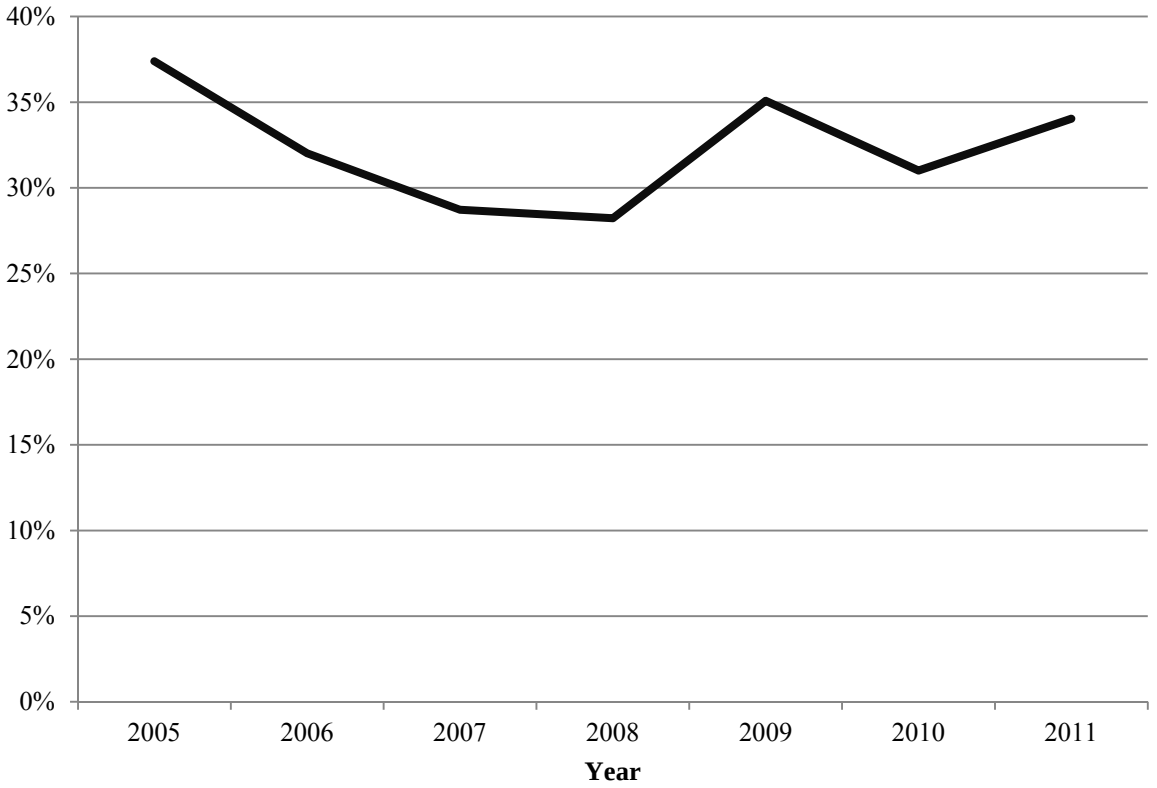

Table 1
Variable Definitions

Variable	Definition
PRICE	Sale price of the property in dollars
ACRES	Number of acres of the lot
AREA	Square feet of house
BATHS	Number of bathrooms
AGE	Age of house
POST	Dummy for if house was sold after June 11th 2009
CITY	Dummy for if house was in city
RR	Dummy for if house is in county with a major city with a residency requirement
CUYA	Dummy for if house is in Cuyahoga county
HAM	Dummy for if house is in Hamilton county
MON	Dummy for if house is in Montgomery county
SUM	Dummy for if house is in Summit county
Y2008	Dummy for if house was sold in 2008
Y2009	Dummy for if house was sold in 2009
Y2010	Dummy for if house was sold in 2010
Y2011	Dummy for if house was sold in 2011
P_LATINO	Percent Latino (not Black) in school district
P_BLACK	Percent Black (not Latino) by school district
P_AGE_0_9	Percent of households with children age 0 to 9 years by school district
P_AGE_65	Percent of households with adults over 65 years by school district
MEDINCOME	Median Income of Households of school district
P_FEMHEAD	Percent of households with children and female only head of household by school district
P_BACHELORS	Percent of households with bachelors degree by school district
P_GRAD	Percent of household with graduate degree by school district
P_NODEGREE	Percent of household with no high school diploma by school district
ATTEND	Average attendance of school district for 2008 - 2009 school year
GRADRATE	Graduation rate of school district for 2008 - 2009 school year
ACT	Average ACT score of school district for 2008 - 2009 school year
SAT	Average SAT score of school district for 2008 - 2009 school year

Sources. Housing transactions were collected from the auditor's offices of Summit County, Cuyahoga County and Montgomery County, where Akron, Cleveland, and Dayton are located, respectively. Public school data comes from the Ohio Department of Education website. Socio-demographic information is obtained from the American Community Survey 2009 – 5 year estimates.

Table 2

Housing and demographic characteristics descriptive statistics for Cuyahoga, Hamilton, Montgomery and Summit

Variable	N	Mean	Std Dev	Minimum	Maximum
PRICE	60,206	138,738	131,951	10,001	4,041,400
ACRES	60,206	0.40	1.71	0.10	121.53
AREA	60,206	1,460	697	502	13,914
BATHS	60,206	1.45	0.66	1.00	6.00
AGE	60,205	60.53	25.96	1.00	202.00
POST	60,206	0.46	0.50	0.00	1.00
CITY	60,206	0.27	0.44	0.00	1.00
RR	60,206	0.67	0.47	0.00	1.00
CUYA	60,206	0.40	0.49	0.00	1.00
HAM	60,206	0.33	0.47	0.00	1.00
MON	60,206	0.21	0.41	0.00	1.00
SUM	60,206	0.06	0.24	0.00	1.00
Y2008	60,206	0.20	0.40	0.00	1.00
Y 2009	60,206	0.20	0.40	0.00	1.00
Y 2010	60,206	0.18	0.39	0.00	1.00
Y 2011	60,206	0.16	0.37	0.00	1.00
P_LATINO	60,206	2.40	2.27	0.00	8.70
P_BLACK	60,206	21.44	20.72	0.00	92.60
P_AGE_0_9	60,206	12.51	1.52	8.00	18.20
P_AGE_65	60,206	11.64	2.58	5.90	33.70
MEDINCOME	60,206	63,687	21,619	33,346	145,360
P_FEMHEAD	60,206	8.57	3.66	1.50	16.30
P_BACHELORS	60,206	18.10	7.96	3.80	39.90
P_GRAD	60,206	11.39	7.35	1.10	36.40
P_NODEGREE	60,206	9.41	5.10	1.60	20.30

Table 3

School Quality Variables- Descriptive Statistics by County

School Variable (total districts)	Cuyahoga (31)	Hamilton (22)	Montgomery (16)	Summit (17)	All
ATTEND					
N	23,925	19,669	12,901	3,711	60,206
Mean	94.62	95.15	94.08	95.13	94.71
Std Dev	1.41	0.68	1.77	1.22	1.36
Minimum	90.70	93.80	91.30	93.10	90.70
Maximum	96.80	96.40	96.10	96.40	96.80
GRADRATE					
N	23,925	19,669	12,901	3,711	60,206
Mean	87.85	89.98	91.98	93.11	89.76
Std Dev	11.51	7.53	7.82	7.31	9.53
Minimum	54.30	80.30	79.80	76.00	54.30
Maximum	99.30	100.00	100.00	99.30	100.00
ACT					
N	23,925	19,669	12,901	3,711	60,206
Mean	20.11	20.87	20.81	21.96	20.62
Std Dev	2.64	2.49	2.84	1.93	2.65
Minimum	15.00	17.00	17.00	19.00	15.00
Maximum	26.00	26.00	25.00	25.00	26.00
SAT					
N	23,925	19,669	12,901	3,711	60,206
Mean	1,001.01	1,046.19	1,020.39	1,112.94	1,026.82
Std Dev	103.43	68.76	100.27	56.22	94.86
Minimum	768.00	780.00	846.00	970.00	768.00
Maximum	1,240.00	1,178.00	1,132.00	1,234.00	1,240.00

Note. Statistics are weighted by number home sale transactions.

Table 4

City vs. Suburban School District Statistics

	Cleveland Municipal City School District	Rank (Out of 31)	Suburban Cuyahoga County
Attendance	90.7	31	95.3
Graduation Rate	54.3	31	93.6
Mean ACT	16	30	21.7
Mean SAT	864	28	1048.3
	Cincinnati City School District	Rank (Out of 22)	Suburban Hamilton County
Attendance	95.2	10	95.1
Graduation Rate	80.4	22	94.2
Mean ACT	19	18	21.6
Mean SAT	1042	10	1041.8
	Dayton City School District	Rank (Out of 16)	Suburban Montgomery County
Attendance	91.3	16	95.0
Graduation Rate	79.8	16	94.4
Mean ACT	17	16	21.7
Mean SAT	904	16	1018.9
	Akron City School District	Rank (Out of 17)	Suburban Summit County
Attendance	93.2	16	95.3
Graduation Rate	76.0	17	95.7
Mean ACT	19	17	22.1
Mean SAT	1046	16	1086.3

Note. Note county excludes major city in mean calculation.

Table 5
Cuyahoga, Montgomery and Summit Counties – Suburbs Only

Variable	(1)	(2)	(3)	(4)
Intercept	8.4563**	10.433**	10.4282**	10.2731**
	(0.6818)	(0.1273)	(0.1384)	(0.1694)
lnACRES	0.111**	0.1107**	0.1083**	0.1112**
	(0.0049)	(0.0049)	(0.0049)	(0.0049)
AREA	0.0003**	0.0003**	0.0003**	0.0003**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
BATHS	0.1003**	0.0998**	0.1001**	0.0999**
	(0.0069)	(0.0069)	(0.0069)	(0.0069)
AGE	-0.0027**	-0.0028**	-0.0027**	-0.0026**
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
AGE_SQ	-0.00001**	-0.00001**	-0.00001**	-0.00001**
	(0.000003)	(0.000003)	(0.000003)	(0.000003)
MON	-0.1335**	-0.1324**	-0.176**	-0.1529**
	(0.0252)	(0.0251)	(0.0262)	(0.0255)
SUM	-0.221**	-0.19**	-0.1694**	-0.2802**
	(0.0273)	(0.0274)	(0.0288)	(0.0268)
ATTEND	0.0279**			
	(0.0073)			
POSTATTEND	0.0015**			
	(0.0001)			
GRADRATE		0.0074**		
		(0.001)		
POSTGRADRATE		0.0014**		
		(0.0001)		
ACT			0.0439**	
			(0.0071)	
POSTACT			0.0067**	
			(0.0006)	
SAT				0.0007**
				(0.0001)
POSTSAT				0.0001**
				(0.00001)
P_LATINO	-0.0504**	-0.0255*	-0.0225+	-0.0223+
	(0.0105)	(0.0111)	(0.0117)	(0.0121)
P_BLACK	-0.0042**	-0.0036**	-0.001	-0.0024**
	(0.0007)	(0.0007)	(0.0008)	(0.0007)
P_AGE_0_9	-0.0269**	-0.0258**	-0.0182**	-0.0216**
	(0.0055)	(0.0055)	(0.0057)	(0.0056)
P_AGE_65	-0.0053*	-0.0051*	-0.0061**	-0.0077**
	(0.0021)	(0.0021)	(0.0021)	(0.0021)
MEDINCOME	0.000001	0.000001	0.0000002	0.000004**
	(0.000001)	(0.000001)	(0.000001)	(0.000001)
P_FEMHEAD	-0.0166**	-0.0211**	-0.0222**	-0.0224**
	(0.0043)	(0.0044)	(0.0044)	(0.0044)
P_BACHELORS	0.0212**	0.0165**	0.0142**	0.0219**
	(0.0026)	(0.0027)	(0.003)	(0.0025)
P_GRAD	0.0127**	0.0201**	0.0083**	0.0043+
	(0.0021)	(0.0024)	(0.0021)	(0.0023)
P_NODEGREE	0.0473**	0.0479**	0.0281**	0.0492**
	(0.0069)	(0.0069)	(0.0076)	(0.0069)
Y2008	-0.2014**	-0.2019**	-0.202**	-0.2018**
	(0.0083)	(0.0083)	(0.0083)	(0.0083)
Y2009	-0.3427**	-0.3289**	-0.3403**	-0.3454**
	(0.0119)	(0.0117)	(0.0117)	(0.0117)
Y2010	-0.3759**	-0.3541**	-0.3721**	-0.3803**
	(0.0156)	(0.0153)	(0.0153)	(0.0154)
Y2011	-0.4686**	-0.4477**	-0.4654**	-0.4739**
	(0.016)	(0.0158)	(0.0157)	(0.0158)
R-Square	0.577	0.5772	0.5774	0.5775

Note. 30,799 housing transactions. The dependent variable is the natural log of the price the home sold for. Zip code level fixed effects are used. Standard errors are in parentheses.

+ Significant at the 10% level

* Significant at the 5% level

** Significant at the 1% level

Variable	Res Req Counties Combined	Cuyahoga County	Montgomery County	Summit County	Hamilton County
Intercept	11.1053**	9.9311**	11.2096**	9.1068**	11.0624**
	(0.0884)	(0.4067)	(2.2043)	(1.8904)	(0.127)
lnACRES	0.1284**	0.1422**	0.1313**	0.0691**	0.1988**
	(0.005)	(0.0095)	(0.0067)	(0.0109)	(0.0065)
AREA	0.0003**	0.0003**	0.0003**	0.0002**	0.0003**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
BATH	0.0845**	0.0777**	0.0761**	0.1165**	0.2099**
	(0.0067)	(0.0101)	(0.0096)	(0.0171)	(0.0054)
AGE	-0.0045**	-0.0015*	-0.0066**	-0.0062**	-0.0137**
	(0.0004)	(0.0006)	(0.0007)	(0.0009)	(0.0004)
AGE_SQ	-0.00001**	-0.00004**	0.00001*	0.00001*	0.00006**
	(0.000003)	(0.000005)	(0.000005)	(0.000006)	(0.000003)
MON	-0.1024**				
	(0.0251)				
SUM	-0.2358**				
	(0.0261)				
POST	0.1759**	0.2042**	0.0994**	0.1039*	0.0491**
	(0.0128)	(0.0167)	(0.0213)	(0.0426)	(0.0145)
CITY	0.0056	-0.3537**	0.3476	0.715	-0.9068**
	(0.0363)	(0.0785)	(0.414)	(1.2185)	(0.0371)
POSTCITY	-0.0947**	-0.0468**	-0.1427**	-0.0549	0.0355**
	(0.0128)	(0.0178)	(0.0182)	(0.0509)	(0.012)
P_LATINO	-0.035**	0.0085	-0.1414	-0.1426	-0.1302**
	(0.0046)	(0.0139)	(0.1058)	(0.2482)	(0.0078)
P_BLACK	-0.0034**	0.0018	-0.0054	-0.0225	0.0192**
	(0.0007)	(0.0023)	(0.0118)	(0.0421)	(0.0009)
P_AGE_0_9	-0.0362**	-0.0729**	-0.0751	0.1415	0.127**
	(0.0054)	(0.0231)	(0.0678)	(0.0931)	(0.0072)
P_AGE_65	-0.0062**	-0.0074	-0.0084	0.082	0.0363**
	(0.0021)	(0.0047)	(0.0441)	(0.0794)	(0.0036)
MEDINCOME	0.000004**	0.000012**	0.000022	-0.000002	-0.000017**
	(0.000001)	(0.000002)	(0.000028)	(0.00001)	(0.000002)
P_FEMHEAD	-0.0138**	-0.0063	0.0823	-0.0789+	-0.0809**
	(0.0043)	(0.0094)	(0.1406)	(0.0464)	(0.0061)
P_BACHELORS	0.0209**	0.0453**	0.0387	0.0332	-0.0144**
	(0.0024)	(0.0083)	(0.0559)	(0.0303)	(0.0028)
P_GRAD	0.0115**	0.0071*	-0.0956	-0.015	0.0538**
	(0.0016)	(0.0035)	(0.0962)	(0.0207)	(0.0045)
P_NODEGREE	0.0527**	0.0988**	-0.0216	0.0284	0.0292**
	(0.0064)	(0.0129)	(0.099)	(0.0634)	(0.005)
Y2008	-0.2037**	-0.2744**	-0.0856**	-0.0821**	0.0377**
	(0.0078)	(0.0105)	(0.0123)	(0.0258)	(0.0089)
Y2009	-0.3592**	-0.4226**	-0.2365**	-0.2414**	-0.025+
	(0.0112)	(0.0147)	(0.0185)	(0.0381)	(0.0133)
Y2010	-0.4129**	-0.4167**	-0.4093**	-0.2255**	-0.0321+
	(0.0149)	(0.0199)	(0.0241)	(0.0498)	(0.0165)
Y2011	-0.5049**	-0.5327**	-0.4606**	-0.2849**	-0.183**
	(0.0153)	(0.021)	(0.0242)	(0.0495)	(0.0164)
R-Square	0.5828	0.5519	0.6475	0.5867	0.6767

Note. Cuyahoga has 23,924 housing transactions, Montgomery has 12,901, and Summit has 3,711, and Hamilton has 19,669 housing transactions. The dependent variable is the natural log of the price the home sold for. Zip code level fixed effects are used. Standard errors are in parentheses.

+ Significant at the 10% level

* Significant at the 5% level

** Significant at the 1% level

Table 7
Cuyahoga, Montgomery, Summit and Hamilton Counties - Suburbs Only

Variable	(1)	(2)	(3)	(4)
Intercept	9.9581**	10.6506**	11.8146**	12.2237**
	(0.5738)	(0.0768)	(0.0917)	(0.0952)
LNACRES	0.1508**	0.147**	0.1514**	0.1504**
	(0.004)	(0.004)	(0.004)	(0.004)
AREA	0.0003**	0.0003**	0.0003**	0.0003**
	(0.000005)	(0.000005)	(0.000005)	(0.000005)
BATH	0.1778**	0.1749**	0.1776**	0.1768**
	(0.0049)	(0.0049)	(0.0049)	(0.0049)
AGE	-0.0076**	-0.0076**	-0.0076**	-0.0077**
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
AGE_SQ	0.00002**	0.00002**	0.00002**	0.00002**
	(0.000002)	(0.000002)	(0.000002)	(0.000002)
HAM	0.5084**	0.5383**	0.5097**	0.5562**
	(0.0304)	(0.0302)	(0.0302)	(0.0302)
MON	-0.1653**	-0.1912**	-0.1392**	-0.1175**
	(0.0218)	(0.0217)	(0.0221)	(0.022)
SUM	-0.1845**	-0.1328**	-0.2301**	-0.1676**
	(0.0237)	(0.0233)	(0.024)	(0.0233)
ATTEND	0.0166**			
	(0.0063)			
POSTATTEND	0.0011**			
	(0.0001)			
NORRPOSTATTEND	-0.002**			
	(0.0002)			
GRADRATE		0.0133**		
		(0.0008)		
POSTGRADRATE		0.0009**		
		(0.0001)		
NORRPOSTGRADRATE		-0.0017**		
		(0.0002)		
ACT			-0.0248**	
			(0.0049)	
POSTACT			0.0062**	
			(0.0005)	
NORRPOSTACT			-0.0117**	
			(0.001)	
SAT				-0.0008**
				(0.0001)
POSTSAT				0.0001**
				(0.00001)
NORRPOSTSAT				-0.0002**
				(0.00002)
P_LATINO	0.0139*	0.0311**	-0.0081	-0.0157*
	(0.0067)	(0.0066)	(0.0073)	(0.0069)
P_BLACK	-0.0019**	-0.0009+	-0.0035**	-0.0034**
	(0.0005)	(0.0005)	(0.0006)	(0.0005)
P_AGE_0_9	-0.0429**	-0.0373**	-0.0426**	-0.0495**
	(0.0036)	(0.0036)	(0.0036)	(0.0036)
P_AGE_65	-0.0102**	-0.0132**	-0.0067**	-0.0067**
	(0.0017)	(0.0017)	(0.0018)	(0.0017)
MEDINCOME	0.00001**	0.000001	0.00001**	0.000005**
	(0.000001)	(0.000001)	(0.000001)	(0.000001)
P_FEMHEAD	0.0106**	-0.0036	0.0109**	0.0071*
	(0.0032)	(0.0033)	(0.0032)	(0.0032)
P_BACHELORS	0.0076**	-0.0008	0.0145**	0.0171**
	(0.0019)	(0.0018)	(0.0021)	(0.0019)
P_GRAD	-0.0025	0.0153**	-0.0028+	0.0017
	(0.0017)	(0.0019)	(0.0016)	(0.0017)
P_NODEGREE	0.0169**	0.0136**	0.0254**	0.0311**
	(0.0039)	(0.0038)	(0.004)	(0.0039)
Y2008	-0.1425**	-0.1438**	-0.1424**	-0.1422**
	(0.0067)	(0.0067)	(0.0067)	(0.0067)
Y2009	-0.2677**	-0.2573**	-0.2876**	-0.2869**
	(0.0097)	(0.0096)	(0.0095)	(0.0096)
Y2010	-0.2848**	-0.2694**	-0.3144**	-0.3133**
	(0.0126)	(0.0123)	(0.0122)	(0.0123)
Y2011	-0.3935**	-0.3785**	-0.4237**	-0.4223**
	(0.0127)	(0.0125)	(0.0124)	(0.0125)
R-Square	0.6085	0.611	0.6094	0.61

Note. 43,921 housing transactions. The dependent variable is the natural log of the price the home sold for. Zip code level fixed effects are used. Standard errors are in parentheses.

+ Significant at the 10% level

* Significant at the 5% level

** Significant at the 1% level

APPENDIX

Table A1
Cuyahoga County – Suburbs Only

Variable	(1)	(2)	(3)	(4)
Intercept	-5.7505	10.0489**	10.6316**	10.075**
	(3.6066)	(0.5066)	(0.4903)	(0.5013)
lnACRES	0.117**	0.1165**	0.1166**	0.1163**
	(0.0093)	(0.0093)	(0.0093)	(0.0093)
AREA	0.0003**	0.0003**	0.0003**	0.0003**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
BATHS	0.097**	0.0971**	0.0973**	0.0974**
	(0.0101)	(0.0101)	(0.0101)	(0.0101)
AGE	-0.00002	-0.00004	-0.00009	-0.00003
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
AGE_SQ	-0.00004**	-0.00004**	-0.00004**	-0.00004**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
ATTEND	0.1765**			
	(0.0384)			
POSTATTEND	0.0021**			
	(0.0002)			
GRADRATE		0.0157**		
		(0.0031)		
POSTGRADRATE		0.0019**		
		(0.0002)		
ACT			0.0723**	
			(0.0137)	
POSTACT			0.0094**	
			(0.0008)	
SAT				0.0021**
				(0.0004)
POSTSAT				0.0002**
				(0.00002)
P_LATINO	-0.0366	-0.0491	-0.0796*	-0.0254
	(0.0415)	(0.0397)	(0.0382)	(0.0403)
P_BLACK	0.0125**	0.0032	0.0057	0.0077*
	(0.0044)	(0.0035)	(0.0036)	(0.0037)
P_AGE_0_9	0.0339	-0.0116	-0.0481	-0.0622+
	(0.0388)	(0.0348)	(0.0339)	(0.0339)
P_AGE_65	-0.0064	-0.0124*	-0.0175**	-0.02**
	(0.0061)	(0.0059)	(0.006)	(0.006)
MEDINCOME	-0.00001+	-0.00001+	-0.00001	-0.00001
	(0.000005)	(0.000005)	(0.000004)	(0.000004)
P_FEMHEAD	-0.1618**	-0.1071**	-0.0715**	-0.0761**
	(0.0334)	(0.0221)	(0.0183)	(0.0182)
P_BACHELORS	0.0223+	0.0146	0.0182	0.0227+
	(0.0124)	(0.0125)	(0.0124)	(0.0123)
P_GRAD	0.0431**	0.0518**	0.0256**	0.0137*
	(0.008)	(0.0086)	(0.0058)	(0.0056)
P_NODEGREE	0.0918**	0.1026**	0.0589**	0.0619**
	(0.0162)	(0.0164)	(0.0169)	(0.0166)
Y2008	-0.2806**	-0.2808**	-0.2811**	-0.2811**
	(0.0112)	(0.0112)	(0.0112)	(0.0112)
Y2009	-0.4336**	-0.4171**	-0.4326**	-0.4378**
	(0.0155)	(0.0152)	(0.0153)	(0.0153)
Y2010	-0.4043**	-0.3779**	-0.4025**	-0.4112**
	(0.0208)	(0.0202)	(0.0202)	(0.0204)
Y2011	-0.52**	-0.4944**	-0.5193**	-0.5277**
	(0.0219)	(0.0214)	(0.0214)	(0.0216)
R-Square	0.563	0.5626	0.5634	0.5638

Note. 18,169 housing transactions. The dependent variable is the natural log of the price the home sold for. Zip code level fixed effects are used. Standard errors are in parentheses.
+ Significant at the 10% level
* Significant at the 5% level
** Significant at the 1% level

Table A2

Montgomery County – Suburbs Only

Variable	(1)	(2)	(3)	(4)
Intercept	8.2512	9.9502**	2.8647	10.9825**
	(5.441)	(3.1018)	(13.8835)	(2.1246)
lnACRES	0.1124**	0.1124**	0.1122**	0.1122**
	(0.0064)	(0.0064)	(0.0064)	(0.0064)
AREA	0.0004**	0.0004**	0.0004**	0.0004**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
BATHS	0.091**	0.091**	0.091**	0.091**
	(0.0101)	(0.0101)	(0.0101)	(0.0101)
AGE	-0.005**	-0.005**	-0.005**	-0.005**
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
AGE_SQ	0.000004	0.000004	0.000004	0.000004
	(0.000005)	(0.000005)	(0.000005)	(0.000005)
ATTEND	0.0324			
	(0.0517)			
POSTATTEND	0.0003			
	(0.0002)			
GRADRATE		0.0102		
		(0.0166)		
POSTGRADRATE		0.0003		
		(0.0002)		
ACT			0.2416	
			(0.3892)	
POSTACT			0.0022*	
			(0.001)	
SAT				0.0001
				(0.0003)
POSTSAT				0.00004*
				(0.00002)
P_LATINO	-0.1346	-0.0926	-0.1117	-0.1388
	(0.0959)	(0.1208)	(0.1054)	(0.0956)
P_BLACK	-0.0017	-0.0049	0.0057	-0.0023
	(0.0109)	(0.0111)	(0.0176)	(0.0107)
P_AGE_0_9	-0.0667	-0.0541	-0.1225	-0.0731
	(0.0619)	(0.0676)	(0.1012)	(0.0613)
P_AGE_65	-0.0038	0.0035	0.0449	-0.0037
	(0.0428)	(0.0483)	(0.1014)	(0.0428)
MEDINCOME	0.00002	0.00002	0.00005	0.00002
	(0.00003)	(0.00003)	(0.00006)	(0.00003)
P_FEMHEAD	0.0444	0.0554	0.1524	0.0529
	(0.1296)	(0.1274)	(0.194)	(0.1277)
P_BACHELORS	0.0443	0.0333	0.1208	0.0449
	(0.0536)	(0.0505)	(0.149)	(0.0539)
P_GRAD	-0.0923	-0.0803	-0.3178	-0.098
	(0.0886)	(0.087)	(0.3875)	(0.0907)
P_NODEGREE	-0.0173	-0.0142	0.0974	-0.0097
	(0.0909)	(0.092)	(0.2183)	(0.0938)
Y2008	-0.0704**	-0.0703**	-0.0703**	-0.0703**
	(0.0131)	(0.0131)	(0.0131)	(0.0131)
Y2009	-0.1533**	-0.1585**	-0.1698**	-0.1655**
	(0.0197)	(0.0197)	(0.0194)	(0.0195)
Y2010	-0.3183**	-0.3262**	-0.3432**	-0.3367**
	(0.0253)	(0.0252)	(0.0247)	(0.0248)
Y2011	-0.3699**	-0.3779**	-0.3947**	-0.3883**
	(0.0254)	(0.0253)	(0.0248)	(0.0249)
R-Square	0.6262	0.6263	0.6264	0.6263

Note. 9,419 housing transactions. The dependent variable is the natural log of the price the home sold for. Zip code level fixed effects are used. Standard errors are in parentheses.

+ Significant at the 10% level

* Significant at the 5% level

** Significant at the 1% level

Table A3
Summit County – Suburbs Only

Variable	(1)	(2)	(3)	(4)
Intercept	8.2399	8.9671	8.9553	9.4677**
	(28.9399)	(11.1293)	(10.7639)	(2.198)
lnACRES	0.0505**	0.0505**	0.0505**	0.0506**
	(0.011)	(0.011)	(0.011)	(0.011)
AREA	0.0002**	0.0002**	0.0002**	0.0002**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
BATHS	0.1071**	0.1072**	0.1073**	0.1072**
	(0.0173)	(0.0173)	(0.0173)	(0.0173)
AGE	-0.0059**	-0.0059**	-0.0059**	-0.0059**
	(0.0009)	(0.0009)	(0.0009)	(0.0009)
AGE_SQ	0.00001*	0.00001*	0.00001*	0.00001*
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
ATTEND	0.0139			
	(0.3487)			
POSTATTEND	0.001*			
	(0.0004)			
GRADRATE		0.0077		
		(0.1948)		
POSTGRADRATE		0.001*		
		(0.0004)		
ACT			0.0084	
			(0.2354)	
POSTACT			0.0038*	
			(0.0019)	
SAT				-0.0001
				(0.0033)
POSTSAT				0.0001*
				(0.00004)
P_LATINO	-0.0784	-0.0685	-0.1334	-0.1049
	(0.4195)	(0.6298)	(0.9398)	(0.4504)
P_BLACK	-0.0194	-0.0185	-0.0206	-0.0197
	(0.0415)	(0.0506)	(0.0459)	(0.0404)
P_AGE_0_9	0.1246	0.1234	0.1437	0.131
	(0.181)	(0.2066)	(0.2995)	(0.0876)
P_AGE_65	0.0627	0.06	0.0799	0.076
	(0.2321)	(0.2918)	(0.2002)	(0.161)
MEDINCOME	-0.000001	-0.000002	-0.000002	-0.000002
	(0.00001)	(0.00001)	(0.00002)	(0.00001)
P_FEMHEAD	-0.0662	-0.06	-0.0793	-0.0699
	(0.0892)	(0.2295)	(0.2312)	(0.0495)
P_BACHELORS	0.022	0.0182	0.0302	0.0273
	(0.0855)	(0.1721)	(0.1142)	(0.0736)
P_GRAD	-0.0107	-0.0077	-0.017	-0.0138
	(0.0579)	(0.129)	(0.089)	(0.027)
P_NODEGREE	0.0133	0.006	0.0238	0.0144
	(0.0604)	(0.1749)	(0.2584)	(0.085)
Y2008	-0.0773**	-0.0773**	-0.0774**	-0.0772**
	(0.0259)	(0.0259)	(0.0259)	(0.0259)
Y2009	-0.2242**	-0.2225**	-0.2185**	-0.2197**
	(0.0384)	(0.0385)	(0.0383)	(0.0383)
Y2010	-0.2142**	-0.2116**	-0.2049**	-0.207**
	(0.0504)	(0.0504)	(0.05)	(0.0502)
Y2011	-0.2762**	-0.2736**	-0.267**	-0.2691**
	(0.0501)	(0.0501)	(0.0496)	(0.0498)
R-Square	0.5926	0.5925	0.5925	0.5925

Note. 3,211 housing transactions. The dependent variable is the natural log of the price the home sold for. Zip code level fixed effects are used. Standard errors are in parentheses.
+ Significant at the 10% level
* Significant at the 5% level
** Significant at the 1% level

Table A4

Hamilton County – Suburbs Only

Variable	(1)	(2)	(3)	(4)
Intercept	7.4537**	10.2502**	10.9226**	10.9358**
	(2.0539)	(0.1891)	(0.2977)	(0.2199)
lnACRES	0.1805**	0.1795**	0.1797**	0.1804**
	(0.0064)	(0.0064)	(0.0064)	(0.0064)
AREA	0.0002**	0.0002**	0.0002**	0.0002**
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
BATHS	0.2003**	0.1988**	0.2003**	0.2006**
	(0.0056)	(0.0056)	(0.0056)	(0.0056)
AGE	-0.0166**	-0.0167**	-0.0167**	-0.0166**
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
AGE_SQ	0.0001**	0.0001**	0.0001**	0.0001**
	(0.000003)	(0.000003)	(0.000003)	(0.000003)
ATTEND	0.0419+			
	(0.022)			
POSTATTEND	0.0006**			
	(0.0002)			
GRADRATE		0.0152**		
		(0.0019)		
POSTGRADRATE		0.0005**		
		(0.0002)		
ACT			0.0223	
			(0.0136)	
POSTACT			0.0025**	
			(0.0006)	
SAT				0.0003*
				(0.0001)
POSTSAT				0.0001**
				(0.00001)
P_LATINO	-0.1203**	-0.1198**	-0.1103**	-0.1205**
	(0.0085)	(0.0084)	(0.0106)	(0.0085)
P_BLACK	0.0217**	0.019**	0.022**	0.0211**
	(0.0012)	(0.0009)	(0.0013)	(0.001)
P_AGE_0_9	0.1378**	0.1068**	0.1291**	0.1457**
	(0.0068)	(0.0078)	(0.0087)	(0.0074)
P_AGE_65	0.0428**	0.031**	0.0442**	0.0516**
	(0.0046)	(0.0044)	(0.0043)	(0.0043)
MEDINCOME	-0.00002**	-0.00002**	-0.00002**	-0.00002**
	(0.000002)	(0.000002)	(0.000002)	(0.000002)
P_FEMHEAD	-0.1043**	-0.0978**	-0.0919**	-0.0949**
	(0.0065)	(0.0058)	(0.0071)	(0.0061)
P_BACHELORS	-0.0223**	-0.0075*	-0.0223**	-0.0245**
	(0.0031)	(0.0035)	(0.0031)	(0.0033)
P_GRAD	0.0602**	0.0569**	0.0545**	0.0602**
	(0.0043)	(0.0043)	(0.0058)	(0.0043)
P_NODEGREE	0.0296**	0.0474**	0.0266**	0.0227**
	(0.0053)	(0.0056)	(0.005)	(0.0052)
Y2008	0.0083	0.0078	0.0083	0.0085
	(0.0091)	(0.0091)	(0.0091)	(0.0091)
Y2009	-0.049**	-0.0532**	-0.0485**	-0.0455**
	(0.0138)	(0.0137)	(0.0135)	(0.0136)
Y2010	-0.0435*	-0.0487**	-0.0427*	-0.039*
	(0.0171)	(0.0169)	(0.0166)	(0.0168)
Y2011	-0.1779**	-0.1831**	-0.1772**	-0.1732**
	(0.0169)	(0.0168)	(0.0164)	(0.0167)
R-Square	0.7412	0.7424	0.7412	0.7413

Note. 13,122 housing transactions. The dependent variable is the natural log of the price the home sold for. Zip code level fixed effects are used. Standard errors are in parentheses.

\+ Significant at the 10% level

* Significant at the 5% level

** Significant at the 1% level

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