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# CASE STUDY

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## HOMES, TAXES, AND SCHOOLS.

**The effects of school district rankings and property tax rates  
on property valuations in Richmond Heights, Missouri.**

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with Research Assistance from Josh Smith

### INTRODUCTION

*“In my opinion the least bad tax is the property tax on the unimproved value of land, the Henry George argument of many, many years ago.”*

— Milton Friedman,  
Nobel laureate in Economics (1976)<sup>1</sup>

*“Our ideal society finds it essential to put a rent on land as a way of maximizing the total consumption available to the society. ...Pure land rent is in the nature of a ‘surplus’ which can be taxed heavily without distorting production incentives or efficiency. A land value tax can be called ‘the useful tax on measured land surplus.’”*

— Paul Samuelson,  
Nobel laureate in Economics (1970)<sup>2</sup>

This case study is a companion piece to Show-Me Institute Policy Study No. 28 on property assessment and taxation in Missouri.

Cities, counties, school districts, and many other local taxing districts rely on property taxes to fund their operations. For a full review of the details of property assessment and taxation in Missouri, please read Show-Me Institute Policy Study Number 28, “Homes, Taxes and Choices: A Review of Real Estate Assessment and Property Taxation in Missouri.” In Missouri, the local assessor assigns a value to taxable property every two years. Local governments then use those values to set their property tax rates. The rate and value are combined to calculate the annual property tax bill sent out each year to homeowners and other types of property owners. Those property taxes are the primary source of funding for local government authorities in Missouri.

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*Richmond Heights is a fully developed suburb of Saint Louis with a population of 8,496 people. All services and property tax rates within the city are exactly the same, except for the separate school districts.*

*All else being equal, a house with a higher property tax bill will sell for less than a similar house with a lower tax rate because the buyer will include the cost of higher future taxes in the offer.*



Property taxation levels — along with the quality of public services they support — affect the value of houses and other property through a process known as capitalization. All else being equal, a house with a higher property tax bill will sell for less than a similar house with a lower tax rate because the buyer will include the cost of higher future taxes in the offer. On the other hand, people are willing to pay more for a home in a good school district than for the same home in a poor school district. Both cases are examples of capitalization, and the purpose of this case study is to examine its effects on housing prices in the municipality of Richmond Heights, Missouri.

There are two categories of taxable property in Missouri: “real” and “personal.” Real property is land and buildings. Personal property is vehicles and equipment.<sup>3</sup> Real property is subdivided into three subclasses: agricultural, residential, and commercial. Both the method of assessing real property and the taxation levels levied upon it depend on the subclass.

The assessment of real property is divided into the value of the land itself, and the value of the improvements (e.g. the house or office building) on the land. The values of the land and improvements are added together to form the appraised value. An assessment ratio is then applied to the appraised value to determine the assessed, or taxable, value. The assessment ratio is the multiplier applied to the three subclasses of real property. The ratios are 32 percent for commercial property, 19 percent for residential property, and 12 percent for agricultural property.

However, Missouri law dictates that both the assessment ratios and the tax rates be uniform for the land and the improvement. For example, take two neighboring homes, each with a total appraised value of \$200,000.<sup>4</sup> If one has land valued at \$80,000 and a house valued at \$120,000, and the other has land valued at \$60,000 and a house valued at \$140,000, the total taxes paid will still be exactly the same. Please see Table 1 in the appendix for an example of how various appraised values translate first to assessments and then to tax dollars.

## WHY RICHMOND HEIGHTS?

Richmond Heights is a natural laboratory for measuring how the quality and tax rates of school districts affect property values and capitalization.<sup>5</sup> All services and property tax rates within the city are exactly the same, except for the separate school districts. The entire city is served by the same police, fire, library, etc., but not the same school district. Instead, the city is divided into four independent school districts — Ladue, Clayton, Brentwood, and Maplewood Richmond Heights — with a wide range in educational quality and tax rates between the four. As another reason for our selection Richmond Heights, the buildings and lot sizes in the city are reasonably consistent in terms of age, size, and quality.

Richmond Heights is a fully developed suburb of Saint Louis with a population of 8,496 people.<sup>6</sup> It borders both the city of Saint Louis and Clayton, the county seat and suburban downtown of Saint Louis County. It is entirely

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surrounded by other, incorporated communities and cannot easily expand.<sup>7</sup> It is centrally located in the greater Saint Louis metropolitan area and has long been considered a desirable place to live. The city first codified zoning in 1941. According to the 1940 census, the city then had a population of 12,802. It is reasonable to assume that the city was almost fully developed by the time zoning was adopted, and that zoning did not play a major role in altering the measures we are now studying.

Economist Charles Tiebout proposed that mobile homeowners with varying demands for public goods create a market in municipal services. Different cities respond to that market by offering varying levels of public service provision and taxation. That competition for residents gives city managers an incentive to keep public services operating efficiently. A resident who does not like what he receives for his tax dollars — whether that is too much or too little — can move to another city with a different level of public services that may better suit his preference.

Although there are obvious costs to moving — and some residents of Richmond Heights prefer to live there and only there — most of the city's residents can “vote with their feet.” Furthermore, a study by Albert Saiz determined that the short and medium run elasticity of the housing supply is higher in Saint Louis than in most other metropolitan areas, ranking 74th out of 95 metro areas with more than 500,000 people.<sup>8</sup> This research supports the general understanding that supply and demand of housing will generally be more elastic in a Midwestern metro area like Saint Louis than in other parts of the country. Although Richmond Heights itself may be fully developed, its residents have many housing options.

Like most suburbs, homeowners dominate Richmond Heights politically. According to the 2010 U.S. census, 58 percent of the housing in the city is owner-occupied, and 42 percent is rented. (For a summary of the percentages of homeowners and renters for the five cities that make up the bulk of the area being studied, please refer to Table 2 in the appendix.<sup>9</sup>) Homeowners across the United States are more likely to vote and be active in government

than renters, and this holds true in Richmond Heights. However, the majority of the renters in the city are within the school district of Maplewood Richmond Heights, and renters' greater propensity to support tax increases may be one of the reasons why that school district taxes property at a higher tax rate than the others.<sup>10</sup>

According to a 2009 survey taken by the city of Richmond Heights, 93 percent of the city's residents rated it as an “excellent or good” place to live.<sup>11</sup> In a directly Tiebout-related question, 81 percent said they were “very or somewhat likely” to live in the city for the next five years.<sup>12</sup> Although the present satisfaction and historic track record of the city is excellent, the opportunities provided by other cities in the area are real and accessible to the residents of Richmond Heights.

Within Richmond Heights, we compared three subdivisions: Lake Forest, Berkshire, and Hampton Park. These three subdivisions are considered wealthy areas — with large homes and lots — and all three are in different school districts. Located directly across the street from each other, Lake Forest and Hampton Park are particularly similar. The comparison of three very similar neighborhoods within Richmond Heights allows us to further judge the impact of tax rates and school performance on property capitalization without having to significantly consider other factors.

## **SCHOOL DISTRICT RANKINGS AND PROPERTY VALUATIONS IN RICHMOND HEIGHTS**

### **Data and Method**

Housing prices are a function of a variety of factors, including school quality, tax rates, lot size, and building size. Individuals have varying degrees of demand for government services, which is reflected in their varying willingness to pay different amounts or different kinds of taxes. Alternative schooling arrangements — such as private schools, homeschooling, and magnet schools — can provide home buyers with high-quality education even if they choose to live in lower-quality public school districts

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Maplewood Richmond  
Heights High School



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services.*

for a reduced price. Chiodo, Hernández-Murillo, and Owyang (2010) inferred that the effect of school district quality on house prices is nonlinear.<sup>13</sup> The authors concluded that, as school quality increases, the demand from home buyers also increases. Meanwhile, because most metropolitan areas have a fixed housing stock in the short run, the supply in these areas is often extremely inelastic. As a consequence of these two forces, metropolitan housing markets tend to increase in rigidity as school district quality increases.

These two hypotheses depend on the assumption that individuals share the same preferences for school quality and neighborhood characteristics, such as public services. Furthermore, Chiodo, et al (2010) argue that individuals and families that already live in higher-quality school districts will be willing to pay more for additional increases in school quality. Stated alternatively, education is often considered to be a luxury good.<sup>14</sup>

### ASSESSMENT DATA

Other capitalization studies examined sale prices of homes in the target area. This study uses appraised values because this allows us to use every single-family home, not just those which have been sold recently, which is a much smaller sample. Furthermore, appraised valuations in Saint Louis County should accurately reflect sale prices for the following reasons:

- Appraisals in Missouri are set at 100 percent market value.
- Reassessment is conducted frequently enough (every other year) to insure that values are current.
- Missouri does not have any limitations on the increase in appraisals and assessments, so a house is appraised in the same way whether it was just built or someone has lived there for 50 years.
- Saint Louis County requires certificates of value to be filed upon the sale of property, making the appraisal process more accurate than in other parts of Missouri.
- If, for whatever reason, the appraisals are inaccurate, the error should be the same throughout the city. There is no reason to suspect that part of Richmond Heights is appraised at 95% of market value and another part appraised at 85% of market value.

To test our hypothesis, we used assessment data from the Saint Louis County Assessor's office. Our sample consists of every assessment of a single-family residence in the municipality of Richmond Heights, Missouri in 2009. For the purpose of data comparability, we included only single-family residences in our data sample. We removed five parcels that did not have a building structure — i.e., the mean appraisal of a building equals \$0 — all of which were located within the Maplewood Richmond Heights school district. Each observation corresponds to an individual parcel and is described by variables relating to a house and to a particular lot. Each parcel is additionally represented by variables that describe its physical characteristics, the average property tax rate of the parcel, and the MAP scores of the local public school district that children residing in the household would attend.



### Clayton High School

According to the 2009 MAP test results, Clayton was the second-highest-ranked school district in the state, out of 553 school districts and charter schools.

Our sample includes 2,870 real estate parcels. Tables 3 and 4 in the appendix provide a summary description of the data set, both in its entirety and across the four school districts.

When we further restrict our data set to include only the parcels in Berkshire, Hampton Park, and Lake Forest our sample includes 263 real estate parcels. For a summary description of the restricted data set, please refer to Table 5 in the appendix.

## TAX RATE

In the municipality of Richmond Heights, the average property tax rate is \$3.01 per \$100 of assessed valuation in the Brentwood school district, \$3.44 in the Clayton school district, \$4.48 in the Maplewood Richmond Heights school district, and \$2.98 in the Ladue school district.<sup>15</sup>

## MAP SCORE

To measure the academic performance of these four school districts, we used reported scores from Missouri's standardized state test, the Missouri Assessment Program (MAP). This test is used to assess student proficiency in mathematics, communication arts, science, and social studies. Based on their performance on the test, students are placed into one of the following categories: below basic, basic, proficient, or advanced. Students in the proficient and advanced categories have met the state standards for their grade levels in the tested subject area. School districts are rated by the state based on students' MAP scores, and districts can lose funding or face state

takeover if too few students meet state goals for a prolonged period of time. According to the 2009 results, Clayton was the second-highest-ranked school district in the state, out of 553 school districts and charter schools. Ladue was third, and Brentwood was eleventh. Maplewood Richmond Heights was ranked 308th.

We used the MAP mathematics test as our measure of student achievement.<sup>16</sup> This test is administered each year to grades 4, 8, and 10 within all public school districts, but DESE aggregates proficiency across grades to create one proficiency percentage for an entire district, which is reported in its Adequate Yearly Progress (AYP) report. A district's mathematics AYP score represents the percentage of students scoring proficient or above on the MAP mathematics test.

The 2009 MAP mathematics test score was 67 in the Brentwood school district, 72.4 in the Clayton school district, 71.7 in the Ladue school district, and 43.8 in the Maplewood Richmond Heights school district.

To test whether property tax capitalization is correlated with MAP scores by school district, we ran a regression of lot assessment per acre and MAP math scores by school district for 2009.<sup>17</sup> Graph 1 in the appendix provides an illustration that suggests the mean total assessment per parcel increases as school district MAP score increases.

*The average property tax rate is \$3.01 per \$100 of assessed valuation in the Brentwood school district, \$3.44 in the Clayton school district, \$4.48 in the Maplewood Richmond Heights school district, and \$2.98 in the Ladue school district.*

**Table 6 – Total Assessment**

(Observations: 2,870; Assessment year 2009; standard errors in parenthesis)

	Model 1	Model 2	Model 3	Model 4
<b>Adj. R squared</b>	0.8611	0.8743	0.8783	0.8800
<b>Lot Size (Acres)</b>	112071.7 (9103.27)	109946.7 (8660.20)	119900.5 (8532.03)	132028.6 (8671.13)
<b>Building Size (Sq. Ft)</b>	208.8 (2.335)	195.7 (2.347)	193.7 (2.312)	194.2 (2.297)
<b>Map Score</b>			2722.4 (135.35)	5916.3 (506.50)
<b>Tax Rate</b>		-53118.8 (3054.12)		73573.2 (11249.35)
<b>Constant</b>	-120903.3 (3605.85)	120976.9 (14323.87)	-238199.2 (6738.37)	-710833.0 (72574.75)

**TOTAL ASSESSMENT REGRESSION RESULTS**

We used a nonlinear function to model this data. This function is a combination of the model parameters and depends on one or more independent variables. We regressed actual assessment data against various combinations of house size, lot size, school district MAP scores, and tax rate, using the ordinary least squares method. The regression was the following:

$$\text{Total Assessment} = \beta_1(\text{Lot Size}) + \beta_2(\text{Building Size}) + \beta_3(\text{Map Score}) + \beta_4(\text{Average Tax Rate}) + \text{constant}$$

We also focus on the coefficient  $\beta_1$ , which accounts for the size of the lot for a particular parcel, as well as the coefficient  $\beta_2$ , which accounts for characteristics that affect the assessment of the structure (e.g., number of bedrooms, assessed condition of house). We ran four versions of this model:

**Model 1:** Total assessment on lot size and building size

**Model 2:** Model 1 plus tax rates

**Model 3:** Model 1 plus MAP scores

**Model 4:** Model 1 plus Map scores plus tax rates

We found that total parcel assessment is highly correlated with lot size and building size and school district map score. Our regression for each model had an adjusted R<sup>2</sup> of 0.8611 or greater.<sup>18</sup> This suggests that the equation models the collected assessment data well and strengthens the findings of Chiodo, et al.

We find that all of the included variables in model 4 positively affect total assessment (see Table 6).

We can use this model to estimate the total assessment for a parcel, holding all other included variables constant. In Table 7, we use model 4 to predict the total assessment of a 2000 square foot building on a 0.5 acre lot.

**Table 7 – Estimated Total Assessment by School District**

(Using Model 4; Assumes 2000 sq. ft. building on 0.5 acre lot)

	Brentwood	Clayton	Maplewood Richmond Heights	Ladue
<b>Est. Assessment</b>	\$ 361,542.44	\$ 425,200.51	\$ 332,483.70	\$ 386,894.38

*The regression was the following:*  
*Total Assessment =*  
 $\beta_1(\text{Lot Size})$   
 $+ \beta_2(\text{Building Size})$   
 $+ \beta_3(\text{Map Score})$   
 $+ \beta_4(\text{Average Tax Rate})$   
 $+ \text{constant}$

**Table 8 – Total Parcel Assessment – Restricted to the 3 Subdivisions**  
(Observations: 263; Assessment year 2009; standard errors in parenthesis)

	Model 1	Model 2	Model 3	Model 4
<b>Adj. R squared</b>	0.5767	0.5832	0.5751	0.6304
<b>Lot Size (Acres)</b>	-25990.26 (20011.87)	-52088.63 (23016.04)	-27175.57 (27326.28)	61008.91 (29074.85)
<b>Building Size (Sq. Ft)</b>	182.6294 (9.8124)	175.7145 (10.2136)	182.5187 (9.9828)	158.5281 (10.0589)
<b>Map Score</b>			-66.2373 (1037.52)	15354.12 (2630.98)
<b>Tax Rate</b>		44167.04 (19690.58)		317756.3 (50414.3)
<b>Constant</b>	165223.6 (38624.11)	53032.76 (63013.86)	170805.3 (95611.44)	-1935789 (345918.6)

Our hypothesis predicted a parcel in Ladue to be more closely assessed with its counterpart in Clayton because those school districts are two of the three top districts in the state, and Ladue’s tax rates are lower. There may be a variety of small factors influencing Ladue housing assessments, such as its greater distance from the Saint Louis region’s central business districts.

**SUBDIVISIONS**

In another series of regressions, we restricted the assessment data to our subdivisions of interest: Lake Forest, Berkshire, and Hampton Park. Our restricted sample includes 286 real estate parcels (see Table 8).

Once again, assessment data were regressed against building characteristics, tax rate, and

school district MAP score, using the Ordinary Least Squares method. We ran the same equation:

$$\text{Total Assessment} = \beta_1 (\text{Lot Size}) + \beta_2 (\text{Building Size}) + \beta_3 (\text{Map Score}) + \beta_4 (\text{Average Tax Rate}) + \text{constant}$$

We again ran four versions of this model:

**Model 1:** Total assessment on lot size and building size

**Model 2:** Model 1 plus tax rates

**Model 3:** Model 1 plus MAP scores

**Model 4:** Model 1 plus Map scores plus tax rates

It is notable that of the three subdivisions studied, Hampton Park has the highest taxes and the lowest school quality. Many studies suggest that school funding and school quality are not

*The estimated cost difference between homes with the same square footage and lot size in Hampton Park and Lake Forest is \$108,776.63.*

**Table 9 – Estimated Total Assessment by Subdivision**  
(Using Model 4; Assumes 4,000-square-foot building on a one-acre lot)

	Berkshire	Hampton Park	Lake Forest
<b>Est. Assessment</b>	\$ 806,558.81	\$ 856,084.33	\$ 964,860.96

*The price difference between a 4,000-square-foot home on a one-acre parcel in Hampton Park and the same home in Lake Forest totals approximately \$109,000. The two subdivisions are located across the street from one another.*



positively correlated.<sup>19</sup> The fact that of the three subdivisions Hampton Park has a higher mean lot size (1.29 acres) than Berkshire (0.78 acres) and Lake Forest (0.40 acres) may suggest that people are willing to accept a higher property tax rate in exchange for a larger lot if the cost of the property is reduced enough. Furthermore, families that can afford to pay a higher property tax rate are more likely to send their children to expensive private schools, which means that the MAP score of local public school district might not matter as much to them. Furthermore, because the Hampton Park subdivision is a small subsection of the Maplewood Richmond Heights school district, it is unlikely that Hampton Park residents would be able to reduce the tax rate through voting or other forms of civic participation. Lower property costs in Hampton Park allow residents to purchase relatively nice homes compared to those across the street in Lake Forest and pay higher taxes for lower quality schools. This is how capitalization can make a property less expensive.

The model can predict the total assessment of a parcel. In Table 9, we use model 4 to predict the total assessment of a 4,000 square foot building on a one acre lot.

The estimated cost difference between homes with the same square footage and lot size in Hampton Park and Lake Forest is \$108,776.63. There are two ways to explain this discrepancy, and they are equally valid. Hampton Park homeowners pay a reduced price premium

of nearly \$109,000 to account for the higher taxes and lower quality schools in their school district.<sup>20</sup> Put conversely, Lake Forest homeowners pay an additional \$108,776 in exchange for a lower tax rate and a higher quality school district. This \$108,776 difference in the values of the properties is the estimated amount that the capitalization of school quality and tax rates increase or decrease housing prices in these two subdivisions.

This \$108,776 difference becomes especially significant when accounting for the time value of money and mortgage interest charges. The extra \$108,776 that Lake Forest residents spend for the same house could be invested and saved. The Lake Forest resident also has to pay mortgage interest on the higher price. Specifically, this Lake Forest resident would pay extra interest charges of \$78,176, assuming the standard 30-year time-frame and a mortgage rate of four percent.

Hampton Park's higher average tax rate of \$1.04 per hundred dollars of assessed valuation will diminish the savings homebuyers in the neighborhood enjoy over their counterparts in Lake Forest. Using the hypothetical assessed valuation in Hampton Park of \$856,084 and assuming a three percent annual tax increase, they would pay \$80,498 more in property taxes over thirty years. It supports the notion that tax rates are capitalized into property prices that a homeowner would pay almost the same amount in additional interest charges for a house in Lake

*The capitalization of school quality and tax rates into the value of homes drives this discrepancy in property values in these subdivisions and throughout the city.*



Forest as he would for higher taxes in Hampton Park.

School costs in this situation are hard to define. It is reasonable to believe that most of the people living in Hampton Park will send their children to private school.<sup>21</sup> Private schooling costs are not uniform, but most private high schools in the St. Louis-area cost more than \$10,000 per year. Sending two children to private grade school and high school in this community can easily cost more than \$100,000, which is approximately the savings from buying a home in Hampton Park instead of Lake Forest.

Other factors could potentially explain this discrepancy in valuation. In this analysis, we focus on tax rate and school quality, but this difference could be the result of other factors, despite the fact that these subdivisions are perfectly homogenous in terms of government service levels — excepting schools. It is difficult to imagine two subdivisions more directly comparable than Hampton Park and Lake Forest. Nonetheless, potential differences unaccounted for in our study may include distance from the urban core, the condition of the buildings, and differing aesthetics. Berkshire, in particular, is farther west than the other two subdivisions, and its homes were constructed in a different style. Exactly how these factors influence home prices in the area is beyond the scope of this study and must be saved for possible future research.

## CONCLUSION

### Homes, Taxes, and Schools in Richmond Heights

The effects of school quality and tax rates on property values in Richmond Heights are clear and large. The price difference between a 4,000-square-foot home on a one-acre parcel in Hampton Park and the same home in Lake Forest totals approximately \$109,000. The two subdivisions are located across the street from one another. Both neighborhoods are considered wealthy, and they have many similar characteristics. The only substantial difference is that Hampton Park is in the Maplewood Richmond Heights school district and Lake Forest is in the Clayton school district.<sup>22</sup> Clayton

school district has a lower tax rate and higher MAP scores. Lake Forest homes have an average appraised value of \$161 per square foot and \$737,075 per acre. Hampton Park homes are valued at \$134 per square foot and \$282,092 per acre. That is a difference of \$454,983 per acre and \$27 per square foot.<sup>23</sup>

Residents of Lake Forest pay more for their homes to be in a superior school district with lower tax rates. In addition, residents of Hampton Park pay less for their homes because of their higher tax rates and lower MAP scores. In particular, residents of Hampton Park who send their children to private schools are, in essence, receiving a price discount in Hampton Park because the quality of the public schools is less important to them. Of course, the tax rate of the school district affects them regardless of whether their children use the schools.

Although the results are the starkest when comparing these two subdivisions — located across the street from each other — the effect is the same throughout Richmond Heights. The results of the analysis in section four clearly demonstrate that the quality of schools and their related tax rates are heavily capitalized into the value of property in Richmond Heights. Homeowners accept lower housing assessments in exchange for higher property taxes and lower quality schools. Other homeowners choose to locate in areas of higher housing prices and assessments as part of a trade-off for a lower tax rate and a higher quality school district. Homeowners in the Clayton and Ladue school districts within Richmond Heights pay substantially more for comparable homes with better performing public schools and lower tax rates. The capitalization of school quality and tax rates into the value of homes drives this discrepancy in property values in these subdivisions and throughout the city.

*...the quality of schools and their related tax rates are heavily capitalized into the value of property in Richmond Heights.*

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**APPENDIX – TABLES AND FIGURES**

**Table 1: Taxable Value for Four Hypothetical Parcels**

Appraised Value	House 1	House 2	Commercial 1	Agricultural 1*
Land	\$80,000	\$60,000	\$40,000	\$180,000
Building	\$120,000	\$140,000	\$160,000	\$20,000
Total	\$200,000	\$200,000	\$200,000	\$200,000
Taxable Value*	\$38,000	\$38,000	\$64,000	\$24,000
School District	Maplewood/RH	Ladue	Clayton	Brentwood
School District Tax Rate Average	4.48	2.98	3.44	3.01
Tax Rate (Excluding Schools)	3.0505	3.0505	3.0505	3.0505
Total Tax Rate*	7.5327	6.0287	8.1930	6.0620
Total Tax Bill	\$2,862.43	\$2,290.91	\$5,243.52	\$1,454.88

\* For agricultural property, this is greatly simplified. We do not include the soil grade rating for the individual acres that make up the land value.

\* For commercial property, the assessment ratio is 32 %, for residential property it is 19 % and for agricultural property it is 12 %.

\* For commercial property, the total tax rate includes the \$1.70 Saint Louis County commercial surcharge. Every county in Missouri has a surcharge, but the amounts vary. We are also using the same across the board baseline 2010 rates for residential, commercial, and agricultural property.

**Table 2: Percentage of Homeowners and Renters for Selected Cities**

Location	Occupied Housing Units	Occupied Rental Units	Percentage Housing	Percentage Rental
Clayton	3239	2032	61.45%	38.55%
Ladue	3037	97	96.90%	3.10%
Brentwood	2469	1276	65.93%	34.07%
Maplewood	2119	2694	44.03%	55.97%
Richmond Heights	2419	1769	57.76%	42.24%

\* The four school districts in this case study all include areas inside and outside of Richmond Heights.

Table 3: Description of variables

Variable	Description	Units
parid	unique parcel identifier	n/a
schooldistrict	school district	n/a
subdivision	subdivision	n/a
aprland	assessment of land	dollars
aprbldg	assessment of building	dollars
Lot Size	size of lot	acres
lotpriceperacre	assessment of land per acre	dollars/acre
Building Size	size of building	square feet
_proficient_or_above_pct	2009 MAP score	real number
Average Tax Rate	average tax rate	real number
total assessment	assessment of land + bldg	dollars

Graph 1: Fitted Values for Mean Assessment for a Parcel by School District

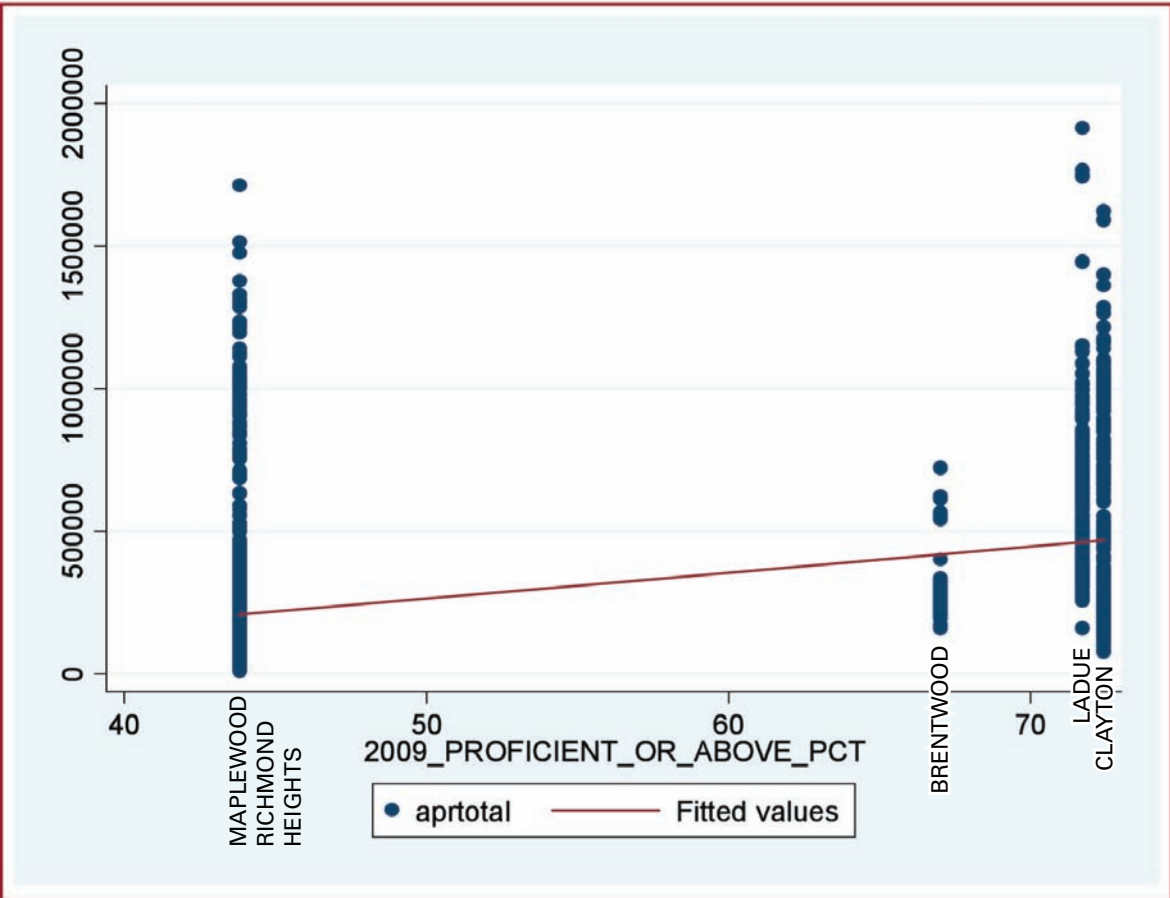


Table 4: Summary description of data set

		School Districts				
Variable	Data	Brentwood	Clayton	Ladue	Maplewood/ Richmond Heights	TOTAL DATASET
Total Assessment	Mean	\$ 292,892.1	\$ 390,944	\$ 598,321.3	\$ 206,735.5	\$ 285,396.7
	Std. Dev.	\$ 108,983.4	\$ 325,851.1	\$ 238,821.6	\$ 164,782.6	\$ 246,826.2
	Min	\$ 160,000	\$ 74,400	\$ 253,800	\$ 10,500	\$ 10,500
	Max	\$ 721,700	\$ 1,622,600	\$ 1,913,400	\$ 1,711,600	\$ 1,913,400
aprbldg	Mean	\$ 213,594.70	\$ 280,279.20	\$ 387,211.40	\$ 153,720.50	\$ 1,034,805.80
	Std. Dev.	\$ 83,022.03	\$ 232,370.40	\$ 197,418.60	\$ 112,721.20	\$ 625,532.23
	Min	\$ 104,700.00	\$ 26,500.00	\$ 90,900.00	\$ 2,000.00	\$ 224,100.00
	Max	\$ 560,700.00	\$ 1,257,500.00	\$ 1,604,300.00	\$ 1,325,000.00	\$ 4,747,500.00
aprlnd	Mean	\$ 79,297.37	\$ 110,664.80	\$ 211,109.90	\$ 53,015.00	\$ 454,087.07
	Std. Dev.	\$ 30,582.41	\$ 105,168.90	\$ 68,713.54	\$ 60,125.68	\$ 264,590.53
	Min	\$ 48,600.00	\$ 7,500.00	\$ 100,600.00	\$ 7,000.00	\$ 163,700.00
	Max	\$ 172,100.00	\$ 445,800.00	\$ 458,900.00	\$ 634,800.00	\$ 1,711,600.00
Building Size (square feet)	Mean	2017.461	2039.208	2993.26	1549.494	8599.423
	Std. Dev.	477.6692	1224.195	905.1073	786.8453	3393.8168
	Min	1162	589	1494	568	3813
	Max	3416	6458	8441	7871	26186
Lot Size (acres)	Mean	0.2574684	0.2039725	0.5522171	0.2084499	1.2221079
	Std. Dev.	0.0763637	0.15005	0.2758989	0.2429989	0.7453115
	Min	0.1481	0.0087	0.1331	0.0393	0.3292
	Max	0.4938	1.5598	1.74	3.8568	7.6504
Average Tax Rate	Mean	3.011545	3.442545	2.978182	4.482182	13.914454
	Std. Dev.	0	0	0	0	0
	Min	3.011545	3.442545	2.978182	4.482182	13.914454
	Max	3.011545	3.442545	2.978182	4.482182	13.914454
Mean Lot Price Per Acre	Mean	327380.1	1926648	460410.1	270349	2984787.2
	Std. Dev.	151678.6	4333017	273800.1	95778.69	4854274.39
	Min	112162.5	86206.9	191680	32843.56	422892.96
	Max	943333.3	14000000	1588210	745547.1	17277090.4
MAP Score	Mean	67	72.4	71.7	43.8	254.9
	Std. Dev.	0	0	0	0	0
	Min	67	72.4	71.7	43.8	254.9
	Max	67	72.4	71.7	43.8	254.9

**Table 5: Summary description of data set, restricted to subdivisions**

Variable	Data	subdivision		
		Berkshire	Hampton Park	Lake Forest
Total Assessment	Mean	684,652.6	934,525.7	927,871.7
	Std. Dev.	138,827.5	261,662.1	193,231.1
	Min	355,700	400,000	507,700
	Max	1,128,000	1,711,600	1,622,600
aprbldg	Mean	\$ 418,538.20	\$ 589,795.90	\$ 648,898.20
	Std. Dev.	\$ 121,886.60	\$ 252,350.50	\$ 177,579.00
	Min	\$ 90,900.00	\$ 110,700.00	\$ 163,800.00
	Max	\$ 834,700.00	\$ 1,325,000.00	\$ 1,257,500.00
aprland	Mean	\$ 266,114.50	\$ 344,729.70	\$ 278,973.50
	Std. Dev.	\$ 34,662.51	\$ 55,757.42	\$ 38,541.52
	Min	\$ 160,500.00	\$ 221,600.00	\$ 212,900.00
	Max	\$ 322,100.00	\$ 634,800.00	\$ 445,800.00
Building Size	Mean	3317.474	4383.23	3997.204
	Std. Dev.	586.1642	1252.198	760.9117
	Min	2317	2218	2713
	Max	4534	7871	6458
Lot Size	Mean	0.7753434	1.289943	0.4009779
	Std. Dev.	0.2031796	0.4993457	0.170299
	Min	0.4805	0.79	0.2586
	Max	1.4467	3.8568	1.5598
Average Tax Rate	Mean	2.978182	4.482182	3.442545
	Std. Dev.	0	0	0
	Min	2.978182	4.482182	3.442545
	Max	2.978182	4.482182	3.442545
Lot Price Per Acre	Mean	355,670.4	282,092	737,074.8
	Std. Dev.	58,154.85	46,627.35	107,925.3
	Min	209,442.2	148,558.3	240,864.2
	Max	505,536.5	355,180.7	857,440.5
MAP Score	Mean	71.7	43.8	72.4
	Std. Dev.	0	0	0
	Min	71.7	43.8	72.4
	Max	71.7	43.8	72.4

# NOTES

<sup>1</sup> Friedman, Milton as quoted by Blaug, Mark, *Economica*, New Series 47, no. 188, 1980 p. 472. Quoted online here: <http://tinyurl.com/69pfppx>

<sup>2</sup> Samuelson, Paul A., and William D. Nordhaus. *Economics*. 12th ed. : McGraw-Hill, 1985. Quote partially viewable in context online here: <http://tinyurl.com/63qympm>

<sup>3</sup> There is also a classification for “intangible personal property,” such as ownership of a patent or copyright, but that class of property is not taxable in Missouri.

<sup>4</sup> Because they are neighbors, we can assume they pay the same tax rates.

<sup>5</sup> Capitalization is the economic process by which various inputs are expressed in the value of the property. It is discussed in detail in the policy study that accompanies this case study. For example, high taxes may result in lower property value because buyers are aware of the high tax burden. Good schools may result in higher property values because buyers want their children to attend those schools, and they know they won’t have to pay for private schools.

<sup>6</sup> 2010 U. S. Census data

<sup>7</sup> Missouri law applies stricter incorporations and expansion rules to cities within Saint Louis County than in the rest of the state. Although there are a large number of cities within the county, current law makes new municipal incorporations difficult, though by no means impossible. It is interesting that in 2007 Richmond Heights and the neighboring city of Clayton considered merging. The two cities ultimately decided against the idea, however.

<sup>8</sup> Saiz, Albert, “On Local Housing Supply Elasticity,” University of Pennsylvania, July 2008.

<sup>9</sup> Note that these are cities, not school districts. However, this data will provide an idea of how many renters live in each school district. The biggest implication to consider is that Ladue school district consists of more than just the city of Ladue and parts of Richmond Heights. It also includes parts of Creve Coeur, Olivette, etc. When these other areas are considered, it is likely that the percentage of renters in the school district would be higher than the number shown for the city of Ladue alone, but not significantly higher.

<sup>10</sup> This idea that renters are more willing to support tax increases is discussed in depth in the policy study that accompanies this case study. Please see, “A Review of Real Estate Assessment and Property Taxation in Missouri” Show-Me Institute Policy Study No. 28.

<sup>11</sup> The National Citizen Survey, City of Richmond Heights, Missouri, 2009. Online here: <http://tinyurl.com/6ce84xt>

<sup>12</sup> This is similar to the question used in the Bickers, Salucci, Stein study — “Assessing the Micro-Foundations of the Tiebout Model” — which found support for the general Tiebout hypothesis. Additionally, because there are sections of Richmond Heights that are primarily apartments, it is probable that this figure would be even higher than 81 percent among homeowners.

<sup>13</sup> Abbigail Chiodo, Ruben Hernandez-Murillo, and Michael Owyand, “Nonlinear Effects of School Quality on House Price,” *Federal Reserve Bank of Saint Louis Review*, May/June 2010, 92(3), pp. 185-204.

<sup>14</sup> *Ibid*, p. 188.

<sup>15</sup> The rate shown is an average over the past ten years. Over the period, Maplewood Richmond Heights has consistently had the highest rate. Brentwood and Ladue’s rates have consistently been much lower and have taken turns being the lowest. Clayton has generally been in the middle but has at times been close to Ladue and Brentwood’s rate.

<sup>16</sup> We used the math score only because we believe it is the most objective measurement.

<sup>17</sup> Although MAP scores have only 4 values, we can still draw a regression line showing the relationship between MAP score and total assessment.

<sup>18</sup> This is a measure of how well the model fits the data; the highest value possible is 1.

<sup>19</sup> Heritage Foundation. “Does Spending More on Education Improve Academic Achievement?” Backgrounder. No. 2179.

<sup>20</sup> Considering all school districts throughout Missouri, the Maplewood Richmond Heights school district is not bad. On the contrary, it is average (and improving), and it only looks like a sub-par district when compared to Ladue, Clayton, and Brentwood, which all rank in the top 11 in Missouri (out of over 500).

<sup>21</sup> Other options include supplementing public schools with private tutoring, which would be far less expensive than private school but still costly, or homeschooling, which has a highly variable opportunity cost depending on whether both parents would otherwise work.

<sup>22</sup> Berkshire is in the Ladue school district.

<sup>23</sup> The declining marginal value of land would decrease the actual value difference substantially. In other words, a person is willing to pay more for the first half-acre than for the second half-acre, so the large difference between acreage values could be attributable to the larger lots in Hampton Park.

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