

9 Neighborhood Features That Hamper Values

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Certain neighborhood features near a home – like cemeteries and power plants -- could drag down a home's price. Realtor.com® recently identified which of those features could have the biggest impact.

Read more: [Playing Up a Left-Shark Neighborhood](#)

To calculate, realtor.com® analyzed home prices and appreciation rates in ZIP codes of the 100 largest metro areas across the country where a specific so-called “drag-me-down facility” – such as power plants or homeless shelter – was present.

Realtor.com®'s research team then calculated the potential discount by comparing the median home price of the ZIP codes with that facility with the median price for all homes in the same country.

The following neighborhood features emerged as the ones that could potentially drag down home values by the greatest amounts:

1. Bad school: -22.2% (translation: home owners near a bad school received 22.2 percent less than an average home in the same county could get)
2. Strip club: -14.7%
3. High renter concentration: -13.8%
4. Homeless shelter: -12.7%
5. Cemetery: -12.3%
6. Funeral home: -6.5%
7. Power plant: -5.3%
8. Shooting range: -3.7%
9. Hospital: -3.2%

Source: [“The Neighborhood Features That Drag Down Your Home Value – Ranked,”](#) realtor.com® (March 28, 2016)

The Neighborhood Features That Drag Down Your Home Value—Ranked

By Yuqing Pan | Mar 28, 2016



MichaelUtech/iStock

When it comes to real estate clichés, “Location, location, location” has all other contenders (including “Not a drive-by!”, “Cash is king!”, “Is that your checkbook or are you just glad to see me?”, and “Worst house, best street”) beat by a mile. Not only has it been in use since at least 1926 (according to the [New York Times](#)), but it’s utterly and inarguably *true*.

More than any other single factor, when you buy a home in a good location, it’s usually a solid long-term investment. And being the unabashed optimists we are here at [realtor.com®](#), we focus most on the factors that help maximize your home’s value. But hey, life—and real estate— isn’t always rainbows and unicorns. So this week we decided to take a look at the *downers*: those things that actually keep you from getting top dollar from your home.

Watch: These Things Are Dragging Down Your Home Value



The list itself probably won't surprise you, but the numbers just might. Who would have thought that it's a worse investment (by far!) to buy in a bad school district than near a strip club or a homeless shelter? Beyond strippers, that is.

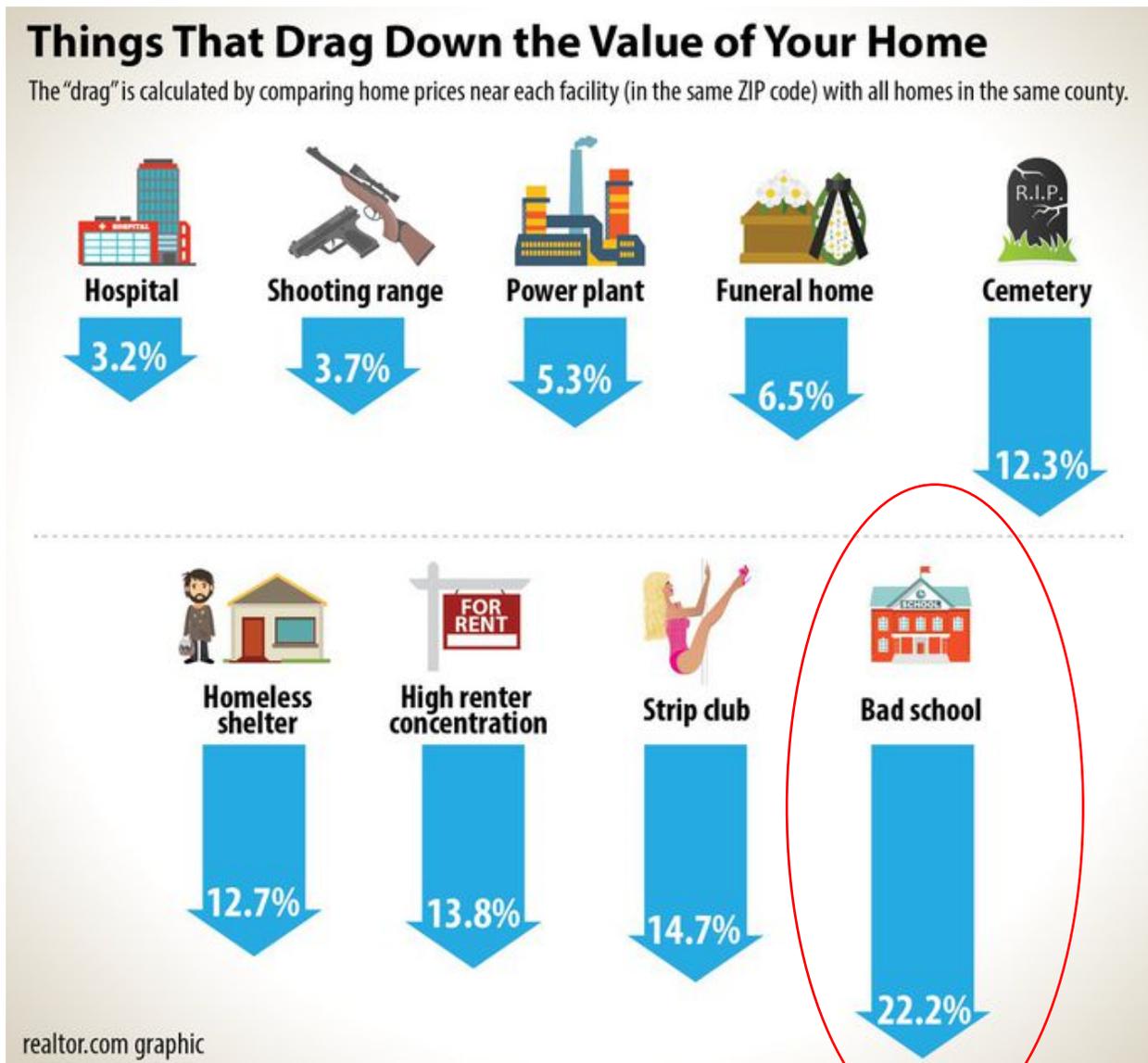
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So how'd we do it? We looked at home prices and appreciation rates in U.S. ZIP codes where a specific drag-me-down facility such as a power plant is present. For each facility, we calculated the drag, or a "location discount," by comparing the median home price of the ZIP codes with that facility with the median price for all homes in the same county. We limited our scope to the 100 largest metropolitan areas, since rural communities have lower home prices and slower appreciation.



Got it? Have a look at the list based on how badly your home's value will get dinged:



Keep in mind the difference between **causation** and **correlation**: Does having a cemetery or shooting range in the neighborhood cause home prices to drop? Or are those businesses drawn to the area because of cheap real estate? We don't have a definite answer, but their presence is generally a sign that a neighborhood is the opposite of up-and-coming. Judge your investment accordingly.

Hospital

The drag: 3.2%

Hospitals are awesome, right? Having a great one within easy access is just about every homeowner's goal. But easy access is one thing, and being woken up by ambulance sirens—or, god forbid, medical helicopters—at 3 a.m. is quite another. Among homeowners who sold in 2015, those near a hospital generally got 3% less than an average home in the same county would get, based on our sales deed records and hospital location data from data.medical.gov. In the world of real estate price demerits, 3% isn't a lot, so clearly plenty of people are willing to overlook some noise and chaos in favor of nearby medical care.

Shooting range

The drag: 3.7%

According to most research, it's not the guns or the people who shoot them that the neighbors of shooting ranges object to most; it's more the *idea* of the places and, in some cases, the noise of gunfire, especially outdoor gun ranges. More perceived problems: environmental concerns, including the lead that leaches off spent shells, potentially poisoning soil and water. Last year, a closed gun club in San Francisco triggered \$22 million in cleanup fees, the [San Francisco Chronicle](#) reported. We used gun range locations from [wheretoshoot.org](#).

Power plant

The drag: 5.3%

There are more than 8,000 power plants across the U.S., according to the [Environmental Information Agency](#). Much as we are grateful for the modern convenience of electricity (thanks, **Ben Franklin!**), the huge facilities spur more NIMBY (“not in my backyard”) movements than anything this side of waste treatment facilities. The most frequently cited reason: safety concerns. The perceived dangers of living near a power plant vary dramatically depending on type, from the seemingly harmless solar to the dreaded nuclear. In general, having a power plant in the neighborhood is associated with lower property prices.

Funeral home

The drag: 6.5%

Some people believe you get bad spiritual energy from living near a funeral home; some just dislike the traffic caused by service workers and funeral attendees; and others fear that the smoke from a crematorium is toxic. But plenty of folks just find them seriously *creepy*, an unpleasant constant reminder of our own mortality. Our analysis of property values near funeral homes listed on [legacy.com](#) seems to confirm the stigma. Properties near a funeral home see a 6.5% drop in price compared to all homes in the same county.

Cemetery

The drag: 12.3%

Call it superstition, call it irrational fear, but there's an awful lot of people who find the prospect of living near lots of buried bodies unpleasant or downright terrifying (see: Funeral homes). To be fair, there are some people who seriously dig how quiet the neighbors are, but they're outnumbered by the haters. To do the research, we used a list of federal and state cemeteries operated by the [Department of Veterans Affairs](#) and found that the median price of ZIP codes with a cemetery is about 12% lower than neighboring areas.

Homeless shelter

The drag: 12.7%

Homeless shelters can be unloved and unwanted misfits in residential areas. Even though there's no rule that homeless shelters are usually accompanied by higher rates of crime, shelters *do* certainly attract motley groups of people, necessitate emergency calls, and require more police in otherwise quiet, safe neighborhoods. Shelter locations, listed on [homelessshelterdirectory.org](#), are often limited to less prime areas in the city where home values are about 13% less.

High concentration of renters

The drag: 13.8%

Does a cluster of rental buildings—or lots of them—lower the property value in a neighborhood? Many homeowners have pondered this. While it's hard to do an analysis down to every property, we found that ZIP codes with a higher-than-average concentration of renters have lower property values compared to the county they are located in—by 14%. The data are from the [American Community Survey](#).

Strip club

The drag: 14.7%

Catering to adult vices—and often (rightly) associated with loud music and less-than-savory visitors—a “gentlemen’s club” is an unwelcome neighbor on the block. We tracked nearly 2,000 strip joints listed on stripclublist.com and ranked the category high on our “unwanted” list. In one extreme case, the crime-plagued neighborhood of Washington Park in East St. Louis, IL—the ZIP code 62204—has 10 strip clubs. *10!* How do they all compete? It saw only a handful of homes sold in the past three years, with a median price of \$10,000.

Bad school**The drag:** 22.2%

While a top-performing school is definitely a plus for your property value, a bad school is a complete, out-and-out disaster. A school where one teacher handles a class of 40 students with a slim graduation rate is usually an indicator of a deprived neighborhood. The median home price of ZIP codes with schools that receive a 1 to 3 rating (out of a possible 10) from GreatSchools.org is only \$155,000.

Dedication to Education

I personally know the importance of school boundaries. When our first child reached school age, my wife and I went house hunting with school-boundary maps in hand. If a home was one block outside our favorite elementary school's boundaries, we didn't even go in. The look of the home, the neighborhood, and how it was laid out were all factors that could disqualify it from our list, but the primary hurdle for every home was that school boundary line.

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Consumers are willing to sacrifice certain things to live in the right school district. Some of the realtor.com survey results were surprising: One out of five buyers would give up a bedroom or a garage for a better school. One out of three would purchase a smaller home to wind up in the right district.

Buyers are also willing to put their money where their mouths are. One out of five home buyers said they would pay six to 10 percent above their budget for the right school. One out of 10 would double that to 20 percent. Considering that premium could approach \$100,000 in a lot of markets, it makes you wonder: How much investment in a school district is appropriate?

Do School Districts Influence Home Prices or Vice Versa?

Conversations about schools and their effect on a home's value are often of the "chicken or the egg" variety. Homes in the best school districts, on average, sell for higher prices than similar homes in less-popular school districts. A simple analysis might say that good schools are wholly responsible for this added value.

At the same time, on average, more affluent home owners live in more sought-after school districts. Statistics often show that for large sample sizes, the more affluence there is in a community, the higher test scores will be in that same community. Test scores are just one measure of "good schools," but they're a highly quoted measure. There can be a self-reinforcing mechanism here that might overemphasize the effect of the school itself on the prices of those homes. One might even hypothesize that the high home prices make the schools better.

Consumer Demand Shows Clear Connection

In the end, though, it's hard to deny that there is strong consumer demand for good schools. **Demand drives prices higher for a limited product like real estate.** We probably can't pinpoint exactly how much that demand has on home prices, because the market is so complex and every home buyer's decision weighs so many different factors.

Clearly, though, consumer demand is large enough that we can conclude that good schools do increase home values in some measure. Half of the home-buying population is willing to pay more than their intended budget to get into the right school district, and more than half would give up other amenities. Making a decision on buying a home should definitely include an analysis of the school district, even for buyers who don't intend to send children to those schools. Good schools provide stability for a community, and that's good for the property values of everyone who lives nearby.

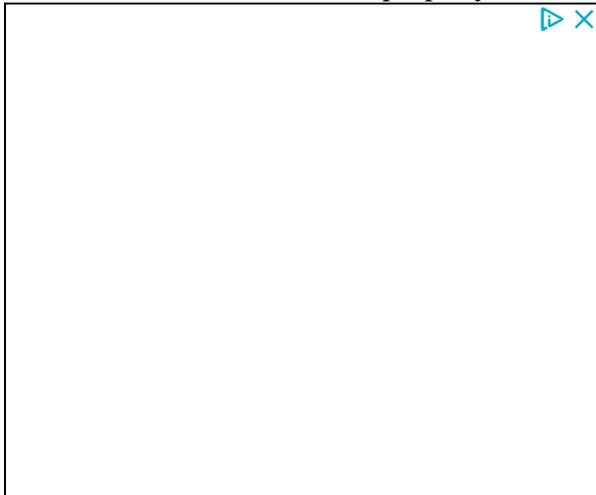
What is the Connection Between Home Values and School Performance?

Updated March 24, 2017 | by [Grace Chen](#)

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Is there a real relationship between expensive houses and better public schools? A new report sheds light on the connection between property value and school quality.



Families often choose the location of their next home by where their children will go to school. As focus on school performance has become more astute thanks to a rising emphasis on test scores and

completion rates, home shoppers have become more cautious in their selections as well. Do schools directly affect home values in a neighborhood? The answer may depend on where you are shopping for your next home.

Home Values and School Spending

According to the [National Bureau of Economic Research](#), there is a definite correlation between school expenditures and home values in any given neighborhood. A report titled, “Using Market Valuation to Assess Public School Spending,” found that for every dollar spent on public schools in a community, home values increased \$20. These findings indicate that additional school expenditures may benefit everyone in the community, whether or not those residents actually have children in the local public school system.

While the findings of this national study are compelling, they do not paint a full picture of the link between school spending and home values. According to the website, some school districts may operate more efficiently, so while expenditures are lower, the quality of education is still high. In addition, the size of the district or proximity of schools from neighboring districts could impact the perception of a specific school’s value, beyond the simple expenditure formula.

Researchers that published the report also found that wealthy school districts, where home values may tend to be higher, spend their funding more efficiently. The greatest spending was seen in school districts filled with [low-income families](#), large districts and districts containing fewer homes – areas where home values may be lower overall. The results indicate that while home buyers may associate school quality with spending to some degree, this factor will not be the most significant one in influencing home values. Still, the trend has been noted on a national level, which offers some credibility to the association between the two.

New Ratings Impact Housing Prices

In 2010, the [Wall Street Journal](#) reported on a higher correlation between school performance and home values, which fluctuates somewhat in different states and school districts. According to the report, the increased availability of school data has led to more families searching for homes based on the quality of schools in the neighborhood than ever before. Today, a family in the market for a new home in a different location need only look as far as the Internet to find information on [standardized test scores](#), completion rates and student-teacher ratios to rank schools in the area where they are headed.

According to the Wall Street Journal, when the state of [Florida](#) rolled out its new grading system for all the schools in the state, home values were directly impacted by the new system. In fact, homes in neighborhoods with A-rated schools increased their value by as much as \$10,000 over a similar home in the vicinity of a B-rated school. As the grading system continued over a number of years, that gap has widened. Now, home values could vary by anywhere from \$50,000 to \$300,000 a home, based on the current rating of the school in that neighborhood.

National Look at Home Values and Schools

A more recent study by the [Brookings Institution](#) found that housing costs tend to be higher in areas where high-scoring schools are located. The study, which looked at the 100 largest metro areas in the country, found an average difference of \$205,000 in home prices between houses near high-

performing and low-performing schools. Homes around high-performing schools also tended to be larger, with 1.5 more rooms than homes near low-performing institutions. In addition, the number of rentals in areas near high-performing schools is around 30 percent lower.

“We think of public education as being free, and we think of the main divide in education between public and private schools,” Jonathan Rothwell of the Brookings Institution was quoted as saying at the website for the [National Association of Realtors](#). “But it turns out that it’s actually very expensive to enroll your children in a high-scoring public school.”

Good for Home Values, Hard for Relocating Families

While this news may be good for individuals concerned about the value of their current home, it can create challenges for families looking to relocate to a new neighborhood. The coveted school district in [Chapel Hill, North Carolina](#), is filled with homes priced at the top of the housing market in the state, making for plenty of financial challenges for families that want their children to benefit from the top-rated schools in the area. Even families that can afford the higher home prices may find houses snatched up so fast, they have a hard time landing a contract on a home that meets their needs.

In addition, the differences in home prices may contribute to the educational disparities that occur between low- and middle to high-income students. Those who can afford to move to a higher quality school district often do, leaving those who cannot afford the same luxury stuck in subpar institutions. In addition, the difference in home values often leads to more [segregated schools](#), which also lead to further disparities in education and subsequent income levels.

Still, the association between home values and quality education can be a boon to those living in a neighborhood with an in-demand public school. As data continues to be published about school performance nationwide, the expectation is that the trend will continue, and even increase, on a district, state and national level.

Why You Need to Research School Districts When Buying a Home

Updated February 26, 2018 | by [Robert Kennedy](#)

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Whether you have children or not, researching school districts is a crucial step when buying a new home.

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If you're in the market for a new home you better be researching local school districts – it could mean all the difference for your family, whether you have children or not.

When people search for a new home, there are many factors that weigh in on their decision: price, amenities, neighborhood, the square footage, rent or own, new or old, and much more. Don't make the mistake of forgetting to add another important aspect of home buying to this research list- school districts. Even if you don't have, or never plan to have school-age children, school districts can still have quite an impact on your home value and living area.

Here are four of the main reasons why the quality of school districts is something that you need to keep in mind when you buy your next home.



1. A Good School District = A Good Neighborhood

All other things constant, a good school district tends to equal a good neighborhood. And when it comes to real estate, the name of the game is location, location, location. Great location can mean safer neighborhoods, abundance of places to eat, ease of access to transportation, proximity to urban, beach or vacation areas, and amenities like public parks and services.

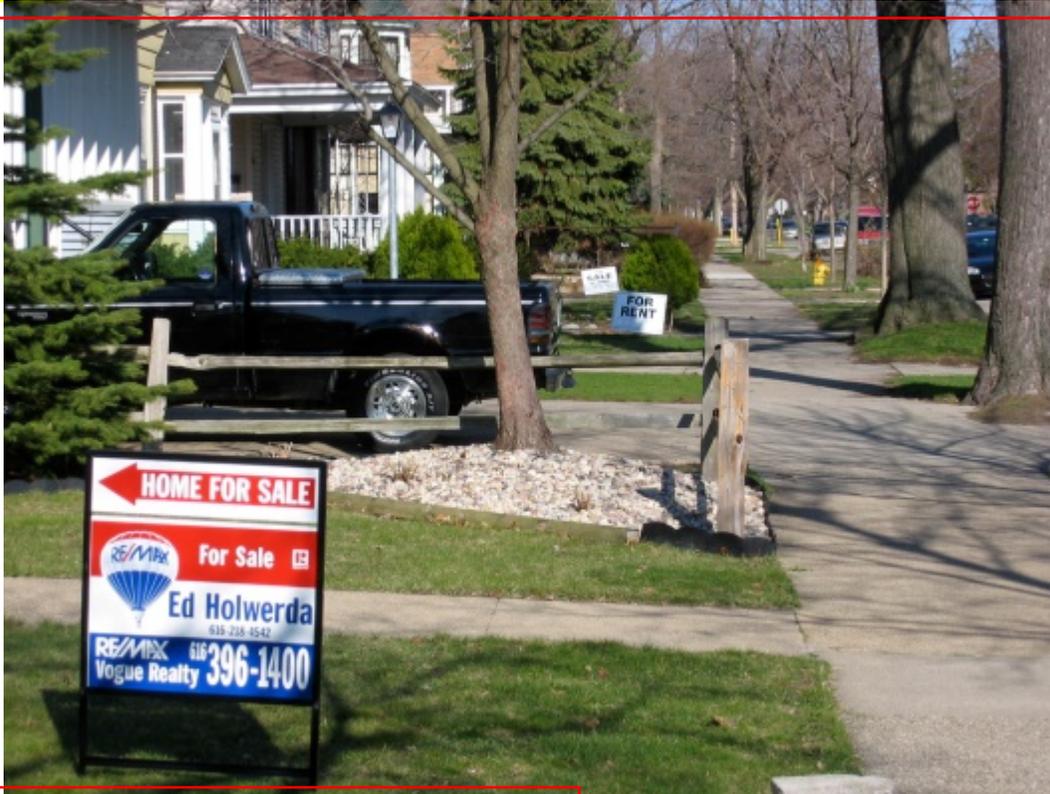
If you do have kids, a good location and good neighborhood are even more important. Just ask John Wetmore, “walking” safety expert and Producer of “Perils for Pedestrians.” “Parents need to consider how their children will get around in the new neighborhood,” John urges. “Will Mom ‘The Chauffeur’ shuttle the kids back and forth to school every morning and afternoon? Or are there sidewalks and crosswalks that enable children to get safely to school on their own?”

2. A Good School District = Home Value Stability

Even in a down market, an excellent school can be the rising tide that lifts all nearby home prices. Homes can go up or down in value based on macro-volatility or local area changes, but a great school district can act as lynchpin for strong values in a given area, and a life preserver when the market is rough.

Kyle Whissel, broker and owner of Whissel Realty in San Diego, says there is a clear relationship between school districts and home values. “?There is a very simple correlation between school ratings and home values. Neighborhoods with higher school ratings tend to have higher home values. ?We

are seeing more and more buyers make school district one of the top considerations when deciding on where to buy.”



3. A Good School District = Higher Selling Price

Real estate is by nature a venture that carries with it a certain level of risk and never comes with guarantees. While this is true, you do want to do everything in your power to make sure you get the best that you possibly can for your family. Home buyers should think about resale and building home equity when selecting their new home- even if they do not plan to move in the near future.

Plans get altered, situations change, and a move could come sooner than expected, so do everything in your power to make sure you could get a good resale value for your home- and **a good school district is one of the best ways to do this.** Not only are the values for these homes higher, but these homes tend to take less time to sell when they hit the market. If you don't move, you are still in a great position to build long-term equity for your home by buying in a good school district.

?Kyle Whissel of Whissel Realty is an adamant believer of home values in good education areas. "The Poway Unified School District is renowned for having some of the best schools in San Diego. As a result, we've seen home values there rise drastically compared to other neighborhoods with similar homes in age, size and quality. For example, values in Poway are 50% higher than those in Escondido which is a very similar neighborhood all because of the higher school ratings?."

Alexis Moore, Real Estate broker with Blackstone Realty Group in El Dorado Hills, California, says that a school district can be a 'dealbreaker' when you're looking to sell your home. "If you need to sell the home in a short period of time...the school district could be a deal breaker and end up costing you money. I know this because it has happened to me and other brokers over the years."



4. A Good School District = The Best Education for Kids

Last but not certainly least are the benefits of a good school district for parents that do in fact have school-age children. Don't rely on word-of-mouth and take the research of school districts for granted before taking a leap and making such a big life decision.

Zach Hanebrink, Manager with real estate specialists "Boomtown ROI," is currently looking for a home in Charleston, and considers school districts a vital part of his search. "Schools are assigned based on where you live. There may be loop holes, magnet or private school opportunities, but neither is a guaranteed option. Most families will remain in their home for at least 3 years, and this means your children will be at the assigned school during that time period; getting an education, and making friends."

Brian Stewart, Education expert and founder of [BWS Education Consulting](#) and [Free Test Prep](#), says that parents can consider different options if they have a private school in mind. "If you know that you are going to send your kids to private school, you can save quite a bit of money by purchasing a nicer home in an area that does not have higher school property taxes."

Brian Stewart also points out that parents should be especially careful if their children have specific learning needs or other interests. "Go beyond the generic reputation of the school if you have kids with unique learning needs. Some schools are much more receptive to accommodating students who need enrichment or remediation. If your child has in-depth extracurricular interests, a larger school is more likely to have a club or activity that your child will enjoy."

Real estate broker Alexis Moore warns that failing to research school districts can be a huge mistake. "In many states and communities like El Dorado Hills, a home may be situated in one particular district however because of overcrowding children are being bussed up to 2 hours away to attend

school. So don't assume anything. This is a costly mistake because not only does it impact the children but home values. So assume nothing and research first.”

Make the Right Decision

School districts should clearly be on every buyer's radar whether or not kids are in the picture. The right home should be one where you feel comfortable and in a location that makes sense to you and fits your needs in terms of size, style, condition and price. Consider all the factors and gather as much information as possible and you can ensure you have the best chance of selecting a great home for you or your family. Check out our full list of public school rankings across the U.S. right here on [Public School Review](#).

How Schools Can Impact Home Prices

January 11, 2015 By Bill Gassett — 3 Comments



There is no denying that the quality of nearby schools can impact the price of a home. But while this fact



has always been somewhat of a given in the real estate industry, recent statistics now demonstrate just how much of an impact school quality has on real estate.

Many home buyers are willing to pay more for good schools and are even willing to trade bigger and better homes for access to quality school systems.

In 2013 The National Association of Realtors surveyed home buyers and found 22 percent of them listed a home's proximity to the school as part of their buying decision. Twenty-nine percent of the buyers listed schools quality as a deciding factor in their decision. What you are about to learn is how schools have an effect on home values!

People are Willing to Pay More For Good Schools

[Realtor.com surveyed home buyers](#) to find out how they viewed school performance as a part of their overall buying strategy. What they found in their study showed that a surprising number of people are willing to give up things to get within the boundaries of a good school district. They found that for every five buyers, one buyer would be prepared to give up a garage or bedroom for a good school.

They also found that for every three buyers surveyed, one buyer would even settle for a smaller home to get access to a good school. And over half of those surveyed said they would sacrifice nearby shopping options for a better school.

Beyond sacrificing things in their home purchase, buyers were willing to pay more money for a home in a good school district. One out of five of those surveyed said they would pay between six and ten percent more for a home – and one out of ten people surveyed stated that they'd go even higher, paying up to 20 percent more for a home with access to the right schools. In my experience as a Massachusetts Realtor for the past twenty-nine years, what applies nationally mirrors the case here as well.

There are certain towns in the Metrowest Massachusetts area that command a much higher price for an identical home in a city that does not have the same cache for their school systems. For example as far as towns go [Southborough Massachusetts](#), [Westborough Massachusetts](#), and [Hopkinton Massachusetts](#) have very highly regarded school systems. If you took a typically four bedrooms, 2.5 bath colonial in any one of these towns and compared the price to say the same home in Milford or Northbridge, the price would be substantially different.

Depending on the location of the home you could be talking a difference of \$50,000-\$100,000! Obviously not chump change but history shows people are willing to pay for it. What's interesting is these towns are not more than fifteen to twenty minutes away from one another.

Some buyers will actually come to these areas with the specific intention to buy a home there specifically for the excellent school systems. This is why Southborough, Westborough, and Hopkinton have become what is known as "destination towns" in the Metrowest region of Massachusetts.

Good Schools Protect Home Prices

This survey conducted by Realtor.com gathered data from 1,000 participants. The survey showed that a whopping 91 percent of respondents included school boundaries in their decision-making process for choosing a home. Not all home buyers have children or even plan on having children – making these figures even more interesting. People are not just interested in the quality of school districts for the educational opportunities they provide; they consider school quality as part of the overall value of the real estate.

To further demonstrate this, we can look at the article “[Do Schools Affect Property Values?](#)” by Ken Corsini. In this article, Corsini discusses a research project he did on housing values in Metro Atlanta. His research showed that school performance in a neighborhood had a substantial effect on the value of homes in that neighborhood.

Looking at home prices in 2006 and then 2009, he found that those homes that had great schools nearby tended to weather the falling real estate market much better than those with only mediocre schools nearby. This data was so compelling that Corsini began using school performance as a major factor in his real estate investing.

Again this holds true in my area of Massachusetts as well. Towns that have top rated school systems weathered the real estate slump from 2006 to 2012 much better than those towns who did not have highly rated schools. So when people ask me “*do schools impact home prices?*”, the answer is *yes they do!*

Good Schools are Important for Multiple Reasons

All of this



information paints an interesting picture of the impact of schools on home prices. It shows that buyers care about the quality of schools – for evident and not-so-obvious reasons. Some buyers are planning on starting a family or already have children. These individuals are looking towards the future for their children and are willing to pay more for less to give their children access to good education.

However, there are other kinds of buyers out there that consider schools as part of an overall equation in determining the desirability of a property. As Corsini demonstrates in his article, buying a home in an excellent school district just makes good business sense. Good schools can help insulate a home from market fluctuations and therefore makes a property a more sound investment.

Real estate investors buy homes for very different reasons than the average nuclear family – yet they are coming to a similar conclusion on the desirability of homes located near good schools. This is a perfect example of how schools can impact buying decisions.

Good Schools and Property Values – A Chicken and Egg Situation

When discussing why good schools do what they do to property values, it is easy to get into a “chicken and egg” dilemma. On the one hand, it is possible to argue that good schools are responsible for increased property values. After all, we just discussed multiple reasons why buyers will seek out homes located in good school

districts and pay a premium for them. The conclusion that good schools drive up prices is an obvious one.

On the other hand, it is also possible to argue that the affluence that is common in neighborhoods near good schools is responsible for the quality of the schools. Generally speaking, good schools tend to be located in neighborhoods that have a higher standard of living. The affluence that is present in these neighborhoods tends to create school districts that score higher on tests, and that tend to rank higher in performance than schools located in poorer neighborhoods.

For buyers searching for a home, though, the exact relationship between good schools and property values may not be as important as the hard facts – better schools tend to lead to higher property values. If you are selling a home in a good school district, you can reasonably ask a higher price for your home than a similar home located in a less desirable school district. If you are a buyer searching for a home in a good school district, you can expect to pay more for that home.

Good Schools vs. Higher Taxes

While one major benefit of having good schools is the



appreciation in home values what this also leads to is paying higher property taxes. There is a direct correlation to excellent schools and higher property values. Given this, those who live in towns with great schools pay more in taxes for this benefit. For those working class families that are relocating with schools as a high consideration,

this is not an issue. What can become problematic, however, are those who have lived in the community who no longer consider schools to be a benefit.

What we consistently hear from real estate agents is the battle between those who have relocated for the interest of schools and those who are being priced out of their community due to taxes. Most often this comes from seniors who are on a fixed budget. With their kids grown and out of the school system, the complaint we hear often is that they don't want any more money allocated to improvements in the education system.

On the one hand, you can sympathize with the fact nobody wants to pay more in taxes but what they often don't consider is how much equity has been put in their pocket because of the schools! Homeowners may pay a little more annually out of their pocket, when it comes time to sell, however, they will be rewarded.

Of course, many of us become shortsighted and don't think of a monetary payout in the future. We all get to wrapped up at the moment. Some seniors do get squeezed out of their town due to higher taxes, fees, and other expenses despite the fact their equity has grown.

Unfortunately, these are the facts of life we have to live with. It is possible some folks are paying more in real estate taxes than they should be. If this is the case, it is always a good idea to know [how to appeal high real estate taxes](#). There are times where we all lose sight of the fact that assessed value could be off which is causing our taxes to be higher than they should be. Each year it is a good idea to look at the town field card and check for the accuracy of data that applies to the property.

How to Research Schools

Given
that
schools
are super

How to Research Schools?



important not only for your children's education but also for the long-term value of your property, [how do you go about the best school systems?](#) There are some ways to determine the viability of an education system. Some of them include:

- Checking online sites for statistics on test scores, the curriculum offered, the rate of attending higher education, etc.
- Going in and visiting the school yourself. Speaking to the head of education and other department heads is a good move.
- Talk to the real estate agent you are working with. A good buyer's agent should have at least a general understanding of what schools are considered top notch and which are less desirable.
- Talk to parents who have kids in the school system already. Speaking to a parent is a good idea because they already have children who are participating daily. A parent generally can get some clue as to how the teachers are for delivering a good education.

Other Statistics Worth Looking at Include:

- Student to teacher ratio.
- Testing results in math, reading, and science.
- Cost per pupil.
- Enrollment and class size for students.
- Teacher educational attainment- How many teachers have master's degrees or Ph.D.'s.

- Languages offered.
- The number and size of specialized programs for gifted or needy students.

While none of these methods alone are full proof by using all of them you will have a better understanding of if the school system will meet your child's needs.

Final Thoughts

For young couples who have a young child or are planning to have them there is often a struggle between getting a home that meets their expectations and also providing a quality schools system for their family. There are often tough choices that are made because young couples purchasing homes can see a dramatic difference in what their money can buy between a community that has top rated schools vs. one that does not.

These are the kind of decisions that should get a hefty amount thought before a conclusion is made. On many occasions, I have seen parents make a decision to opt for a better home initially. This purchase becomes a "transition" property before their children reach school age or at least upper-level education.

Everybody is different when it comes to schools and the home buying process. Just make sure you give it a considerable amount of thought before ultimately making your final decision.

No Kids? Here's Why You Should Still Buy in a Good School District



Even if you don't have kids, buying in a good school district is always a good decision — if you can afford it.

By **Rebecca McClay** | Sep 09, 2015 6:00AM

Learn why buying in a top-notch school district can benefit you — even if you don't have kids.

Living in a good school district doesn't just bring better teachers, better books, and better test scores — it also can help preserve home values and ensure faster resale rates.

It's a smart move to consider the quality of **school districts** in your **home-buying decision** — although there are pros and cons to buying in top-notch school regions. Parents hoping to land a good home deal *and* give their kids access to a high-quality education have several

costs to weigh. If you do the math, you'll find that pricier homes in a strong public school district may actually be better bargains than affordable homes in districts where many children attend private schools.

Seeking good public schools

Many buyers search for real estate by school district, and say school districts are among the key factors in their home-buying decision. In a **recent Trulia survey**, 19% of Americans indicated that their dream home is located in a great school district. But among parents of children under 18, the percentage of Americans who want to live in a great school district jumps to 35%.

How can you tell if your potential new home is in a district that makes the grade? Consider the age of the schools, the condition of their facilities, the student-to-teacher ratios, and, of course, standardized test scores.

The bigger picture

It's not as simple as it may seem to draw conclusions between school districts and real estate, though. A poorly ranked public school district doesn't necessarily mean that the overall quality of local education there is poor.

And there are private schools to consider as well. Parents looking for homes in lower-rated districts but who still want quality education may need to factor in the cost of a private education, which runs well into the thousands per year. Tuition rates vary widely, but the average tuition cost is \$10,940, which is the same as \$912 per month in mortgage payments, according to a **2014 Trulia analysis**.

Put it this way: A homeowner with a \$1,326 mortgage payment on a \$300,000 house who is also paying the \$912-per-month average tuition could, in effect, afford a \$520,000 house with public school education in a better-quality school district. Because home prices and school tuitions vary so widely, buyers will have to calculate these differences on their own (and obviously there are more factors than just local school districts and housing prices that drive real estate decision making).

Considering the future

When it comes to resale value, though, even for buyers without children, investing in a home in a good-quality school district can pay off. Homes in good school districts tend to sell faster than homes in lower-quality school districts. And during tougher economic times that trigger declines in home values, homes in better school districts usually hold their value more than homes in lower-quality school districts.

On the downside, these homes in better school districts also tend to be more expensive. Buyers here will pay higher property taxes, and much of that money will be allotted right back to the schools. For childless buyers, that's no bargain. But in general, buying in a good school district does matter and, with more stability in home prices and more savings from costly private school education, it usually works in favor of the buyer.

Do Schools Really Affect Property Values?

by Ken Corsini | BiggerPockets.com



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In 2009 as I worked to complete my masters degree from Georgia Tech, I undertook a large research project to study the effects of the recession on housing values in Metro Atlanta. The purpose of the research was to

identify changes in the demand for certain characteristics of residential properties as the market was falling. Essentially, we were interested in identifying changes in what buyers valued in a residential property in 2009 versus 2006.

In conducting the research we targeted Cobb County, a suburban county about 20 minutes northwest of downtown Atlanta. We looked at approximately 150 home sales from August 2006 and 150 home sales from August 2009. Using statistical analysis, we analyzed characteristics such as bedrooms, bathrooms, square footage, age, stories, garage, basement, general interior and exterior, school district, crime stats, median income, etc. One of the most interesting takeaways from this research was the profound effect that a quality school district can have on the housing values in the surrounding community.

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Quality Schools Do Affect Property Values

In our research, we used the website SchoolDigger.com which uses a 5-star rating system based on a number of different factors including enrollment, student/teacher ratios and test scores. What we found was that properties near schools with a rating of 4 or 5 stars were almost completely insulated from declining values while those near schools with 1-3 stars experienced massive losses in value over that 3 year period.

As a full-time real estate investor, this information has dramatically affected my buying criteria. **While I am fully aware that there are many, many other factors to consider when buying an investment property, school districts have become much more important in my decision making.**

For example, I was looking at a HUD home last week in Marietta, GA (Cobb County) as a possible long-term investment. It was a nice split level home built in 1980, located in a stable neighborhood with good comparable sales, but there was nothing particularly special about the house itself. Truthfully, if this house had been located in another Metro Atlanta area hit harder by foreclosures, I probably wouldn't have bothered to look at it. Or if I had considered the house in a less attractive area, I would have expected to pay at least \$25,000 less than what I was prepared to bid on this property. In reality I was okay paying a slight premium for the property because of the location in a 4-star school district with strong comparable sales. Fully realizing that I would probably sacrifice some level of monthly cash flow in the short term, I concluded that the stability of real estate values in this area would make for a better long term investment.

Unfortunately, another investor thought this was a good buy as well and ended up bidding higher than I was willing to pay. This perhaps serves as a great reminder that regardless of how good an area (or school district) is, the numbers still have to make sense.

Bottom line? Yes, schools are an important consideration in the purchase of a property; however, several key factors need serious thought before placing that final bid.

Why the School District Should Impact Your Home Search

by [Deanna Lawley](#) On August 7, 2014

Buying a home in a good school district can result in resale advantages, offer protection from market fluctuation and provide a great education. Real estate experts markets across the country share what you should know about a school district's impact on real estate, whether or not you plan on using the school system.



Determine what you're looking for in a school district

Before you begin your search, determine how you are looking to benefit from the school district.

According to Aisha J. Thomas, associate broker, The Thomas Agency, the most important quality of a good school district is unique to every buyer. "Although test

scores and statistics are a great starting point, schools require a closer look. Factors to consider are the environment, active parental participation, teacher credentials/support offering of core competencies, extracurricular and after-school options. These factors can contribute to a well-rounded education.”

“The quality of the school district is one of the first things home buyers evaluate before making a purchase. Many buyers filter their search by only looking for homes in a certain district,” says Jake Cain, real estate agent, [Keller Williams](#). “Defining what a ‘good’ school district is varies from one family to the next. While we often think of high test scores, some families may be concerned with their budding athlete playing for a top program and others may place a particular premium on student to teacher ratio.”

You don’t need to have children to benefit from buying in a top school district.

“A home located in a good school district carries the benefit of maintaining its value in comparison to lower tiered school systems,” says Linda Brincks, real estate consultant [The Raines Group](#). “Even if you do not plan to use the school systems yourself, many buyers (especially relocation buyers) will opt for homes in the top notch school system when it’s time to sell them in the future.”

Consider the resale value potential

When thinking of the area’s long-term potential, the school district should be a top consideration.

“Before you invest in an area you should research as much as possible to determine the factors that could affect your resale ability in the future,” says Kristie Zimmerman, real estate agent, [McEneaney Associates](#).

“A school district is a very important factor to consider when buying a home even if you don’t have children, because it can have a dramatic effect on the resale value of the property,” says Thomas. “Properties located in good school districts tend to hold value or even increase in value when the rest of the market has stalled.”

“Parents of young children or individuals without children will look for schools in up-coming areas, where the influx of buyers could substantially change the schools, due to the increased enrollment and tax base, while the home prices remain on the lower end,” says Thomas.

“A good school district definitely adds to the value of a property whether you have children or not, however in my experience better school districts are usually located in more upscale neighborhoods, says Jim Esposito, real estate agent, [Intercoastal Real](#)

“They are safer, offer higher appreciation, will hold value better through market fluctuations.”

Buying without children

Even if you don’t plan on using the schools, the school district should still be an important part of your home hunt.

“It is always a better investment to buy into a top school district,” says Carol Huston, a real estate professional with [Wish Sotheby’s International Realty](#). “In Los Angeles, properties located in high ranking school districts, which is California’s Academic Performance Index, school districts with scores of 9-10+ always sell at a premium.”

“Real estate values are driven by demand,” says Zimmerman. “The end buyer may make their decision to purchase based solely on a school.”

If you don’t plan on using the school district, it still pays to get involved.

“I always advise clients to support the school in their neighborhood even if they don’t have children,” says Huston. “It will help children and bring up the value of their own property.”

Weighing the cost of buying in a higher priced school district

In addition to a higher resale value, buying in a good school district can save on the costs of a private school.

“Many of my clients sold their homes to take their kids out of private school and to move into a great school district, says Huston. “They felt that they would rather support public school and pay it into their house mortgage, than pay it to a private school.

“The higher home costs of a top district are worth it when you factor in the cost of private schools, says Thomas. According to the Digest of Education Statistics 2010, National Center for Education Statistics report the average cost is [\\$8,549](#).”

Do your homework

To gain a full understanding of the school district, Nicole Lee, owner of [Ashford Realt Group](#) recommends looking into the teacher student ratios, testing scores, and any recent school of excellence awards.

Cain says, “One great place to get district information is from [SchoolDigger.com](#).”

“Find your state’s website, which should offer district report cards that will let you compare schools against another,” says Brincks.

“Ask your real estate agent and any personal contacts in the prospective areas, or via Internet posts for opinions. There always seems to be one school or district that gets repeated,” says Thomas.

“I’ve relocated from Michigan to California then to Georgia within the past year, and online resources like GreatSchools.org, were instrumental in helping me find a good school for my child,” says Thomas.

Huston encourages her clients to go to the local school and check it out themselves. She says, “See if there are parents walking their children to school. Are there local businesses that support the school? How crowded are the classrooms? Are you guaranteed a space in the school just by living in neighborhood, or is it so popular that you have to be put on a waiting list or go into a lottery?”

Use this advice when home hunting to make the most out of your investment and increase your resale value – whether or not you have children.

The effect of school performance on local home prices

Posted on [October 18, 2013](#) by [Mark Sprague](#)

When people buy a home, a variety of factors influence their decision. The look of the home, price, size, layout, age, and proximity to all their needed amenities all play a role in the selection process.

Here are some basic questions to ask yourself when you start shopping for a home:

- Where do I want to live? (location, location, location)
- How much can I afford? (or can I afford to live in the location I want?)
- What is driving home values in the area?
- Is it in a good school district?

For people starting families, the quality of local schools is very important. We've always known that good schools attract families with school-age children, but recent statistics add concrete numbers and surprising trends to the storyline. Redfin, an online real estate brokerage, recently conducted an analysis on the relationship between school performance

and home prices. Redfin looked at homes on Multiple Listing Services (MLS) databases used by real estate brokers that sold between May 1 and July 31, 2013 to calculate median sale price and price per square foot of homes within school zones. For this study, they analyzed home prices compared to the test scores of elementary schools across the country. School and home coverage consisted of 10,811 elementary school zones across 57 metro areas and included 407,509 home sales. What they found is what we all have know in our hearts for years – that home buyers will pay more per square foot for homes located within top-ranked school districts. The company used MLS databases to calculate sales prices per square foot of homes located within the boundaries of particular school zones and compared them against the standardized test scores of the area's elementary schools.

What the study found is that homes could be identical and just a short distance apart, but the prices could vary by sometimes as much as \$130,000+ because of the difference in school districts. A good example in the Dallas area is Highland Park, where the Highland Park ISD and Dallas ISD both exist in a very prestigious area. Homes just a short distance apart with nearly identical attributes are selling for drastically different prices.

This study suggests that potential home buyers are not only willing to pay more, but are also willing to take less in a home. The report showed that the homes in high-scoring school districts were not necessarily bigger, of a higher quality or in a prime location with nice views or quieter streets.

Arguably, there are many factors that may play in the determination of a locality's real estate prices. These factors include proximity to workplaces, shopping and convenience, the quality and adequacy of residential housing supply, and property tax rates, to name just a few. Nevertheless, after curb appeal or adequacy of space and amenities, the quality of a community's schools ranks high among buyer influences. In my market study days, I was surprised to see that commercial real estate was as affected by the same parameters. Why? Quality schools mean strong graduation rates, and a lack of young unemployed hanging around. In the past when we did market studies, we found that it was the lack of quality schools and community involvement that made an investment area undesirable, rather than location.

Why do we think that is? Are there clear, empirical bases for this widespread belief that schools influence housing prices? To what degree are measures of school quality capitalized in housing values? Who benefits when housing prices fall / rise? During this recession, did quality school district communities keep their values better?

First, the data we pulled show that homes in our Texas neighborhoods that have excellent schools sell for more money than similar homes in neighborhoods having lower rated schools.

Second, when the economic downturn hit, home prices in Texas metros with excellent schools did not fall as much and have recovered better than home prices in areas having lower rated schools. Almost all of these areas have a high 'community involvement'. Which in turn affects their real estate values.

Third, consider why some areas have schools with better ratings. Families having more money and putting a stronger emphasis on education move to areas having higher rated schools. Even those with less money, but more emphasis on education as shown by the school's rankings have better values. These families help build the reputation of the schools

Empirical data in Texas metros show as much as a 70+% difference in values over exemplary school vs. low performing. Yes, some of the value could be in the more desirable locations of those school districts, but historically we have seen schools add value, sometimes almost to an extreme.

Do better school districts have bigger homes, higher quality homes, larger lots, or more desirable locations (views, quiet streets, etc)? In general, not necessarily. When accounting for size, on average, people pay more per square foot for homes in top-ranked school zones

compared with homes served by average-ranked schools. This means that the price differences for similar homes located near each other but served by different schools can range from tens to hundreds of thousands of dollars.

Whether you agree with the hypothesis of this or not, if you have kids, you personally know the importance of school boundaries. When your first child reaches near school age, you and your significant other begin house hunting with school-boundary maps in hand. If a

house is one block outside of your elementary school's boundaries or district, most scratch it off the list. The look of the home and other factors could disqualify it from our list, but for parents the first hurdle is finding something in that school boundary line.

Buyers are willing to sacrifice certain things to live in the right school district. In a Realtor.com survey this summer, results were surprising: One out of five buyers would give up a bedroom or a garage for a better school. One out of three would buy a smaller home.

In the same survey, buyers are also willing to put their money where their mouths are. One out of five home buyers said they would pay 6 to 10 percent above their budget for the right school. One out of 10 would double that to 20 percent. Considering that number could be \$100,000 in a lot of markets, it makes one wonder: How much investment in a school district is appropriate?

In my history of looking at empirical data, homes in the best school districts, on average, sell for higher prices than similar homes in less-popular school districts. A simple analysis might say that good schools are wholly responsible for this added value. And because of that, more affluent families seek and live in more sought-after school districts. Statistics often show that for large sample sizes, the more affluence there is in a community, the higher test scores will be in that same community. Some of this is the effect of both parents being very involved in pushing their children's education. These test scores are just one measure of "good schools," but they're a highly quoted measure. There can be a self-reinforcing mechanism here that might overemphasize the effect of the school itself on the prices of those homes. One might even argue that the high home prices make the schools better, as school districts in Texas are funded by property taxes. More valuable real estate means more tax revenue for the district.

Demand drives prices higher for a limited product like real estate. There are just so many homes in each school boundary or district. The old adage of supply and demand and limited supply drives up the price. Yes there are many other factors, but school districts are near the top on most consumers list. Making a decision on buying a home should definitely include an analysis of the school district, even for buyers who don't intend to send children to those

schools. Good schools provide stability and continuity for a community, and that's good for the property values of everyone who lives nearby. Many quality schools and districts have been that way for years due to the quality of participation from all ages in improving school and community involvement.

The 2012 “Profile of Home Buyers and Sellers,” a separate survey released last year by the National Association of Realtors, also measured the importance of school districts to home buyers. This survey found 61 percent of recent buyers ranked the perceived quality of the neighborhood as important in their home-purchase decision, and 43 percent said convenience to jobs was a desirable characteristic. Forty-six percent of buyers who had school-aged children highly valued the quality of schools, the same proportion of this group that ranked employment proximity as important.

Earlier in this article, I mentioned that commercial real estate values are driven by the same parameters. Historically, not only do sales values remain higher, but so do rental values. To build an office, commercial, retail, etc investment in a less than desirable school district is challenging. Both from the equity side as well as the absorption velocity. ‘Shelter’ in any quality school boundary or district is historically more expensive.

This issue examined historical and current empirical research and published papers by leading economists and analysts and found general confirmation that communities with better schools are rewarded with higher housing prices, that the premium commanded by good schools can be quantified, and that ongoing investments in schools are returned to taxpayers faster in communities experiencing high housing demand. This may be one reason, that homeowners of all ages rely on the underlying principles at work in these studies when they vote to improve their local schools. Whatever motivates buyers and sellers, newspapers regularly cite instances of strong community schools in describing healthy resale markets for housing. Financially speaking, improving local schools is a matter of common sense.

Review of Housing Insights in Top Rated School Districts

This study identifies the price premium to buy a home in a strong public school district, and provides timely and granular housing market insights into the top districts garnering the highest home prices and demand from buyers.

To that end, we overlay data from [realtor.com](#)'s residential listings database with granular school ratings from [GreatSchools.org](#). Specifically, we aggregate key price, demand and supply metrics for all homes listed during the first half of 2016, and compare properties located in school districts rated nine or 10 on the [GreatSchools.org](#) 10-point scale against all other homes, as well as homes in lower rated districts.

National Summary

Attaching fresh and real figures to a well known dynamic is both entertaining and intriguing. The national picture reveals just how much more, on average, buyers are willing (or having) to pay for a top school. The analysis shows homes within the boundaries of the higher rated public school districts are, on average, 49 percent more expensive – at \$400,000 – than the national median list price of \$269,000 and 77 percent more expensive than schools located within the boundaries of lower ranked districts with a median of \$225,000.

To put this in perspective, our findings show that, in most markets, families are willing to pay more for a highly ranked school than an extra bedroom, a shorter commute, and even big home features such as a swimming pool, higher ceilings, sport courts, and even a private dock.

Houses located in these areas, on average, also move eight days faster than homes in below average school districts and sell four days faster – at 58 days – than the national median of 62 days. Additionally, properties within the boundaries of higher-rated school districts are viewed 26 percent more, on average, than the average home on [realtor.com](#)® (an indicator of buyer demand) and 42 percent more than homes in areas with lower ranked schools.

This gives sellers an edge, and results in stiffer competition for buyers, in what is already the **hottest real estate summer in a decade** and what continues to be very shallow supply conditions. Prices and competition are higher, but it's not impossible. Savvy and lucky buyers can still land the right home in these competitive schools districts. Those who understand local seasonality patterns, and start their search early in that cycle, are bound to have better chances and better value.

Local Dynamics

AUGUST 12, 2016

Being able to quantify the premium and popularity of these A+ communities is revealing. However, data at a more granular level provides deeper insights into local dynamics and uncovers a variety of unique patterns.

See interactive tool below.

Select a tab to view a particular metric (price premium, listing views, days on market). The default view shows top rated school districts across the country with the highest relative difference compared to the surrounding county. Select a geography (specific county and/or school district) to see how your local area compares. Note not all districts are shown on the default view. To show all districts, select 'All' under the School Rating Group.

To download a full file with all metrics for all districts and counties analyzed, see download link below.

Top Rated School Districts with the Highest Relative Premiums

The top 20 districts in this list have a combined median list price of \$1.77 million, and range from \$750,000 to 3.85 million. That's about seven times higher than the US overall, and three to seven times higher than their surrounding county.

But the list is more than just a reflection of the priciest areas in the country. These are areas with high premiums that also have top rated schools. In fact, there are plenty of districts that come in at a higher price tag that don't make the list since they have average or below average rated schools.

Top Rated School Districts with the Highest Relative Demand

The top 20 districts in this list receive 2.5 times more views on realtor.com than the US overall. They also receive 1.8 to 2.8 times more views than their surrounding county. Demographics play a key factor and competition intensifies in key cohorts; online traffic propensity from buyers aged 35-44 and 45-64 in these areas is 25 and 20% higher than the US overall respectively.

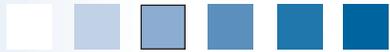
Interestingly, these top 20 districts are also not completely out of reach of the median household. They have a combined median list price of \$320,000, about 1.3 times higher than the US overall, and 1.5 times higher than their surrounding county, keeping them just within reach of the upper-mid income households. Most lie in what could be categorized as high-end communities within relatively affordable markets. This suggests these highly sought-after locales offer great value to families looking to land nice homes in top rated districts.

Top Rated School Districts with the Fastest-Moving Relative Supply

The top 20 districts in this list have a combined median days on market of just 33 days (16-45 days). That's a full 32 days faster than the US overall, and 13 days (range 5-12 days) faster than their surround-

ing county. Bidding wars and bully bids are not unlikely in a portion of these neighborhoods, and it's fairly possible that a home listed on Friday night may be gone before the weekend is over.

AUGUST 12, 2016



Nonlinear Effects of School Quality on House Prices

Abbigail J. Chiodo, [Rubén Hernández-Murillo](#), and [Michael T. Owyang](#)

We reexamine the relationship between quality of public schools and house prices and find it to be nonlinear. Unlike most studies in the literature, we find that the price premium parents must pay to buy a house in an area associated with a better school increases as school quality increases. This is true even after controlling for neighborhood characteristics, such as the racial composition of neighborhoods, which is also capitalized into house prices. In contrast to previous studies that use the boundary discontinuity approach, we find that the price premium from school quality remains substantially large, particularly for neighborhoods associated with high-quality schools. (JEL C21, I20, R21)

Federal Reserve Bank of St. Louis *Review*, May/June 2010, 92(3), pp. 185-204.

The relationship between house prices and local public goods and services has been widely studied in the literature, dating back to Oates's (1969) seminal paper, in which he studied the effect of property tax rates and public school expenditures per pupil on house prices. Oates conjectured that if, according to the Tiebout (1956) model, individuals consider the quality of local public services in making locational decisions, an increase in expenditures per pupil should result in higher property values, whereas an increase in property tax rates would result in a decline in property values, holding other things equal across communities. Oates suggested that the variation in expenditures per pupil partially reflected the variation in the quality of public schools.

In the analysis of school quality, researchers have often applied the hedonic pricing model developed by Rosen (1974). In this model, the implicit price of a house is a function of its com-

parable characteristics, as well as measures of school quality and a set of neighborhood characteristics. A house's comparable characteristics include the number of bedrooms, square footage, and so on. The estimated coefficients from the regression represent the capitalization of the different components into house values.

In an influential study, Black (1999) argued that previous research estimating hedonic pricing functions introduced an upward bias from neighborhood quality effects that are unaccounted for in the data.¹ Specifically, she noted that better schools may be associated with better neighborhoods, which could independently contribute to higher house prices. Black circumvented this problem by estimating a linear hedonic pricing function using a restricted sample of data from

¹ By neighborhood *quality* we refer to the availability of mass transit and thoroughfares, proximity to commercial and industrial areas, and other such amenities, in addition to sociodemographic characteristics.

Abbigail J. Chiodo is a former research analyst at the Federal Reserve Bank of St. Louis. Rubén Hernández-Murillo is a senior economist and Michael T. Owyang is a research officer at the Federal Reserve Bank of St. Louis. Jeremy Bixby, Katie Caldwell, Kristie M. Engemann, Christopher Martinek, Mark L. Opitz, and Deborah Roisman provided research assistance. The authors acknowledge First American (Real Estate Solutions) for house price data and technical support.

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houses along the boundaries of school attendance zones.² She rationalized that, while test scores make a discrete jump at attendance boundaries, changes in neighborhoods are smoother.³ The linear specification of the hedonic approach, including Black's (1999) variation, presupposes that the marginal valuation of below-average schools is equal to the valuation of above-average schools and results in a constant premium on school quality.⁴

In this paper, we argue that the relationship between school quality and house prices in the boundary discontinuity framework is better characterized as a *nonlinear* relationship. We formulate motivating hypotheses for the presence of nonlinear effects of school quality on house prices based on heterogeneous parent valuations of school quality and competition in the housing market. We then test for nonlinear effects estimating a nonlinear pricing function in the St. Louis, Missouri, metropolitan area, using standardized state math test scores as the measure of education quality. To control for neighborhood quality, we measure education capitalization by using Black's method of considering only houses located near attendance zone boundaries. We find that the effect of school quality is indeed best characterized as a nonlinear function.

We find, as did Black (1999), that controlling for unobserved neighborhood characteristics with boundary fixed effects reduces the premium estimates from test scores relative to the hedonic regression with the full sample of observations. We also find, however, that the linear specification for test scores underestimates the premium at high levels of school quality and overestimates the premium at low levels of school quality. In

contrast to Black (1999) and many subsequent studies in the literature, we find that the effects of school quality on housing prices remain substantially large even after controlling for neighborhood demographics, such as the racial composition of neighborhoods, in addition to boundary fixed effects. We also find that the racial composition of neighborhoods has a statistically significant effect on house prices.

This paper is organized as follows. The next section presents a survey of the recent literature. We then describe the hypotheses and the econometric model. Our data description is followed by the empirical results.

LITERATURE REVIEW

Ross and Yinger (1999) and Gibbons and Machin (2008) provide surveys of the literature on capitalization of local public goods and services. Examples of the traditional full-sample hedonic regression approach include papers by Haurin and Brasington (1996), Bogart and Cromwell (1997), Hayes and Taylor (1996), Weimer and Wolkoff (2001), and Cheshire and Sheppard (2002). Additional works are surveyed in Sheppard (1999).

Various studies in the hedonic analysis tradition have used so-called input-based measures of education quality, such as per-pupil spending. Hanushek (1986, 1997) found that school inputs have no apparent impact on student achievement and are therefore inappropriate as measures of school quality. His insights have led to the more prevalent use of *output-based* measures, such as standardized test scores.⁵ The research on education production functions also has made the case that *value-added* measures of achievement—often measured as the marginal improvement in a particular cohort's performance over a period of time—would be more appropriate as measures of quality in capitalization studies. However, con-

² A school's attendance zone delimits the geographic area around the public school the residents' children would attend. In this text, we often refer interchangeably to a school's attendance zone as the *school*, but this term should not be confused with *school district*, which is an administrative unit in the public school system often comprising several schools.

³ Black's (1999) boundary discontinuity approach is part of the more general *regression discontinuity design* surveyed by Imbens and Lemieux (2008).

⁴ Nonlinear effects are nevertheless routinely allowed among some house characteristics, such as the number of bathrooms and the age of the building.

⁵ Some authors, however, have expressed concerns about the potential endogeneity of school quality when it is measured by indicators of student performance. Gibbons and Machin (2003), for example, argue that better school performance in neighborhoods with high house prices may reflect that wealthy parents buy bigger houses with more amenities and therefore devote more resources to their children.

structuring value-added measures requires tracking groups of students over time and implies more sophistication in the decisionmaking process of potential buyers, as value-added measures are not commonly available to the public. Brasington (1999), Downes and Zabel (2002), and Brasington and Haurin (2006) found little support for using value-added school quality measures in the capitalization model; they argued that home buyers favor, in contrast, more traditional measures of school quality in their housing valuations.

A prevalent concern of capitalization studies is the possibility of omitted variable bias, induced by failing to account for the correlation between school quality and unobserved neighborhood characteristics, as better schools tend to be located in better neighborhoods. As mentioned previously, Black (1999) tackled this problem by restricting the sample to houses near the boundaries between school attendance zones and controlling for neighborhood characteristics with boundary fixed effects. A rudimentary precursor of this idea was analyzed by Gill (1983), who studied a sample of houses in Columbus, Ohio, restricting observations to neighborhoods with similar characteristics. Also, Cushing (1984) analyzed house price differentials between adjacent blocks at the border of two jurisdictions in the Detroit, Michigan, metropolitan area. Recent examples of this approach include studies by Leech and Campos (2003), Kane, Staiger, and Samms (2003), Kane, Staiger, and Riegg (2005), Gibbons and Machin (2003, 2006), Fack and Grenet (2007), and Davidoff and Leigh (2007).

The boundary discontinuity approach has been criticized in some recent studies motivated primarily by concerns about the successful removal of any remaining omitted spatial fixed effects (Cheshire and Sheppard, 2004) or the possibility of discontinuous changes in neighborhood characteristics, which also depends on the definition of “neighborhood” that is adopted (Kane, Staiger, and Riegg, 2003; Bayer, Ferreira, and McMillan, 2007). However, barring the availability of repeat sales data or information on boundary redistricting or policy changes to supply the exogenous variation required for identification, in the case of stable boundary definitions and cross-

sectional data, the boundary discontinuity approach remains a useful methodology. In addition to boundary discontinuities, recent studies have used various methods of addressing the omitted variables and endogeneity issues, including time variation (Bogart and Cromwell, 2000; Downes and Zabel, 2002; Figlio and Lucas, 2004; Reback, 2005, among others), natural experiments (Bogart and Cromwell, 2000, and Kane, Staiger, and Riegg, 2005), spatial statistics (Gibbons and Machin, 2003, and Brasington and Haurin, 2006), or instrumental variables (Rosenthal, 2003, and Bayer, Ferreira, and McMillan, 2007).

In this paper, we measure school quality at the individual school level and we regress house prices on their physical characteristics and a full set of pairwise boundary dummies to control for unobserved neighborhood characteristics. Additionally, in response to the criticisms of the boundary discontinuity approach, we augment the estimation by controlling for a set of demographic characteristics defined at the Census-block level (as opposed to the larger block groups or tracts). Many papers that do not use the boundary discontinuity approach measure education quality at the school-district level, as opposed to considering schools individually. These studies also face the challenge of devising appropriate definitions of neighborhoods to match the geographic level at which school quality is measured. For example, Clapp, Nanda, and Ross (2008) measure school quality at the school-district level and use Census-tract fixed effects to control for omitted neighborhood characteristics. Brasington and Haurin (2006) also measure school quality at the school-district level but use spatial statistics rather than fixed effects to control for neighborhood characteristics.

To the best of our knowledge, nonlinear hedonics from school quality have been explored only by Cheshire and Sheppard (2004) in a study of primary and secondary schools in the United Kingdom. They estimate a full-sample, standard hedonic regression modified to include Box-Cox transformations of house prices, house characteristics, and measures of school quality. Their evidence suggests that the price-quality relationship is highly nonlinear. Although Cheshire and

Sheppard include a wide variety of local neighborhood characteristics as controls, their approach also suffers from the possibility of omitted variable bias present in traditional hedonic models.

A previous study of house prices in the St. Louis metropolitan area by Ridker and Henning (1967) found no evidence of education capitalization in St. Louis house prices. Although their main concern was to determine the negative effect of air pollution on housing prices, they included a dummy variable that indicated residents' attitudes about the quality of the schools (above average, average, and below average). Ridker and Henning (1967) acknowledged, however, that their study may suffer from small-sample bias that could explain this seemingly contradictory finding. Kain and Quigley (1970) also conducted an early study of the components of a hedonic price index for housing in the St. Louis metropolitan area, but it does not consider measures of school quality.

THE MODEL

In this section, we discuss three motivating hypotheses that can generate nonlinear effects from school quality on house prices. We argue that the nonlinearity with respect to school quality illustrates two aspects of the market for public education that are reflected in the housing market. Although developing a full theoretical model is beyond the scope of our paper, interested readers are referred to a previous working paper version in which we sketch a search model of the housing market in the spirit of Wheaton (1990) and Williams (1995) that can motivate these features.

Three Arguments for Nonlinear Effects

First, in an environment in which potential buyers are heterogeneous in the intensity of their preferences for school quality and neighborhood characteristics, buyers with a stronger preference for education quality may concentrate their buying search for a house in the highest-quality attendance zones. As school quality increases, competition from other buyers creates an increasingly tight housing market, because the housing supply in these areas is often very inelastic, as

most metropolitan areas have a fixed housing stock in the short run.

This argument is similar to that proposed by Hilber and Mayer (2009). They argue that scarcity of land confounds identification of the education premium. Brasington (2002) and Hilber and Mayer (2009) have also noted that the extent of capitalization in a hedonic framework may vary depending on whether houses are located near the interior or the edge of an urban area. They find that capitalization is weaker toward the edge, where housing supply elasticities and developer activity are greater.

Second, alternative schooling arrangements (e.g., private schools, home schooling, magnet schools) can provide home buyers with high-quality education even if they choose to live in lower-quality public school attendance zones, allowing for a reduced price premium in these neighborhoods. The existence of these options underlies our belief that a constant premium across the range of school quality is not realistic.

The previous two hypotheses rely on the heterogeneity of preferences for school quality and neighborhood characteristics among the population of prospective home buyers, a feature widely documented in the literature. Bayer, Ferreira, and McMillan (2007), for example, argue that there is a considerable degree of heterogeneity in homeowners' preferences for schools and racial composition of neighborhoods.

Finally, an alternative hypothesis that can generate nonlinearities is that school quality can be considered a luxury good; therefore, at higher-quality schools (and therefore richer neighborhoods), people would be willing to pay more for the same marginal increase in school quality.

The Econometric Model

We now estimate a model of house prices. Specifically, we estimate the dollar value difference in home prices for a quantified increase in school quality. We discuss three alternative specifications that include two different identification techniques to disentangle neighborhood quality from school quality.

Pure Hedonic Pricing Model. As a benchmark, we introduce a hedonic pricing equation

in which the sale price is described as a function of the characteristics of the house and its location-specific attributes, including the quality of the school associated with it. The basic hedonic function can be described as follows:

$$(1) \quad \ln(p_{iaj}) = \kappa + \mathbf{X}'_i \boldsymbol{\beta} + \mathbf{Z}'_j \boldsymbol{\delta} + \mu_a \psi^H + \varepsilon_{iaj},$$

where p_{iaj} is the price of house i in attendance zone a in neighborhood j . The vector \mathbf{X}_i represents the comparable aspects of house i (e.g., the number of bedrooms, bathrooms, and so on) and vector \mathbf{Z}_j represents local characteristics. The value μ_a is the quality of the school in attendance zone a . In this paper, we measure school quality with an index constructed from test scores, defined at the school level and expressed in standard deviations (SDs) from the mean. The quantity of interest ψ^H is the education capitalization premium and represents the percentage increment in house prices from increasing school test scores by 1 SD.

Thus, the house price reflects all relevant attributes; that is, the physical and location-specific characteristics of the home are capitalized into the house value even if they are not directly consumable by the current tenants (because of their effects on the resale value of the house).⁶ One potential problem with this specification is that the comparable house characteristics, \mathbf{X}_i , do not fully capture the quality of the house (updates, condition, landscaping, layout, and so on), the quality of the surrounding neighborhood, and various other factors. The hedonic pricing function attempts to capture these factors with the inclusion of the \mathbf{Z}_j vector. The success with which the model captures these unobserved factors often depends on how coarsely the geographic area encompassed by \mathbf{Z}_j is defined (i.e., for how small a vicinity around the house \mathbf{Z}_j provides variation).

Linear Boundary Fixed Effects Model. As discussed earlier, the methodology of adding the location characteristics vector, \mathbf{Z}_j , may reduce but not entirely account for all of the variation that can be introduced on a neighborhood level. Suppose that the neighborhood characteristics

gradient is large in absolute value. This implies that houses a few blocks away from each other can vary a great deal in “atmosphere” and, therefore, in price. This variation can be related to distance to amenities, mass transit, and thoroughfares (i.e., highway access), proximity to commercial and industrial zoning, single-family housing density, and so on. The vector \mathbf{Z}_j may be unable to account for all the unobserved neighborhood variation that confounds the estimate of the capitalization premium because of the potential correlation with school quality. Much of this variation (though admittedly not all) can be corrected for by analyzing houses that are geographically close.

The boundary discontinuities refinement considers only houses that are geographically close to school attendance zone boundaries and replaces the vector of local characteristics with a full set of pairwise boundary dummies. Each house in this reduced sample is associated with the nearest, and hence unique, attendance zone boundary. This yields the following:

$$(2) \quad \ln(p_{iab}) = \kappa + \mathbf{X}'_i \boldsymbol{\beta} + \mathbf{K}'_b \boldsymbol{\phi} + \mu_a \psi^L + \varepsilon_{iab},$$

where \mathbf{K}_b is the vector of boundary dummies and the subscript b indexes the set of boundaries. The resulting education premium calculated with the linear boundary fixed effects model is ψ^L . Equation (2), then, is equivalent to calculating differences in house prices on opposite sides of attendance boundaries while controlling for house characteristics and relating the premium to test-score information.

The boundary dummies allow us to account for unobserved neighborhood characteristics of houses on either side of an attendance boundary because two homes next to each other generally would have the same atmosphere. For this approach to be successful, particular care must be taken to exclude from the sample attendance zones whose boundaries coincide with administrative boundaries, rivers, parks, highways, or other landmarks that clearly divide neighborhoods, as neighborhood characteristics in these cases would be expected to vary discontinuously at the boundary.

⁶ For example, if the current tenants have no school-aged children.

Nonlinear Boundary Fixed Effects Models.

As an alternative to the linear model, we consider the possibility that the capitalization premium is not constant over the range of school qualities. This is accomplished by testing whether the education capitalization term enters nonlinearly. Consider the following pricing equation:

$$(3) \quad \ln(p_{iab}) = \kappa + \mathbf{X}'_i\boldsymbol{\beta} + \mathbf{K}'_b\boldsymbol{\phi} + f(\mu_a) + \varepsilon_{iab},$$

where $f(\mu_a)$ represents a potentially nonlinear function of school quality. For simplicity, suppose the function $f(\mu_a)$ is composed of a linear polynomial term and higher-order polynomial terms in school quality. That is,

$$(4) \quad f(\mu_a) = \psi_1\mu_a + \psi_2\mu_a^2 + \psi_3\mu_a^3,$$

where ψ_m , $m = 1, 2, 3$, are scalar parameters. We then rewrite equation (3) as

$$(5) \quad \ln(p_{iab}) = \kappa + \mathbf{X}'_i\boldsymbol{\beta} + \mathbf{K}'_b\boldsymbol{\phi} + \psi_1\mu_a + \psi_2\mu_a^2 + \psi_3\mu_a^3 + \varepsilon_{iab}.$$

Specification (5) offers several advantages over the linear form (equation (2)). First, the rate at which the nominal premium varies across the range of school quality is not fixed. This allows us to differentiate the incremental effects on house prices of low- versus high-quality school attendance zones. Second, with a constant premium the linear model *penalizes* houses in low-quality school attendance zones by valuing them below what would be predicted by their comparable attributes.⁷ Moreover, the penalty increases as the school quality worsens. This scenario is unappealing because, as mentioned before, potential buyers who value education quality often can find substitute arrangements outside the public school system. Our prediction is that houses in lower-quality attendance zones command a smaller premium; in other words, the price function should be flatter for areas with lower test scores and steeper for those with higher test scores. This possibility is explicitly excluded in the linear model.

⁷ We adopt the convention that an increase in school quality induces a *premium* on house prices, whereas a decrease in school quality imposes a *penalty* on house prices.

A Note on the Estimation. We estimated regression equations (1), (2), and (5) with ordinary least squares. In all cases, we computed robust standard errors (SEs) clustered at the school level. For completeness, the “Results” section also presents the estimation of the nonlinear models using the full sample. We included boundary dummies in the regression equation and estimated the coefficients for these variables directly.

In an attempt to reduce any remaining bias from omitted characteristics, some recent studies, such as that by Bayer, Ferreira, and McMillan (2007), have supplemented their analysis by including demographic controls in the regressions. We therefore present results of the boundary fixed effects regressions in which the vector \mathbf{Z}_i of neighborhood characteristics has been reinserted in the estimation. In particular, we control for the racial composition of neighborhoods. Studies that specifically consider the racial composition of neighborhoods include those by Bogart and Cromwell (2000), Downes and Zabel (2002), Cheshire and Sheppard (2004), Kane, Staiger, and Riegg (2005), Reback (2005), Clapp, Nanda, and Ross (2007), and Bayer, Ferreira, and McMillan (2007).

DATA

In this analysis, we restrict our attention to single-family residences and elementary school attendance zones. Each observation corresponds to a house and is described by variables reflecting its physical characteristics, the quality of the local public elementary school that children in the household would attend, and the characteristics of the neighborhood in which the house is located—namely, demographic indicators measured at the Census-block level and property tax rates measured at the school-district level.

Real Estate Prices and Housing Characteristics

We obtained house price and house characteristics data from First American Real Estate Solutions. The observations selected correspond to a cross section of single-family residences sold during the 1998-2001 period in the St. Louis,

Missouri, metropolitan area. The data are from transactions as recorded in county property records. After eliminating from the original dataset observations with missing or outlier house prices (outside a bound of 3.5 SDs from the mean unadjusted house price), our sample includes 38,656 single-family residences.

We deflated house prices to 1998 dollars with the Office of Federal Housing Enterprise Oversight repeat-sales price index for the entire St. Louis metropolitan area.⁸ In the full sample the resulting adjusted house price has a mean of \$148,082 and an SD of \$161,397. House characteristics include the total number of rooms, number of bedrooms, number of bathrooms, lot size, internal square footage, age of the structure, and number of stories in the house.

Attendance Zones

For the boundary discontinuity analysis, we obtained the definitions of 121 attendance zones for elementary schools in 15 school districts in St. Louis County. Most of these were obtained by contacting the school districts directly. Boundaries were variously provided as listings of streets, maps, and in some isolated cases as geocoded files. We, in turn, geocoded all the attendance zones and determined the boundary for every pair of adjacent schools, as in Black's paper (1999). We also geocoded each house in our sample using the street address. We then selected houses within a 0.1-mile buffer of the boundaries and assigned them to the nearest (and therefore unique) pairwise boundary.⁹ We also eliminated from the boundary sample observations in St. Louis County that were associated with the boundaries of St. Louis City schools because the City property records contained no house price information. The final boundary sample consisted of 10,190 single-family residences.

⁸ House prices were deflated using the average price index corresponding to the quarter of the sale. The results were qualitatively unaffected if the National Association of Realtors price index was used instead.

⁹ Black considers a number of different boundary width ranges and finds no significant differences. Our sample does not permit wider boundaries as these would encompass some attendance zones almost entirely.

Neighborhood Characteristics

Houses were also matched to Census blocks as the geographic unit at which we measured neighborhood demographics. We used the publicly available population tables at the block level from the Census 2000 Summary File 1, which includes counts by age, sex, and race, to construct the following measures: percent of females, percent of school-aged children (between 5 and 14 years of age), and percent of nonwhite population (defined as the total population count minus the count of white people).¹⁰

Additionally, we include as neighborhood controls the property tax rates defined at the school-district level for the years 1998 through 2001. In this case, each house was matched to the tax rate prevailing during the year of sale in its associated school district.¹¹ Table 1 presents summary statistics for house prices and characteristics with neighborhood characteristics for both the full and boundary samples.

Test Scores

As the measure of school quality, we use a school-level index generated by the Missouri Department of Elementary and Secondary Education. This index is computed from test score data from the Missouri Assessment Program (MAP); annual MAP testing is a statewide mandate for public schools. The MAP test includes a *Mathematics* section, a *Communication Arts* section (which includes a *Reading* portion), a *Science* section, and a *Social Studies* section.

Neither individual student scores nor school-level averages of these scores are publicly available. Instead, for each content area, the publicly available data provide the overall school-level MAP index. This index is obtained with a state-defined formula as the weighted sum of the percentages of students in each of five performance categories (Advanced, Proficient, Nearing

¹⁰ Our choice of demographic variables was limited by the availability of information at the block level in the public data files. Alternative measures such as median household income or share of households with a female head of household are not available at the block level.

¹¹ The analysis was not affected qualitatively if an average over the period was used instead.

Table 1**Summary Statistics (House and Neighborhood Characteristics)**

House variables	Full sample (N = 38,656)		Boundary sample (N = 10,190)	
	Mean	SD	Mean	SD
Sale price (1998 US\$)	148,081.67	161,397.24	142,033.42	176,191.20
Log of sale price	11.62	0.73	11.56	0.75
Number of bedrooms	2.96	0.84	2.9	0.84
Number of bathrooms	2.01	0.95	1.95	0.93
Number of bathrooms (squared)	4.97	5.05	4.66	5.04
Age of building	38.91	20.63	40.72	21.27
Age of building (squared)	1,939.38	1,922.87	2,110.15	2,028.41
Lot area (1,000s of sq. ft.)	14.75	38.35	13.61	39.20
Living area (1,000s of sq. ft.)	1.16	0.44	1.13	0.42
Number of stories	1.24	0.42	1.23	0.41
Total number of rooms	6.38	1.6	6.26	1.57

Census variables	Full sample (N = 6,360 blocks)		Boundary sample (N = 2,560 blocks)	
	Mean	SD	Mean	SD
Percent female population	51.17	11.22	51.34	11.33
Percent nonwhite population	20.43	29.29	22.42	30.67
Percent population 5 to 14 years of age	9.34	9.58	9.98	9.38

Table 2**Summary Statistics (Test Scores and Property Tax)**

Variable	Mean	SD	Minimum	Maximum
Test scores (N = 121 schools)				
Math MAP score	211.45	19.44	168.14	250.18
Science MAP score	211.88	22.56	100.00	242.61
Reading MAP score	200.73	20.15	100.00	228.94
Property tax (N = 15 school districts)				
Property tax rate (\$1/\$1,000 of assessed house value)	4.23	0.91	2.60	5.74

Table 3
Correlation Table

Variable	Log house price	Math score	Math score (squared)	Math score (cubed)	Number of bedrooms	Number of bathrooms	Number of bathrooms (squared)	Age of building	Age of building (squared)	Lot area (1,000s of sq. ft.)	Living area (1,000s of sq. ft.)	Number of stories	Number of rooms	Census block: Percent female	Census block: Percent nonwhite	Census block: Percent people 5 to 14 years of age	Property tax rate
Log house price	1.00																
Math score	0.66	1.00															
Math score (squared)	-0.14	-0.35	1.00														
Math score (cubed)	0.50	0.87	-0.44	1.00													
Number of bedrooms	0.57	0.34	-0.09	0.25	1.00												
Number of bathrooms	0.68	0.50	-0.07	0.37	0.64	1.00											
Number of bathrooms (squared)	0.63	0.43	-0.01	0.32	0.58	0.94	1.00										
Age of building	-0.32	-0.38	0.17	-0.27	-0.29	-0.48	-0.39	1.00									
Age of building (squared)	-0.21	-0.29	0.16	-0.21	-0.21	-0.36	-0.28	0.94	1.00								
Lot area (1,000s of sq. ft.)	0.23	0.13	0.02	0.10	0.14	0.17	0.19	-0.03	-0.01	1.00							
Living area (1,000s of sq. ft.)	0.51	0.36	-0.04	0.26	0.39	0.45	0.43	-0.30	-0.27	0.20	1.00						
Number of stories	0.46	0.31	-0.02	0.22	0.47	0.56	0.52	-0.21	-0.07	0.06	-0.13	1.00					
Number of rooms	0.65	0.37	-0.04	0.26	0.82	0.71	0.67	-0.22	-0.14	-0.18	0.47	0.49	1.00				
Census block: Percent female	-0.11	-0.09	0.05	-0.07	0.11	-0.09	-0.08	0.04	0.02	-0.07	-0.08	-0.04	-0.11	1.00			
Census block: Percent nonwhite	-0.49	-0.69	0.48	-0.60	-0.25	-0.35	-0.28	0.30	0.24	-0.09	-0.24	-0.21	-0.26	0.16	1.00		
Census block: Percent people 5-14 yrs. of age	0.01	-0.07	0.12	-0.07	0.14	0.08	0.08	-0.13	-0.09	0.02	0.03	0.09	0.11	0.04	0.17	1.00	
Property tax rate	-0.47	-0.68	0.26	-0.56	-0.20	-0.35	-0.29	0.27	0.25	-0.07	-0.29	-0.14	-0.22	0.05	0.56	0.14	1.00

Table 4
Education Regressions: Full Sample

Variable	Log house price		
	(1)	(2)	(3)
Math score	0.21734*** (7.79)	0.22192*** (7.13)	0.31693*** (7.70)
Math score (squared)		0.03002 (1.48)	0.01555 (0.76)
Math score (cubed)			-0.03606** (-2.60)
Number of bedrooms	0.01062 (1.09)	0.01502 (1.52)	0.01575 (1.62)
Number of bathrooms	0.14086*** (4.75)	0.14413*** (4.93)	0.13458*** (4.44)
Number of bathrooms (squared)	-0.00612 (-1.14)	-0.00740 (-1.37)	-0.00501 (-0.89)
Age of building	0.00065 (0.37)	0.00057 (0.31)	0.00123 (0.67)
Age of building (squared)	0.00002 (1.35)	0.00002 (1.31)	0.00002 (1.03)
Lot area (1,000s of sq. ft.)	0.00123*** (4.21)	0.00120*** (4.27)	0.00119*** (4.17)
Living area (1,000s of sq. ft.)	0.45365*** (20.02)	0.44475*** (17.35)	0.43526*** (19.05)
Number of stories	0.39693*** (11.29)	0.38775*** (10.58)	0.37835*** (10.87)
Number of rooms	0.07484*** (10.10)	0.07421*** (10.21)	0.07245*** (10.11)
Census block: Percent female	-0.00061 (-0.88)	-0.00050 (-0.73)	-0.00053 (-0.79)
Census block: Percent nonwhite	-0.00221*** (-3.62)	0.00277*** (5.06)	-0.00257*** (-4.57)
Census block: Percent people 5 to 14 years of age	-0.00017 (-0.19)	-0.00033 (-0.38)	-0.00021 (-0.24)
Property tax rate	-0.04636 (-1.65)	-0.04457 (-1.51)	-0.03562 (-1.28)
Constant	10.00143*** (59.89)	9.99065*** (57.55)	9.96337*** (58.13)
<i>N</i>	38,656	38,656	38,656
<i>R</i> ²	0.697	0.699	0.702
Adjusted <i>R</i> ²	0.697	0.698	0.702

NOTE: *t*-Statistics are listed in parentheses. ***Significant at the 1 percent level.

Proficient, Progressing, and Step 1). The formula is MAP index = (percent in Step 1) \times 1 + (percent in Progressing) \times 1.5 + (percent in Nearing Proficient) \times 2 + (percent in Proficient) \times 2.5 + (percent in Advanced) \times 3. The weights are exogenously determined by the Missouri Department of Elementary and Secondary Education.¹²

For our study we chose the math MAP index for elementary schools only (fourth grade) as our measure of school quality.¹³ This measure was then averaged over the 1998-2001 period to remove any year-to-year noise in the component variables (as in Bayer, Ferreira, and McMillan, 2007). Because our housing data are essentially cross sectional, this procedure provides one consistent score for each school in the sample.

Table 2 presents summary statistics for MAP indices along with property tax rates among the schools and school districts included in the sample. Table 3 presents the correlation matrix for the variables used in the analysis.

EMPIRICAL RESULTS

Standard Hedonic Regression

Table 4 presents the regression results using the full sample, which includes neighborhood demographic controls but excludes the boundary fixed effects. In addition to the traditional linear model, we include the quadratic and cubic specifications in test scores for completeness.

The housing characteristics enter the pricing equation with the expected sign. Increases in living area, lot size, and the total number of rooms increase the price of a house on average. Similarly, the number of bathrooms and the number of stories have a positive and statistically significant effect. The number of bedrooms, the number of bathrooms squared, the age of the building, and

its square do not seem to have a statistically significant effect in the full sample.

Among the neighborhood demographics only the percent of the nonwhite population (measured at the block level) is capitalized into house prices with a negative and statistically significant effect. The estimated coefficients indicate that an increase of 1 percentage point in the proportion of the nonwhite population decreases house prices by about 22 (in the linear model) to 27 (in the quadratic model) basis points. The property tax rate does not have a statistically significant effect.

As expected, the regressions illustrate a strong relationship between school quality and house prices. The coefficient of 0.21734 in the traditional linear model (column 1) reveals that an increase in school test scores of a half SD results in a house premium of about 11 percent ($0.21734/2 = 10.867$ percent) or about \$16,000 at the mean price. A half-SD increase is equivalent to an increase of 4.6 percent in the math MAP index.

The quadratic and cubic models in columns 2 and 3 of Table 4, respectively, also indicate a large and positive linear coefficient of school quality on house prices. The coefficient for the square of the math score is, however, not statistically significant in columns 2 and 3. Interestingly, the cubic coefficient in column 3 is statistically significant, but it enters with a negative sign, which indicates that the house price premium does not monotonically increase over the range of school quality. In any case, these models suggest that nonlinearities are relevant. This is confirmed by a battery of Wald specification tests (Table 5). These tests reject the null hypothesis of a model with a constant education premium. We find that the restriction of not including a quadratic or cubic term ($\psi_2 = \psi_3 = 0$) is rejected at the 1 percent level, while not including a cubic term ($\psi_3 = 0$) is rejected at the 5 percent level. However, the restriction of no quadratic term ($\psi_2 = 0$) is not rejected. Thus, the evidence indicates that the preferred specification for the education premium in the full sample is the cubic model.

Boundary Discontinuity Models

Table 6 presents the results for the restricted boundary sample (omitting the estimated coeffi-

¹² This formula was updated in 2007 when the number of performance categories was reduced to four.

¹³ We consider the math score to be a measure of school quality superior to the reading or science measures. First, the math scores are arguably the most objective measure. Second, the distribution of the school math MAP index among the schools was contained almost entirely within 2 SDs of the mean. In contrast, the reading and science indices contained a large number of outliers, particularly in the lower tail. We did not consider the social sciences scores.

Table 5
Specification Tests: Full Sample with Neighborhood Controls

	Premium Model $f(Y) = \psi_1 Y + \psi_2 Y^2 + \psi_3 Y^3$		
	Linear	Quadratic	Cubic
Null hypothesis	$\psi_1 = 0$	$\psi_1 = \psi_2 = 0$	$\psi_1 = \psi_2 = \psi_3 = 0$
Wald <i>F</i> -statistic	60.757***	27.686***	30.665***
Null hypothesis		$\psi_2 = 0$	$\psi_2 = \psi_3 = 0$
Wald <i>F</i> -statistic		2.192	7.446***
Null hypothesis			$\psi_3 = 0$
Wald <i>F</i> -statistic			6.754**

NOTE: **Significant at the 5 percent level; ***significant at the 1 percent level.

coefficients for the boundary fixed effects). As in the full sample, house characteristics are statistically significant and with the expected sign. In contrast to the full sample results, the age of the building and its square, along with the square of the number of bathrooms, are statistically significant. Compared with the full sample results, the estimated coefficients for house characteristics are smaller in magnitude but very stable across specifications.

In the linear model in column 1, school quality is a statistically significant contributor to house prices and enters with the expected positive sign. Compared with the results from the full sample regression, the estimated coefficient declines in magnitude by a factor of about four. The estimate of the education premium implies that a half-SD increase (equivalent to an increase of 4.6 percent) in the average school score leads to an increase of about 3.2 percent in house prices, or about \$4,766 evaluated at the full sample mean price. This value is only slightly higher than that estimated by Black (1999). She reports a 2.1 percent increase (or \$3,948 at her sample mean) in house prices for a 5 percent increase in test scores.

The two specifications of the nonlinear boundary fixed effects models in columns 2 and 3 indicate that the quadratic coefficient of school quality is statistically significant, but the cubic coefficient is not. The positive sign of the quadratic coefficient indicates that the capitalization effect

of school quality is increasing over the range of test scores.

Specifications 1, 2, and 3 do not include additional controls for neighborhood quality other than the boundary fixed effects. As mentioned previously, some authors have raised concerns about whether the boundary discontinuity approach fails to control for omitted neighborhood characteristics and suggest that explicit additional controls be included in the estimation. We therefore include the same demographic controls as in the full sample regression—namely, the percent of female population, the percent of nonwhite population, and the percent of school-aged children, all measured at the block level. We also include the school-district property tax rate.

Columns 4, 5, and 6 in Table 6 show that these additional variables are directly capitalized into house prices. The percent of the nonwhite population is statistically significant and enters with a negative sign as in the full sample results. The magnitude of the effect is similar to the full sample results and indicates a decline of about 22 basis points in house prices for a 1-percentage-point increase in the proportion of the nonwhite population. We interpret the significance of this variable, as in other papers, as evidence of preferences about the racial composition of neighborhoods.

In contrast to the full sample results, the percent of school-aged children is statistically significant and indicates an increase in house prices of about 15 basis points for a 1-percentage-point

Table 6**Education Regressions: Restricted Boundary Sample**

Variable	Log-adjusted price					
	(1)	(2)	(3)	(4)	(5)	(6)
Math score	0.06437** (2.58)	0.06274*** (2.90)	0.04659 (1.64)	0.03227* (1.78)	0.03579* (1.93)	0.03172 (1.20)
Math score (squared)		0.02656** (2.47)	0.02909** (2.47)		0.02209** (2.48)	0.02284** (2.40)
Math score (cubed)			0.00514 (0.73)			0.00137 (0.21)
Number of bedrooms	0.03726*** (3.88)	0.03730*** (3.89)	0.03749*** (3.90)	0.03816*** (4.02)	0.03805*** (4.01)	0.03809*** (4.00)
Number of bathrooms	0.10834*** (5.78)	0.10785*** (5.80)	0.10792*** (5.82)	0.10349*** (5.81)	0.10318*** (5.82)	0.10320*** (5.83)
Number of bathrooms (squared)	-0.00529* (-1.68)	-0.00533* (-1.70)	-0.00535* (-1.71)	-0.00488 (-1.58)	-0.00491 (-1.60)	-0.00491 (-1.60)
Age of building	-0.00408*** (-2.73)	-0.00411*** (-2.75)	-0.00412*** (-2.76)	-0.00453*** (-3.11)	-0.00454*** (-3.13)	-0.00454*** (-3.14)
Age of building (squared)	0.00004*** (2.89)	0.00004*** (2.91)	0.00004*** (2.92)	0.00004*** (3.15)	0.00004*** (3.16)	0.00004*** (3.17)
Lot area (1,000s of sq. ft.)	0.00089** (2.41)	0.00089** (2.41)	0.00089** (2.41)	0.00088** (2.39)	0.00088** (2.40)	0.00088** (2.39)
Living area (1,000s of sq. ft.)	0.35315*** (15.43)	0.35228*** (15.29)	0.35236*** (15.29)	0.34332*** (15.52)	0.34297*** (15.49)	0.34301*** (15.49)
Number of stories	0.27574*** (9.30)	0.27559*** (9.30)	0.27558*** (9.31)	0.26621*** (9.55)	0.26625*** (9.57)	0.26626*** (9.57)
Number of rooms	0.05974*** (7.38)	0.05952*** (7.33)	0.05945*** (7.31)	0.05902*** (7.43)	0.05893*** (7.40)	0.05891*** (7.39)
Census block: Percent female				-0.00044 (-0.66)	-0.00039 (-0.59)	-0.00039 (-0.59)
Census block: Percent nonwhite				-0.00219*** (-3.50)	-0.00223*** (-3.56)	-0.00222*** (-3.55)
Census block: Percent people 5 to 14 years of age				0.00154** (2.25)	0.00153** (2.24)	0.00154** (2.25)
Property tax rate				-0.06787*** (-3.21)	-0.05526*** (-2.88)	-0.05465*** (-2.73)
Constant	11.13260*** (32.85)	11.12998*** (32.96)	11.13935*** (32.97)	8.86314*** (59.31)	8.72871*** (62.61)	8.72454*** (60.54)
<i>N</i>	10,190	10,190	10,190	10,182	10,182	10,182
<i>R</i> ²	0.769	0.77	0.77	0.772	0.772	0.772
Adjusted <i>R</i> ²	0.763	0.763	0.763	0.766	0.766	0.766
Boundary fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

NOTE: *t*-Statistics are listed in parentheses. *Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

Table 7**Specification Tests: Boundary Sample**

	Premium Model $f(Y) = \psi_1 Y + \psi_2 Y^2 + \psi_3 Y^3$		
	Linear	Quadratic	Cubic
Without neighborhood controls			
Null hypothesis	$\psi_1 = 0$	$\psi_1 = \psi_2 = 0$	$\psi_1 = \psi_2 = \psi_3 = 0$
Wald F -statistic	6.632**	4.658**	3.130**
Null hypothesis		$\psi_2 = 0$	$\psi_2 = \psi_3 = 0$
Wald F -statistic		6.115**	3.114**
Null hypothesis			$\psi_3 = 0$
Wald F -statistic			0.527
With neighborhood controls			
Null hypothesis	$\psi_1 = 0$	$\psi_1 = \psi_2 = 0$	$\psi_1 = \psi_2 = \psi_3 = 0$
Wald F -statistic	3.178*	3.581**	2.381*
Null hypothesis		$\psi_2 = 0$	$\psi_2 = \psi_3 = 0$
Wald F -statistic		6.166**	3.102**
Null hypothesis			$\psi_3 = 0$
Wald F -statistic			0.043

NOTE: **Significant at the 5 percent level; ***significant at the 1 percent level.

increase in the proportion of children between 5 and 14 years of age. The property tax rate is also statistically significant and enters with a negative sign.

The inclusion of explicit neighborhood controls does not affect the magnitude of the coefficients of the housing characteristics, but it decreases the magnitude of the linear test score coefficient by almost half. The quadratic coefficient declines only slightly. The linear coefficient on school quality remains, nevertheless, statistically significant, and the results suggest that the magnitude of the effect of school quality on house prices remains substantially large.

Wald specification tests (Table 7) confirm that, with or without the inclusion of additional neighborhood controls, the preferred specification is the quadratic model. These tests also reject, as in the full sample regressions, the null hypothesis of a model with a constant education premium. We find that the restriction of not including a quadratic or cubic term ($\psi_2 = \psi_3 = 0$) is rejected at the 5 percent level. However, the restriction of no cubic term ($\psi_3 = 0$) is not rejected.

Implicit Housing Premia

Figure 1 illustrates the preferred specification for the house pricing function with the more conservative model with boundary fixed effects resulting from the inclusion of additional neighborhood controls. The plot includes 1-SE bands.¹⁴ We argued earlier that competition in the housing market generates increasing tightness in areas associated with higher school quality, but that competition is not as prevalent in areas associated with lower school quality. The pricing function in Figure 1 confirms our argument.

The premium from school quality on housing prices is better illustrated in Figure 2. This figure is constructed from the pricing function of specification 5 in Table 6 and represents the percentage increase in house prices in response to a half-SD increase in math test scores plotted

¹⁴ The asymptotic variance of the price function was computed using the delta method as

$$\text{AsyVar}(f(\mu; \beta)) = \frac{\partial f(\mu; \beta)}{\partial \beta'} \text{AsyVar}(\beta) \left(\frac{\partial f(\mu; \beta)}{\partial \beta'} \right)'$$

Figure 1

Implied Price Function (with Neighborhood Controls)

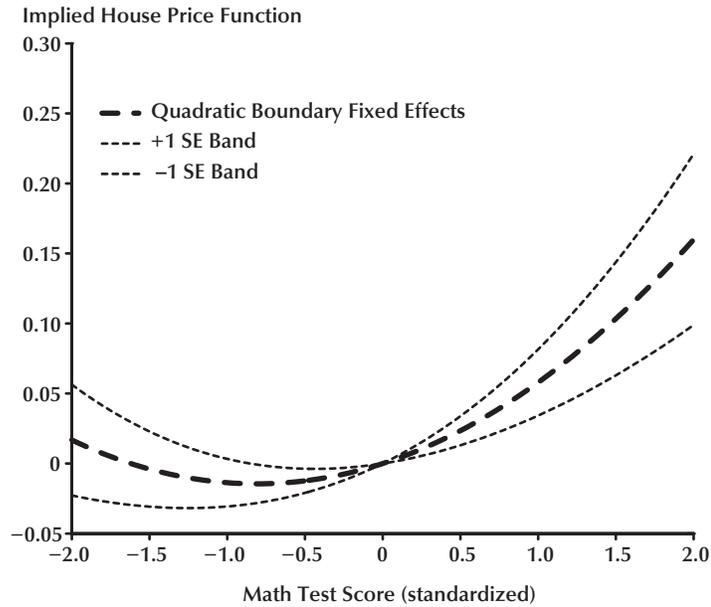
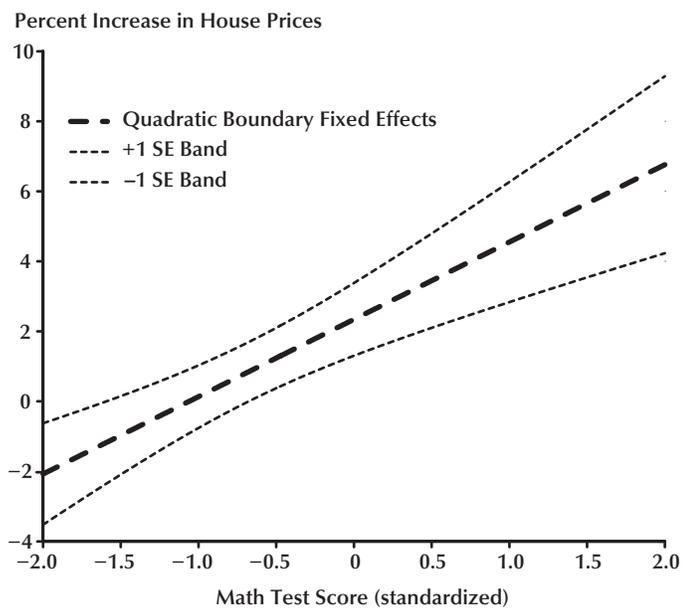


Figure 2

Implied Premium Function (with Neighborhood Controls)



NOTE: The plots show the response to a half-SD increase in math test scores.

Table 8
Implied House Price Premia from School Quality

Regression model	Full sample with neighborhood controls			Boundary sample					
				Without neighborhood controls			With neighborhood controls		
Linear coefficient	0.21734	0.22192	0.31693	0.06437	0.06274	0.04659	0.03227	0.03579	0.03172
Quadratic coefficient	—	0.03002	0.01555	—	0.02656	0.02909	—	0.02209	0.02284
Cubic coefficient	—	—	-0.03606	—	—	0.00514	—	—	0.00137
Case 1 (mean score minus 1 SD)									
Percent increase in house price	10.87	8.84	11.53	3.22	1.15	0.6	1.61	0.13	-0.01
Dollar value at mean (full sample)	16,092	13,097	17,066	4,766	1,696	885	2,389	197	-11
Dollar value at mean (boundary sample)	15,435	12,562	16,369	4,571	1,626	849	2,292	189	-10
Case 2 (mean score)									
Percent increase in house price	10.87	11.85	15.78	3.22	3.80	3.12	1.61	2.34	2.17
Dollar value at mean (full sample)	16,092	17,542	23,374	4,766	5,629	4,622	2,389	3,468	3,219
Dollar value at mean (boundary sample)	15,435	16,826	22,419	4,571	5,399	4,433	2,292	3,326	3,088
Case 3 (mean score plus 1 SD)									
Percent increase in house price	10.87	14.85	9.23	3.22	6.46	7.19	1.61	4.55	4.77
Dollar value at mean (full sample)	16,092	21,988	13,662	4,766	9,562	10,642	2,389	6,739	7,058
Dollar value at mean (boundary sample)	15,435	21,090	13,104	4,571	9,171	10,207	2,292	6,464	6,770

NOTE: The table presents the premium in house prices evaluated at different math scores resulting from a change in math score of 0.5 SD (equivalent to 4.6 percent of the mean score). The premium is computed from the logarithm specification $\Delta p/p = \Delta \ln(p) = \Delta f(\mu)$, so the percent change in house prices is given by $\Delta f(\mu) = f(\mu_1) - f(\mu_0)$ and the premium at the mean price is $\Delta f(\mu) \times \bar{p}$.

along the range of school scores within 2 SDs of the mean.

The plotted function reveals a monotonically increasing premium across the spectrum of school quality. The plot indicates that, even with the most conservative estimates, the premium for houses in areas associated with high-quality schools remains substantially large. The plot also reveals a much smaller premium for houses in areas associated with low-quality schools, where house prices seem to be driven almost entirely by housing and neighborhood characteristics other than public school quality.

Table 8 summarizes the implied school quality premia from school quality for all models and provides the dollar equivalent of the implied percentage increase in house prices relative to the mean house prices in the full and boundary samples that results from a half-SD increase in test scores.

The linear model with the full sample regression results in a constant premium of 10.87 percent or about \$16,000 at the mean house price. The cubic model in the full sample, which the specification tests suggest is the preferred model, illustrates a nonmonotonic premium that ranges from 11.53 percent for houses in areas where school quality is 1 SD below the mean to 15.78 percent in areas where school quality coincides with the average, and finally to 9.23 percent in areas where school quality is 1 SD above the mean.

The boundary sample models with and without additional neighborhood controls indicate that the premium is severely overestimated in the traditional hedonic regressions, even accounting for nonlinearities. Nevertheless, even in the most conservative estimates, the premium remains substantially large, especially for areas associated with very high-quality schools. Table 8 also shows two characteristics in the quadratic equation—the middle column of the third panel: The premium is very small in areas where test scores are 1 SD below the mean (about 0.13 percent or less than \$200) and monotonically increases in areas with higher test scores (about 2.34 percent or \$3,468 in areas with average test scores [Case 2] and 4.55 percent or \$6,739 in areas with test scores 1 SD above the mean [Case 3]).

CONCLUSION

Traditional empirical models of the capitalization of education quality on house prices have established that the quality of primary school education is positively correlated with house prices. Recent capitalization studies have used various approaches to address concerns about omitted variable bias induced by failing to account for the correlation between school quality and unobserved neighborhood characteristics. Most of these variations on the traditional hedonic approach (including the boundary discontinuity regression) have assumed that the house price premium is constant because in all these models the contribution from school quality on house prices is constrained to be linear.

In this paper, we propose an alternative formulation that allows for nonlinear effects of school quality. We show that this formulation is preferred by the data over a baseline linear boundary fixed effects model and that the rate at which the house price premium rises increases over the range of school quality. In other words, the standard linear specification for test scores overestimates the premium at low levels of school quality and underestimates the premium at high levels of school quality.

In the St. Louis metropolitan area, houses associated with a school ranked at 1 SD below the mean are essentially priced on physical characteristics only. In contrast, houses associated with higher-quality schools command a much higher price premium.

Interestingly, and in contrast to many studies in the literature, the price premium remains substantially large, especially for houses associated with above-average schools. This is true even in our most conservative estimates, which complement the boundary discontinuity approach by explicitly controlling for neighborhood demographics. These estimates also reveal that the racial composition of neighborhoods is capitalized directly into house prices.

REFERENCES

- Bayer, Patrick; Ferreira, Fernando and McMillan, Robert. "A Unified Framework for Measuring Preferences for Schools and Neighborhoods." *Journal of Political Economy*, August 2007, 115(4), pp. 588-638.
- Black, Sandra E. "Do Better Schools Matter? Parental Valuation of Elementary Education." *Quarterly Journal of Economics*, May 1999, 114(2), pp. 577-99.
- Bogart, William T. and Cromwell, Brian A. "How Much More Is a Good School District Worth?" *National Tax Journal*, June 1997, 50(2), pp. 215-32.
- Bogart, William T. and Cromwell, Brian A. "How Much Is a Neighborhood School Worth?" *Journal of Urban Economics*, March 2000, 47(2), pp. 280-305.
- Brasington, David. "Which Measures of School Quality Does the Housing Market Value?" *Journal of Real Estate Research*, 1999, 18(3), pp. 395-413.
- Brasington, David. "Edge Versus Center: Finding Common Ground in the Capitalization Debate." *Journal of Urban Economics*, November 2002, 52(3), pp. 524-41.
- Brasington, David and Haurin, Donald R. "Educational Outcomes and House Values: A Test of the Value Added Approach." *Journal of Regional Science*, May 2006, 46(2), pp. 245-68.
- Cheshire, Paul and Sheppard, Stephen. "The Welfare Economics of Land Use Planning." *Journal of Urban Economics*, September 2002, 52(2), pp. 242-69.
- Cheshire, Paul and Sheppard, Stephen. "Capitalising the Value of Free Schools: The Impact of Supply Characteristics and Uncertainty." *Economic Journal*, November 2004, 114(499), pp. F397-F424.
- Clapp, John M.; Nanda, Anupam and Ross, Stephen L. "Which School Attributes Matter? The Influence of School District Performance and Demographic Composition of Property Values." *Journal of Urban Economics*, March 2008, 63(2), pp. 451-66.
- Cushing, Brian J. "Capitalization of Interjurisdictional Fiscal Differentials: An Alternative Approach." *Journal of Urban Economics*, May 1984, 15(3), pp. 317-26.
- Davidoff, Ian and Leigh, Andrew. "How Much Do Public Schools Really Cost? Estimating the Relationship Between House Prices and School Quality." Discussion Paper No. 558, Australian National University, Centre for Economic Policy Research, July 2007.
- Downes, Thomas A. and Zabel, Jeffrey E. "The Impact of School Characteristics on House Prices: Chicago 1987-1991." *Journal of Urban Economics*, July 2002, 52(1), pp. 1-25.
- Fack, Gabrielle and Grenet, Julien. "Do Better Schools Raise Housing Prices? Evidence from Paris School Zoning." Unpublished manuscript, Paris École Normale Supérieure, October 2007.
- Figlio, David N. and Lucas, Maurice E. "What's in a Grade? School Report Cards and House Prices." *American Economic Review*, June 2004, 94(3), pp. 591-604.
- Gibbons, Stephen and Machin, Stephen. "Valuing English Primary Schools." *Journal of Urban Economics*, March 2003, 53(2), pp. 197-219.
- Gibbons, Stephen and Machin, Stephen. "Paying for Primary Schools: Admission Constraints, School Popularity, or Congestion?" *Economic Journal*, March 2006, 116(510), pp. C77-C92.
- Gibbons, Stephen and Machin, Stephen. "Valuing School Quality, Better Transport, and Lower Crime: Evidence from House Prices." *Oxford Review of Economic Policy*, Spring 2008, 24(1), pp. 99-119.
- Gill, H. Leroy. "Changes in City and Suburban House Prices During a Period of Expected School Desegregation." *Southern Economic Journal*, July 1983, 50(1), pp. 169-84.

- Hanushek, Eric A. "The Economics of Schooling: Production and Efficiency in Public Schools." *Journal of Economic Literature*, September 1986, 24(3), pp. 1141-77.
- Hanushek, Eric A. "Assessing the Effects of School Resources on Student Performance: An Update." *Educational Evaluation and Policy Analysis*, Summer 1997, 19(2), pp. 141-64.
- Haurin, Donald R. and Brasington, David. "School Quality and Real House Prices: Inter- and Intrametropolitan Effects." *Journal of Housing Economics*, December 1996, 5(4), pp. 351-68.
- Hayes, Kathy J. and Taylor, Lori L. "Neighborhood School Characteristics: What Signals Quality to Homebuyers?" Federal Reserve Bank of Dallas *Economic Review*, Fourth Quarter 1996, pp. 2-9; www.dallasfed.org/research/er/1996/er9604a.pdf.
- Hilber, Christian A.L. and Mayer, Christopher J. "Why Do Households Without Children Support Local Public Schools? Linking House Price Capitalization to School Spending." *Journal of Urban Economics*, January 2009, 65(1), pp. 74-90.
- Imbens, Guido W. and Lemieux, Thomas. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics*, 2008, 142(2), pp. 615-35.
- Kain, John F. and Quigley, John M. "Evaluating the Quality of the Residential Environment." *Environment and Planning*, 1970, 2(1), pp. 23-32.
- Kane, Thomas J.; Staiger, Douglas O. and Reigg, Stephanie K. "Changing School Assignments and Housing Values." Working paper, UCLA Department of Policy Studies, 2003.
- Kane, Thomas J.; Staiger, Douglas O. and Reigg, Stephanie K. "School Quality, Neighborhoods and Housing Prices: The Impacts of School Desegregation." NBER Working Paper No. 11347, National Bureau of Economic Research, May 2005; www.nber.org/papers/w11347.pdf.
- Kane, Thomas J.; Staiger, Douglas O. and Samms, Gavin. "School Accountability Ratings and Housing Values," in William Gale and Janet Pack, eds., *Brookings-Wharton Papers on Urban Affairs*. Washington, DC: Brookings Institution, 2003, pp. 83-137.
- Leech, Dennis and Campos, Erick. "Is Comprehensive Education Really Free? A Case-Study of the Effects of Secondary School Admissions Policies on House Prices in One Local Area." *Journal of the Royal Statistical Society Series A*, 2003, 166(1), pp. 135-54.
- Oates, Wallace E. "The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis." *Journal of Political Economy*, November/December 1969, 77(6), pp. 957-71.
- Reback, Randall. "House Prices and the Provision of Local Public Services: Capitalization Under School Choice Programs." *Journal of Urban Economics*, March 2005, 57(2), pp. 275-301.
- Ridker, Ronald G. and Henning, John A. "The Determinants of Residential Property Values with Special Reference to Air Pollution." *Review of Economics and Statistics*, May 1967, 49(2), pp. 246-57.
- Rosen, Sherwin. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." *Journal of Political Economy*, January/February 1974, 82(1), pp. 34-55.
- Rosenthal, Leslie. "The Value of Secondary School Quality." *Oxford Bulletin of Economics and Statistics*, July 2003, 65(3), pp. 329-55.
- Ross, Stephen and Yinger, John. "Sorting and Voting: A Review of the Literature on Urban Public Finance," in Paul Cheshire and Edwin Mills, eds., *Handbook of Regional and Urban Economics. Volume 3: Applied Urban Economics*. Chap. 47. Amsterdam: North Holland, 1999, pp. 2003-060.

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- Sheppard, Stephen. "Hedonic Analysis of Housing Markets," in Paul Cheshire and Edwin Mills, eds., *Handbook of Regional and Urban Economics. Volume 3: Applied Urban Economics*. Chap. 41. Amsterdam: North Holland, 1999, pp. 1595-635.
- Thorsnes, Paul and Reifel, John W. "Tiebout Dynamics: Neighborhood Response to a Central-City/Suburban House-Price Differential." *Journal of Regional Science*, October 2007, 47(4), pp. 693-719.
- Tiebout, Charles M. "A Pure Theory of Local Expenditures." *Journal of Political Economy*, October 1956, 64(5), pp. 416-24.
- Weimer, David L. and Wolkoff, Michael J. "School Performance and Housing Values: Using Non-Contiguous District and Incorporation Boundaries to Identify School Effects." *National Tax Journal*, June 2001, 54(2), pp. 231-53.
- Wheaton, William C. "Vacancy, Search, and Prices in a Housing Market Matching Model." *Journal of Political Economy*, December 1990, 98(6), pp. 1270-92.
- Williams, Joseph T. "Pricing Real Assets with Costly Search." *Review of Financial Studies*, Spring 1995, 8(1), pp. 55-90.