

Reinvestment BRIEF

Issue 6



Capital at the point of impact.

Summary

This study, funded by the William Penn Foundation, measured school quality in Philadelphia and quantified its impact on the value of Philadelphia residential real estate. Findings indicate that elementary school test scores play a significant role in the prediction of sales price, even after controlling for neighborhood and individual home conditions. For every level of school quality improvement, the housing price increases 0.52 cents per square foot on average. For a 900 square foot home, a 10 point increase in school quality translates into a \$4,500 increase in sales price.

These results are important because improving school quality is a good way to create more desirable neighborhoods. Desirable neighborhoods attract homeowners, translating into tax revenue for the city. Although this research begs the question of what one needs to do to improve school quality, it does demonstrate that if schools improve, neighborhood house prices will reflect that change. Improving neighborhood schools should be used as one of a variety of intervention strategies for neighborhoods – one way to potentially attract people back to the city and to strengthen the city's residential real estate market (and the city's tax ratables).

While the strong connection between school quality and neighborhood quality is well accepted, there has been little quantitative evidence documenting the connection. From an evidence based policy making perspective, we want to know the strength of the relationship. This research puts a dollar value on this relationship and provides evidence supporting new and existing efforts to coordinate investment and strategies for school reform and neighborhood revitalization.

Schools in the Neighborhood: Are Housing Prices Affected by School Quality?

The quality of local schools plays an important role in the home buying and selling decisions for families with school aged children. A 2000 survey by the Philadelphia City Planning Commission found that the presence of good schools was selected as the third most important neighborhood characteristic for both buyers and sellers between ages 25 and 44 with children¹. While it is clear that families consider the quality of local public schools when making real estate location decisions, there is little evidence quantifying the dollar value impact that school quality has on the local real estate market.

The majority of existing research has focused on the impact of school district quality on home sales rather than the impact of individual schools². The few studies that explored the impact of specific schools within the same district have limitations such as not controlling for other neighborhood conditions³, studying only a subset of catchment areas within a district⁴ or studying only home sales on either side of catchment area boundaries⁵.

This policy brief summarizes TRF's research examining the influence of elementary school quality (measured by standardized test score results) on home sales prices occurring within City of Philadelphia elementary school catchment areas. This research is unique in that it: (a) studies sales price influence among schools in the same district; (b) includes all city-wide sales and all catchment areas in the analysis; and (c) controls for aspects of property and neighborhood that influence sales price (Crime, Structural Decline).

¹ Philadelphia City Planning Commission (2001). Summary of home buyers and home sellers survey: New century neighborhoods (Technical report #4).

² Clapp, J.M., Nanda, A., & Ross, S.L. (2008). Which school attributes matter? The influence of school district performance and demographic composition on property values. *Journal of Urban Economics*, 63, 451-466.; Haurin, D.R., Brasington, D. (1996). School quality and real house prices: Inter- and intrametropolitan effects. *Journal of Housing Economics*, 5, 351-368.

³ Hayes, K.J., Taylor, L.L. (1996). Neighborhood school characteristics: What signals quality to homebuyers?, *Economic Review—Federal Reserve Bank of Dallas Fourth Quarter*, 2-9.

⁴ Bogart & Cromwell. (2000). How Much Is a Neighborhood School Worth? *Journal of Urban Economics* 47, 280-305.

⁵ Black, S. (1999). Do better schools matter? Parental valuation of elementary education, *Quarterly Journal of Economics* 114, 577-599.

II Method

To assess the impact of school quality on housing prices, all 44,985 of Philadelphia’s 2006-2007 arms-length residential sales were geocoded. During the 2006-2007 school year, there were a total of 174 elementary school catchment areas. The elementary school catchment area within which each sale was located was identified and the combined PSSA⁶ Reading and Math percent of elementary students scoring proficient or above⁷ for each catchment area was then assigned to each sale. Figure 1 shows an example of this process.

Recognizing the importance of neighborhood quality in determining sales price, we assigned Crime⁸ and Structural Decline⁹ values to each home sale. The structural decline value is a scale score representing building vacancies and demolitions, frequent lien sales for unpaid taxes, and water shut offs due to unpaid bills. The Crime Scale is a composite measure of drug use and possession, along with a range of aggravated and weapons-related offenses and arson. These measures, developed as part of a previous research project¹⁰, exist for each of Philadelphia’s 1,816 census block groups. Each home sale was assigned the Structural Decline and Crime score for the census block group within which the home was located. Figure 2 shows an example of this process.

In order to control for the influence of home size on price differences a price per square foot value was created by dividing sales price by the living area square footage. Two variables included in the Philadelphia Board of

Revision and Taxation (BRT) dataset, *Type of Dwelling* and *Exterior Conditions*, were also used in the analysis as a way of controlling for other structure-related sales price influences. The following lists the values for each of these variables:

(a) Type of Dwelling

1. Row house
2. Condominium
3. Semi-detached
4. Single

(b) Exterior Conditions (relates to how the exterior appears based on observation)

1. New construction
2. Rehabilitated
3. Above average
4. Average
5. Below average
6. Vacant
7. Sealed
8. Structurally compromised, open to the weather.

Multilevel modeling¹¹ analysis was used to assess the relationship between home sales price and school quality, neighborhood conditions (Structural Decline and Crime) and home square footage. The following equations shows the variables used to predict the sales price of individual homes.

$$\begin{array}{l}
 \text{Price per} \\
 \text{square foot} \\
 \text{(individual home)}
 \end{array}
 =
 \begin{array}{l}
 \text{Math + Reading PSSA} \\
 \text{\% proficient and above} \\
 \text{(catchment area)}
 \end{array}
 +
 \begin{array}{l}
 \text{Structural} \\
 \text{decline} \\
 \text{(block group)}
 \end{array}
 +
 \begin{array}{l}
 \text{Crime} \\
 \text{(block group)}
 \end{array}
 +
 \begin{array}{l}
 \text{Type of} \\
 \text{dwelling} \\
 \text{(individual home)}
 \end{array}
 +
 \begin{array}{l}
 \text{Exterior} \\
 \text{conditions} \\
 \text{(individual home)}
 \end{array}$$

⁶ “The annual Pennsylvania System of School Assessment (PSSA) is a standards based criterion-referenced assessment used to measure a student’s attainment of the academic standards while also determining the degree to which school programs enable students to attain proficiency of the standards. Every Pennsylvania student in grades 3 through 8 and grade 11 is assessed in reading and math.” http://www.pde.state.pa.us/a_and_t/site/default.asp. Evidence suggests that test scores such as PSSA are important indicators of school quality.

⁷ The value is the sum of the percent proficient and above for both reading and math thus the maximum value is 200.

⁸ Tita, G.E., Petras, R.T., & Greenbaum, R.T. (2006). Crime and residential choice: a neighborhood level analysis of the impact of crime on housing price. *Journal of Quantitative Criminology*, 22, 299-317.

⁹ Maric, I., Quercia, R. and Simons, R.A. (1998). The Value Impact of New Residential Construction and Neighborhood Disinvestment on Residential Sales Price. *Journal of Real Estate Research*, 15, 147-161.

¹⁰ Gross, K. and McDermott, P. (2008). Use of City-Archival Data to Inform Dimensional Structure of Neighborhoods. *Journal of Urban Health*, 86 (2): 161-182; The crime and structural decline scores are on a scale of 0 to 100 with an average of 50 and a standard deviation of 10.

¹¹ Multilevel modeling is a statistical method that accounts for data being correlated at various levels. If those multiple levels of correlation are not accounted for, it is not possible to determine an accurate relationship between two variables. For example, house prices within the same block group are expected to be similar. House prices linked with the same school are also expected to be similar. Multilevel modeling determined the extent of similarity (or correlation) between the prices of houses in the same block group and those linked to the same school. The method accounts for these correlations in the regression model used to determine the accurate pure effect of school quality on house prices.

Example showing home sales within elementary school catchment areas and the PSSA proficient and above Reading and Math value assigned to each sale.

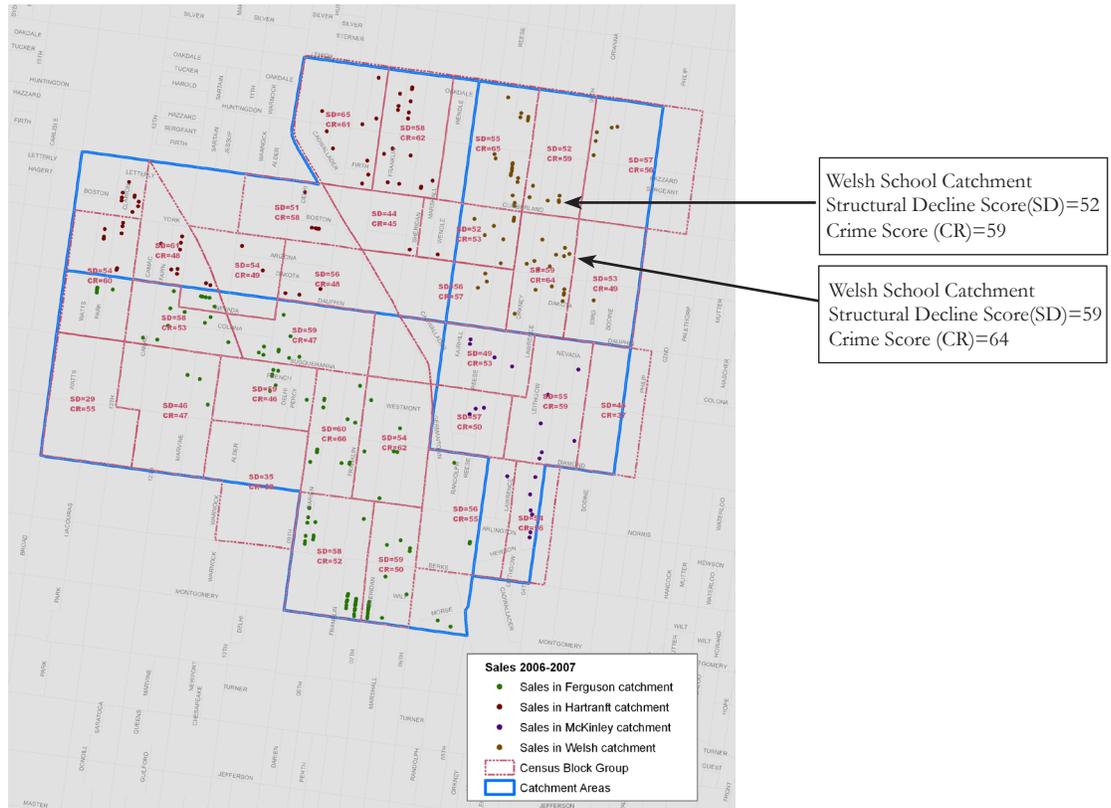


Figure 1

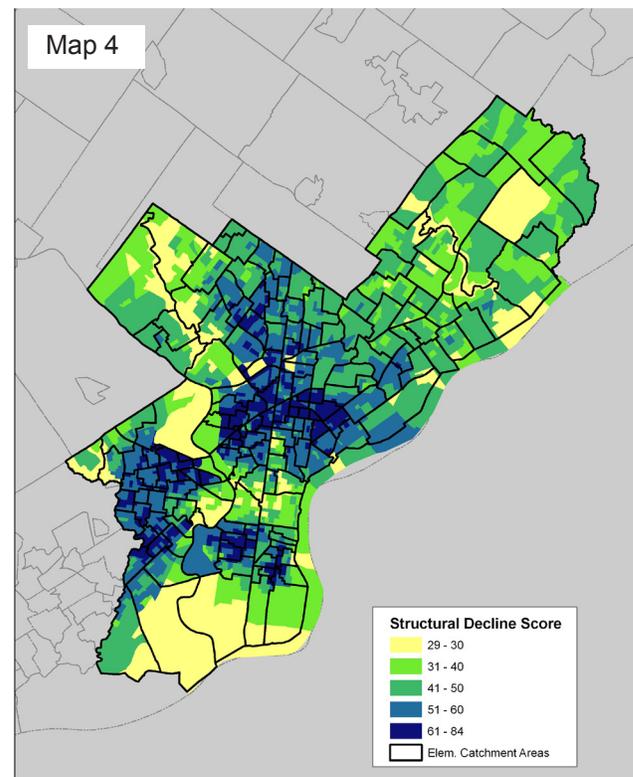
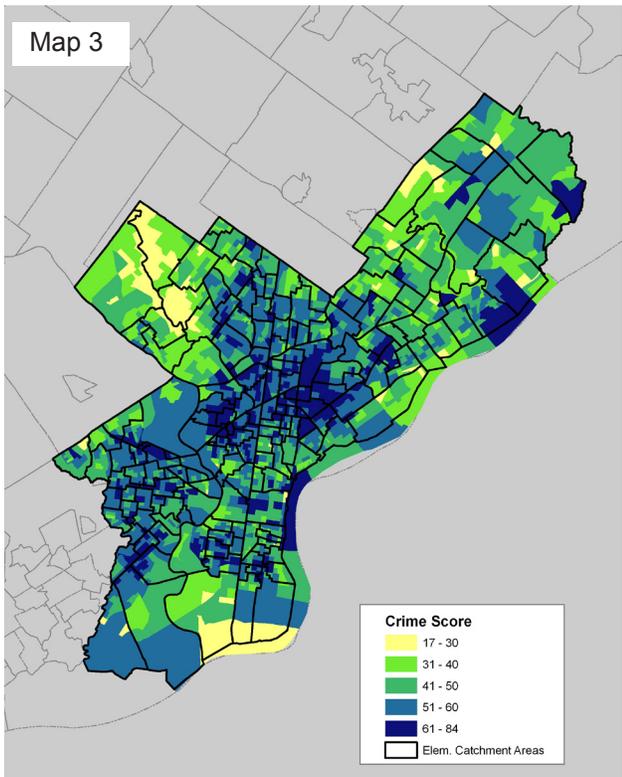
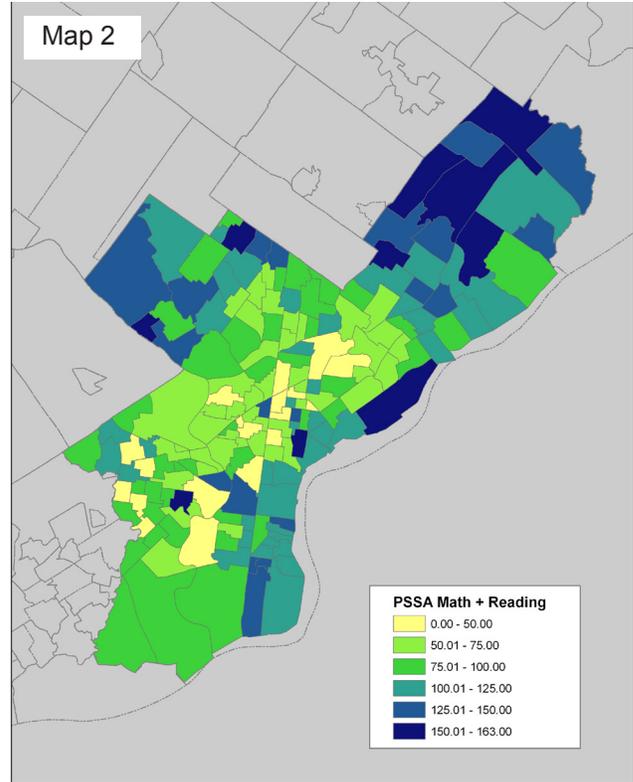
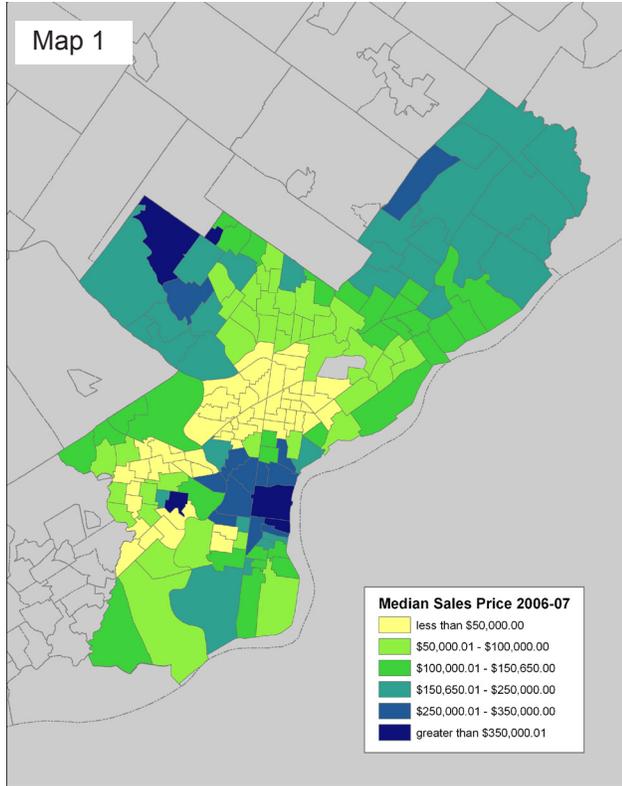
Example showing houses linked to the same catchment area being differentiated by census block group Crime (CR) and Structural Decline (SD) scores.



Figure 2

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Maps 1-4 show the spatial distribution of the variables used in the analysis. Map 1 shows median sales price by school catchment area¹². Map 2 displays the percent of elementary school students scoring proficient or above on PSSA. Maps 3 and 4 show the block group Crime and Structural Decline scores respectively. On both indicators, higher scores reflect more problematic levels of crime and structural decline.



¹² Median sales price at the elementary school catchment area level was not used in the analysis. Instead the analysis considered each home sale individually. This map merely illustrates the spatial distribution of the median sales price aggregated by catchment area.

III Results

City-wide Results

Results show that after controlling for housing type and exterior condition, catchment area PSSA scores, block group Crime scores and block group Structural Decline scores each play a significant¹³ role in the prediction of sales price. There were differences in the effect of each variable, with the results showing that on average for homes in Philadelphia:

- A point increase in Structural Decline score reduced the sales price of homes in that block group by \$1.50 per square foot;
- A point increase in Crime score reduced the sales price of homes in that block group by \$1.00 per square foot;
- Each percentage point increase in catchment area PSSA score % proficient and above increases sales price of homes in that catchment area by \$.52 per square foot.

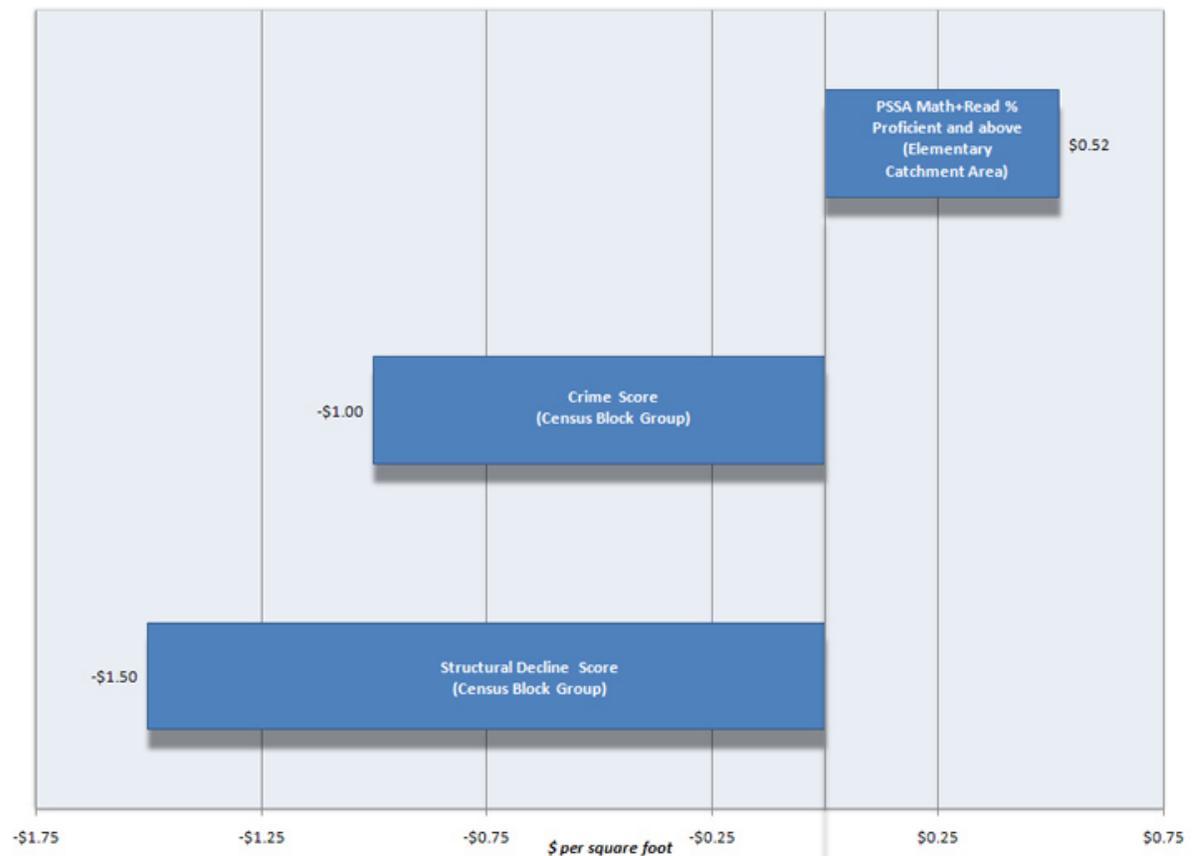
Example:

If we were to compare a typical 900 square foot Philadelphia home in areas with the same Structural Decline and Crime and schools differing by 10 points in test score results, we'd see a \$4,500 difference in price. If the typical home in Philadelphia during that time was selling for about \$100,000, that translates into near a 5% bump in price.

Improving structural decline by 10 points (+\$13,500) but allowing test scores to drop by 10 points (-\$4,500). Net sales price impact +\$9,000.

Improving structural decline by 10 points (+\$13,500) and increasing test scores by 10 points (+\$4,500). Net sales price impact +\$18,000.

Price per square foot estimates after controlling for type of dwelling and exterior conditions.



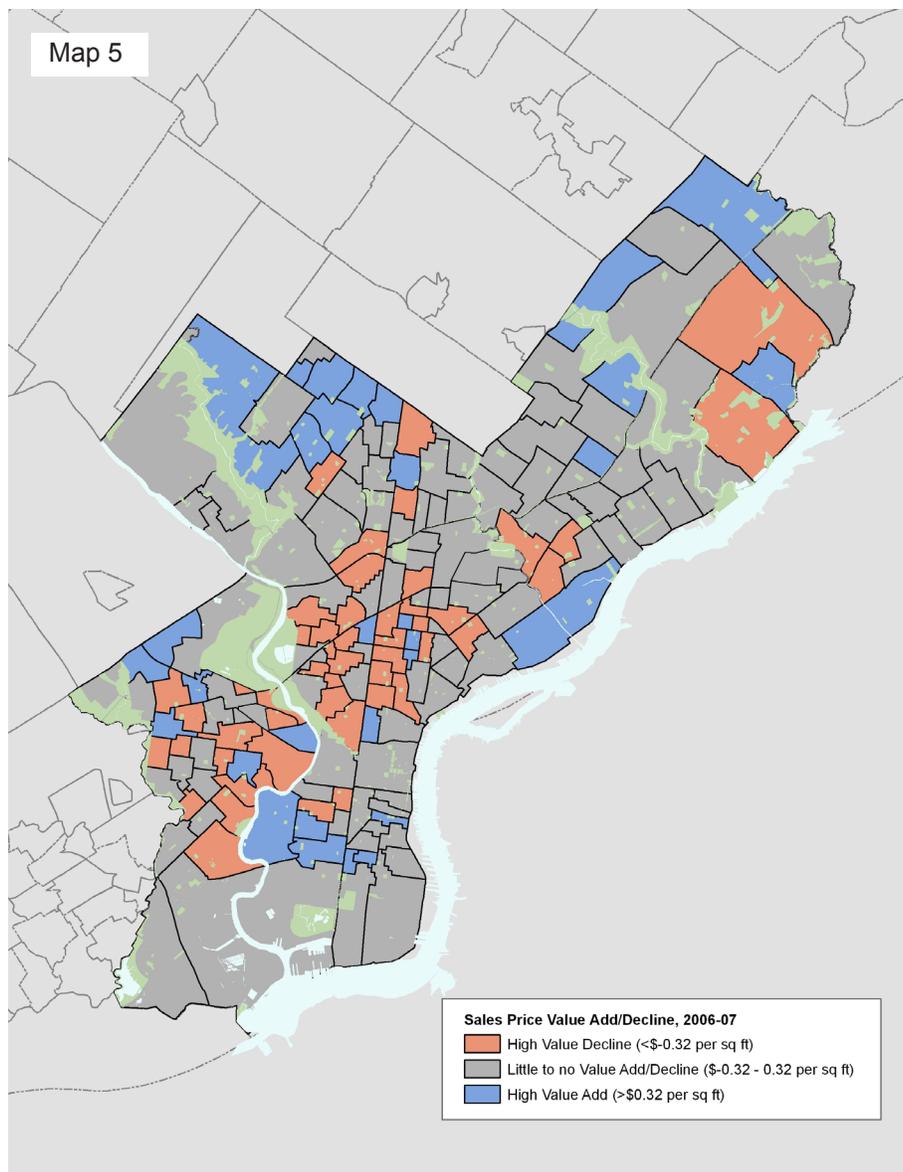
¹³ p<.001

Catchment Area Results

City-wide results indicate the overall relationship between test scores and sales price. Additional analysis was done to estimate the test score impact for each elementary school. The overall model was used to derive a predicted sales price for each sale. The median predicted value for each catchment area was then calculated. In order to determine what the predicted value would be without test scores in the model, predicted values were calculated using all variables except PSSA test scores. The median

catchment area predicted sales price was then calculated. The differences between the predicted medians represent the value-add/decline attributed to each catchment area's test score. Map 5 shows the value-add/decline results by elementary school catchment areas.

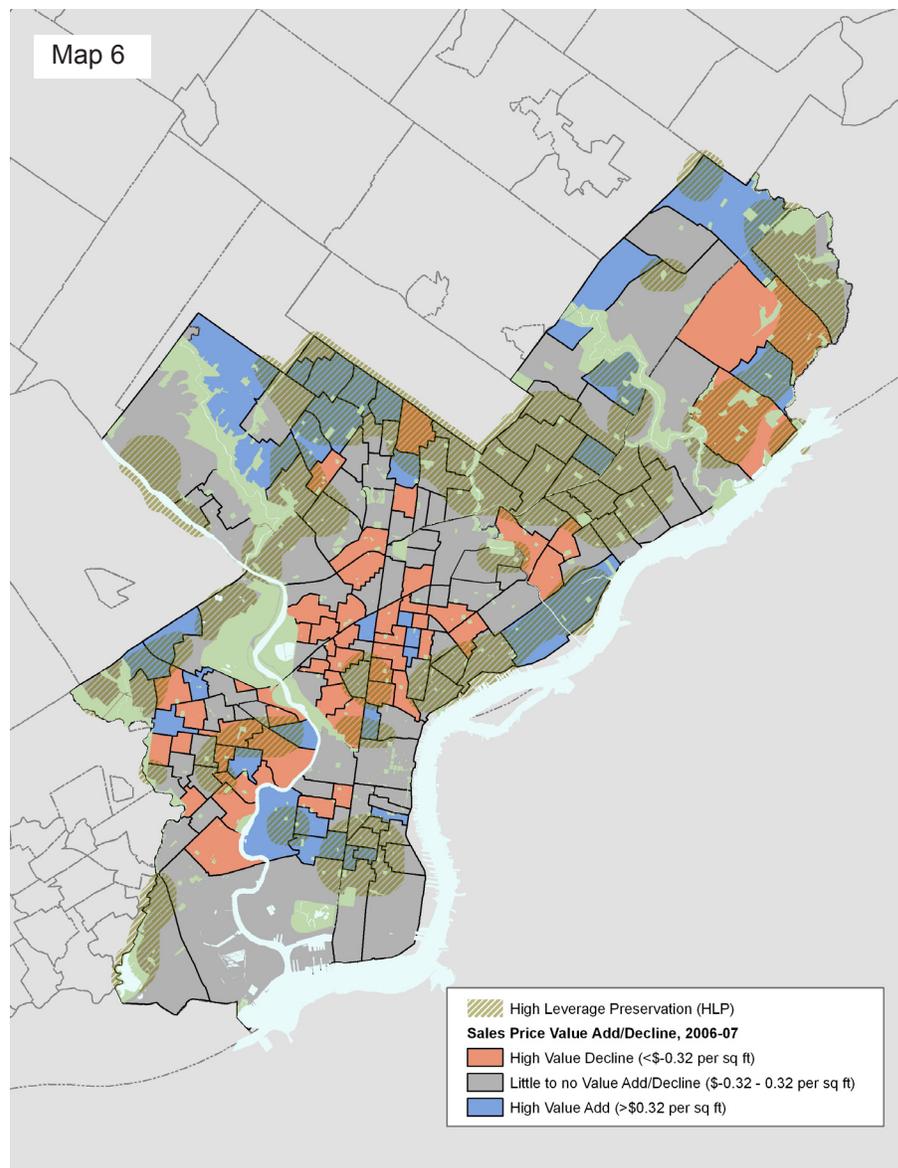
Map 6 shows catchment area results combined with neighborhood level residential real estate indicators. Specifically identifying potentially vulnerable markets in relation to school value add/decline helps identify areas where the schools could play a part in stabilizing markets.



Through the TRF Market Value Analysis process, TRF identified these potentially vulnerable markets calling them High Leverage Preservation (HLP)¹⁴ areas. The needs of these areas vary greatly. Some are experiencing high levels of crime and/or high concentrations of mortgage foreclosures. Others are in close proximity to Center City, high performing schools and/or properties that have appreciated in market value. Both areas might require public intervention but the nature of intervention will differ. Map 6 demonstrates how the merging of housing and school information can identify areas where schools should be part of the intervention strategy. For HLP areas

located within High Value-Add catchment areas (blue) the school might be an existing strength supporting the market. Here the schools are adding value to the properties within the neighborhood and retaining or improving these schools will have a significant influence on property values.

For HLP areas located within High Value-Divide catchment areas (red), the school might be an amenity weakening the market. In these areas improving the school quality could help stabilize or improve the already vulnerable HLP markets.



¹⁴ In 2008, TRF released the most recent Market Value Analysis (MVA) study for Philadelphia. At that time we also identified High Leverage Preservation (HLP) areas for the City as an overlay to the MVA. We discern High-Leverage Preservation areas first by focusing on those areas identified as middle markets on the MVA that share common boundaries with stronger markets or weaker markets. These represent areas where targeted public investment has the potential to positively influence the market. These middle markets are characterized with fairly typical housing sale prices, modest indicia of vacancy, elevated foreclosures (but not acute levels), high owner occupancy, relatively little new construction and little subsidized rental housing.

Conclusion

We recognize that the Crime and Structural Decline variables used in this study do not capture all aspects of neighborhood. Other unobserved or unmeasured neighborhood characteristics might have provided additional sales price control variables. Additionally, our use of standardized test scores as a measure of school quality represents only one aspect of school quality. However, test scores were used for two main reasons: (a) they represent a standardized measure administered in all schools allowing for comparison between schools; (b) evidence suggests that test scores are reasonable indicators of school quality.

While this brief does not address strategies for improving test scores, we acknowledge the many factors such as peers, teachers, parents and administrators that play a role in test score change. This makes increasing test scores a complex task for schools. The value of this research lies in highlighting the relationship between housing and education at the neighborhood level. Understanding the economic value of improved school quality can and should initiate discussion among policy makers on how schools can improve neighborhoods and how neighborhoods can improve schools.

The Reinvestment Fund

The Reinvestment Fund (TRF) is a national innovator in capitalizing distressed communities and stimulating economic growth for low- and moderate-income families. TRF identifies the point of impact where capital can deliver its greatest financial and social influence. TRF's investments in homes, schools and businesses reclaim and transform neighborhoods, driving economic growth and improving lives throughout the Mid-Atlantic region. Since its inception in 1985, TRF has made \$900 million in community investments.

TRF is also nationally recognized for its research and housing-related policy analysis. TRF's Policy Solutions team focuses both on helping TRF identify opportunities to invest its own resources as well as providing services to public sector and private clients seeking assistance with their own strategies to preserve and rebuild vulnerable communities. Its services include physical planning and development; policy analysis and program assessment; and the new online tool, PolicyMap. Policy Solutions combines these services with the use of geographically displayed analysis to provide quality information and practical analysis. To learn more about TRF and its Policy Solutions work, visit www.trfund.com.