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Trinity College
HARTFORD CONNECTICUT

Public Schools and Private Real Estate Markets, 1940-2000

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Trinity College, Class of 2005
December 13, 2004

Prepared for
Professor Jack Dougherty
to fulfill the requirements of
Educational Studies Senior Research Project

[**Note that econometric formulas did not print properly in this version. **]

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Executive Summary

The following is a cliometric study, a survey of history through the scope regression analysis, which attempts to determine the relationship over time between net expenditures per pupil and taxable property values across Hartford County, CT. The majority of the secondary literature available on this subject deals with the nature of this relationship in the central city. Through the approximation of the aforementioned relationship, one can better understand how property values rose up so quickly in the Post-War period in some suburbs and why the suburbs have taken different economic trajectories.

This study examines 27 municipalities in Hartford County, CT for a period of 60 years. The independent variable, equalized net grand list (ENGL) is substituted for residential property values, as much of that data is unavailable. The variables used have been given the designations of Demographic, School, or Fiscal and include: town population, population minority, density, average daily membership, net expenditure per pupil, percent of expenditure derived from local funds, and town tax revenue. The initial regressions of the equation showed that there was no clear relationship across the entire county over time; therefore, the focus was switched to approximating the relationship over time for each individual municipality.

The results section focuses on the towns of Avon, Bloomfield, and West Hartford, CT. It was found that though potential Avon residents greatly value large amounts of school spending, they place an even higher value on low density. In Bloomfield, potential residents also seem to value high levels of school spending (though not nearly as much as Avon residents), but a high level of minority residents has seemingly caused an overall adverse affect on property values. In West Hartford, which does not have the same negative history with race relations that Bloomfield does, both the population that is minority and high levels of school expenditure have cause property values to increase there.

Overall, though there does seem to be a relationship between school spending and taxable property values given the statistical significance of the regressions, one should be cautious in the amount of credence that is given to these results. Each of the towns have similar amounts of school spending, yet potential residents value this spending in fairly different ways. This study

does not determine why that is and this suggests that there are omitted variables, which could have produced biased results.

Introduction

Much of the literature available concerning the relationship of school expenditures and housing values explains the relationship in terms of the central city, yet we know little about the nature of this relationship in suburban towns. Perhaps this is because our perceptions of the suburbs have lead us to believe that they all have the same high levels of school spending and that they all have high residential property values. As the literature concerning the history of suburbs has become more extensive, we have learned that this is not the case. A suburb is not a suburb, and school spending and property values can differ greatly from municipality to municipality. How much can school spending explain about how the property wealth of suburbs have taken different trajectories relative to each other over time? This study concludes that there is an obscure relationship between school funding and property values, and that there seems to be missing variables, such as perceptions, which are subjective and cannot be measured quantitatively.

Literature Review

There are two strands of literature which are very close to, but differ greatly from this study: the influence of school spending on student achievement and the influence of perceived school quality on home values. Economist Eric Hanushek writes about the effect that increased school spending has had on student achievement. According to him, though expenditures per pupil have risen approximately 3.5% each year from 1890-1990 and increased exponentially in recent years, there have been very insignificant gains in student achievement, as measured by performance on standardized tests.[1] Hanushek attributes this to a misunderstanding of the effect of all other inputs on student achievement and how over time children change and the needs for certain inputs may be different.[2]

Concerning the latter, in chapter four of his "Public Schools and Economic Development: What the Research Shows," Jonathan Weiss writes about the role that perceptions of school quality plays on housing studies. In a cross-sectional study of the Cleveland, OH metropolitan area, it was found that suburban

[1] Eric Hanushek, "The Failure of Input-Based Schooling Policies." *National Bureau of Economic Research*, 2002, p. 6.

housing comparable to that in the center city went for $500-$1200 more in a particular suburb, simply because the schools were perceived as being better. He also draws from anecdotal evidence in the form of surveys which suggests that the quality of the school district is one of the top two reasons, second only to the safety of the neighborhood, for why people choose to live in one residential area over another.[3] These are two very challenging ways to analyze school spending, as there are no accurate ways to account for student achievement and it is difficult to measure perceptions.

This study attempts to answer a different question regarding the issue of school funding: how have relative amounts of school spending over time (operating expenses, excluding capital expenses) influenced taxable property values over time across Hartford County, Connecticut? Understanding this relationship between school spending and property wealth may help explain how some values in this area rose up so quickly in the post-WWII era. For example, as Jack Dougherty observes in his study, Avon, CT moved from having a one-room schoolhouse in the late-1940s to developing a nationally competitive school

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[2] Ibid.

[3] Jonathan Weiss, *Public Schools and Economic Development: What the Research Shows.* Cincinnati Ohio: KnowledgeWorks Foundation, 2004, p. 23; W.T Bogart and B.A. Cromwell, "How Much Is A Good School System Worth?" *National Tax Journal*, v. 2, 1997, pp. 215-232; National Association of Realtors and Local Government Commission, 2002.

system in the 1990s.[4] To what extent did these changes in school spending boost the taxable property values of the suburb, with respect to neighboring towns?

The conclusions of the literature concerning the question above are very conflicting. Some note that there is an obscure relationship between residential property values and school funding. In some instances it was found that housing values increase as school expenditures per pupil increase, because people value school districts that spend more money per pupil. In other instances, it was a decrease in both property taxes and school expenditures that increased housing values, as many people only value increased school services when their tax bills remain unchanged.[5]

In their "Using Market Valuation to Assess Public School Spending," Lisa Barrow and Cecilia Rouse examine whether an additional dollar of public money spent on schools increases residential property values and discover that potential residents do value education expenditure, driving housing values up.[6] They find that for a one dollar increase in per pupil state aid, aggregate per pupil housing values increase by twenty

[4] Jack Dougherty. "The Transformation of City and Suburban Schools: Metropolitan Hartford in the Twentieth Century." Draft of conference paper prepared for the History of Education Society Conference. October 13, 2004, p. 4-5.
[5] Theodore Crone. "House Prices and the Quality of Public Schools: What are We Buying?" *Federal Reserve Bank of Philadelphia Business Review.* September/October 1998, p. 6.

dollars.[7] Other studies have come to similar conclusions to the Barrow and Rouse piece. In a study of Gainseville, FL metro area, it was found that schools that reported having high math scores on standardized tests, which inevitably were the schools with higher amounts of per pupil expenditures, saw housing values increase approximately $1492.[8] This study will attempt to determine how much education spending has been valued over time by Hartford County, CT residents as reflected in taxable property values.

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[6] Lisa Barrow and Cecilia E. Rouse. "Using Market Valuation to Assess Public School Spending." *National Bureau of Economic Research*, July 2002, p.2.
[7] Ibid, p. 23.
[8] David Figlio and Maurice Lucas. "What is in a Grade? School Report Cards and Housing Prices." *National Bureau of Economic Research*. November 2000, p. 17.

The Data

This study will examine the geographical boundary of Hartford County Connecticut. The city of Hartford is at the center and is surrounded by 28 other municipalities (see map below). For the purposes of this study, two of the municipalities, Marlborough and Burlington have been removed from the sample. These two rural towns participate in regional school district, which makes the school data for these towns unreliable.[9]



Unlike the models in the secondary literature, which examine the relationship between school spending and

residential, or house, values, the model for this study will examine taxable property values as the dependent variable. Taxable property values, here to forth referred to as the equalized net grand list (ENGL), is defined as an estimate of the full market value of all taxable property from sales/assessment ratio info supplied by local assessors. It is "a measure of a municipality's total taxable wealth."[10] It is measured in thousands of dollars. This change was made, because the data for housing values prior to about 1955 is either unavailable or has many gaps.

The variables for this study have been divided into three different categories. They are demographic variables, school variables, and fiscal variables.

Demographic Variables[11]:

Town Population (POP): This is a measure of all the people residing in the town as collected from Census information. It is expected that the relationship between this and ENGL will be positive, so that as town population increases, taxable property values should increase, too.

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[9] Though the other 27 municipalities will be examined, this study will concentrate on the cities of Avon, Bloomfield, and West Hartford, for consistency with the other Cities, Suburbs, and Schools research projects.
[10] Office of Policy Management, State of Connecticut. *Fiscal Indicators For Connecticut Municipalities, 1981-1985*. January 1987, p. 6.
[11] Need to locate footnote for census information.

Population Minority (POPM): This measures the percentage of people in the town who do not racially identify as being white. It was calculated by subtracting the town white population from the total town population and then dividing by one hundred. As the minority population increases over time, it is expected that ENGL will decrease, because due to the history of racialized classism in our country, a high number of minorities in an area generally means poverty and crime, along with other negative neighborhood qualities, have the ability to proliferate.

Density (DENSE): This measures the amount of people per acre in a town and was calculated by dividing the town population by the acreage of the town. The relationship between this variable and ENGLA is uncertain. On one hand, density could increase ENGL for the same reason that town population does. On the other hand, the relationship could be negative as high density may be unfavorable, hence them moving from the central city in the first place.

School Variables[12]:

[12]Data prior to 1990 can be found in the following documents: Local Public Schools and State Aid in Connecticut (Hartford: CPEC), Office of Policy and Management Fiscal Indicators for Connecticut Municipalities, and Office of the Tax Commissioner, State of Connecticut: Information Relative To the Assessment and Collection of Taxes. Data from 1990 to the present can be found online at http://www.ct.gov/ecd/cwp/view.asp (town profiles) or www.csde.state.ct.us/public/der/datacentral/multiplesearch.asp (school profiles).

Average Daily Membership (ADM): This is the number of children who attended school on average each day in a town as per looking at the attendance logs for October 1st and May 1st of each year. It does not include non-resident students. The relationship between this and ENGL is expected to be positive, because if a majority of the people who should be in school are in school each day, then that shows that residents value education and thus, school spending should increase driving taxable property values upward.

Net Expenditure Per Pupil (NEPP): This is measured in dollars and is the net expenditure (total expenditures less transportation and capital costs) divided by the average daily membership. The primary relationship being examined in this study, it is expected that the relationship between this and ENGL will be positive. As most of the secondary literature concluded, the quality of schools is a primary reason why people choose living in one place over another, suggesting that homebuyers value education, which should drive property values up. On the other hand, the relationship is expected to be a negative, non-linear one in municipalities classified as cities. This is because increased school expenditures could be indicative of increased poverty among the children in the school district. An increase of NEPP in this case would mean that the school system is attempting to alleviate some of the outcome

differences among children in poverty and surrounded by negative neighborhood externalities and those who are not.

Percent of Expenditures from Local Funds (PELF): This is the percentage of net expenditures per pupil that derive from local funds, i.e., property taxes. If the percentage of school expenditures coming from local funds increase, this probably means that the locality's tax base is increasing, which suggests that ENGL should also rise.

Fiscal Variables[13]:

Tax Revenue (TAXR): In Connecticut, tax revenue only includes real and personal property taxes that are levied by the municipality.[14] The relationship between this and ENGL is expected to be positive, as the more taxes that are collected, the more money can be spent on schools, which should increase ENGL.

[13]Office of the Tax Commissioner, State of Connecticut, Information Relative To the Assessment and Collection of Taxes, (1940-1970 data); Office of Policy and Management, Fiscal Indicators for Connecticut Municipalities, 1981-1985; Office of Policy and Management, Fiscal Indicators for Connecticut Municipalities, 1986-1990, 1987-1991; 2000 fiscal year data can be found at www.opm.state.ct.us.

[14] Office of Policy Management, State of Connecticut. *Fiscal Indicators For Connecticut Municipalities, 1981-1985*. January 1987, p. 8.

Research Design and Analysis

$$ENGL = \beta_0 + \beta_1(NEPP) + \beta_2(POP) + \beta_3(POPM) + \beta_4(DENSE) + \beta_5(ADM) + \beta_6(PELF) + \beta_7(TAXR) + \varepsilon$$

Given the aforementioned data, the above equation is what this study will attempt to approximate, where β is the change in ENGL given a one unit change in the independent variable with which it coordinates and ε is the margin of error of the equation. As was implied in the introduction, this study will examine a cross-sectional (27 municipalities in Hartford County), time-series (1940 to 2000) model. There are many limitations to this equation and they can be summarized under two categories: 1) violations of the classical assumptions and 2) insufficient observations.

Concerning the former, it is expected that this equation will violate many of the classical assumptions upon which econometrics is based. The first violation is one of specification. The functional form that should be used for the equation is unclear. It is not certain that the relationship

between the independent variables and the dependent variable is linear. For instance, NEPP has the potential to make ENGL appear quadratic. That is, as NEPP increases, ENGL could rise to a certain point after which continued increases in NEPP cause ENGL to decrease. An outcome like this would be expected in the cities of Hartford County, Hartford and New Britain, because increased school expenditures in central cities may indicate that the school is trying to ameliorate some of the differences in educational inputs that impoverished inner-city students may be lacking, which directly affects these children's outcomes. Because of the affects of poverty, taxable property values would decrease in this case despite a continually increasing net expenditure per pupil.

The second assumption that is violated is that there is no multicollinearity. If there is multicollinearity that means that there is a relationship among the independent variables. In the presence of multicollinearity, the t-scores, or the statistical measure of significance of the coefficients is higher than it should be making the variable more likely to be found statistically significant, even in a case where it actually may not be. The only way to correct for this is to remove one of the variables that is the cause or leave the equation as is. It is expected that there will be at least three instances of multicollinearity in this equation. As POP increases, DENSE

should also increase, because if the population of a municipality rises, then will the number of people per are also grow. There is also expected to be multicollinearity between POP & TAXR and TAXR and PELF. As the population increases, so does the amount of taxes that are levied and collected. In the same respect, as more taxes are levied and collected, then there is more room for the locality to allocate more funds towards its public schools.

The next violation deals with the cross-sectionality of the model. It is expected that there will be heteroskedacticity, or variance among unrelated error terms. Say that the error term in this equation represents suburban sprawl. Sprawl has many consequences, but these differ from locality to locality and the effects of sprawl will vary depending on whether one is a resident of a suburb, a rural town, or a city. Because of the nature of sprawl, variance in the error term will cause upwardly bias coefficients, which are unreliable.

The final violation expected in this model is serial correlation. Serial correlation is a time-series issue in which the errors are correlated. One cause of this would be a misspecification of the functional form. Another reason that this could happen would be a lag in the effect that an unobserved variable has, meaning that the error from one time period would inevitably effect the error in another.

Another limitation of this model is a lack of sufficient observations. This presents a problem for two reasons. First, a lack of observations means that when the equation is put through regression analysis, some statistical measurements cannot be made, making it difficult to correct the above violations of the classical assumptions. The second problem is that insufficient observations cause another violation of the classical assumptions: omitted variables. If there are variables that are omitted from the equation, then the coefficients that are produced are bias and therefore unreliable. As was mentioned in the introduction, one variable that is expected to have been omitted is perceptions.

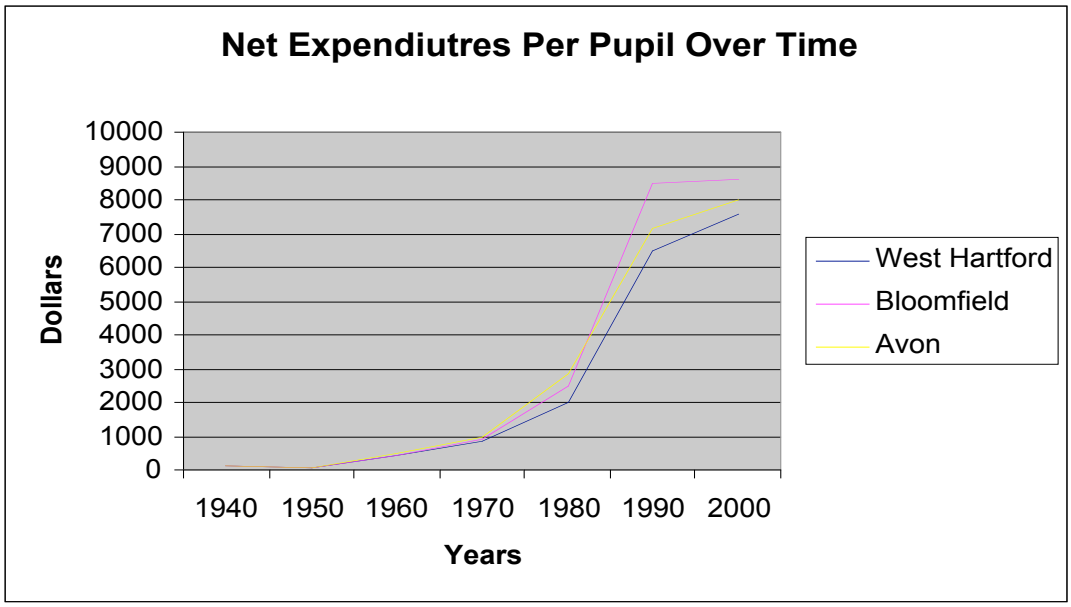
Results

Initially, the model was designed to be three-dimensional, that is examining the research question both cross-sectionally and over time simultaneously. From the initial regressions, it soon became clear that a three-dimensional relationship did not exist. There is not a consistent relationship across the entire county over time; therefore, model became time-series and was evaluated over each Hartford County municipality separately.

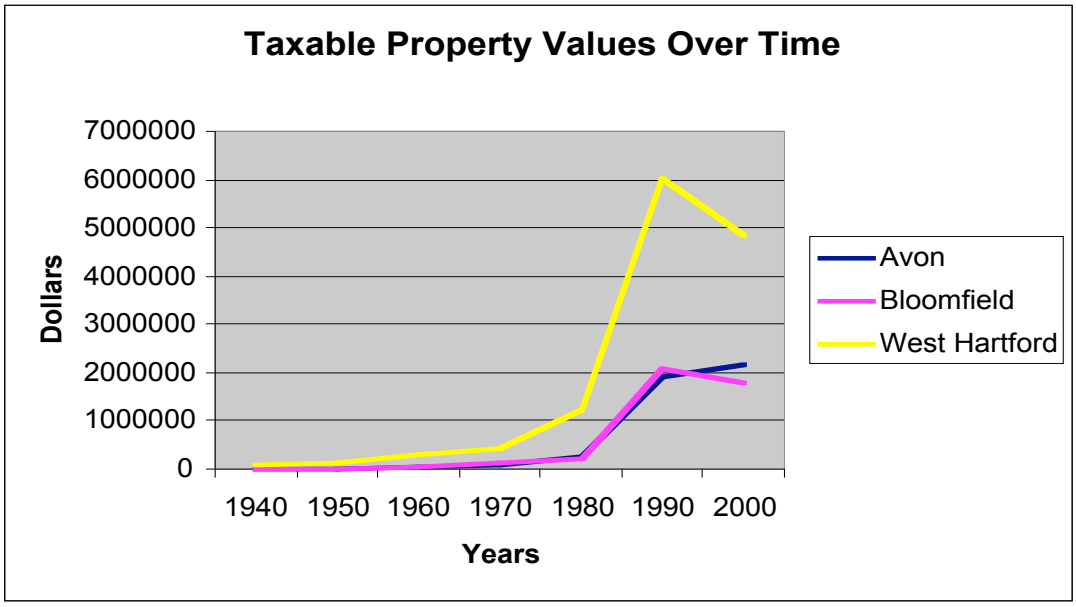
The factors that have affected taxable property values in Hartford County, CT are as varied as the municipalities themselves. There are no two cities that have the same set of variables affecting ENGL in the same way. For that reason, this section will focus on the most relevant towns of Avon, Bloomfield and West Hartford. Jack Dougherty provides a brief history of each of these towns in his study and the quantitative data provided here provides some correlation with his qualitative study. Though each of these towns display similar trend in school spending over time, the taxable property values vary greatly (See Graphs I and II on next page), as does the

affect that an increase in school spending has on property values.

Graph I: Net Expenditures



Graph II: Taxable Property Values



Avon

ENGL = β_0 + β_1(log(NEPP)) + β_2(log(PELF)) + β_3(log(DENSE)) +β

In the town of Avon, which was noted earlier on in the study for having significantly transformed its school district over the course of fifty years, it was found that a for a one percent increase in school spending per pupil, taxable property values rose $41,336,000 over time. A one percent increase in the amount of that funding deriving from local funds has caused taxable property values to increase in excess of $45,000,000 over time. These numbers are quite substantial, having statistical significance at 5%, this shows that Avon residents undoubtedly value school spending.

It is interesting to note that though those numbers are significant, density seems to have had the greatest influence on

property values in Avon. A one percent increase in density caused property values to decrease $109,059,000. This is double plus the effect that increased school funding had on property values in the town. Despite having good schooling as a high priority, it seems that Avon residents over time are more concerned with what can be deemed as a traditional suburban value: big backyards.

Bloomfield

$$ENGL = \beta_0 + \beta_1(NEPP) + \beta_2(POPM) + \varepsilon$$

The factors that have affected Bloomfield over time differ greatly from those that affected Avon. In Bloomfield, a one dollar increase in school spending has increased taxable property values by only $13,677. This number is highly statistically significant, which means that the residents do value school spending, but not nearly as much as Avon residents do.

What has affected taxable property values greatly in Bloomfield is the percentage of the municipality that is minority. As Dougherty noted in his study, blockbusting[15] was a major occurrence in the 1960s history of the suburb and many whites were concerned about the increase in the Black population

[15] The American Heritage Dictionary defines *blockbusting* as profiteering by inducing property owners to sell hastily and often at a loss by appeals to fears of lowered values because of threatened minority encroachment and then reselling at inflated prices.

that was relocating to the town.[16] The numbers correlate with this as it was found that for a one percent increase in the minority population, the taxable property value decreased $905,850 over time. Looking again at Graph II, the taxable property values in Bloomfield were rising from the period of about 1980 to 1990. What this suggests is that though property values were rising, they may have been doing so at a diminishing rate as more and more black families moved into the suburb. Post-1990 property values then downturn and begin to decrease as is illustrated in the graph. At the same time, the school district of the town is also seen as declining.

West Hartford

$$\mathbf{ENGL = \beta_0 + \beta_1(\log(NEPP)) + \beta_2(POPM) + \varepsilon}$$

West Hartford is a comparable city to Bloomfield in that they seem to follow a similar trajectory concerning property values, yet the variables affected the two towns in very different ways. The increase that enhanced school spending caused in West Hartford is much greater than in Bloomfield. In fact, school spending seems to be the single most important factor affecting West Hartford's taxable property values from this study. A one percent increase in school spending per pupil has caused property values to increase $8,973,000 over time.

[16] Dougherty, p. 7.

Though this is not nearly as much as the increase in Avon, it is significant nonetheless. For a one percent increase in the percent of the town population that is minority, the taxable property values increased $1,607,000. West Hartford does not have the history with race relations that Bloomfield has had, and this modest increase in property values caused by the minority population suggests that West Hartford residents value diversity.

Conclusion

The results of this study, though the numbers produced are highly statistically significant, provide at best a cloudy picture of the relationship between school spending and taxable property values in Hartford County, Connecticut, over time. An examination of the role that perceptions of school quality play (though these perceptions cannot be measured quantitatively) may shed some light on the relationship between school funding and taxable property values. It is evident however, that though school funding seems to have had a significant influence on property values in Hartford County, there are many other qualitative influences that may be more compelling.

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