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Abstract

In 1990, Kentucky passed the Kentucky Education Reform Act (KERA) in response to a State Supreme Court mandate regarding educational spending inequality across rich and poor school districts. A comprehensive bill, KERA completely altered the existing school funding system, and instituted a number of accountability and curricular changes. More specifically, KERA effectively equalized per pupil funding across Kentucky school districts, pulling a majority of both low-spending and poor districts up to what had been higher spending quartiles. Economic theory suggests such a dramatic transformation in school finance has the potential to increase income heterogeneity within districts, which may, in turn, improve the educational and economic outcomes of those previously segregated.

This honors thesis examines whether KERA significantly decreased residential income segregation across school districts. Differing from existing research, I focus on one of the most comprehensive reforms in history and its subsequent impact on residential sorting patterns. Using a difference-in-difference regression technique, I find that KERA had no effect on the household poverty rate across districts when compared to Tennessee. These results are robust through a number of different specifications.

Table of Contents

Introduction

In 1989, the Kentucky Supreme Court found Kentucky's public education system unconstitutional, declaring that the "General Assembly has fallen short of its duty to enact legislation to provide for an efficient system of common schools throughout the state" (Rose v. Council for Better Education, 1989). A year later, the General Assembly passed the Kentucky Education Reform Act (KERA), considered the largest attack yet on the constitutionality of a state education system (Adams & White, 1997). One of the most studied aspects of KERA is its effect on per pupil spending across Kentucky districts. Research suggests KERA dramatically affected expenditure levels – most importantly equalizing, but also increasing per pupil spending across all districts.[1]

While much attention has been devoted to KERA's effect on school finance and student achievement outcomes, I know of no analysis focusing on KERA's impact beyond these two realms. It is well known that public education plays an important role in housing, as public schools have traditionally been funded through local property taxes and school quality is capitalized in the housing and rental markets.[2] Additionally, there exists a theoretical and empirical literature that analyzes school finance reform's effects on household incentives to segregate based on income. The theory suggests that a dramatic school funding equalization scheme, such as KERA, will decrease a household's incentive to sort by income, resulting in a decreased percentage of households below the poverty line in initially poor or low-spending districts. Such a change in neighborhood concentration carries the potential to improve the economic and

[1] See Adams (1994); Adams and White (1997); Clark (2003); and Hoyt (1999)
[2] See Brunner et al. (2002); Dee (2000); Loubert (2005); and Oates (1969)

educational outcomes of those segregated.[3] The empirical studies analyzing reform and residential sorting, however, are limited and weak. Since the empirical evidence linking reform to resorting is so insignificant, it is prudent to study a substantial and comprehensive school finance reform individually. Indeed, if analysis of a specific reform finds a significant impact on income segregation, stronger conclusions may be drawn regarding the indirect effects of school finance reform.

In the following paper, I examine the impact of KERA on residential income segregation, measured by the percent of households below poverty within school districts. Specifically, I implement a difference-in-differences regression analysis across school districts, using Tennessee districts as a control group. My findings suggest that KERA did not significantly impact residential income segregation across districts. Some empirical weaknesses, however, remain. The findings, nevertheless, are the first state-specific results and provide much-needed insight into the residential effects of school finance reform.

The remainder of this paper is structured as follows. The first section briefly overviews the Kentucky Education Reform Act. The second outlines the existing literature regarding school finance reform and residential segregation, while the third section details the economic theory behind such a relationship. The fourth section introduces my empirical measurements and provides initial analysis, and the fifth section reviews and discusses the results of my estimations. The paper ends with a brief conclusion outlining the findings and limitations of my research.

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[3] Peer and neighborhood effects have been shown to significantly impact educational and economic outcomes (Hoxby, 2000; Ioannides & Loury, 2004).

The Kentucky Education Reform Act (KERA)

Known as "the nation's first experiment with comprehensive education reform", KERA not only addressed school finance discrepancies, but also implemented new policies directed at school governance and classroom curricular reform (Clark, 2003).[4] Specifically, KERA shifted the Kentucky public school curriculum towards a standards-based assessment system, holding students and schools accountable for meeting or exceeding certain measurable performance standards at each grade level. Schools that meet improvement goals as measured by the new assessment system collect cash rewards for their students' performance; schools failing to meet the standards must employ improvement plans and/or receive financial assistance in addition to outside consulting. In regard to governmental reform, KERA allocated more specific curricular and instructional responsibility to the school level, while providing the Department of Education the power to take over failing schools and districts.

In addition to addressing governmental and curricular reform, KERA established the Support Education Excellence in Kentucky (SEEK) fund, which aimed to both increase funding for schools and equalize per pupil funding across school districts. In particular, SEEK provides each district with a yearly base-guarantee sum of money, derived from the percentage of students qualifying for the federal school lunch program, the percentage of students with disabilities, and the cost of transportation within the district. Districts contribute 0.3 percent of their assessed property value per pupil to their base-guarantee, while the state provides the difference. Additionally, districts can increase their spending per pupil up to 49.5 percent above the base-guarantee (149.5 percent of the base-guarantee), with the state matching district increases until funding

[4] This section relies heavily on Clark's (2003) summary of KERA.

reaches 115 percent of the base-guarantee. This matching policy seeks to provide incentives for poorer districts to increase funding, as no matching funds are provided for districts with assessed property value per pupil equal to or greater than 1.5 times the statewide average.

Literature Review

School Finance and Property Values

There are two conditions that must hold for KERA to affect residential income segregation. First, school finance reform must affect property values. Research regarding local public good capitalization suggests that it does. Specifically, reform changes a locally-determined public good into a state-equalized local public good, which can dramatically alter residential sorting incentives. The seminal Tiebout (1956) model identifies this relationship between households' choices and local property taxes, asserting that households will choose where to live based on the with-tax price and the relative quality of local public goods, settling in a community where the marginal benefit of public goods consumption is equal to the marginal cost. In particular, along with local taxes, property values reflect the quality of local public goods, as they are bid up when households move to districts receiving increases in funding and bid down when districts experience decreases.

Many studies have applied Tiebout's theory to public education, resulting in empirical evidence that supports Tiebout's hypothesis. Oates' groundbreaking paper (1969) uses per pupil spending as a proxy for local public good quality and finds that property values in the Northeast have a significant positive relationship with expenditure per pupil. In more recent studies, Loubert (2005) similarly discovers the existence of school-based premiums in the Texas housing market after finance reform, while Brunner et al. (2002) concludes that housing values rose when the 1971 *Serrano v. Priest* ruling increased school spending in California.

Dee (2000) expands the scope of study by applying the Tiebout hypothesis to court-ordered school finance reform across the nation. Specifically, Dee compares states that experienced an exogenous shock of court-ordered finance reform to other states that had not undergone court-ordered reform, finding a relationship between reform, an increase in resources devoted to poorer districts, and an increase in housing values in those districts. Dee's results not only imply that an increase in school aid is capitalized in the housing market, but that (at least as perceived by households) funding levels affect school quality.

Residential Sorting

The second condition required for reform to affect residential income segregation is the existence of residential income sorting incentives. In particular, household preferences or incomes must differ in order for sorting to occur. Generally, these incentives can be classified into two main categories: public sector incentives and non-public sector incentives (Nechyba, 2002). Westhoff (1977) identifies local income tax as a sorting motivation, where households are assumed to have homogeneous tastes but heterogeneous incomes. In this model's equilibrium, differences in local public goods provided by the income tax are attributable to the variation of household incomes. Epple et al. (1993) incorporate local property taxes and conclude that under specific assumptions, income heterogeneity still explains the variation in property tax-funded public goods levels across jurisdictions. Thus, both Westhoff (1977) and Epple et al.

(1993) find that when household income varies, public sector determinants (income and property taxes) are an income-segregating force across jurisdictions (Nechyba, 2002).

The simplest non-public sector sorting incentive is heterogeneity in household utility functions based on income. In other words, households that differ in willingness to pay for public goods as income varies will segregate themselves into certain communities dependent on these tastes. Property heterogeneity also provides motivation for households to sort via income (Nechyba, 1997).[5] Inputs in the school quality production function, if dependent on residential income sorting, can also lead to residential segregation. Specifically, research demonstrates that peer inputs, such as peer ability and parental involvement, increase with household income.[6] Thus, school quality, which is partially dependent on peer inputs, provides another incentive for households to sort via income.[7]

School Finance and Residential Sorting

Empirical research suggests that both conditions discussed above hold, which implies school finance reform should decrease residential income segregation. The empirical relationship between reform and poverty concentrations, however, is surprisingly weak. Aaronson (1999) studies court-ordered reform across the United States

[5] Nechyba (1997) models residential decisions in a heterogeneous housing market and concludes that the variation in the housing market is a segregating force – regardless of local tax characteristics. Nechyba (2002) attributes these findings to the inelasticity of housing market supply assumed in the model.

[6] Research finds peer ability is correlated with parental income (Solon, 1992; Zimmerman 1992), and that wealthy parents are more likely to monitor (McMillan, 1999) and contribute their own resources to their schools (Brunner and Sonstelie, 1999).

[7] Bayer et al. (2004) incorporate neighborhood effects into the school quality definition and estimate that the "full effect" of school quality on residential sorting is two times greater than the direct effect, suggesting that when the measurement of school quality considers additional neighborhood attributes, its existence is pivotal in household residential decisions.

and the change in the fraction of poor households within a particular school district.[8] Income sorting in states that upheld their existing funding formula is found to significantly increase, while sorting decreases in states that underwent equalizing reform, although not significantly. Relative to wealthy districts, low-income districts are more likely to experience sorting movement as a result of reform. Aaronson's results support the theory that poor districts will become more economically integrated when undergoing finance reform. His findings, however, remain weak and largely "suggestive," leading Aaronson to discuss the need for further future work to address endogeneity issues concerning school quality, funding, and private school options.

In their unpublished work, Downes and Figlio (1999b) identify and address a number of weaknesses in Aaronson's study and find expected directions of reform-induced resorting (Downes and Figlio 1999a).[9] Unlike Aaronson, the authors analyze the dynamics within low-spending districts (not low-income districts), finding reform relatively decreases the poverty rates within such districts. Although the authors find a consistent "qualitative" relationship between reform and a reduction in the incentive to sort by income, the relationship is not always significant.

In his general equilibrium model and subsequent simulation of reform's impact on income segregation, Nechyba (1997, 2003) addresses some of the specification problems

[8] Lamm (2001) conducts a similar analysis, concluding reform has a small, but significant effect on integration. As in Aaronson (1999), Lamm stresses caution in the interpretation of her findings, due to empirical model specification problems.

[9] Specifically, Downes and Figlio (1999a) highlight three main points of weakness in Aaronson's study that may have affected the results. First, a significant number of the reforms Aaronson focuses on were enacted very close to the base year in the data sample and therefore, may understate the true impact of reform on sorting. Second, Aaronson groups school districts by differences in income (the fraction of poor households within a certain district), not per pupil funding. Since school finance reform can have differential impacts based on initial district per pupil spending, Downes and Figlio argue that variables should be interacted with initial values of per pupil spending, not district income levels. Third, Aaronson applies a simplistic view of the education demand function, focusing only on one input (income). Downes and Figlio assert that parental education level is also strongly correlated with the demand for education, and thus should be included in the analysis.

acknowledged by Aaronson (peer effects and the existence of private schools). Nechyba defines school quality as a function of per pupil spending and average peer quality, where peer quality is determined by a child's educational ability and the parent's income level. Incorporating private schools into a household's decision process by assuming a perfectly competitive private school market, Nechyba runs simulations with and without private schools. Nechyba finds small decreases in residential income segregation under more centralized funding, while the existence of a perfectly competitive private school market results in dramatic desegregation. These results suggest private schools play an important role in determining the level of income segregation across communities and that school finance reform may only have a weak impact on residential sorting.

A review of the sparse empirical literature reveals weak and insignificant findings regarding the effect of school finance reform on residential income sorting. The studies analyzing past reforms are conducted at the national level and thus generalize all types of reform into broad categories, such as court-ordered reform or legislative-mandated reform.[10] Such groupings fail to capture the size and magnitude of each state equalization scheme, which may contribute to the weak and generally inconclusive results discussed above.[11] By isolating and analyzing a single state's finance equalization scheme, one can hopefully determine a specific reform's impact on residential sorting within that state.[12]

[10] Aaronson (1999), Downs & Figlio (1999b), and Lamm (2001).

[11] In other words, national studies that generalize reforms into broad categories assume that the variance of the independent variable (reform) is zero, when in reality many reforms entail state-specific policies or have varying success at equalizing funding.

[12] Downes and Figlio (1999a) identify omission of reforms' characteristics as a limitation of their study, they are unable to do so because they include state-specific fixed effects in their estimation.

Theory

A model specifying a household's residential decision is the first step in analyzing the effect of school finance reform on residential income sorting. I assume a household will locate in the district in which net benefits are maximized. My theoretical approach is a discrete choice framework loosely based on Barrow (2000), who examines the monetary value placed on school quality by households. In her analysis, Barrow assigns a functional form to utility (multinomial logistic), whereas I deal here with general representations of household utility.

Household Location Decision

In choosing a residence, households are assumed to maximize their net benefits of locating in one district versus another, subtracting the total monetary cost of living in a certain location from the total monetized utility generated from living in that area. Specifically, a household maximizes utility, *U*, by choosing a school district so that $U_i > U_j$; for all districts *i, j*. In particular, they choose district *i* if:

$$[\frac{U_i(pubgoods, privcsmp)}{\lambda} - (t_i * H)] > [\frac{U_j(pubgoods, privcsmp)}{\lambda} - (t_j * H)] \qquad (1)$$

where λ is equal to the marginal utility of income measured in dollars, while $t * H$ represents the total monetary cost of living in a house and is equal to the amount the household pays in taxes.[13] Dividing total household utility by λ captures in dollars the total utility generated, allowing for the calculation of net monetized utility.

Since I focus on state-level finance reform, I assume that all national and state public goods are independent of the household's residential decision. With the exception

[13] It is assumed that all households own a house, with *H* representing the taxable wealth of each housing unit.

of public school quality, all other district-specific public goods and housing attributes are assumed to generate uniform utility across households.[14] Public school quality therefore is crucial in the maximization of household utility. Furthermore, I assume the proportion of families with children across districts is constant.[15] Thus, a household's utility can be represented as a function of district school quality and private consumption, so that the household chooses district *i* if:

$$[\frac{U_i(pubschqlty_i, privcsmp)}{\lambda} - (t_i * H)] > [\frac{U_j(pubschqlty_j, privcsmp)}{\lambda} - (t_j * H)],$$

$$\forall i, j \text{ districts} \qquad (2)$$

Where $t_i * H$ now equals the amount the household pays in local property taxes.

School Quality Production Function

Similar to Nechyba (2002), I define school quality to be a function of monetary and peer inputs.[16] Research is mixed regarding the effect of funds on school quality, however it seems reasonable to assume that many of the commonly-agreed upon factors that increase school quality, such as the quality of teachers and the pupil-teacher ratio, depend directly on school funding.[17] Assuming funds are used efficiently and effectively

[14] While it is true the characteristics and size of the housing stock, and costs of living differ across districts, I do not expect school finance reform to affect the differentials of housing stock across districts. Thus, this assumption should not influence my theoretical outcomes.
[15] My empirical work focuses at the district level, not the household level. Assuming an equal proportion of households with children across districts allows me to ignore differences in sorting incentives between households with and without children, something which cannot be analyzed in my empirical examination.
[16] The research regarding the school quality production function varies widely, suggesting that no precise way exists to specify this function.
[17] In a review of nearly 400 studies, Hanushek (1997) finds no consistent relationship between school funding and student achievement. Hanushek attributes these insignificant findings to ineffective and inefficient local use of school funds. Card and Krueger (1992) examine specific school quality measures and find small pupil/teacher ratios, higher teacher pay, and longer school years positively affect labor-market outcomes. Similarly, Darling-Hammond (1998) argues that small schools, small class sizes, challenging curriculum, and highly-qualified teachers all have been shown to positively affect student achievement. Funding level, therefore, is probably a necessary, but not sufficient condition for school quality.

by school districts allows me to use school funding as a proxy for school quality. The relationship between funding and school quality is assumed to be positive and demonstrate decreasing marginal returns. Furthermore, I assume the quality of a school is also affected by peer inputs, such as peer ability.[18] Thus, households consider both the funds and peers associated with each school district in their residential decision. Rewriting Equation (2), allows us to consider a household's residential decision with respect to school funding and peer inputs. The household chooses district *i* if:

$$\begin{aligned}&[\frac{U_i(f(funding_i, peerinputs_i), privcsmp)}{\lambda} - (t_i * H)] > \\ &[\frac{U_j(f(funding_j, peerinputs_j), privcsmp)}{\lambda} - (t_j * H)]\end{aligned} \quad , \forall i, j \text{ districts} \qquad (3)$$

Initial Equilibrium

Before reform, an income-segregated residential equilibrium exists, where poor and wealthy households reside in different districts due to the segregating forces of the school quality inputs and possibly private consumption. Additionally, in the first period, school funding is completely localized, where the consumed-to-spent ratio of school quality utility to school funds in every district equals some constant.[19] In other words, each district generates and spends all of its school funds through a local property tax. Assuming a perfectly competitive housing market, in equilibrium, each household within the district maximizes its net monetized utility. In this Pareto optimal condition, no household can increase its net monetized utility by moving to another district. Thus, for any household,

[18] Hanushek et al. (2003) find that peer achievement positively affects achievement growth, with all students benefiting from high-achieving peers.
[19] I assume the constant is positively related to a household's utility function.

$$[\frac{U_i(f(funding_i, peerinputs_i), privcsmp)}{\lambda} - (t_i * H)] = [\frac{U_j(f(funding_j, peerinputs_j), privcsmp)}{\lambda} - (t_j * H)], \ \forall i, j \text{ districts} \quad (4)$$

In this initial equilibrium, stark contrasts between school districts exist, as funding depends on local property wealth. When compared to wealthy districts, poor districts raise and spend little on schools as a result of their low property tax base. Moreover, households in poor districts experience negative peer effects, as most poor households are segregated into separate districts. This implies that under the initial equilibrium, poor households experience a substantially lower monetized utility from public schooling relative to those residing in wealthy districts, as both inputs into the school quality function are smaller. More generally, under this equilibrium, the differences between net monetized utility across households are explained by both the public and private inputs, as poor households consume fewer private goods *and* inferior public schooling when compared to wealthy households. Those who make the case for equity in education focus on this discrepancy of public good provision and argue for a more centralized funding system.

School Finance Reform

By completely centralizing school finance, reform effectively equalizes the funding input in the school quality production function across all districts, reducing the number of district-specific public good variables in the monetized utility equation to one (See Equation 5).[20] The exogenous shock of school finance reform on the initial equilibrium disrupts a household's maximization of net monetized utility, as households

[20] Centralization of school finance is defined as the state redistributing the funds generated through local property taxes equally per pupil across all districts.

are no longer in a Pareto optimal situation. In other words, the net monetized utility of living in school district *i* is not equal to *j*'s, thus, households move to other districts to maximize their net monetized utility.

$$[\frac{U_i(f(peerinputs_i), privcsmp)}{\lambda} - (t_i * H)] \neq [\frac{U_j(f(peerinputs_j), privcsmp)}{\lambda} - (t_j * H)],$$

$$\forall i, j \text{ districts} \qquad (5)$$

Specifically, the consumed-to-spent ratio faced by households living in a poor district increases when school finance is centralized, as poor districts experience a growth in marginal utility generated from a rise in district public school funding. In other words, while poor districts contribute a relatively smaller fraction of total funding for public schools, they spend the same amount as wealthy districts on public education. Thus, holding private consumption constant, poor districts become more attractive places for households to locate, as the net monetized utility in these areas increases. [21]

New Equilibrium

Households respond to this exogenous finance reform shock by moving until they once again maximize their net monetized utility. Because previously poor districts contribute relatively less to public education while receiving equal funding (their consumed-to-spent ratio increases), wealthy households move to these districts and increase the tax bases, which effectively reduces the poor districts' consumed-to-spent ratios.[22] In contrast, the movement of households from previously wealthy districts lowers the wealthy districts' tax bases, increasing the ratio faced by wealthy districts. A

[21] This increase, however, is dependent on the strength of peer inputs in the school quality production function. If peer inputs play a major role in determining school quality, wealthy households may choose to stay in wealthy districts as the net monetized utility falls only slightly.
[22] To avoid a limit on the number of households moving into one district, I assume a perfectly elastic housing supply.

new equilibrium is reached when all households are living in the district that maximizes their net monetized utilities and every district has a consumed-to-spent ratio equal to the initial constant. Unlike the initial equilibrium, significant income sorting is required to equalize the consumed-to-spent ratio of school quality utility to school funds across all districts.

While theory suggests income sorting will occur, it does not predict perfect income integration. Peer inputs, which may be correlated with household income, are still considered in the household's utility function. Thus, the amount of income integration also relies on the relative importance of peer effects in the school quality production function. As stated previously, research regarding this function is unclear as to the role peer inputs play. Additionally, school finance reform may *increase* residential income integration if households are assumed, during the reform period, to internalize the externality generated by income segregation across communities. In other words, if households internalize the decreasing returns of having all human capital located in one community, the incentive to sort by income is decreased and a less segregated equilibrium is reached (Fernandez, 2001). The existence of private schools across districts may also increase residential income integration, as wealthy households may choose to move to previously poor districts and send their children to a private school.[23] Therefore, theory predicts that school finance reform will decrease residential income segregation, but to what extent remains unclear.

[23] Nechyba (2002) finds that a perfectly competitive private school market significantly increases the level of residential income integration when localized school finance is centralized under reform.

Summary Statistics

In light of theory, an ideal dataset for the examination of KERA's effect on residential segregation would center on household level variables over a longer time period (for instance, twenty years). An analysis meeting these requirements allows the researcher to observe specific relationships among potential residential decision factors within each household as reform is implemented. Additionally, with data at the household level, the researcher could construct income inequality indexes for each school district, such as the Gini coefficient, which would provide for the ideal dependent variable. Since the decision to move is not made precipitously, a longer time period will allow the researcher to measure additional residential movement, which may be caused by a reform-induced increase of peer effects in the previously low-spending districts. In other words, with data at the micro level over a longer time period, the researcher can empirically test how a specific household's utility function is affected by the exogenous shock of school finance reform and the potential resulting feedback effects. Due to data availability issues however, I am unable to obtain data of this type.

The dependent variable throughout all regressions is the percent below poverty within each district. Although not ideal, this measurement should proxy for district income segregation. As highlighted in the theoretical section, we expect to see a decrease in the percent of households below poverty in low-spending and poor district as a result of reform. In addition, all previous literature addressing the effect of reform on income heterogeneity use the percent of households or families below poverty as their measure for income segregation.[24] The following section first discuses the data I have accessed and reviews my collection procedures. I then provide statistics on the dataset, comparing

[24] Aaronson (1999), Downs & Figlio (1999b), and Lamm (2001).

Kentucky and Tennessee, and use these statistics to both provide initial analysis and identify potential problems that may affect a difference-in-differences estimation.

Data Sources

I derive the demographic and industry variables from the 1990 and 2000 US Decennial Censuses.[25] Specifically, I accessed the School District Demographics System (SDDS) provided by the National Center for Education Statistics (NCES), which allows users to download select demographic data at the school district level from the 1990 and 2000 Censuses. The 1989-90 and 1999-2000 NCES Longitudinal School District Fiscal-Nonfiscal Files supply the education finance measurements, specifically the total per pupil expenditure data. Every data observation is taken at the school district level for both Kentucky and Tennessee during the years 1990 and 2000.

A number of issues became apparent during the data collection process. First, between 1990 and 2000, NCES changed the way it classified some Tennessee school districts. In particular, the data for a number of school districts in 2000 are broken down into the city or cities within the actual school district.[26] To address this problem, I take the weighted average of the variables across the district and all the sub-districts identified, using total population and total households as weights for respective population and household variables.[27] Second, I am unable to incorporate three Kentucky

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[25] Downloaded from http://nces.ed.gov/surveys/sdds/.

[26] For instance, Coffee County School District is broken up into "Coffee County School District" *and* "Coffee County School District in Manchester", even though no Coffee County School District in Manchester exists.

[27] In the Coffee County example, to find the 2000 median household income, I multiplied both median household entries of the "Coffee County School District" and "Coffee County School District in Manchester" by their respective number of total households and then divided by the sum of the total households.

school districts due to incomplete data.[28] Third, because I am unable to access private school data at the school district level, I use percent enrolled in private school at the county level.[29] Most districts in Kentucky and Tennessee are entire counties; however, for districts within a county, I assign their respective counties' private school measures.

Total Districts Statistics

Table 1 provides variable definitions, while Tables 2 and 3 detail the summary statistics and give a total district comparison for each state in each time period. Comparing the means of the Kentucky and Tennessee variables during both time periods reveals expected similarities between the two states. Both states are predominately white, exhibit mean poverty levels above the national average for both years (US Census Bureau), and have a similar rural makeup, along with a comparable mean percentage of renter occupied housing. In addition, the age composition and the educational background of residents in both states are similar. The tables do highlight some pertinent differences between the two states. Most notably, Tennessee not only has fewer school districts in both time periods (136 versus 175 Kentucky districts), but those districts also have a mean population roughly twice that of Kentucky (a 2000 mean population of 43,404 versus 22,915). This may affect the residential sorting decisions of households, since both a larger population and a fewer number of districts could theoretically decrease a household's incentive to sort by income across districts within a state.[30]

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[28] Those districts are Anchorage Independent School District, Fort Campbell Dependent Schools, and Fort Knox Dependent Schools – all of which are missing school finance variables. Coincidentally, Clark (2003) excludes Anchorage Independent School District because it is a "tremendous outlier in median income or current expenditures per pupil."

[29] I access these data directly from the 1990 and 2000 Censuses.

[30] The larger a district's population, the more likely it *will not* be homogeneous (with respect to the distribution of income). Similarly, the fewer number of districts within a household's residential decision, the lower the probability is that districts will appeal to specific household desires. In other words, both

Applying a difference-in-differences regression approach should address these initial differences in sorting. The number and size of districts in a state, however, may affect how households respond to the exogenous shock of school finance reform.

To test the above hypothesis, I ran t-tests on the 1990 mean school district in both states, which reveal some differences in income distribution. Specifically, the 1990 mean Kentucky district has a significantly higher percentage of households with incomes below $15,000. In addition, the 1990 mean Tennessee district has a significantly higher percentage of households with incomes between $15,000 and $40,000. Supporting the notion that larger districts have greater income heterogeneity, the t-tests show that Tennessee districts have somewhat less income stratification within districts. This relationship may affect the results across all Kentucky and Tennessee districts, as wealthy families are less likely to sort into a district of extreme poverty, thus understating the impact of KERA.

Poor and Low-Spending Districts Statistics – Is Tennessee a good control?

Tables 4 and 5 isolate the districts in the lowest quartile of the 1990 total per pupil expenditure distribution, while tables 6 and 7 detail summary statistics for the poorest 25% of 1990 districts based on the percent of households below poverty. Unlike the total district population findings, the mean population of low-spending Tennessee districts is *smaller* in both years relative to Kentucky (but not significant at the 5% level). Consequently, the income stratification in the mean Tennessee district should be roughly comparable to Kentucky's mean district. T-tests reveal this to be true, as the household income distribution in the mean Tennessee district is similar to Kentucky's for the

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statistics suggest that residents in Tennessee will have a lower incentive to sort, since the districts across Tennessee are more comparable than Kentucky's districts.

majority of the income brackets.[31] Therefore, when looking solely at the income distribution between districts, the low-spending Tennessee districts appear to be a suitable control group.

T-tests suggest poor districts, however, differ across states in regard to median income and the income distribution. Specifically, poor Kentucky districts have a significantly lower median income and higher percentage of households with income below $10,000 (almost 40%). In contrast, poor Tennessee districts have a significantly higher number of households with incomes ranging between $15,000 and $39,999.[32] These results imply that households living in poor Kentucky districts are more likely to be in extreme poverty, whereas households in poor Tennessee districts are more moderately distributed across income categories relative to Kentucky. These initial dissimilarities may bias difference-in-differences estimates downward, as households are less likely to move to an area of extreme poverty.

Differences between state education finance systems can be seen in the mean total expenditure per pupil variable, as Kentucky contributes significantly more to its low-spending districts relative to Tennessee in both 1990 and 2000. Similar to the poverty and unemployment measurement, the difference in mean expenditures potentially introduces a problem in the estimation process if a per pupil spending threshold exists, since school funding's diminishing marginal returns implies that school quality cannot be significantly improved above a certain funding limit.[33] If KERA results in increasing funding to

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[31] Tennessee's mean low-spending district has a significantly higher number of households with $15,000 to $25,000 in yearly income. All other income brackets are statistically comparable to Kentucky's mean low-income district.
[32] Also, poor Tennessee districts have a higher number of households with income between $45,000 and $49,999.
[33] See Hanushek (1997).

Kentucky's low-spending districts above this threshold, the findings will understate the true impact reform similar to KERA has on income sorting.

While the variations discussed above have the potential to bias difference-in-differences estimates, there exist a number of similarities between the two states. Among other variables, both poor and low-spending districts exhibit comparable education and age characteristics across states. Additionally, Tennessee's education reforms throughout the decade reflect the normal trend of finance reform across the country, and Clark (2003) convincingly proves these reforms were relatively weak in comparison to KERA. It remains important, however, to consider these significant initial differences between states when interpreting the empirical results, as the potential for biased estimates exists.

Initial Analysis – Did KERA pull poor and low-spending districts up?

For KERA-induced residential resorting to occur in low-spending districts, KERA must be progressive in regard to district per pupil expenditure levels. In other words, KERA must affect the per pupil expenditure level rankings of districts, pulling initially low-spending districts up to a higher spending ranking in 2000 relative to other districts. Likewise, for KERA-induced resorting to occur in poor districts, those districts must experience a higher increase in per pupil expenditures when compared to other districts. Clark (2003) shows that KERA's effect on *per pupil current expenditures* in relation to *district median income* is progressive, as districts with lower incomes spent, on average, more per pupil than rich districts by 2000. Her analysis, however, only briefly highlights the movement in current expenditures of low-spending districts.[34]

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[34] Somewhat surprisingly, Clark finds the ratio of per pupil expenditures at the 10^{th} percentile to the median decreased from 1990 to 2000, suggesting that KERA may not have pulled low-spending districts up to an equalized funding level. Conversely, the ratio of the 25^{th} percentile to the median increased.

My investigation of KERA's progressiveness in relation to low-spending districts uncovers mixed results. Statistical tests comparing low-spending Kentucky districts to the rest of the state find that the mean and median change in total per pupil expenditure levels is statistically insignificant between groups.[35] These findings suggest that, when considering initial district total per pupil expenditure levels, instead of equalizing the expenditures of low-spending districts to other Kentucky districts, KERA increased expenditures for all districts uniformly. Such a result would generate no incentive for households to relocate, as all districts experience roughly the same increase in spending.

In contrast, charts graphing the expenditure rankings of districts in both Kentucky and Tennessee highlight substantial movement in ranking for low-spending Kentucky districts post reform (See Charts 1 and 2). In particular, the Kentucky chart reveals that approximately 70% of low-spending districts, and roughly 59% of districts initially below the median expenditure level moved to a higher spending quartile by 2000.[36] Contrary to the t-test results, these findings suggest that KERA did, in fact, generate some substantial changes in spending levels which may motivate households to relocate.[37]

Since I primarily classify poor districts via the percent of households in poverty distribution and not median income, I additionally need to address KERA's progressivity

[35] This result holds when mild and severe outliers are excluded. Mild outliers are defined as districts with per pupil expenditure changes that are either: a.) less than or equal to the 25th percentile of the change in per pupil expenditure – 1.5*(inter quartile range) of their grouped districts, or b.) greater than or equal to the 75th percentile of the change in per pupil expenditure + 1.5*(inter quartile range) of their grouped districts. Similarly, severe outliers are defined by the same expression, except the inter quartile range in multiplied by three. Statistical tests refer to the t-test for the equality of the means and a K-sample test for the equality of the medians.

[36] The 59% calculation includes poor districts that remained in the highest spending quartile from 1990 to 2000.

[37] When compared to Tennessee findings, however, the Kentucky numbers are not significantly different, which suggests that, with respect to the expenditure changes of initially low-spending districts, KERA's finance reform is not extremely different from the reforms undergone in Tennessee throughout the decade. If Tennessee's reform history regarding expenditure changes of initially low-spending districts is in fact not representative of the nation's, KERA's effect on income integration may be biased downwards.

with regard to the household poverty rate. A t-test on the equality of the means reveals that, when outliers are excluded, the mean change in total expenditures per pupil in poor districts is not significantly different from the mean change in all other Kentucky districts. The poor district median change, however, is significantly larger at the 10% level when outliers are excluded. At best, these statistical comparisons imply that KERA marginally improved poor districts' expenditures relative to the rest of the state.

Charts 3-6 reveal that while KERA may have only marginally improved the total expenditure level over time, poor districts were already spending equally per pupil, if not more, than the other Kentucky districts. When compared to Tennessee's initial distribution (Chart 5), which displays a wide distribution around the trend line and negative relationship between the poverty rate and total per pupil expenditures, it is clear that 1990 Kentucky districts were more equally funded across poverty rate. This is a surprising result that differs from Clark (2003), who finds Kentucky's 1990 finance system to be regressive when considering current expenditures per pupil and median income. Specifically, Chart 3 implies that Kentucky already funded poor districts equally – in other words, Kentucky poor districts did not need to be pulled up. Chart 4, nevertheless, suggests poor districts continued to receive increased funding over time, which is supported by the numbers, as roughly 59% of poor districts moved to a higher spending quartile (or remained in the highest one) in 2000. Additionally, the slope of the trend line in Chart 4 (post-KERA) is significantly steeper than Chart 3 trend line's slope (pre-KERA), which suggests that KERA significantly increased the progressivity of Kentucky's school finance system. Although the 1990 Kentucky results differ from Clark

(2003), the numbers, along with the comparison of slopes do reflect some progressivity in total expenditures per pupil when considering household poverty rate.[38]

The mixed results suggest KERA may or may not generate enough incentives relative to Tennessee for households living in higher spending districts to move to previously low-spending or poor districts. That said, there is evidence that the majority of poor and low-spending Kentucky districts were pulled up in funding by 2000. While Clark (2003) convincingly illuminates the progressivity of KERA in relation to current expenditures and low-income districts, it is not fully clear that KERA's extreme progressivity holds when considering total per pupil expenditures across either initially low-spending districts or poor districts classified by household poverty rate. Thus, to address this discrepancy, my robustness checks include districts classified by their median household income and median housing unit value.

Initial Analysis – Changes in low-spending and poor districts

A comparison of means reveals that the change in the percent of households below poverty declines in both states' low-spending districts between 1990 and 2000, with Kentucky and Tennessee experiencing a roughly 3.5% and 2.5% drop respectively. Correspondingly, the means calculated for poor districts in each state are negative, as the household poverty rate in Kentucky falls by roughly 5.7%, while the Tennessee poverty rate decreases by approximately 4.8%. The differences in both the low-spending and poor

[38] One possible explanation is the difference in school finance variables analyzed. Current expenditures provide insight into the daily operations of districts, while total expenditures include among others, capital outlays and expenditures on programs outside of normal public education. If I had more time to continue this research, I would primarily use current expenditures, as this measurement provides better insight into money spent purely on public education and can more aptly be used to compare finances across states (St. John et al., 2007). It is important to mention, however, my failure to use current per pupil expenditures in this comparison will not affect my overall results, as per pupil expenditure is not included in my regressions.

district means, however, are statistically insignificant across states, which suggests initially that KERA did not alter income stratification across districts.

Analysis

To estimate KERA's impact on Kentucky's residential sorting patterns across districts, I implement a difference-in-differences analysis and use the percent of households below poverty (perbelowpov) as the primary dependent variable in my empirical model, since it is both indexed to inflation and a measure of income *within* the districts. In particular, along with the control variables, I regress the dependent variable on an interaction term equal to the multiplication of a Kentucky dummy variable and a Pre/Post KERA dummy variable.[39] This interaction term, labeled "interact", will carry in its coefficient the impact of KERA on income segregation across Kentucky districts. My empirical model mirrors Clark (2003), which similarly implements an interaction variable to calculate KERA's effect on ACT scores.

My primary analysis focuses on low-spending and poor districts, specifically districts in the lowest quartile of 1990 total per pupil expenditures and districts in the highest quartile of the 1990 household poverty rate distribution. While the theory outlined above assumes a completely localized school funding scheme in which poor districts and low-spending districts are synonymous, in the real world, low-spending districts are not always the poorest districts. Downes and Figlio (1999a) argue the greatest amount of reform-induced residential movement should be observed in low-spending districts – not poor districts. The authors explicitly highlight this weakness in

[39] The Kentucky dummy variable equals one when a school district is located in Kentucky and zero when a school district is located in Tennessee. The Pre/Post KERA dummy variable equals one for 2000 school districts and zero for 1990 school districts. The interaction term resulting from the multiplication of these two dummy variables, equals one for all 2000 Kentucky school districts and zero for all other districts.

Aaronson's (1999) analysis, which focuses on heterogeneity changes in poor districts, and suggest that research should concentrate on residential movement in low-spending districts. Previous research on KERA, however, identifies KERA's significant role in equalizing school funding across districts, especially in regard to property wealth and income.[40] Thus, while I primarily focus on both poor and low-spending districts, for the purpose of robustness, I also consider both district median household income and district median housing unit value in my analysis.

Expected Signs

District demographic variables significantly affect residential decisions. Specifically, I include in my primary analysis percent rural population, percent renter-occupied housing, unemployment rate, median household income, age, education level, and race. Since significant portions of both Kentucky and Tennessee are located in the rural and poor Appalachian Region, I expect the percent of rural population within a district to be associated with an increase in poverty.[41] In addition, since renting signifies a lack of wealth or income, I predict the percent of renter-occupied housing to be similarly related to increased poverty. Age and education level are anticipated to negatively impact percent below poverty, as wealth typically increases with both. Race carries an ambiguous predicted effect, since racial discrimination in the housing and labor markets may cause the race variables to affect the dependent variable positively. If an insignificant amount of racial discrimination exists, however, race should not affect the percent below poverty, as both income and education are controlled for.

[40] Adams & White (1997), Clark (2003), Hoyt (1999).
[41] See CensusMapper (2006).

In addition to demographic variables, the empirical framework includes a measurement for private school attendance. Specifically, the percent enrolled in private school carries an uncertain sign since incentives exist for private schools to locate in both rich and in poor districts. For the purpose of controlling for any macroeconomic shifts, thirteen industry dummies are added in later phase of the model. In particular, the dummies equal one, if the district percentage of laborers within one industry is greater than the state mean that year, and zero otherwise.

Regression Analysis

The difference-in-differences approach will calculate the average change in the percent below poverty in Kentucky and subtract the average change in the percent below poverty in Tennessee. The subsequent result represents KERA's effect on the percent below poverty, holding all else constant. My primary analysis implements two phases of this model, where the 2nd Phase incorporates industry dummies. I additionally run regressions for the 2nd Phase using ten different groups of districts as robustness checks.[42] The generalized form of the 2nd Phase can be seen below:

$$perbelowpov_{dt} = \beta_0 + \beta_1 ky_{dt} + \beta_2 post_{dt} + \beta_3 interact_{dt} + \beta_4 X_{dt} + \beta_5 Z_{dt} + \varepsilon_{dt} \quad (6)$$

where $perbelowpov_{dt}$ represents the percent below poverty within district *d* in the year *t*, ky_{dt} is a dummy variable equal to one if a school district is located in Kentucky and zero if the district is located in Tennessee, $post_{dt}$ is a dummy variable equal to one for 2000

[42] In order, the robustness groups are: (1) Poor Districts defined by median household income (the poorest quartile of districts in 1990); (2) Poor Districts defined by median household value (the poorest quartile of districts in 1990); (3) 10th Percentile Low-Spending Districts; (4) 2nd Spending Quartile (districts in the 2nd quartile of total per pupil expenditure); (5) 3rd Spending Quartile (districts in the 3rd quartile of total per pupil expenditure); (6) Highest Spending Quartile (districts in the 4tt quartile of total per pupil expenditure); (7) 10th Percentile Poor Districts; (8) 2nd Poorest Quartile (districts in the 3rd quartile of household poverty rate); (9) 2nd Richest Quartile (districts in the 2nd quartile of household poverty rate); and (10) Richest Districts (districts in the 1st quartile of household poverty rate).

school districts and zero for 1990 school districts, ε_{dt} is the stochastic error term, while X_{dt} and Z_{dt} equal vectors of demographic/school controls and industry dummies respectively. The variable of interest, $interact_{dt}$, is generated by multiplying the ky_{dt} and $post_{dt}$ dummies, and equals one for all 2000 Kentucky school districts and zero for all other districts.

I assume serial correlation is insignificant in my empirical approach, since the data are from only two time periods. Additionally, the low number of observation years makes any correct for serial correlation quite difficult. Heteroskedasticity, alternatively, is expected and confirmed to be present in both phases, as the Park Test identifies evidence of heteroskedastic residual patterns for all analyzed groups.[43] To control for heteroskedasticity, I use the "robust" function in STATA, which creates estimates containing heteroskedasticity-corrected standard errors.[44]

In addition to heteroskedasticity, the empirical model is plagued with multicollinearity, as many of the demographic/school controls and the industry controls are significantly correlated.[45] It remains difficult to correct for this, because the majority of correlations make sense and, moreover, the controls theoretically belong in the model. The impact of multicollinearity – specifically, increased R-squared values and standard errors – may partially explain my results, which I detail below.

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[43] Specifically, the Park Test finds the coefficients of the log of median household income (low-spending and all districts), percent rural (poor districts), the log of total per pupil expenditure (2nd spending quartile), and the percent with a 12th grade education or less (3rd spending quartile) all significant when regressed as a double-log regression of the squared residual.

[44] Explicitly, the "robust" function predicts the variance based on a covariance matrix and a list of equations regarding each variable (STATA Manual).

[45] In particular, both percent rural and percent renter-occupied housing, and percent 12th grade or less education and the log of median household income are severely negatively correlated (-.76). Further, the unemployment rate is negatively correlated with the log of median household income (-.74) and positively correlated with the percent 12th grade or less education (-.63).

Results

Supporting the difference in means comparison discussed in the Summary Statistics section, the interaction coefficient in both phases of my primary results is statistically insignificant, while the predicted magnitude is roughly zero.[46] The reader should refer to Table A below for selected primary results and Tables 8-12 for complete regression results. The Phase 1 Low-Spending regression estimates that KERA had exactly zero effect on the household poverty rate in low-spending districts, while the Phase 2 Poor regression estimates that KERA increased the percent of households below poverty by 0.1%. Both coefficients are insignificant, as their respective t-statistics are extremely low (-0.01 and -0.11). Additionally, 95% confidence intervals across all primary regressions suggest that at most, KERA either decreased the poverty rate by 1.5% or increased the poverty rate by 1.8% (See Table 9). Further, regressions classifying poor districts by both 1990 median household income and 1990 median household value, predict KERA to have an insignificant effect of less than 1% (See Table 10).

The statistical insignificance and the small magnitude of the interaction coefficient hold across virtually every robustness check, lending support to the conclusion that KERA did not affect residential income segregation across districts.[47] Furthermore, since the interaction coefficient demonstrates consistent magnitude and insignificance across the majority of robustness checks, the results do not disprove the hypotheses discussed in the Summary Statistics section regarding an underestimation of

[46] "Statistically significant" coefficients refer to the 5% significance level.
[47] In fact, the only significant estimate of the interaction term occurs in the 2nd Richest Quartile regression. Specifically, KERA is estimated to decrease poverty in the 2nd quartile of household poverty rate distribution by approximately 1%. This result is somewhat unexpected theoretically, but might be explained by the interaction coefficient in the 10th Percentile Poor regression. In particular, KERA is estimated to increase the poverty rate of the poorest 10% of districts (although the coefficient is insignificant). It is possible that the relatively few poor households in the 2nd Richest Quartile moved as a result of KERA to the 10th Percentile Poor districts, increasing the poverty rate of the previously poorest 10% of districts.

KERA in low-spending and poor districts. In fact, the largest absolute magnitude for the interaction coefficient over all primary regressions is -.003, found in the Phase 2 Low-Spending regression, suggesting that KERA reduced the percent below poverty in low-spending Kentucky districts by 0.3%.

Median income and unemployment rate, along with percent renter occupied housing, percent with education at or below the 12^{th} grade level, and percent 65 and older maintain statistically significant coefficients and exhibit predicted signs in both phases of all primary regressions. Unemployment rate is expected to increase the percent below poverty in low-spending districts the greatest, as both phases estimate a 10% increase to result in a roughly 4% growth of the percent below poverty. In contrast, the percent enrolled in private schools is predicted to have approximately zero effect on the household poverty rate in both low-spending and poor districts, however, all coefficients are statistically insignificant. The percent black coefficient is positive and significant in both Phase 1 and Phase 2 Poor regressions, which tenuously suggests that racial discrimination may exist in the housing and/or labor markets of poor Kentucky districts. Further, while the percent rural coefficient exhibits its expected sign, its significant holds only in the Phase 1 Low-Spending regression.

Table A: Primary Results

Classification	Low-Spending Districts Phase 1	Poor Districts Phase 1	Low-Spending Districts Phase 2	Poor Districts Phase 2
Ky	0.018	0.011	0.019	0.017
	(3.31)**	-1.47	(3.27)**	(2.48)*
Post	0.021	0.012	0.026	0.009
	(2.94)**	-1.55	(3.29)**	-1.11
interact	**0**	**0.003**	**-0.003**	**0.001**
	-0.01	**-0.36**	**-0.53**	**-0.11**
lnmedhhinc	-0.228	-0.279	-0.224	-0.273
	(10.74)**	(13.82)**	(10.53)**	(12.92)**
perblack	0.011	0.05	0.001	0.046
	-0.48	(2.48)*	-0.05	(2.12)*
pernotwhbl	-0.108	-0.49	-0.048	-0.373
	-0.94	-1.57	-0.43	-1.21
perrural	0.025	0.008	0.015	0.011
	(3.04)**	-0.8	-1.79	-1.06
perrentocc	0.193	0.134	0.16	0.126
	(5.45)**	(3.40)**	(4.37)**	(3.13)**
per12thorless	0.106	0.154	0.11	0.126
	(2.37)*	(3.27)**	(2.27)*	(2.53)*
per2064	-0.094	-0.33	-0.205	-0.311
	-0.79	(2.37)*	-1.46	(2.14)*
per65up	-0.341	-0.582	-0.39	-0.525
	(3.47)**	(6.62)**	(3.78)**	(6.62)**
perprivenroll	0	0.001	-0.001	0.001
	-1.07	-1.75	-1.51	-0.75
unemprate	0.372	0.188	0.409	0.196
	(4.14)**	(3.03)**	(4.36)**	(2.97)**
Constant	2.473	3.193	2.499	3.11
	(10.00)**	(13.39)**	(10.54)**	(13.12)**
Observations	156	156	156	156
R-squared	0.94	0.93	0.95	0.94

Dependent Variable: perbelowpov; Robust t statistics in parentheses
* significant at 5%; ** significant at 1%

In general, the results suggest multicollinearity and possible omitted variable bias as they reveal inflated R-squared values across regressions, low test statistics, and at times, some dramatic changes in control variable coefficient magnitudes. For example, the unemployment rate coefficient varies between .049 and .377 and is insignificant in half of the low-spending and poverty robustness checks (Table 11 and 12). Although insignificant, the percent between ages 20 and 64 coefficient doubles between Phase 1 and Phase 2 Low-Spending primary regressions. Additionally, the average R-squared value in both Phase 1 regressions, which include the *least* controls of any regression used, is 0.935.

Discussion

The primary analysis suggests that KERA has no impact on changes in residential income segregation across Kentucky low-spending or poor school districts over the 1990-2000 time period. The insignificance of the interaction coefficient may be attributed to multicollinearity, which is reflected in the high R-squared value in the primary regressions.[48] While multicollinearity may somewhat explain the insignificance of the interaction variable, it is also rare to have a statistically significant zero coefficient. With this in mind, in order to convincingly prove an insignificant zero coefficient "significant", one of two relationships must be shown: either the interaction coefficient is zero and insignificant across all subgroups, or the coefficient is significant and offsetting across all subgroups.[49] I, however, do not have the data to prove either since the percent below poverty is the only inflation-indexed income measurement I have at the school district level.

I am able to compare the effect of KERA across different groups within Kentucky, specifically the ones who are theoretically predicted to experience an increase in the percent below poverty, as wealthier households move out in favor of living in previously low-spending or poor districts. Specifically, the low-spending and poor robustness groups, detailed in Tables 11 and 12, aim to measure this interaction. The

[48] In fact, the lowest R-squared value across all regressions in Phase 2 and Phase 3 is .93.
[49] The subgroups refer to the percent of households in each indexed income bracket *within* each low-spending or poor district.

results indicate KERA has virtually no impact on the change in percent below poverty in these districts.[50] In addition, the interaction coefficient is roughly zero and insignificant across the other two robustness groups, namely poor districts classified by both median household income and median household value (Table 10).

Admittedly, this “poor-man’s” approach does not take into consideration the potential difference in the in- and out-migration across districts, which could significantly affect the dependent variable within each regression. In possible further exploration however, I may be able to obtain inflation-indexed income brackets at the census tract or block group level and aggregate them into school district-level measurements via Geographic Information Systems.[51] Such an approach would negate the potential differential impact of the in- and out-migration across groups, enabling me to test whether one of the two aforementioned relationships exist solely within low-spending or poor districts.

In addition, there is evidence of possible omitted variable bias, as a number of variable coefficients fluctuate in magnitude and significance across robustness checks. In the future, I may address this by including a crime variable, a measurement for school peer effects, and possibly a measurement identifying differential effects of KERA.[52] My classification of low-spending groups may also be improved through the use of current district expenditures, as it provides a better measurement of public school spending

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[50] See Footnote 45.
[51] Technically, I would overlay two shapefiles, one with the block group or census tract indexed data and boundaries and the other with the school district boundaries. Next, I would spatially join the block group or census tract indexed data to each school district, aggregating the indexed data to the school district-level.
[52] Presently, my analysis assumes KERA affected all districts in Kentucky equally. It remains likely, however, that districts responded to KERA differently. In fact, because of monetary incentives in the school funding structure, districts have been found to alter the number of students identified as learning disabled (Cullen, 2003). As of now, however, I am unable to identify a variable that identifies differences across Kentucky districts as to how KERA was received.

across districts and states when compared to total expenditures. Furthermore, my analysis is limited with respect to the scope of time. Residential decisions carry large fixed costs, and thus are not easy decisions for households. In addition, households may not internalize the increased school funding in other districts until consistent equalization is shown.

Conclusion

The literature analyzing KERA's effects finds consistent evidence that KERA dramatically changed the funding structure for Kentucky school districts. Indeed, I find similar evidence, as roughly 70% of low-spending districts and approximately 59% of poor districts moved to a higher quartile by 2000 (see Chart 1 and Chart 4).[53] Such a funding change carries with it potential influences outside of the realm of education. The few studies that have analyzed the relationship between school finance and residential income heterogeneity focus on reform across the nation, finding weak and insignificant results (Aaronson, 1999; Downs & Figlio, 1999b; Lamm, 2001). Generalizing reform for the purpose of national studies may contribute to such fragile findings, and until either significant national findings or a number of state-specific finance reform analyses are completed, the question remains: does school finance reform reduce residential income segregation?

The results found in this state-specific analysis suggest that reform does not affect income segregation across districts. Across all estimations, KERA – one of the largest attacks on a state school system[54] – is found to be an insignificant predictor of district changes in the household percent below poverty. Granted, one cannot apply what has

[53] The poor district calculation includes poor districts in the highest 1990 spending quartile remaining there in 2000.
[54] See Adams & White (1997).

happened in one state to the nation, however, this state-specific analysis contributes to both the sparse literature evaluating reform's effect on income heterogeneity, as well as to the understanding of school finance reform as a whole.

There are, nevertheless, significant flaws in my analysis, as the data suffer from multicollinearity and possible omitted variable bias. To the extent that I may be unable to correct these issues, it remains feasible to include inflation-indexed income brackets, which would enable me to run regressions on certain income subgroups within low-spending and poor districts. A more definitive answer to whether KERA affected income segregation across Kentucky districts would necessarily depend on such results.

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Table 1: Variable Definitions
(Demographic, School, and Industry Variables)

Variable	Definition
ky	Dummy variable equal to 1 if district is located in Kentucky
post	Dummy variable equal to 1 if observation is in the year 2000
interact	The independent variable of interest: interaction variable equal to (ky x post)
perbelowpov	The dependent variable: percent of people below the poverty line
totalpop	Total district population
medhhincome	Median household income
perblack	Percent of people who are Black
pernotwhbl	Percent of people who are not Black or White
perrural	Percent of households who live in a rural area
perrentocc	Percent renter occupied housing
per12thorless	Percent of people with a 12th grade or less education (did not complete high school)*
per2064	Percent of people age 20-64
per65up	Percent of people 65 and older
puptotexp	Total expenditures per pupil
perprivenroll	Percent of people age 3 and up attending a private school
unemprate	Unemployment rate
perag1	Percent of labor force in agriculture, forestry, fishing, hunting & mining
pertrans1	Percent of labor force in transportation, warehousing & utilities
perconstruct1	Percent of labor force in construction
permanufac1	Percent of labor force in manufacturing
perinfo1	Percent of labor force in information
perfin1	Percent of labor force finance, insurance, real estate, & rental & leasing
perprofess1	Percent of labor force in professional, scientific, technical services, management of companies & enterprises, & administrative, support & waste management services
peredhealth1	Percent of labor force in health care, social & educational services
perartsfood1	Percent of labor force in arts, entertainment, recreation, accomodation & food services
perotherserve1	Percent of labor force in other services (except public administration)
perpublicadmin1	Percent of labor force in public administration
perwholesale1	Percent of labor force in wholesale trade
perretail1	Percent of labor force in retail trade

All data are from the 1990 and 2000 Censuses with the exception of school finance data, which is from the NCES Longitudinal School District Fiscal-Nonfiscal File, Fiscal Years 1990 and 2000

*The educational attainment measurements for 1990 are for all persons 20 and up, while the measurements in 2000 are for all persons 18 and up.

Table 2: Kentucky Summary Statistics
1990 Demographic, School, and Industry Variables

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
perbelowpov	175	0.2281	0.0974	0.0145	0.5525
totalpop	175	20896	53165	1122	662720
medhhincome	175	26740	8000	10950	52738
perblack	175	0.0402	0.0515	0.0000	0.2337
pernotwhbl	175	0.0050	0.0054	0.0000	0.0411
perrural	175	0.6337	0.3995	0.0000	1.0000
perrentocc	175	0.2807	0.0992	0.1439	0.6306
per12thorless	175	0.3994	0.1056	0.1277	0.6261
per2064	175	0.5659	0.0240	0.4801	0.6423
per65up	175	0.1425	0.0348	0.0633	0.2579
puptotexp	175	4197	507	3207	7458
perprivenroll	175	5.0263	5.9098	0.0000	22.6000
unemprate	175	0.0968	0.0457	0.0249	0.2548
perag1	175	0.0751	0.0664	0.0011	0.3559
pertrans1	175	0.0534	0.0208	0.0159	0.1535
perconstruct1	175	0.0673	0.0230	0.0115	0.1875
permanufac1	175	0.2020	0.0873	0.0205	0.4174
perinfo1	175	0.0294	0.0082	0.0060	0.0518
perfin1	175	0.0409	0.0161	0.0030	0.0973
perprofess1	175	0.0648	0.0119	0.0298	0.0934
peredhealth1	175	0.1709	0.0533	0.0973	0.4503
perartsfood1	175	0.0678	0.0141	0.0379	0.1100
perotherserve1	175	0.0340	0.0072	0.0144	0.0578
perpublicadmin1	175	0.0456	0.0352	0.0126	0.3351
perwholesale1	175	0.0327	0.0152	0.0002	0.1026
perretail1	175	0.1161	0.0269	0.0646	0.2105

Table 2 (con.): Kentucky Summary Statistics
2000 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	175	0.1907	0.0869	0.0296	0.4538
totalpop	175	22915	56332	1125	691270
medhhincome	175	30092	8812	15034	63321
perblack	175	0.0406	0.0537	0.0000	0.3016
pernotwhbl	175	0.0194	0.0118	0.0028	0.0648
perrural	175	0.5950	0.3913	0.0000	1.0000
perrentocc	175	0.2727	0.1037	0.1326	0.5939
per12thorless	175	0.3087	0.0925	0.0810	0.4980
per2064	175	0.5895	0.0239	0.5020	0.6625
per65up	175	0.1384	0.0317	0.0695	0.2459
puptotexp	175	6932	1005	5223	12971
perprivenroll	175	7.9571	6.2185	0.5000	26.1000
unemprate	175	0.0676	0.0299	0.0144	0.1765
perag1	175	0.0486	0.0400	0.0000	0.1948
pertrans1	175	0.0574	0.0206	0.0189	0.1272
perconstruct1	175	0.0772	0.0221	0.0202	0.1643
permanufac1	175	0.1946	0.0803	0.0193	0.3987
perinfo1	175	0.0186	0.0097	0.0000	0.0674
perfin1	175	0.0424	0.0176	0.0168	0.1032
perprofess1	175	0.0484	0.0202	0.0136	0.1220
peredhealth1	175	0.2055	0.0560	0.1158	0.4207
perartsfood1	175	0.0638	0.0220	0.0256	0.1402
perotherserve1	175	0.0460	0.0097	0.0193	0.0741
perpublicadmin1	175	0.0461	0.0303	0.0074	0.2814
perwholesale1	175	0.0286	0.0116	0.0073	0.0662
perretail1	175	0.1222	0.0236	0.0798	0.2048

All data are from the 1990 and 2000 Censuses with the exception of school finance data, which is from the NCES Longitudinal School District Fiscal-Nonfiscal File, Fiscal Years 1990 and 2000

Table 3: Tennessee Summary Statistics
1990 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	136	0.1780	0.0573	0.0515	0.4005
totalpop	136	34669	74951	1154	610337
medhhincome	136	29339	6798	15883	64592
perblack	136	0.0833	0.1084	0.0000	0.5488
pernotwhbl	136	0.0064	0.0054	0.0000	0.0316
perrural	136	0.5939	0.3990	0.0000	1.0000
perrentocc	136	0.2668	0.0936	0.1078	0.5243
per12thorless	136	0.3954	0.0860	0.1087	0.5557
per2064	136	0.5725	0.0266	0.4778	0.6235
per65up	136	0.1507	0.0363	0.0542	0.2496
puptotexp	136	4183	914	2869	8733
perprivenroll	136	3.3625	3.1496	0.2000	16.8000
unemprate	136	0.0767	0.0252	0.0275	0.2015
perag1	136	0.0323	0.0205	0.0020	0.0981
pertrans1	136	0.0458	0.0133	0.0226	0.1086
perconstruct1	136	0.0673	0.0184	0.0232	0.1110
permanufac1	136	0.3061	0.0832	0.1201	0.4796
perinfo1	136	0.0358	0.0090	0.0212	0.0725
perfin1	136	0.0386	0.0152	0.0155	0.0987
perprofess1	136	0.0547	0.0137	0.0226	0.1300
peredhealth1	136	0.1482	0.0354	0.0666	0.2433
perartsfood1	136	0.0624	0.0144	0.0345	0.1283
perotherserve1	136	0.0303	0.0088	0.0151	0.0643
perpublicadmin1	136	0.0403	0.0196	0.0086	0.1320
perwholesale1	136	0.0308	0.0130	0.0017	0.0744
perretail1	136	0.1073	0.0216	0.0525	0.1706

Table 3 (con.): Tennessee Summary Statistics
2000 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	136	0.1527	0.0452	0.0422	0.2941
totalpop	136	43404	86247	2205	649845
medhhincome	136	32351	7655	18938	75877
perblack	136	0.0852	0.1118	0.0000	0.6120
pernotwhbl	136	0.0255	0.0163	0.0032	0.1406
perrural	136	0.5692	0.3645	0.0000	1.0000
perrentocc	136	0.2685	0.0907	0.1232	0.4968
per12thorless	136	0.2996	0.0695	0.0961	0.4429
per2064	136	0.5890	0.0268	0.5048	0.6619
per65up	136	0.1478	0.0358	0.0743	0.2763
puptotexp	136	6143	1496	4521	13786
perprivenroll	136	5.9132	3.8657	0.0000	25.9000
unemprate	136	0.0594	0.0193	0.0262	0.1490
perag1	136	0.0241	0.0170	0.0000	0.0777
pertrans1	136	0.0542	0.0166	0.0226	0.1284
perconstruct1	136	0.0800	0.0235	0.0266	0.1467
permanufac1	136	0.2656	0.0781	0.0822	0.4613
perinfo1	136	0.0163	0.0092	0.0000	0.0557
perfin1	136	0.0422	0.0168	0.0079	0.1132
perprofess1	136	0.0523	0.0297	0.0132	0.2583
peredhealth1	136	0.1719	0.0312	0.1165	0.2577
perartsfood1	136	0.0638	0.0269	0.0260	0.2223
perotherserve1	136	0.0448	0.0103	0.0148	0.0860
perpublicadmin1	136	0.0394	0.0159	0.0128	0.1360
perwholesale1	136	0.0307	0.0113	0.0102	0.0589
perretail1	136	0.1146	0.0184	0.0755	0.1657

All data are from the 1990 and 2000 Censuses with the exception of school finance data, which is from the NCES Longitudinal School District Fiscal-Nonfiscal File, Fiscal Years 1990 and 2000

Table 4: Kentucky Low-Spending* Summary Statistics
1990 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	44	0.2309	0.0858	0.0929	0.3994
totalpop	44	21119	17733	1122	78294
medhhincome	44	26277	6356	16210	39576
perblack	44	0.0250	0.0356	0.0000	0.1783
pernotwhbl	44	0.0044	0.0061	0.0000	0.0411
perrural	44	0.7469	0.3232	0.0000	1.0000
perrentocc	44	0.2444	0.0799	0.1439	0.5086
per12thorless	44	0.4207	0.0952	0.2121	0.5832
per2064	44	0.5688	0.0193	0.5277	0.6068
per65up	44	0.1267	0.0298	0.0633	0.2171
puptotexp	44	3711	138	3207	3863
perprivenroll	44	3.5455	3.7682	0.0000	22.6000
unemprate	44	0.1041	0.0449	0.0410	0.2319
perag1	44	0.0853	0.0788	0.0110	0.3559
pertrans1	44	0.0572	0.0175	0.0330	0.1109
perconstruct1	44	0.0702	0.0254	0.0115	0.1287
permanufac1	44	0.1964	0.0902	0.0248	0.3250
perinfo1	44	0.0276	0.0075	0.0134	0.0504
perfin1	44	0.0382	0.0130	0.0191	0.0823
perprofess1	44	0.0640	0.0115	0.0402	0.0898
peredhealth1	44	0.1655	0.0463	0.1023	0.3842
perartsfood1	44	0.0679	0.0132	0.0379	0.1100
perotherserve1	44	0.0339	0.0063	0.0144	0.0457
perpublicadmin1	44	0.0409	0.0202	0.0184	0.1155
perwholesale1	44	0.0335	0.0139	0.0140	0.0704
perretail1	44	0.1193	0.0267	0.0660	0.2105

Table 4 (con.): Kentucky Low-Spending* Summary Statistics
2000 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	44	0.1959	0.0847	0.0746	0.4056
totalpop	44	23614	19315	1275	73705
medhhincome	44	29537	7953	15667	45093
perblack	44	0.0238	0.0336	0.0000	0.1768
pernotwhbl	44	0.0179	0.0117	0.0052	0.0573
perrural	44	0.6924	0.3107	0.0000	1.0000
perrentocc	44	0.2360	0.0825	0.1400	0.4949
per12thorless	44	0.3232	0.0888	0.1717	0.4868
per2064	44	0.5951	0.0206	0.5327	0.6353
per65up	44	0.1213	0.0213	0.0724	0.1562
puptotexp	44	6591	605	5442	8330
perprivenroll	44	5.8818	4.5932	0.5000	26.1000
unemprate	44	0.0640	0.0275	0.0288	0.1278
perag1	44	0.0526	0.0451	0.0000	0.1948
pertrans1	44	0.0612	0.0200	0.0252	0.1182
perconstruct1	44	0.0813	0.0210	0.0202	0.1303
permanufac1	44	0.1950	0.0845	0.0193	0.3281
perinfo1	44	0.0192	0.0082	0.0031	0.0359
perfin1	44	0.0397	0.0127	0.0192	0.0688
perprofess1	44	0.0455	0.0145	0.0183	0.1033
peredhealth1	44	0.1988	0.0525	0.1255	0.4207
perartsfood1	44	0.0604	0.0174	0.0294	0.1259
perotherserve1	44	0.0456	0.0089	0.0271	0.0666
perpublicadmin1	44	0.0421	0.0170	0.0155	0.1038
perwholesale1	44	0.0316	0.0124	0.0078	0.0662
perretail1	44	0.1257	0.0232	0.0841	0.1908

All data are from the 1990 and 2000 Censuses with the exception of school finance data, which is from the NCES Longitudinal School District Fiscal-Nonfiscal File, Fiscal Years 1990 and 2000

*Low spending districts are those in the lowest quartile of districts ranked by 1990 total expenditure per pupil

Table 5: Tennessee Low-Spending* Summary Statistics
1990 Demographic, School, and Industry Variables

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
perbelowpov	34	0.1879	0.0442	0.1083	0.2868
totalpop	34	14928	11201	1154	51373
medhhincome	34	26914	3707	20742	41352
perblack	34	0.1019	0.1277	0.0000	0.4951
pernotwhbl	34	0.0045	0.0031	0.0000	0.0147
perrural	34	0.6851	0.3694	0.0000	1.0000
perrentocc	34	0.2556	0.0797	0.1161	0.4401
per12thorless	34	0.4362	0.0507	0.3295	0.5230
per2064	34	0.5611	0.0287	0.4778	0.6093
per65up	34	0.1582	0.0345	0.0840	0.2465
puptotexp	34	3386	200	2869	3615
perprivenroll	34	2.2588	1.4896	0.2000	6.7000
unemprate	34	0.0798	0.0236	0.0455	0.1505
perag1	34	0.0363	0.0209	0.0020	0.0833
pertrans1	34	0.0453	0.0107	0.0267	0.0721
perconstruct1	34	0.0681	0.0216	0.0232	0.1012
permanufac1	34	0.3422	0.0621	0.1960	0.4796
perinfo1	34	0.0348	0.0088	0.0230	0.0645
perfin1	34	0.0330	0.0098	0.0155	0.0645
perprofess1	34	0.0499	0.0114	0.0226	0.0724
peredhealth1	34	0.1437	0.0358	0.0909	0.2360
perartsfood1	34	0.0561	0.0106	0.0345	0.0827
perotherserve1	34	0.0263	0.0062	0.0151	0.0430
perpublicadmin1	34	0.0369	0.0180	0.0086	0.1108
perwholesale1	34	0.0275	0.0116	0.0017	0.0520
perretail1	34	0.0998	0.0175	0.0638	0.1475

Table 5 (con.): Tennessee Low-Spending* Summary Statistics
2000 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	34	0.1627	0.0399	0.0744	0.2910
totalpop	34	18052	13740	2205	62315
medhhincome	34	30351	4207	21587	45556
perblack	34	0.1015	0.1326	0.0000	0.5117
pernotwhbl	34	0.0267	0.0226	0.0064	0.1406
perrural	34	0.6907	0.3231	0.0177	1.0000
perrentocc	34	0.2597	0.0846	0.1232	0.4607
per12thorless	34	0.3275	0.0431	0.2486	0.4148
per2064	34	0.5843	0.0284	0.5048	0.6319
per65up	34	0.1481	0.0333	0.0852	0.2503
puptotexp	34	5577	1122	4659	10970
perprivenroll	34	5.0412	2.1507	1.4000	9.8000
unemprate	34	0.0628	0.0257	0.0275	0.1490
perag1	34	0.0296	0.0180	0.0000	0.0679
pertrans1	34	0.0563	0.0135	0.0379	0.1015
perconstruct1	34	0.0807	0.0229	0.0360	0.1375
permanufac1	34	0.3032	0.0614	0.1460	0.4613
perinfo1	34	0.0140	0.0087	0.0000	0.0419
perfin1	34	0.0363	0.0116	0.0176	0.0780
perprofess1	34	0.0397	0.0152	0.0162	0.0766
peredhealth1	34	0.1660	0.0334	0.1237	0.2527
perartsfood1	34	0.0545	0.0260	0.0265	0.1785
perotherserve1	34	0.0417	0.0096	0.0148	0.0648
perpublicadmin1	34	0.0371	0.0143	0.0147	0.0800
perwholesale1	34	0.0301	0.0119	0.0102	0.0589
perretail1	34	0.1108	0.0199	0.0800	0.1478

All data are from the 1990 and 2000 Censuses with the exception of school finance data, which is from the NCES Longitudinal School District Fiscal-Nonfiscal File, Fiscal Years 1990 and 2000

*Low spending districts are those in the lowest quartile of districts ranked by 1990 total expenditure per pupil

Table 6: Kentucky Poor* Summary Statistics

1990 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	44	0.3609	0.0590	0.2893	0.5525
totalpop	44	12283	8947	1122	43586
medhhincome	44	18393	2805	10950	24113
perblack	44	0.0227	0.0421	0.0000	0.2048
pernotwhbl	44	0.0035	0.0044	0.0000	0.0267
perrural	44	0.7990	0.3483	0.0000	1.0000
perrentocc	44	0.2894	0.1071	0.1819	0.6306
per12thorless	44	0.5092	0.0679	0.3174	0.6261
per2064	44	0.5550	0.0167	0.4801	0.5848
per65up	44	0.1356	0.0347	0.0869	0.2579
puptotexp	44	4167	619	3340	7458
perprivenroll	44	2.8068	2.4647	0.0000	14.8000
unemprate	44	0.1527	0.0412	0.0806	0.2548
perag1	44	0.1228	0.0905	0.0011	0.3559
pertrans1	44	0.0558	0.0173	0.0178	0.0949
perconstruct1	44	0.0681	0.0329	0.0115	0.1875
permanufac1	44	0.1477	0.1074	0.0205	0.3492
perinfo1	44	0.0259	0.0108	0.0060	0.0504
perfin1	44	0.0313	0.0114	0.0030	0.0691
perprofess1	44	0.0597	0.0136	0.0298	0.0898
peredhealth1	44	0.1953	0.0622	0.1146	0.3842
perartsfood1	44	0.0694	0.0159	0.0440	0.1100
perotherserve1	44	0.0324	0.0068	0.0144	0.0457
perpublicadmin1	44	0.0434	0.0176	0.0215	0.1195
perwholesale1	44	0.0244	0.0135	0.0002	0.0689
perretail1	44	0.1238	0.0317	0.0797	0.2105

Table 6 (con.): Kentucky Poor* Summary Statistics
2000 Demographic, School, and Industry Variables

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
perbelowpov	44	0.3035	0.0589	0.1753	0.4538
totalpop	44	12681	8982	1275	42440
medhhincome	44	20501	2870	15034	27800
perblack	44	0.0273	0.0539	0.0000	0.3016
pernotwhbl	44	0.0148	0.0101	0.0039	0.0515
perrural	44	0.7609	0.3499	0.0054	1.0000
perrentocc	44	0.2674	0.1041	0.1400	0.5513
per12thorless	44	0.4089	0.0660	0.2333	0.4980
per2064	44	0.5911	0.0246	0.5024	0.6300
per65up	44	0.1336	0.0283	0.0724	0.2271
puptotexp	44	7120	1138	5681	12971
perprivenroll	44	4.8614	2.9800	0.5000	13.9000
unemprate	44	0.1014	0.0267	0.0585	0.1765
perag1	44	0.0698	0.0497	0.0000	0.1948
pertrans1	44	0.0536	0.0166	0.0252	0.0878
perconstruct1	44	0.0745	0.0268	0.0202	0.1643
permanufac1	44	0.1598	0.0987	0.0193	0.3733
perinfo1	44	0.0193	0.0104	0.0000	0.0470
perfin1	44	0.0316	0.0127	0.0168	0.0731
perprofess1	44	0.0382	0.0120	0.0136	0.0668
peredhealth1	44	0.2469	0.0626	0.1333	0.4207
perartsfood1	44	0.0574	0.0175	0.0256	0.1259
perotherserve1	44	0.0438	0.0119	0.0193	0.0741
perpublicadmin1	44	0.0516	0.0226	0.0074	0.1214
perwholesale1	44	0.0227	0.0103	0.0091	0.0490
perretail1	44	0.1290	0.0287	0.0826	0.2048

All data are from the 1990 and 2000 Censuses with the exception of school finance data, which is from the NCES Longitudinal School District Fiscal-Nonfiscal File, Fiscal Years 1990 and 2000

*Poor districts are those ranked in the highest quartile of 1990 percent of households below poverty

Table 7: Tennessee Poor* Summary Statistics
1990 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	34	0.2520	0.0445	0.2042	0.4005
totalpop	34	29934	102851	2426	610337
medhhincome	34	23495	2965	15883	30465
perblack	34	0.1308	0.1693	0.0000	0.5488
pernotwhbl	34	0.0046	0.0029	0.0000	0.0114
perrural	34	0.5539	0.4615	0.0000	1.0000
perrentocc	34	0.3098	0.1035	0.1756	0.4885
per12thorless	34	0.4565	0.0580	0.2833	0.5557
per2064	34	0.5590	0.0260	0.5074	0.6069
per65up	34	0.1596	0.0380	0.1076	0.2496
puptotexp	34	3929	628	2869	5783
perprivenroll	34	2.8412	3.0347	0.2000	14.8000
unemprate	34	0.0957	0.0289	0.0536	0.2015
perag1	34	0.0380	0.0260	0.0020	0.0981
pertrans1	34	0.0455	0.0142	0.0267	0.0898
perconstruct1	34	0.0671	0.0224	0.0248	0.1099
permanufac1	34	0.3063	0.0602	0.1201	0.4485
perinfo1	34	0.0370	0.0089	0.0221	0.0688
perfin1	34	0.0353	0.0107	0.0179	0.0609
perprofess1	34	0.0496	0.0115	0.0226	0.0757
peredhealth1	34	0.1503	0.0341	0.0909	0.2360
perartsfood1	34	0.0627	0.0152	0.0365	0.1010
perotherserve1	34	0.0292	0.0085	0.0168	0.0499
perpublicadmin1	34	0.0449	0.0241	0.0193	0.1320
perwholesale1	34	0.0281	0.0116	0.0017	0.0575
perretail1	34	0.1062	0.0220	0.0666	0.1681

Table 7 (con.): Tennessee Poor* Summary Statistics
2000 Demographic, School, and Industry Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
perbelowpov	34	0.2035	0.0401	0.1248	0.2941
totalpop	34	33126	109375	2380	649845
medhhincome	34	26471	3957	18938	40155
perblack	34	0.1368	0.1779	0.0000	0.6120
pernotwhbl	34	0.0203	0.0109	0.0032	0.0573
perrural	34	0.5693	0.4164	0.0008	1.0000
perrentocc	34	0.3049	0.1084	0.1579	0.4968
per12thorless	34	0.3618	0.0468	0.2470	0.4429
per2064	34	0.5822	0.0335	0.5048	0.6619
per65up	34	0.1551	0.0415	0.1053	0.2763
puptotexp	34	6044	1633	4521	13037
perprivenroll	34	5.4971	4.4396	0.0000	25.9000
unemprate	34	0.0731	0.0244	0.0384	0.1490
perag1	34	0.0281	0.0190	0.0021	0.0777
pertrans1	34	0.0537	0.0163	0.0296	0.1141
perconstruct1	34	0.0815	0.0289	0.0360	0.1456
permanufac1	34	0.2712	0.0528	0.1020	0.3717
perinfo1	34	0.0142	0.0088	0.0030	0.0419
perfin1	34	0.0362	0.0133	0.0079	0.0612
perprofess1	34	0.0430	0.0201	0.0132	0.0944
peredhealth1	34	0.1734	0.0305	0.1186	0.2295
perartsfood1	34	0.0677	0.0336	0.0265	0.1785
perotherserve1	34	0.0443	0.0134	0.0173	0.0737
perpublicadmin1	34	0.0439	0.0223	0.0128	0.1360
perwholesale1	34	0.0272	0.0101	0.0136	0.0519
perretail1	34	0.1156	0.0196	0.0800	0.1657

All data are from the 1990 and 2000 Censuses with the exception of school finance data, which is from the NCES Longitudinal School District Fiscal-Nonfiscal File, Fiscal Years 1990 and 2000

*Poor districts are those ranked in the highest quartile of 1990 percent of households below poverty

Table 8: Primary Results (Full)

Classification	Low-Spending Districts Phase 1	Poor Districts Phase 1	Low-Spending Districts Phase 2	Poor Districts Phase 2
ky	0.018	0.011	0.019	0.017
	(3.31)**	-1.47	(3.27)**	(2.48)*
post	0.021	0.012	0.026	0.009
	(2.94)**	-1.55	(3.29)**	-1.11
interact	0	0.003	-0.003	0.001
	-0.01	-0.36	-0.53	-0.11
lnmedhhinc	-0.228	-0.279	-0.224	-0.273
	(10.74)**	(13.82)**	(10.53)**	(12.92)**
perblack	0.011	0.05	0.001	0.046
	-0.48	(2.48)*	-0.05	(2.12)*
pernotwhbl	-0.108	-0.49	-0.048	-0.373
	-0.94	-1.57	-0.43	-1.21
perrural	0.025	0.008	0.015	0.011
	(3.04)**	-0.8	-1.79	-1.06
perrentocc	0.193	0.134	0.16	0.126
	(5.45)**	(3.40)**	(4.37)**	(3.13)**
per12thorless	0.106	0.154	0.11	0.126
	(2.37)*	(3.27)**	(2.27)*	(2.53)*
per2064	-0.094	-0.33	-0.205	-0.311
	-0.79	(2.37)*	-1.46	(2.14)*
per65up	-0.341	-0.582	-0.39	-0.525
	(3.47)**	(6.62)**	(3.78)**	(6.62)**
perprivenroll	0	0.001	-0.001	0.001
	-1.07	-1.75	-1.51	-0.75
unemprate	0.372	0.188	0.409	0.196
	(4.14)**	(3.03)**	(4.36)**	(2.97)**
perag1dum			0.005	0
			-1.53	-0.03
pertrans1dum			-0.001	0.007
			-0.23	-1.81
perconstruct1dum			0.003	0.007
			-0.86	-1.72
permanufac1dum			0	0.005
			-0.06	-0.97
perinfo1dum			0.002	0.003
			-0.55	-0.75
perfin1dum			0.002	0.004
			-0.56	-0.78
perprofess1dum			0.003	0.01
			-0.96	(2.29)*
peredhealth1dum			0.009	0.009
			-1.91	(2.22)*
perartsfood1dum			0	0.004
			0	-0.84
perotherserve1dum			-0.004	-0.003
			-1.13	-0.69
perpublicadmin1dum			0.006	0.008
			-1.23	(2.01)*
perwholesale1dum			0.007	0.001
			(2.36)*	-0.31
perretail1dum			-0.002	-0.005
			-0.41	-1.09
Constant	2.473	3.193	2.499	3.11
	(10.00)**	(13.39)**	(10.54)**	(13.12)**
Observations	156	156	156	156
R-squared	0.94	0.93	0.95	0.94

Dependent Variable: perbelowpov; Robust t statistics in parentheses
* significant at 5%; ** significant at 1%

Table 9: Confidence Intervals for Primary Results (Full)

Classification	Low-Spending Districts Phase 1 95% Confidence Interval		Poor Districts Phase 1 95% Confidence Interval		Low-Spending Districts Phase 2 95% Confidence Interval		Poor Districts Phase 2 95% Confidence Interval	
interact	-0.012	0.012	-0.013	0.018	-0.015	0.009	-0.014	0.016

95% Confidence Intervals for the estimated coefficient of the variable of interest; Dependent Variable: perbelowpov

Table 10: Median Income and Median Housing Unit Value Results

Classification	Lowest Quartile of Median Household Income Phase 2	Lowest Quartile of Median Household Value Phase 2
ky	0.002	0.019
	-0.21	(3.22)**
post	0.026	0.022
	(2.90)**	(2.04)*
interact	0.007	-0.006
	-0.93	-0.84
lnmedhhinc	-0.281	-0.293
	(9.89)**	(12.20)**
perblack	0.004	0.036
	-0.13	-1.21
pernotwhbl	-0.171	-0.003
	-1.09	-0.01
perrural	0.021	0.004
	(2.31)*	-0.34
perrentocc	0.146	0.06
	(3.58)**	-0.99
per12thorless	0.158	0.076
	(2.62)**	-1.25
per2064	-0.592	-0.428
	(4.18)**	(2.48)*
per65up	-0.544	-0.548
	(6.35)**	(4.88)**
perprivenroll	0.001	0.001
	-0.67	-0.7
unemprate	0.256	0.255
	(3.93)**	(4.29)**
perag1dum	-0.006	-0.002
	-1.21	-0.37
pertrans1dum	0.004	0
	-0.82	-0.09
perconstruct1dum	0.005	0.009
	-1.29	(2.01)*
permanufac1dum	-0.003	0.002
	-0.46	-0.3
perinfo1dum	0.006	0.003
	-1.3	-0.67
perfin1dum	-0.003	0.001
	-0.39	-0.21
perprofess1dum	0.007	0.007
	-1.24	-1.35
peredhealth1dum	0.002	0.005
	-0.47	-0.93
perartsfood1dum	0.005	-0.003
	-0.98	-0.54
perotherserve1dum	-0.006	-0.001
	-1.29	-0.29
perpublicadmin1dum	0.012	0.012
	(2.47)*	(2.85)**
perwholesale1dum	-0.006	0.004
	-1.31	-0.99
perretail1dum	-0.007	-0.007
	-1.47	-1.39
Constant	3.331	3.412
	(10.85)**	(11.59)**
Observations	156	156
R-squared	0.93	0.95

Dependent Variable: perbelowpov; Robust t statistics in parentheses
* significant at 5%; ** significant at 1%

Table 11: Spending Results

Classification	10th Percentile Low-Spending Phase 2	2nd Spending Quartile Phase 2	3rd Spending Quartile Phase 2	Highest Spending Quartile Phase 2
ky	0.023	0.018	0.015	0.003
	-1.82	(3.57)**	(2.75)**	-0.32
post	0.022	0.01	0.015	0.011
	(2.03)*	-1.21	-1.55	-1.22
interact	0.004	-0.006	0.004	0.006
	-0.33	-0.9	-0.47	-0.66
lnmedhhinc	-0.226	-0.242	-0.202	-0.245
	(5.68)**	(10.62)**	(8.05)**	(6.77)**
perblack	0.012	0.085	0.026	0.009
	-0.28	(2.64)**	-0.57	-0.46
pernotwhbl	0.045	0.262	0.323	-0.048
	-0.21	-0.79	-0.94	-0.25
perrural	0.027	0.015	0.006	0.002
	(2.39)*	-1.28	-0.47	-0.16
perrentocc	0.18	0.168	0.059	0.025
	(2.36)*	(3.18)**	-1.14	-0.61
per12thorless	0.197	0.175	0.188	0.04
	(2.68)*	(3.81)**	(3.72)**	-0.58
per2064	0.121	-0.044	-0.414	-0.547
	-0.55	-0.36	(2.61)*	(4.44)**
per65up	-0.186	-0.554	-0.564	-0.625
	-1.04	(6.99)**	(5.21)**	(5.98)**
perprivenroll	-0.001	0.001	-0.001	0.001
	-0.86	-1.62	-1.85	-1.41
unemprate	0.377	0.152	0.264	0.3
	-1.68	-1.69	(3.93)**	(2.64)**
perag1dum	0.007	-0.003	-0.004	0.006
	-1.01	-0.99	-0.73	-1.1
pertrans1dum	0.001	0.004	0.002	-0.006
	-0.11	-1.22	-0.43	-0.87
perconstruct1dum	0.008	0.008	-0.003	0
	-1.03	-1.94	-0.76	0
permanufac1dum	-0.003	-0.005	-0.004	0
	-0.33	-0.84	-0.7	-0.03
perinfo1dum	0	0.006	0.008	-0.001
	-0.07	-1.59	-1.79	-0.24
perfin1dum	0.017	0.002	-0.002	0
	-1.83	-0.55	-0.31	-0.1
perprofess1dum	0	0.001	0.01	0.013
	-0.06	-0.28	(2.49)*	(2.09)*
peredhealth1dum	0.01	0.003	0.012	0.023
	-1.09	-0.69	(2.52)*	(3.94)**
perartsfood1dum	0.005	0.004	-0.001	-0.004
	-0.79	-1.05	-0.3	-0.75
perotherserve1dum	-0.008	-0.001	0.002	-0.005
	-1.34	-0.19	-0.56	-0.91
perpublicadmin1dum	0.002	0.004	0.003	0.002
	-0.22	-0.78	-0.63	-0.47
perwholesale1dum	0.001	-0.004	0.001	0
	-0.23	-1.3	-0.11	-0.06
perretail1dum	-0.009	0	-0.004	-0.003
	-1.38	-0.07	-0.99	-0.54
Constant	2.261	2.616	2.455	3.043
	(4.55)**	(9.74)**	(8.48)**	(6.83)**
Observations	64	156	156	154
R-squared	0.95	0.96	0.95	0.93

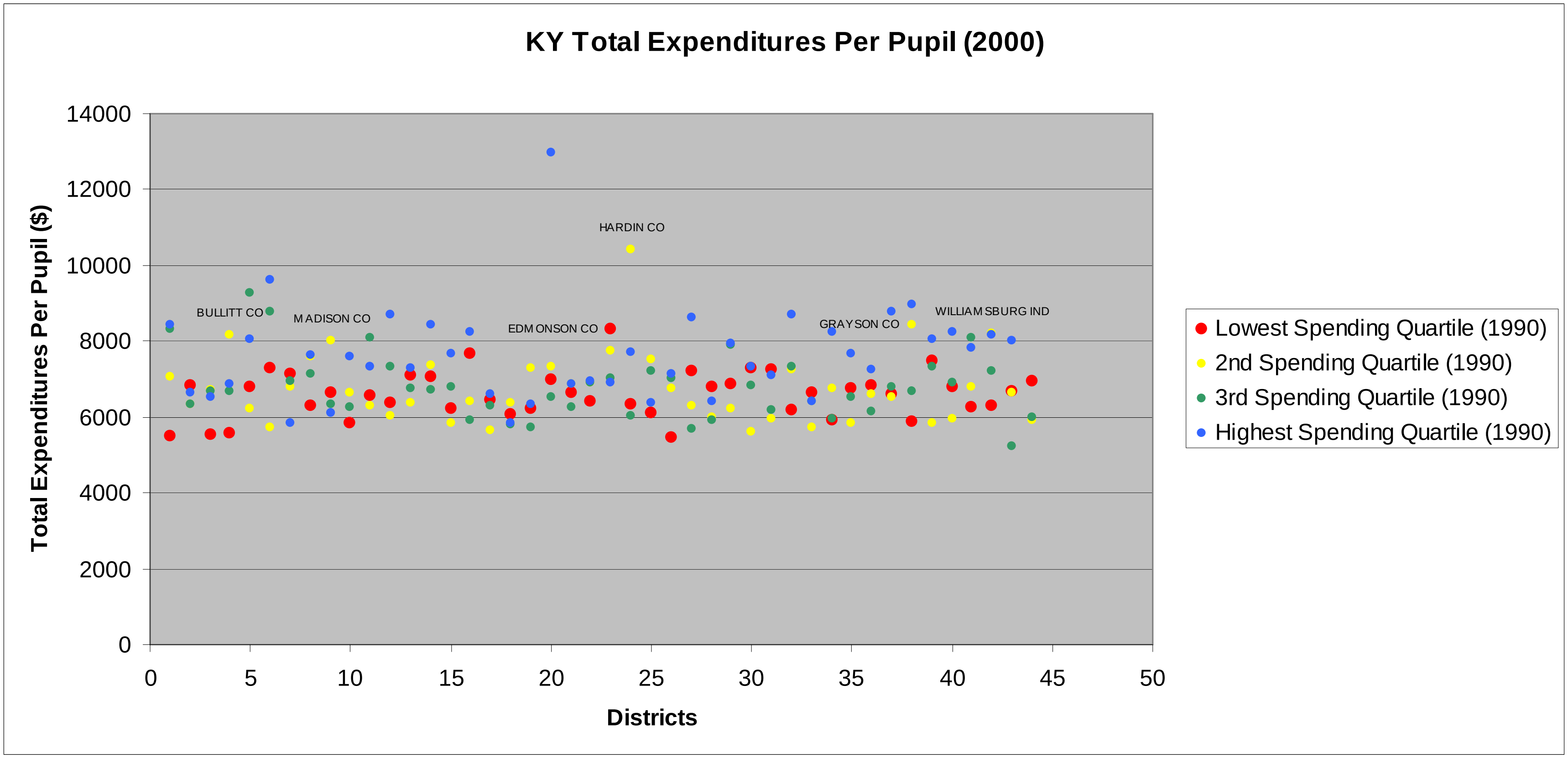
Dependent Variable: perbelowpov; Robust t statistics in parentheses
* significant at 5%; ** significant at 1%

Table 12: Poverty Results

Classification	10th Percentile Poor Phase 2	2nd Poorest Quartile Phase 2	2nd Richest Quartile Phase 2	Richest Quartile Phase 2
ky	-0.005	0.029	0.02	0.015
	-0.31	(4.98)**	(5.18)**	(3.62)**
post	0.017	-0.009	0.006	0.019
	-1.12	-1.45	-0.96	(3.06)**
interact	0.021	0.001	-0.011	-0.008
	-1.39	-0.13	(2.12)*	-1.58
lnmedhhinc	-0.303	-0.153	-0.137	-0.099
	(7.38)**	(6.14)**	(6.63)**	(4.88)**
perblack	0.015	-0.028	0.016	0.094
	-0.35	-1.09	-0.56	(2.82)**
pernotwhbl	-1.041	0.279	0.254	-0.163
	-1.67	(2.27)*	-1.23	-0.91
perrural	-0.018	-0.002	0.017	-0.003
	-1.08	-0.21	(2.60)*	-0.4
perrentocc	0.197	0.021	0.112	0.06
	(3.21)**	-0.55	(3.91)**	-1.67
per12thorless	0.268	0.054	0.115	0.092
	(2.26)*	-1.08	(3.79)**	(2.07)*
per2064	-0.49	-0.312	-0.007	-0.048
	-1.97	(2.42)*	-0.06	-0.74
per65up	-0.351	-0.272	-0.093	-0.157
	-1.56	(2.70)**	-1.02	(2.74)**
perprivenroll	0.004	0	0	-0.001
	-1.7	-0.8	-0.94	(3.22)**
unemprate	0.204	0.049	0.162	0.366
	-1.97	-0.67	(2.22)*	(3.75)**
perag1dum	0.002	0.002	-0.003	-0.001
	-0.2	-0.69	-0.98	-0.24
pertrans1dum	0.008	-0.005	0.002	-0.003
	-0.93	-1.89	-0.66	-0.77
perconstruct1dum	0.013	-0.002	-0.003	0.003
	-1.95	-0.57	-1.16	-0.94
permanufac1dum	0.006	0	-0.006	0.006
	-0.63	-0.01	-1.47	-1.55
perinfo1dum	-0.004	0.005	-0.001	-0.001
	-0.48	-1.57	-0.37	-0.28
perfin1dum	-0.023	0.003	0.004	-0.002
	(2.20)*	-0.91	-1.06	-0.5
perprofess1dum	-0.001	0.009	0.001	0.007
	-0.16	(2.43)*	-0.51	(2.05)*
peredhealth1dum	0.015	0.006	0.003	0.006
	-1.85	-1.6	-0.87	(2.02)*
perartsfood1dum	0.002	0.001	-0.004	0.003
	-0.28	-0.19	-1.28	-0.96
perotherserve1dum	-0.005	-0.006	0.007	0.001
	-0.73	-1.67	(2.63)**	-0.18
perpublicadmin1dum	0.009	0.002	0	-0.002
	-0.89	-0.41	-0.07	-0.49
perwholesale1dum	0.006	-0.002	-0.001	0.003
	-0.51	-0.88	-0.3	-0.75
perretail1dum	-0.002	0	-0.001	0
	-0.28	-0.06	-0.47	-0.11
Constant	3.422	1.933	1.498	1.12
	(8.17)**	(6.27)**	(6.09)**	(4.81)**
Observations	60	154	158	154
R-squared	0.96	0.86	0.78	0.83

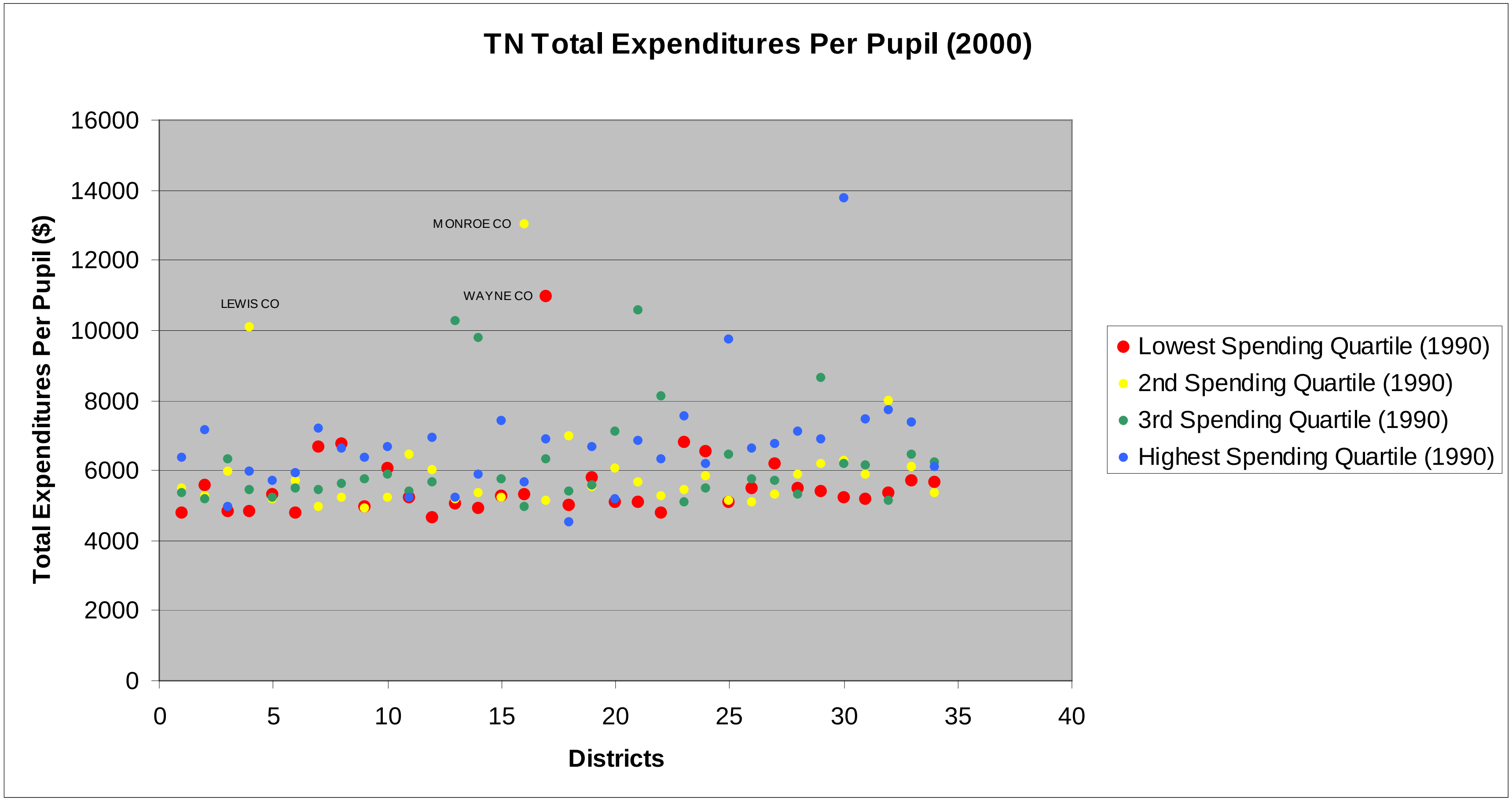
Dependent Variable: perbelowpov; Robust t statistics in parentheses
* significant at 5%; ** significant at 1%

Chart 1:



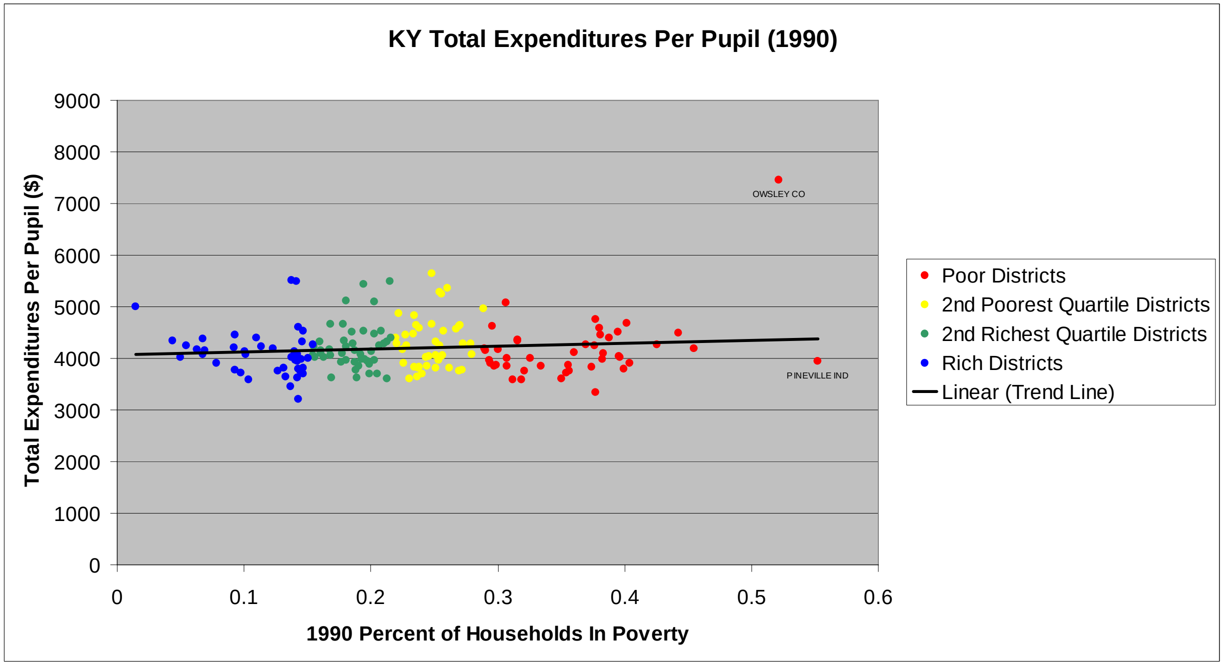
Note: All monetary values are in 1999 dollars

Chart 2:



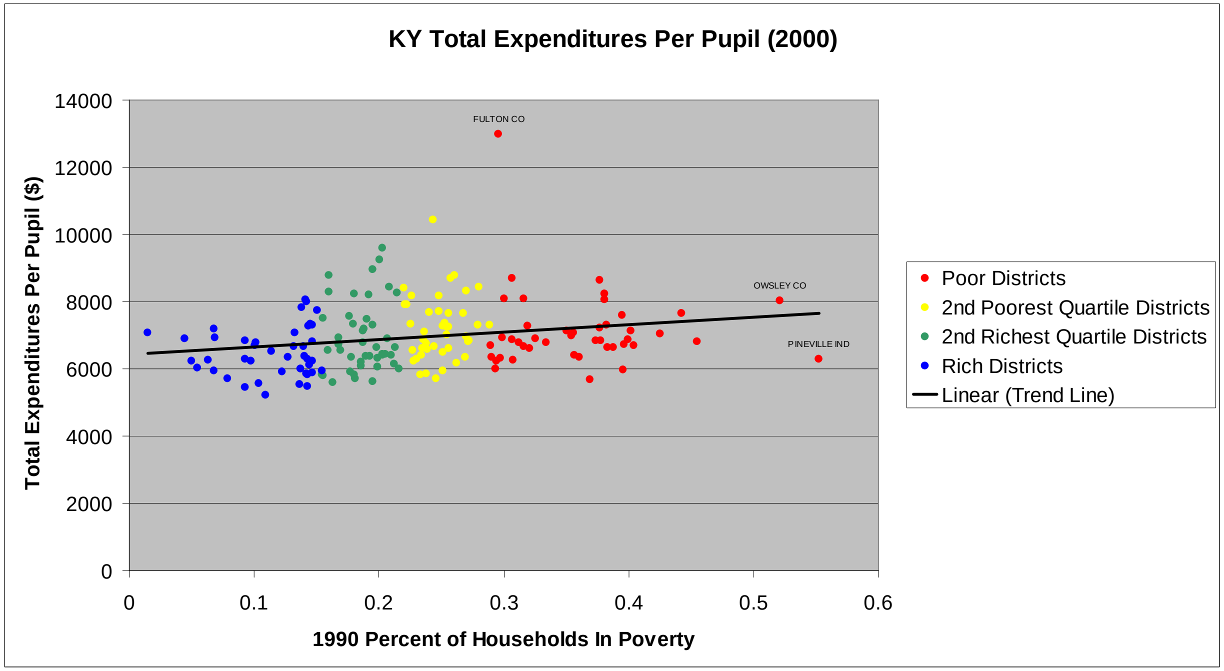
Note: All monetary values are in 1999 dollars

Chart 3:



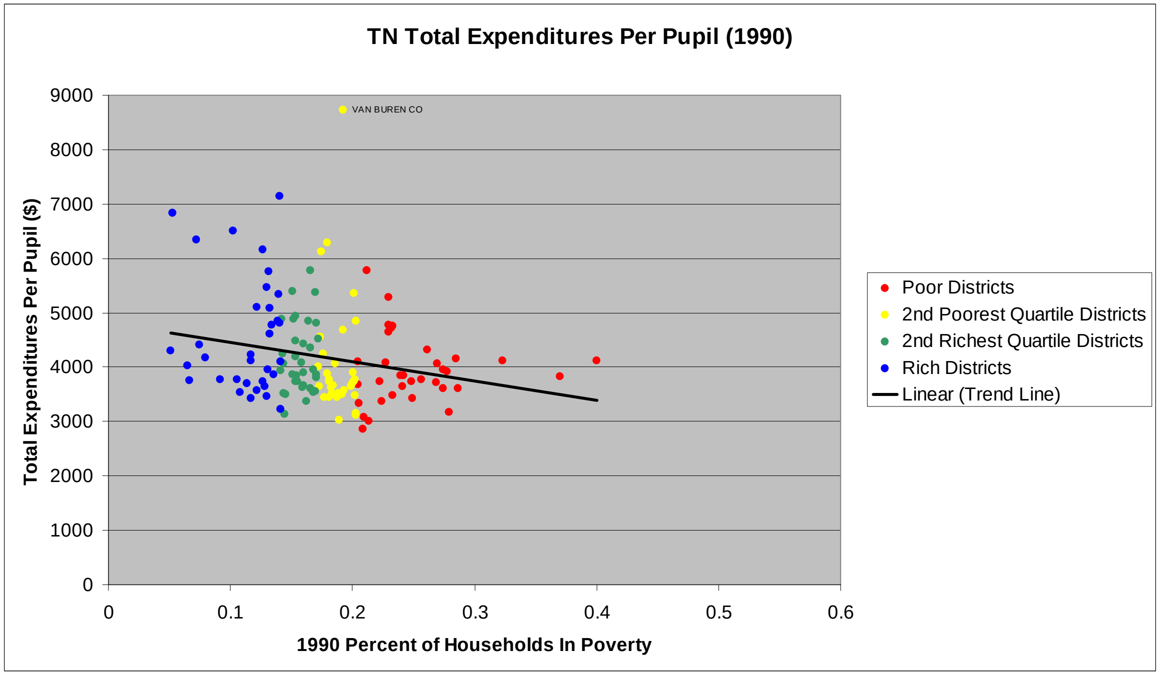
Note: All monetary values are in 1999 dollars

Chart 4:



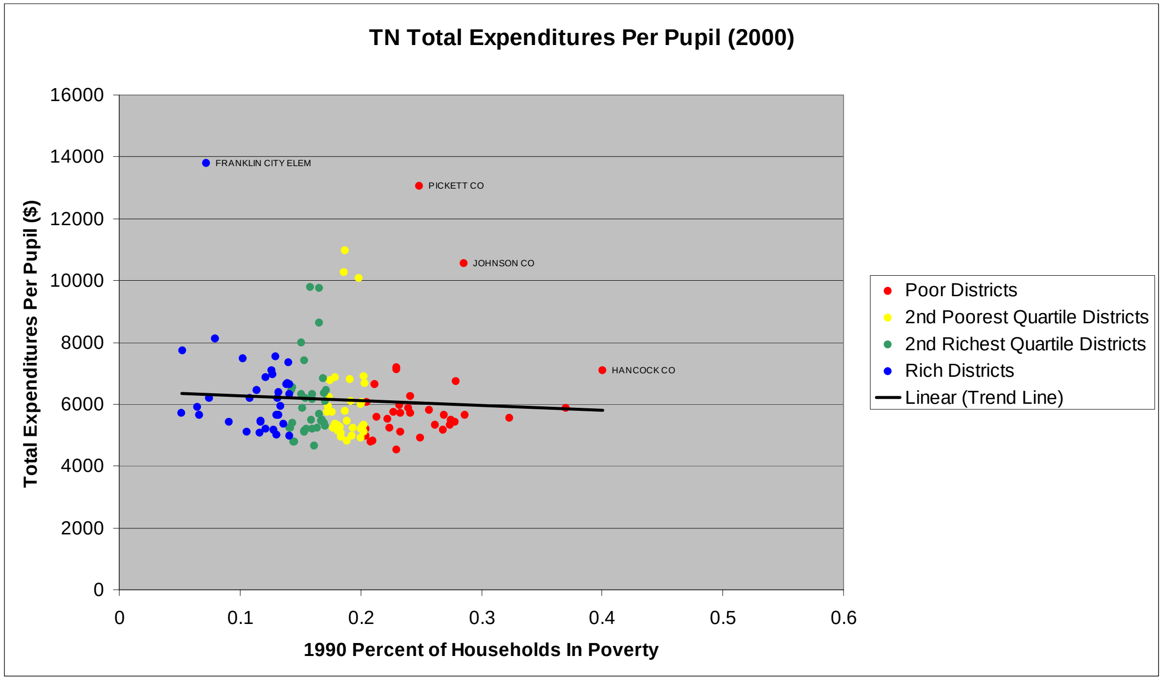
Note: All monetary values are in 1999 dollars

Chart 5:



Note: All monetary values are in 1999 dollars

Chart 6:



Note: All monetary values are in 1999 dollars