

BEYOND MONEY:
RELATING LOCAL SCHOOL TAXATION TO FAMILY AND COMMUNITY RISK

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ABSTRACT: State school finance formulas moved from tax-driven to student needs, while local community taxation requirements remain. However, no study has examined links between student needs risk factors affecting educational opportunity and local taxation choices. Using regression analyses, this study asked: Are local school district taxation levies related to community, family and economic factors? Using eleven years of financial data to examine Missouri's 1993 tax-rate driven formula this study shows community and family risk factors are related to taxation. Some groups that had prior effects on taxation lost this ability under a tax-rate driven formula. As a result, a state's fixed taxation requirement without regard for local risk can potentially harm constitutionally protected educational opportunity, particularly in new student needs formulas that move away from equalizing local taxation and wealth.

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Prior to the advent of student-needs based school finance formulas, policy and research considered local wealth and taxation policy as critical elements of state school financing formulas. Newer state formulas continue to use local taxation as key component, but focus on student need and risk factors while considering district financial components as unrelated to student needs. However, less is understood as to whether the various family, community and economic situations that hinder student learning are related to local taxation.

The purpose of this study was to understand how the family and community risk factors that affect student educational opportunity relate to local school district wealth and taxation. This research explored whether local tax choices are related to the social demographic make-up of 522 Missouri school districts. Furthermore, we explore how these factors correlated with district-level tax levies in response to a significant change in the state's foundation formula in 1993, which utilized a minimum incentive levy to increase district tax effort. In particular, we ask the following research questions: Are family and community risk factors related to district tax levy setting behaviors? Are family and community risk factors related to district revenue from the state foundation formula? Have the relationships between family and community risk factors and district tax levies and state support changed after the implementation of the minimum incentive levy in 1993? Our findings suggest that risk factors are related to local taxation effort, so that states need to more carefully consider how these relationships affect equitable and adequate education when developing distribution mechanisms using local taxation requirements.

K-12 School Finance: Key Constructs

Education finance policy meant to achieve vertical equity in resources across districts reflects the commonly held understanding that students with particular troublesome circumstances (e.g. poverty, language proficiency, disability, ethnic minority, limited parental education) face greater obstacles to gaining an equal education and require additional resources to educate (Baker 2005; Guthrie 2004; Land and Legters 2002; Verstegen 2004; Vesely and Crampton 2004). Vertical equity is closely aligned with financial adequacy, which is defined as the provision of enough resources to achieve some end as defined by state policymakers (Guthrie 2004). From the state's view, as long as all students receive the minimum standard of education required for adequacy, then equity is reached as well. The Minnesota Supreme Court wrote that "The finance system, including voter approved tax supplements and debt service levies, satisfied this constitutional test," (King, Swanson and Sweetland 2005, 5). Their ruling implies that as long as the minimum per pupil expenditure is deemed high enough to provide students an adequate education, then disparities among per pupil expenditures are constitutionally acceptable.

Some of the earliest school finance studies evaluated state-level taxation policy and its resource distribution (Guthrie 2004); those studies focused on local wealth and community capacity (Berne and Stiefel 1999). But as adequacy policy developed a focus on student needs, understanding differences in distribution of state aid, local revenue and the like were deemed as "arcane issues" (Guthrie 2004, 1) because they appear not to link to student needs.

More recent student needs-based finance policies include voter and taxpayer decisions as a critical component for generating revenue, however, given the increase in statewide tax and expenditure limitations (TEL) state education finance systems were being put to the test.

Blankenau and Skidmore (2002) showed that when states have court-ordered education finance reform the state's voters tend to pass state and local TEL. Blankenau and Skidmore (2004) indicate that in the absence of court-ordered reform local TEL negatively affect education spending. Furthermore, TEL coupled with supermajority requirements negatively affect both local and state response to court-ordered reform (Jordan, Jordan, and Crawford 2005).

Although the equity and adequacy requirements might be sustained via per pupil expenditures (PPE) where TEL and supermajorities exist, Downes and Figlio (1999) noted that research generally shows that student performance growth becomes limited in states with TEL. So despite intended and intentional decoupling of student needs from local wealth (taxation and property wealth), student needs and financial issues remain linked even in newer state aid distribution policies; its effects unearthed in research particularly around TEL, and less clear within discussions of budget-maximizing or median voter assertions.

Linking Student Risk to Taxation

Many factors negatively affect a student's academic performance. Land and Legters (2002) describe both family and school-level risk factors that affect student achievement. Family factors include poverty, race/ethnicity, limited English proficiency (LEP), parent's educational attainment and single parent families. Land and Legters describe an urbanicity factor, which uses several risk areas, including school-level poverty, racial/ethnic minority composition and school size.

Vesely and Crampton (2004) adapted the Legters and Land typology for a cross-state school finance analysis by honing in on the risk factors that are beyond the school's control, including "disability, poverty, limited English proficiency, race, and urbanicity" (p. 115). Other research supports the notion of using community, family and social variables to examine school

finance issues, including local education expenditures. Poterba (1997) examined thirty years of data to discover how changing demographics affected total school spending. He remarked that heterogeneity in the demographics of a community affect educational expenditures, in particular, the more diverse the population in terms of age and race the less it spends on education. Poterba concludes that more research was needed with regard to community heterogeneity and its effect on school spending, and made a point of offering no conclusions on how to resolve tensions within the local school finance election processes, which use voter approval for local taxation.

Several researchers have tied non-economic factors to district-level tax behaviors and state financial support. Chandler (2005) found that revenues from state finance formulas reduced the differences in local taxation across districts. Upon discovering that percent poverty positively affected spending, he offered two alternate explanations: that these communities rely less on local funding and property taxes and more on state aid, or that high-poverty populations reflect an urban effect, meaning greater costs. Rolle (2004) concluded that Indiana's foundation formula did not equalize student opportunity, since districts with large numbers of families with high risk factors, including low income, minority, single parent and high school educations received less money per student than districts in communities without those characteristics.

Prior research also argues that school taxation and spending relate to types of property wealth. Fischel (2001) and Ladd and Harris (1995) contend that districts with greater wealth, particularly commercial, will tend to lower their levies to share the cost of education. Fischel also argued that districts with more non-residential assessed valuation will naturally have higher taxes in their district, because the shared cost with business and agriculture lowers their costs at the same time school improves along with home prices.

The GTB arrangement in Missouri “encouraged school districts with below-average levels of district wealth to raise their local tax rates” (Podgursky and Springer 2006, 36). Missouri’s 1993 formula used a GTB based on collective assessed valuations; state statute sets residential property assessment at 19% of its value, and commercial at 32%. Agricultural property is assessed at 12% of its productivity value as set by the University of Missouri rather than fair market value (Podgursky and Springer 2005).

With prior research linking family and community risk factors to school finance research, this Missouri study used all of the elements of the Land and Legters typology related to local taxation choices (see Table 1 for a complete list). Prior local school district studies use state aid percentages to attempt to capture voter and bureaucratic behaviors; this study does the same, but omits PPE purposefully in order to keep the study’s focus on family/community factors related to local taxation. To capture the effect of non-residential assessed valuation on local taxation, this study included a variable for the three types, in a per pupil ratio, to keep the focus on student needs

Research Design

The purpose of this study was to better understand how Missouri’s community and economic factors relate to district tax levy-setting behaviors and subsequent state financial support. Two primary research questions are investigated in this analysis. First, we seek to identify which community factors are related to district tax levies and the state financial support of districts, and second, to identify how changes in community and economic factors across time are associated with district tax levies and state support.

Statistical Models

Based upon prior theoretical and empirical research (Land and Legters 2002, Vesely and Crampton 2004), we model a district's tax levy as a function of its family, community, and economic factors. Specifically, we use regression analysis to examine how district tax levies and district factors are related:

$$(1) \text{ LogTax Levy}_i = \alpha_i + \beta'_F \text{LogFamily}_i + \beta'_C \text{LogCommunity}_i + \beta'_E \text{LogEconomic}_i + \delta X_i + \varepsilon_i$$

where LogTax Levy_i is the logarithm of tax levy for each school district i , LogFamily_i and LogCommunity_i are vectors of variables identified by Land and Legters (2002) to represent family and community risk factors, LogEconomic_i is a vector of variables representing local taxpayer wealth, and the vector X_i contains other control factors expected to influence district tax levy decisions¹. All monetary variables were adjusted to reflect real 1992 dollars.

The analysis used the equalized operating tax levy and percent state aid as dependent variables in two separate analyses². The analyses therefore used state aid as a second dependent variable, to avoid spurious conclusions about the effects of community and family risk factors and economic indicators on local taxation choices. Local taxation choices were shown to relate to state aid although with substantial variation across districts. For example, school districts levying at \$2.75 received anywhere from 30 to 60 percent of their revenue from state aid.

¹The National Center for Educational Statistics (NCES) has locale codes for school districts from the mid-80's to the present, as well as English Language Learner (ELL) and special education data from 1986 to the present. Missouri's Office of Social and Economic Data Analysis (OSEDA) had the 1990-2003 U.S. Census figures broken down by district that includes data on a community's median income, race/ethnicity, single parents and educational attainment. Missouri's Department of Elementary and Secondary Education (DESE) had information on school districts' assessed valuation types per pupil, their enrollments, tax levies and percent state aid from 1990 to the present. DESE also had free-reduced lunch (FRL) percentages by district from 1995 to the present, and NCES had FRL percentages prior to that.

² Replace LogTax Levy_i with the percentage of district revenue received from the state in equation 1.

Equation 1 is expressed in a double-log format, and thus, the estimated coefficients take on the particular interpretation of an elasticity. Elasticities are interpreted as the percentage change in one variable due to a one percentage change in another variable. Specific to the estimating equation for Question 1, each coefficient in β'_F is interpreted as the expected percentage change in a district's tax levy given a one percentage change in the associated family risk factor.

We estimate equation 1 for both the years 1992 and 2003 to provide a snapshot of factors related to tax levy behavior at the beginning and end of the sample. Including the year prior to the creation of the minimum incentive levy in 1993 best identifies the relationship between the community, family and economic factors and tax levy behaviors before the policy alters their incentives. Examining the relationship in the final year of our sample allows an investigation into how the relationship between the district-level factors and tax levies may have changed post the incentive policy.

Equation 1's analysis only used absolute dollar amounts in tax levies rather than explaining the relative changes in taxation over time. Although it provides two years of analysis to compare, the method of analysis itself did not control for change or account for the effects of unobserved issues on taxation. For that reason, the second question looked at each district's own changes over time, from 1992-93 to the 2002-2003 school year; that is, one year prior to the passage of the 1993 formula, through its two-year phase in, through state budget withholdings in fiscal year 2001 up to the most recent data available. This longitudinal analysis uses district-level fixed effects in a regression to explain how changes in the family, community and economic variables affect changes in the tax levies within each district. This technique accounted for districts' relative change in their tax levies since 1993, and examined those differences relative to

community, family and economic factors. The third question asked: What changes in economic and community/family variables affected local taxation changes within districts?

To capture the change effects of community, family, and economic risk factors in both tax levy and percent state aid, a district-level fixed effects regression analysis was estimated of the form:

$$(2) \text{LogTax Levy}_{it} = \alpha_i + \beta'_F \text{LogFamily}_{it} + \beta'_C \text{LogCommunity}_{it} + \beta'_E \text{LogEconomic}_{it} + \delta X_{it} + \varepsilon_{it}$$

Where each group of variables is similar to equation 1, but each variable is measured across districts (i) and time (t). To take advantage of the longitudinal nature of this data we include a district-level fixed effect (α_i) to control for unobserved time-invariant district heterogeneity. ε_{it} represents an idiosyncratic error term specific to district i at time t . As this is a double-log model similar to that in Question 2, all coefficients should be interpreted as elasticities as well.

This analysis provided information on the relative change in taxation of all school districts, including the family and community characteristics. The time period studied also accounted for the significant changes in state budget revenues (2001) and the political environment, and, despite initial concern that this analysis would not succinctly capture how districts as a group behaved regarding the 1993 state policy with a \$2.75 minimum tax levies, the findings show that the districts responded to the state incentive. ELL data were available starting in 1998, so the fixed effects models were estimated based upon 2 alternative samples; 1992-2003 (without ELL), and 1998-2003 (with ELL).

The Missouri Context

Missouri's 1993 formula required a minimum \$2.75 effort for matching state aid for its 524 districts, had a \$3.85 cap and a guaranteed tax base (Podgursky and Springer, 2006). The districts that had half the wealth of the most affluent districts received dollar-for-dollar aid. A

less generous formula was available for those who could afford to tax themselves below this level (Podgursky and Springer 2006).

Prior to 2007 (and throughout our sample), school boards could set their tax rates at or below the ceilings approved by local voters, and in some cases were required to roll back a tax rate. Within Missouri statute, the actual minimum operating levy is defined as a tax levy of \$1.25 per \$100 of assessed valuation (Section 48.010, RSMo.). Many districts had to raise their levies to receive the incentive; twenty percent remained at \$2.75 in 2007.

When DeMoss (2004) described states' political contexts, her cross-cluster analysis suggested that Missouri is in a region that values low tax effort. Missouri has a two-thirds requirement for school bond issues, and a simple majority on operating levy increases up to \$6.00 (DESE, 2006). Missouri voters approved a TEL provision placed into the state constitution in 1980, commonly referred to as the Hancock amendment, but rejected a similar 1994 *Hancock II* ballot issue. The Hancock amendment ties state revenue caps to state per capita income (Podgursky and Springer 2006). This study accounts for this political culture using a dummy variable.

Some researchers noticed that the combination of a school district's location plus other socioeconomic factors creates a compound educational risk (Baker 2005, Vesely and Crampton 2004). Missouri has additional school finance interests to consider with the St. Louis City and Kansas City desegregation cases and settlements. Moreover, the politics of school finance arguments tend to fall along rural, suburban and urban interests. As a result, this study used a locale factor, and used 1992 NCES codes to label districts as metro (N=63), rural (N=450) and mid-city (N=9).

Descriptive statistics for the first and last years of our samples can be found in Tables 2 and 3. In 1992, some school districts reported no local levy. However, eleven years later, the lowest district operating tax levy was \$2.03, with the standard deviation reduced by a third and the mean rising \$1.05. This pattern suggests that local school taxes rose generally even as the disparity between tax efforts shrunk, as would be expected given the implementation of the minimum incentive levy.

The state aid minimum percentages in districts fell from 8.9% to 2.9%, but the means and standard deviations remained nearly the same. In 1992, many districts had between one- and two-thirds of their revenue from state aid, which remained true in 2003, but the percentages of state aid varied more, particularly for the districts receiving less than 30 percent of their revenue from the state.

Property wealth per pupil shows that residential values changed far more than either commercial or agricultural wealth, which remained similar from 1992 to 2003. Residential wealth in 1992 had a mean of .19, or \$19,000 per student, and by 2003 was .27, or \$27,000 per student. The highest 1992 residential wealth per pupil in one district was 40 times the wealth in the lowest district, with a variance of .026.

Findings

The regression analyses which estimate the analysis of equation 1 for the years 1992 and 2003 can be found in Tables 4 and 5. The cross-sectional results found significant effects of community and family risk factors on both taxation and state aid to varying degrees prior to and after the inception of 1993 state incentive. The models explain far more variation in state aid percentages as opposed to the local taxation measures. The analysis of equation 2 can be found

in Tables 6, 7 and 8 which generally find stronger relationships between the independent variables on tax levy when compared to their effects on state aid. In the discussion that follows, we present the results of the estimation of equations 1 and 2 jointly, and center the discussion around the relationships between independent variables and the dependent measures of tax levies and state aid.

Community/Family Variables

Minority. As the past research suggests, communities with higher percentages of minority populations tended to support higher tax levies in both 1992 and 2003, but had no significant effect on percent state aid in either year. A one percent increase in minority population equaled a 1.3% increase tax levy in 1992 and 0.5% increase in 2003. Although the changes appear small, the subsequent additional local taxation dollars (for the average district) amounted to an average of \$1.2 million additional dollars of local revenue in 1992 and \$3.1 million in 2003.

The fixed effects analysis shows that communities with increasing minority proportions lose both state aid and the ability to lower or raise local tax levies. For every one percent increase in a community's minority population, state aid decreased by 1.97 percent, which is a large relationship. The consequences depend on the type of school district; it appears that racially unchanged districts obtained more state aid, while other districts lost shares of state aid as more minorities moved into the school district.

This finding is consistent with prior research, particularly the findings of Porterba's (1997) research spanning thirty years that suggests that relatively homogeneous communities spent more on education, and noted that particular demographics may affect local taxation choices. Rolle's (2004) Indiana case study found that high need districts received less state aid

despite various needs, while Chandler (2005) found no minority effect on district spending in his Connecticut study.

Single parents. The fixed effects finding shows a district with increasing single parents has the opposite effect as minority population, specifically, a depressive effect on tax levies and no effect on state aid. Although Vesely and Crampton (2004) left single parents out of their policy analysis of state finance systems, claiming it is too closely correlated with poverty, this study indicate a separate effect of single parents and minorities on tax levies and state aid despite a small correlation (but not as strong as might have been presumed). These risk factors may be considered separately in research and arguably in policy, at least in Missouri.

Free-reduced lunch. In 1998, Missouri added an FRL component to account for high-poverty students as part of its desegregation settlement in the urban St. Louis and Kansas City school districts. In both 1992 and 2003, Missouri districts with higher numbers of free-reduced lunch students had lower tax levies and higher percentages of state aid. FRL still tended to decrease local levies, but much less so, while maintaining the same share of state funding within a district's budget.

Over time, FRL had no effect on either local tax levies or state aid, unlike the single parent and minority variable effects. State aid effects might have been expected given the FRL adjustment. The OLS analysis and an abbreviated logistical regression analysis showed that school districts' communities tended to respond to the \$2.75 local taxation incentive with matching state aid, which nullified some community effects observed in the 1992 OLS; in this case, the depressive effects of FRL on tax levies. As a result, the 1993 formula, with its local tax

incentive *and* its additional poverty disbursement, may have managed to strike the proper balance between local effort, local community/family needs, and state aid.

Several community and family risk factors had compelling relationships to tax levies. Minority communities once had effects on local taxation until state aid required a minimum incentive levy, which also led to statistically significant decreases in state aid within local district budgets. FRL had no effect on local taxation with an incentive levy which was likely due to a poverty supplement added in 1998. And single parent status showed markedly different dynamics than the other two predominant risk factors, which could be an area of exploration for future policy and research.

Assessed Valuation of the District Tax Base. Fischel (2001) and Ladd and Harris (1995) contend that districts with greater wealth, particularly commercial, will tend to lower their levies to share the cost of education. By this logic, in 1992 the absence of a state incentive for local taxation would have led to an inverse relationship of property wealth to tax levies. Then by 2003, with a state incentive in place for districts with a \$2.75 levy coupled with a GTB that assuring all districts had revenue equaling the 95th percentile of all districts, there should have been little to no relationship of the wealth types to tax levy, and a negative relationship to state aid. However, the 1992 OLS analysis indicates that school districts with higher agricultural wealth per student had higher tax levies, and although residential and commercial property had no statistically significant effect, the coefficients were positive rather than negative, which was unexpected.

The fixed effects analysis shows a one percent increase in residential wealth per student equates to a .08 percent decrease in local tax levy and a .24 percent decrease in state aid. This is not unexpected knowing that the 1993 formula tried to equalize local taxation and wealth, so the

more property wealth of any kind, the less state aid would be expected. This finding also shows that the wealthier homeowners in districts with increasing residential wealth have lower tax levies on their homes. This dynamic may mean that communities with higher risk but also higher taxes are disproportionately carrying the taxation burden.

Similarly, commercial property only decreases state aid but does not relate to local levies. This is an unexpected finding given Fischel and Ladd's (1995) contention that local district voters will share tax costs with commercial property owners. But understanding Missouri formula's guaranteed tax base, which calculated state aid as if every district had local wealth at the 95th percentile, the state aid finding is expected. It suggests that communities respond to a state incentive rather than to the local incentive, where voters might chose to share the cost of education in communities with higher commercial wealth, which could include lower rather than higher tax levies. It also suggests that residential owners lose their chance to share tax burden as commercial wealth increases in a given district. This is not unexpected given the widespread use of tax increment financing in local economic development, which defers local taxation for new commercial property, while still adding wealth to its own local community and the statewide guaranteed tax base.

Politics. The Hancock amendments were statewide ballot initiatives to establish tax and expenditure limitations on the state of Missouri. The first amendment in 1980 passed; the second proposed amendment, considered in 1994, failed. This dummy variable was used to understand the community values reflected in tax levy analyses in particular. A community's support or opposition to Hancock in 1980 shows no relationship to their tax levy choices in 1992 or 2003. Community support of Hancock II in 1994 shows an inverse relationship; that is, communities that supported additional restrictions to the Missouri state budget also had lower tax levies in

both 1992 and 2003, although their state aid percentages were an average of 20% higher than those communities that did not support Hancock II.

Communities with lower local school district tax levies also supported statewide tax and expenditure limitations; intuitively, this finding makes sense in that those with lower tax levies would probably support taxation restrictions. The concern from a school finance perspective is that voting for both lower local and state taxation might prevent the adequacy goals within the state's constitution from being achieved, particularly now that the 2005 formula considers the adequate per pupil expenditure to be \$6,117, regardless of revenue sources.

Locale and Compound Risk. This study's correlations showed that while communities with higher percentages of single parents tend not to be rural, there are still many single parents families throughout Missouri regardless of locale. The single parent effects on taxation were not confined to urban areas, and had a different effect from minority populations on tax levies.

Using correlations, locale shows that risk factors are spread throughout Missouri and are not necessarily isolated to one locale. Correlations show that rural school districts have fewer minority students, with fewer single parent households, less educational attainment, higher percentages of free-reduced lunch students, fewer ELL students and nearly the same special education percentages. The urbanicity factor put forth by Vesely and Crampton (2005) and urged to study by Baker (2005) is a combination of urban locale and minority communities. In Missouri, a compound urban/poverty factor would not properly capture the compound risk of the poor living in rural locales.

Discussion

The crux of this study was to understand how the community and family risk factors that affect a student's education might also affect local taxation choices, which could affect the ability of the state to provide equal and adequate education. Insights into economic dynamics regarding property types and TEL are included as well.

The collective prior research presented in the literature review suggests that the factors in the Land and Legters (2002) typology do affect both tax levies and state aid. Several of items on the Land and Legters typology have been studied in school finance, including poverty, single parent status, minority and educational attainment. Vesely and Crampton (2004) used the Land and Legters typology to study state-level school finance policy. Based on that and other prior research, this analysis included all the Land and Legters variables individually in order to fully ascertain the relationships among community variables, to shape policy conclusions specific to Missouri but especially to avoid improper conclusions based on stereotypes; for example, presuming that all single parents are both poor and uneducated, a notion that began to unravel based on descriptive statistics and correlations.

Implications for Policy

Several family and community risk factors are distinctly different from one another. The poverty, minority and single parent factors have an effect on local school taxation even with a required minimum tax levy with an incentive match in state policy. The urbanicity factor put forth by Vesely and Crampton (2005) and by Baker (2005) is a combination of urban locale and minority. But this study shows that in Missouri, urbanicity would not properly capture the compound risk of the poor living in rural locales.

This study showed great movement in taxation by local communities when given state matching funds. State-induced incentives are effective means for increasing local (but perhaps not total) education funding. However, the new 2005 formula has no incentive for local taxation, instead deducting local effort as if every school district has a levy of \$3.43 after calculating state entitlement aid based on student need counts. High student needs are weighted at above 1.0; that is, FRL, special education and ELL student counts generate more state entitlement aid than non-high needs students. But without that statutory minimum incentive, local voter values may take an increasing role in taxation choices, as the 1992 analysis showed (minority, locale (rural and mid-city), single parents, enrollment, age over 65, taxation values (Hancock support), and agricultural assessed valuation). This would not be a concern as long as taxation led to adequate spending to provide equitable and adequate education, and this study did not examine per pupil expenditures that might have informed a conclusion in this regard.

But the districts that supported the failed 1994 Hancock amendment, that is, those communities that supported spending limitations for state government, in turn had lower taxes when not receiving state aid based on taxation. A community that values low taxation/spending with lower than the \$3.43 deduction may be more likely to accept that large deduction from state aid in the absence of matching funds or a mandated minimum, rather than using the \$3.43 as an inducement to raise local effort. The end result for those districts would be using state money to maintain current spending rather than using the additional state funds intended for students with particular needs (poverty, special education and ELL learners). And understanding that many stakeholders affected local taxation prior to the 1993 state incentive gives just cause for warning that without a statutory minimum, or some sort of incentive, may in fact reduce spending. Again,

this may not be cause for alarm as long as spending levels provide adequate and equitable education.

This discussion has posited that the 1992 OLS analysis provides a glimpse of community tax choices for local schools in the absence of a state incentive that prompts state aid, while the 2003 OLS and 1998 to 2003 fixed effects regression analyses shed light on the incentive environment. The 1993 formula had a profound effect on land-owning taxpayers. Fischel (2001) and Ladd and Harris (1995) contended that homeowners are able to tax themselves less in areas with more commercial property, thus sharing the tax burden. But in 1992 in Missouri, this was not the case; neither residential nor commercial property affected local tax levies, and agricultural wealth did. With the state's tax incentive in place, the situation reversed: residential and commercial wealth now negatively affected taxation and agricultural property had no effect. The fixed effects analysis showed that residential property had a large negative effect on local taxes and an even larger negative effect on state aid. The more residential wealth a district had, the less its proportion of state aid. The commercial property had no effect on tax levies over time, and the more commercial wealth a district had, a district relied on less state aid. This dynamic likely helps taxpayer equity across districts, but this analysis shows that commercial values do not affect local tax levies in this incentive environment, making residential owners less able to rely on expanded local businesses for some share of tax burden. In fact, increasing commercial property values in a district actually leads to less state aid. Missouri homeowners had no chance to share local taxation with commercial property.

Policymakers can know that with no local taxation incentive in place, only agricultural wealth affects tax levies. With an incentive, relative wealth for all three properties leads to lower

taxation across all districts. And within a district, with a tax levy present, state minimum incentive levy decreases tax levies as agricultural and residential wealth increases.

Implications for Future Research

However, this study did not definitively show whether increased state aid or local taxation levels were related to school districts' spending behavior, as previous research studied (Chandler 2005, Rolle 2004). The future taxing behavior of school districts will provide an opportunity to see if school districts do work to maximize their budgets by keeping current tax levies or raising them (budget maximizing theory), or if additional state aid, now intended for high needs students, will lead to lower taxation thus maintaining the same level of services (median voter theory). Further research using PPE could speak to this while exploring further the critical relationships between PPE, risk factors and taxation that can affect a student's constitutional right to educational opportunity.

Similarly, because this study omitted per pupil expenditures (PPE), it may not be asserted that minority communities lost funding simply because there clearly was a negative effect on state aid coupled with a loss of influence to increase local levies. Further research could re-run these analyses with PPE as a dependent variable to provide a way to better contextualize how the an incentive levy affects local spending, but especially would lead to more definitive conclusions about how all of the community and family factors that affect local taxation influences equity and adequacy.

More research could be done on compound risk, since previous publications (Vesely and Crampton 2004; Baker 2005) posit that minority students tend to have compounding factors affecting educational opportunity. In 1992, school districts in rural locales had 40 percent lower

tax levies than mid-city or metropolitan areas, but by 2003, tax levies were only 16 percent lower. And although tax levies increased in rural areas, the state aid effects stayed nearly the same. This study shows that the 1993 tax levy incentive clearly closed the large gap in taxation among locales to improve taxpayer equity. But without an analysis with per pupil expenditures, this observation cannot extend to a conclusion on school finance equity; that is, whether additional state aid and local taxation led to increased per pupil expenditures within districts or a smaller disparity of PPE among districts.

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Table 1

Factors Used to Study Missouri's 1993 Incentive Tax Levy

Descriptors	Variables
Community/Family	City/Suburb/Town/Rural (NCES 2006 locale designation) Race/Ethnicity Single parent households Educational attainment Free-Reduced Lunch (FRL) percentages English Language Learner (ELL) population percentages Special education population percentages
Economic	Agricultural assessed valuation/per pupil Commercial assessed valuation/per pupil Residential assessed valuation/per pupil Median household income

Table 2

1992 Descriptive Statistics of School Tax Levies, Percent State Aid, and Community, Family and Economic Variables in Missouri School Districts, in percentages

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Dependent variables					
Tax levy	522	2.19	.92	0	5.83
Percent state aid	522	.43	.12	.09	.67
Community/Family					
Free-reduced lunch (FRL) %	465	.32	.14	.04	.78
Special education %	522	.12	.12	.05	.38
Minority %	522	3.91	8.12	0	96.2
Single parents %	522	5.39	2.5	0	24.7
High school graduates %	522	39.27	6.74	10.6	59.4
Midcity	522	.01	.12	0	1
Rural	522	.86	.34	0	1
Economic					
Residential assessed valuation per pupil	522	.19	.16	.049	1.97
Commercial assessed valuation per pupil	522	.09	.22	.00	3.27
Agricultural assessed valuation per pupil	522	.08	.08	0	.71
Median household income	522	38.96	11.77	17.84	109
Other					
Enrollment	522	1577.75	3508.19	28	40925
Hancock 1980	522	.83	.37	0	1
Hancock 1994	522	.069	.25	0	1
Over 65 %	522	16.35	4.94	3.1	32

Table 3

2003 Descriptive Statistics of School Tax Levies, Percent State Aid, and Community, Family and Economic Variables in Missouri School Districts, in percentages

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Dependent variables					
Tax levy	522	3.24	.58	2.03	5.1
Percent state aid	522	.42	.12	.029	.64
Community/Family					
Free-reduced lunch (FRL) %	522	.35	.15	0	.77
Special Education %	522	.16	.05	.05	.43
English Language Learner (ELL) %	522	.01	.02	0	.16
Minority %	522	6.19	9.88	0	98.4
Single parents %	522	7.39	2.48	.1	29.3
High school graduates %	522	40.67	6.96	10.5	57.3
Midcity	522	.01	.12	0	1
Rural	522	.86	.34	0	1
Economic					
Residential assessed valuation per pupil	522	.27	.21	0	2.45
Commercial assessed valuation per pupil	522	.10	.16	0	1.99
Agricultural assessed valuation per pupil	522	.07	.08	0	.46
Median household income	522	34.70	9.06	16.62	83.47
Other					
Enrollment		1707.			
	522	49	3737.63	22	42654
Hancock 1980	522	.83	.37	0	1
Hancock 1994	522	.07	.25	0	1
Over 65 %	522	14.67	3.92	4	30.8

Table 4

1992 and 2003 OLS Regression Analyses for Community, Family and Economic Variables Predicting Missouri School Districts' Operating Tax Levies, in logarithms

Variable	1992		2003	
	B	SE	B	SE
Community/Family				
Mid-sized city	0.333	(0.113)**	0.022	(0.041)
Rural	-0.530	(0.086)**	-0.181	(0.033)**
Minority	0.013	(0.005)**	0.005	(0.001)**
Single parents	-0.035	(0.011)**	0.002	(0.004)
High school graduates	-0.002	(0.002)	-0.002	(0.001)
Free-reduced lunch (FRL)	-0.289	(0.053)**	-0.096	(0.021)**
Special education	-0.015	(0.019)	0.042	(0.006)
English Language Learner (ELL)			0.024	(0.006)**
Economic				
Residential assessed valuation per pupil	0.062	(0.050)	-0.044	(0.020)*
Commercial assessed valuation per pupil	0.013	(0.019)	-0.024	(0.011)**
Agricultural assessed valuation per pupil	0.077	(0.021)**	0.009	(0.007)
Median household income	-0.057	(0.069)	-0.062	(0.028)*
Other				
Enrollment	0.214	(0.055)**	-0.018	(0.025)
Hancock 1980	0.054	(0.051)	0.012	(0.016)
Hancock 1994	-0.491	(0.103)**	-0.107	(0.016)**
Over 65	0.018	(0.004)**	0.004	(0.002)*
Constant	1.863	(0.367)**	1.802	(0.138)**
Observations	455		511	
R-squared	0.360		0.370	

Note. * $p < .05$ ** $p < .01$.

Table 5

1992 and 2003 OLS Regression Analyses for Community, Family and Economic Variables Predicting Missouri School Districts' State Aid, in logarithms

Variable	1992		2003	
	B	SE	B	SE
Community/Family				
Mid-sized city	-0.103	(0.078)	-0.021	(0.150)
Rural	0.201	(0.062)**	0.215	(0.082)**
Minority	-0.004	(0.003)	-0.000	(0.003)
Single parents	0.020	(0.009)*	0.006	(0.009)
High school graduates	0.005	(0.002)*	-0.002	(0.002)
Free-reduced lunch (FRL)	0.255	(0.041)**	0.214	(0.046)**
Special education	0.044	(0.018)**	-0.003	(0.066)
English Language Learner (ELL)			-0.041	(0.013)**
Economic				
Residential assessed valuation per pupil	-0.133	(0.051)**	-0.304	(0.047)**
Commercial assessed valuation per pupil	-0.243	(0.033)**	-0.303	(0.030)**
Agricultural assessed valuation per pupil	-0.065	(0.017)**	0.005	(0.021)
Median household income	0.076	(0.049)	-0.162	(0.062)*
Other				
Enrollment	-0.338	(0.043)**	-0.170	(0.065)**
Hancock 1980	-0.022	(0.038)	-0.007	(0.033)
Hancock 1994	0.162	(0.047)**	0.183	(0.046)**
Over 65	-0.018	(0.004)**	-0.008	(0.005)
Constant	-1.299	(0.320)**	-1.107	(0.330)**
Observations	457		511	
R-squared	0.61		0.69	

Note. * $p < .05$ ** $p < .01$.

Table 6

Fixed Effects Regression Analysis for Community, Family and Economic Variables Predicting District Operating Tax Levies and State Aid from 1990-2003, in logarithms

Variable	Tax Levy ¹ N=513		State Aid N=513	
	B	SE	B	SE
Community/Family				
Minority	0.285	(0.164)	-1.978	(0.314)**
Single parents	-0.242	(0.065)**	0.177	(0.124)
High school graduates	0.231	(0.059)**	0.086	(0.113)
College graduates	-0.163	(0.055)**	-0.300	(0.104)**
Free-reduced lunch (FRL)	0.001	(0.002)	-0.001	(0.004)
Special education	-0.006	(0.003)	-0.069	(0.006)**
Economic				
Residential assessed valuation per pupil	-0.079	(0.018)**	-0.236	(0.034)**
Commercial assessed valuation per pupil	0.014	(0.009)	-0.112	(0.017)**
Agricultural assessed valuation per pupil	-0.021	(0.010)*	-0.017	(0.019)
Median household income	0.282	(0.059)**	0.121	(0.112)
Other				
Enrollment	-0.181	(0.022)**	-0.038	(0.043)
Over 65	-0.215	(0.099)*	0.592	(0.188)**
Year indicators				
Year below \$2.75		Yes		Yes
Constant	-1.243	(0.601)*	-1.782	(1.150)
R-squared	0.55		0.11	

Note. * $p < .05$ ** $p < .01$.

¹ One year lag

Table 7

Fixed Effects Regression Analysis for Community, Family and Economic Variables Predicting District Operating Tax Levies and State Aid from 1998-2003, in logarithms

Variable	Tax Levy ¹ N=513		State Aid N=513	
	B	SE	B	SE
Community/Family				
Minority	-0.415	(0.170)*	-1.827	(0.857)*
Single parents	-0.165	(0.059)**	0.766	(0.297)*
High school graduates	-0.100	(0.060)	-0.020	(0.300)
College graduates	-0.037	(0.050)	-0.534	(0.250)*
Free-reduced lunch (FRL)	-0.003	(0.001)*	-0.003	(0.007)
Special education	-0.004	(0.002)*	-0.075	(0.008)**
English language learners (ELL)	0.004	(0.002)**	0.003	(0.008)
Economic				
Residential assessed valuation per pupil	-0.037	(0.018)*	-0.193	(0.089)*
Commercial assessed valuation per pupil	-0.037	(0.008)**	-0.148	(0.038)**
Agricultural assessed valuation per pupil	-0.008	(0.008)	-0.001	(0.040)
Median household income	-0.017	(0.049)	0.193	(0.248)
Other				
Enrollment	-0.148	(0.024)**	0.023	(0.121)
Over 65	-0.226	(0.057)**	0.148	(0.288)
Year indicators				
Year below \$2.75		Yes		Yes
Constant	2.234	(0.526)**	-2.716	(2.645)
R-squared	0.28		0.09	

Note. * p < .05 ** p < .01.

¹ One year lag