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DOCUMENT(S) REVIEWED:	"Shortchanging Disadvantaged Students: An Analysis of Intra-district Spending Patterns in Ohio"
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PUBLISHER/THINK TANK(S):	The Buckeye Institute
DOCUMENT RELEASE DATE(S):	September 20, 2007
REVIEW DATE:	October 17, 2007
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EPSL DOCUMENT NUMBER	EPSL-0710-245-EPRU

Summary of Review

The Buckeye Institute report, *Shortchanging Disadvantaged Students: An Analysis of Intra-district Spending Patterns in Ohio*, argues that high-poverty Ohio school districts can no longer place blame on the State of Ohio for failing to provide financial resources equitably. Rather, the authors argue that inequitable resource allocation across schools within high-poverty districts is the primary cause of remaining poverty-related disparities in student outcomes in Ohio. However, analyses presented by the authors fail to validate that the State of Ohio has allocated financial resources across districts with any greater degree of equity than high-poverty districts have allocated resources across schools. The

authors show that many of the 72 high-poverty districts they identify in the state do not systematically allocate more funding to higher-poverty schools. This finding is undermined by numerous well-understood, overlooked factors, however, including cost differences and poverty-reporting differences by school grade level and very basic issues of sample size. Finally, while the authors contend that poverty related achievement gaps are a function of within district resource allocation disparities, the authors provide no validation that the achievement gap they measure exists within rather than between districts.

Review

I. INTRODUCTION

The Buckeye Institute report, *Shortchanging Disadvantaged Students: An analysis of intra-district spending patterns in Ohio*,[1] argues that high-poverty Ohio school districts can no longer place blame on the State of Ohio for failing to provide financial resources equitably. Rather, they argue, remaining blame for poverty-related disparities in funding falls on high-poverty districts themselves, because those districts have failed to allocate their resources to schools as the state intended. The authors then argue that inequitable resource allocation within high-poverty districts is a significant reason for remaining poverty-related disparities in student outcomes in Ohio.

The Buckeye Report purports to examine the aftermath of the 1997 Ohio Supreme Court *DeRolph* decision and subsequent rulings. In *DeRolph*, the state high court declared that the Ohio's system for financing public schools was in violation of the state's constitution, which required the General Assembly to provide a "thorough and efficient system of common schools." In part, the decision focused on the need for additional funding to raise all districts to some more rationally derived minimum level of funding. The court applied a relatively weak standard on educational equity, indicating that "disparities between school districts will always exist," and that it advocated neither a revenue sharing from wealthy to poor, nor a revenue ceiling on the wealthy.[2] After mediation failed in 2002 (DeRolph III), the court issued one final opinion, dismissing the case but declaring that the Ohio school finance system still failed to comply with the relatively modest demands issued in DeRolph I (DeRolph IV, 2002).

The analyses presented by the authors fail to validate that the State of Ohio has allocated financial resources across districts with any greater degree of equity than high-poverty districts have allocated resources across schools. Further, the authors' finding that many of the 72 high-poverty districts in the state do not systematically allocate more funding to higher-poverty schools is confounded by numerous, well-understood, overlooked factors, including cost differences and poverty-reporting differences by school grade level and very basic issues of sample size (many correlations estimated to samples with N of 3 or 4 dissimilar cases).

Finally, the authors' contention of a relationship between within district resource allocation in high-poverty districts and existing achievement gaps is not validated by any analysis provided in the report. In fact, the authors fail to show that the achievement gap identified is a gap within, rather than between, districts.

II. FINDINGS AND CONCLUSIONS OF THE REPORT

The Buckeye report adopts several key assumptions and applies a limited set of analyses in order to advance the following reasoning:

- Since the time of the *DeRolph* school funding case in 1997, the Ohio legislature has met if not exceeded its obligation to increase overall funding to schools and to target funding to where it's needed most — high-

poverty school districts (Chart 1 and Chart 2, p. 3).

- Because large Ohio school districts are using staffing allocation formulas that allow senior teachers with higher salaries to move to or stay in low-poverty schools with more advantaged students, districts are creating inequity in total spending that disadvantages high-poverty schools.
- This within-district inequity is the primary cause of the remaining achievement gap between high- and low-poverty children in Ohio (Chart 3, p. 4, and Chart 4, p. 5).
- Requiring districts to implement weighted student funding will "guarantee" that within-district inequities are fixed.

The Buckeye report asserts that court pressure and legislative responses in the 1990s through early 2000s led to dramatic increases to overall and poverty-targeted funding in Ohio, especially advantaging large urban districts. But, the authors contend, because of the corrupt budgeting strategies invariably used by those districts, the potential benefits of the legislature's progressive actions have gone unrealized, and poverty-related achievement gaps persist.

Specifically regarding school district budgeting practices, the authors of the Buckeye report have chosen to assume the following:

> Districts, especially larger ones, tend to use staffing allocations to distribute funding. However, these allocations are often a result of central office decisions and collective bargaining agreements, which do not necessarily reflect student need (p. 1).

These assumptions are followed with empirical analyses of state spending behavior over time and statewide achievement gaps over time, and finally by an analysis of whether school districts are, on average, allocating resources to schools according to the same weighting system by which resources are allocated from the state to districts.

Finding that districts are not allocating systematically in the same way as the state, the authors conclude:

> From these findings, there is reason to believe that general, or even focused, increases in state funding will continue to have little to no effect on increasing student achievement or reducing the achievement gap. Despite the fact that state funds are allocated based on characteristics of the student populations in districts, the state funding program is, in fact, a weighted-district funding, not a weighted-student funding system (p. 1).

That is, the authors argue that while the state has, by combination of political will and judicial pressure, allocated funds equitably to districts via weighted district funding, additional state controls are required to ensure that the need-adjusted funding reaches schools and pupils. Accordingly, the authors recommend:

> Ohio should implement quality controls to ensure that intended weighted-student funding is actually following designated students to their school buildings. Employing building-based budgeting is one mechanism to guarantee that wealthy schools within districts are not siphoning off the resources that have

> been appropriated to help close the achievement gap. (p. 1)

The assumption that need-based funding allocated from states to districts should similarly be allocated from districts to schools is a reasonable one. However, for reasons discussed in the following review, the Buckeye report falters in its explanation of the "problem" before it gets to this solution. The authors fail to validate their central thesis that the problem with Ohio school finance is a predominantly a within- rather than between-district problem and that the state system of allocating resources to districts is the most appropriate and equitable system to be used by districts allocating resources to schools.

III. RATIONALES SUPPORTING FINDINGS AND CONCLUSIONS OF THE REPORT

The authors contend that the state of Ohio has met its obligation to improve funding adequacy and target funding to student needs by showing two graphs — one that shows an overall increase in state support to local public school districts over time (Chart 1), and another that shows marginally greater increase in funding among higher-poverty school districts (Chart 2).

However, while a state average margin of difference is shown, the actual distribution across districts of spending differences by poverty is not addressed. That is, the authors provide no direct analysis to demonstrate their implicit contention: substantial margins of difference in funding received by higher-poverty school districts relative to their lower-poverty peers in the same labor markets. In a technical appendix to this review, I present such an analysis, which in fact shows a relatively small margin of difference in current expenditure per pupil associated with district level poverty rates.

Further, at least a portion of the difference shown in the report's Chart 2, which addresses current expenditures in lower- and higher-poverty districts, is likely a function of federal Title I aid, not additional state aid. At the very least, this figure is poorly documented.

The authors attribute the current "equitable" condition of inter-district funding in Ohio to the *DeRolph* school finance litigation.[3] They contend that dramatic increases in targeted funding have occurred but have not resulted in closure of achievement gaps — an argument backed by graphs showing poverty-related achievement gaps over the same period. The authors argue that this gap persists because of school district practices undermining legislative efforts:

> Legislative efforts to provide supplemental resources for disadvantaged students are well-conceived; however, the money earmarked for this purpose is not reaching its target, let alone producing satisfactory academic results (p. 1).

But the authors never actually demonstrate that substantially greater funding really was reaching higher-poverty districts, and they also fail to disaggregate the extent that the statewide poverty-related achievement gap persists across or within school districts. Rather, they choose to assume — with no supporting evidence — that this achievement gap exists primarily within rather than between school districts.

A second critical assumption underlying the authors' analysis is that all large Ohio school districts are using a single form of staffing-based allocation formulas and that these staffing allocation formulas are the primary cause of within-district inequity. The

argument here is that staffing allocation formulas allow senior teachers to rig the system in their favor such that they may get and keep the jobs in desirable schools. It may or may not be true that most Ohio districts use similar budgeting strategies. But the authors provide no evidence one way or the other. They simply assume it to be true.

The authors then assume that adopting site-based budgeting coupled with weighted student funding will *"guarantee that wealthy schools within districts are not siphoning off the resources that have been appropriated to help close the achievement gap."* Again, the first problem with this statement is the untested assumption that the state of Ohio has allocated sufficient resources to districts in order to close the achievement gap.[4]

The second assumption, concerning the solution of site-based budgeting and weighted student funding, is equally problematic. First, there exists no systematic, empirical evidence to indicate that districts employing site-based budgeting and weighted student funding achieve, on average, greater equity than those using alternative approaches.[5] In fact, there is also no systematic research available to validate this popular assumption that big city districts all use staffing-based allocation formulas, and that there exists but a single form of staffing-based allocation formula — a form that, the argument goes, simply cannot yield equity.[6]

Interestingly, the relative equity of alternative budgeting strategies can be tested within the borders of Ohio, since the Cincinnati school district is frequently cited as a weighted student funding success story in the scant literature cited in the Buckeye report. Roza and Hawley-Miles, for example, in a technical paper for the *Annenberg Institute for School Reform* indicate that their evaluation of Cincinnati's implementation of budget reforms found substantial reduction in cross-school inequity over a four year period. Yet, even from this finding, we know little of how Cincinnati's within-district inequity compares either to statewide between-district inequity or to other large Ohio districts' within-district inequity.

The Buckeye report never mentions that Cincinnati has adopted the solution that the report proposes, and the report fails to make any comparisons between Cincinnati and other large Ohio cities and statewide patterns. In fact, the Cincinnati school district is not mentioned by name even once in the Buckeye report.

IV. THE REPORT'S USE OF RESEARCH LITERATURE

The authors of the Buckeye report either ignore entirely or are simply unaware of a vast body of directly and indirectly relevant literature, including but not limited to literature on:

1. Within-district inequity and its comparison to between-district inequity;[7]
2. Methods for measuring horizontal and vertical equity;[8]
3. Conceptions of vertical equity and differences in costs associated with achieving vertical equity, with application to equity analysis;[9] and
4. How weighted funding systems can, in some cases do, lead to greater rather than lesser inequity.[10]

After disregarding this literature, the relevance of which I detail in the next section, the Buckeye report assumes that there is substantial support for other key assumptions, such as the assumption that most large urban districts use a single form of

dysfunctional and inequitable budgeting and that those using site-based budgeting with weighted student funding necessarily (they choose the word "guarantee") achieve more equitable results.

The Buckeye report refers to the work of Robert Berne and Leanna Stiefel[11] (1999) as a basis for definitions of horizontal equity, vertical equity and fiscal neutrality (see discussion in Section V, below). But the Buckeye report ignores other key work of Berne and Stiefel. In particular, these authors describe ways of actually measuring horizontal and vertical equity in their seminal book *The Measurement of Equity in School Finance*.[12]

The authors of the Buckeye report should have also consulted to the earlier work of Berne and Stiefel (1984),[13] or more recent work of widely published authors in school finance including William Duncombe and John Yinger,[14] Andrew Reschovsky and Jennifer Imazeki,[15] among others for insights on the measurement of costs associated with vertical equity and methods for evaluating cost- and need-adjusted equity.

The Buckeye report relies instead on a problematic set of methods proposed by the *Annenberg Institute for School Reform* — methods that have not appeared (or been built upon) in any applicable peer-reviewed literature.

In the technical appendix of this review, I provide examples of Berne and Stiefel's (1984) methods applied to Ohio district- and school-level data from 2005-06. In short, I find that within-district resource allocation across schools in large Ohio districts is no worse and no better than cross-district resource allocation in Ohio. Some large districts fair better than the state on providing vertical equity and others worse. These findings raise serious questions regarding the central claim of the Buckeye report.

V. REVIEW OF THE VALIDITY OF THE FINDINGS AND CONCLUSIONS

How do these oversights undermine the Buckeye analyses? The central analysis of the Buckeye report is one in which the authors attempt to show that while the state is aggressively providing for vertical equity (based solely on their state aggregate analysis in Figure 1), school districts are failing miserably to do the same. The authors provide a definition of vertical equity drawn from Berne and Stiefel[16]:

> Vertical equity considers whether different students receive different levels of resources. Students with greater needs should receive greater resources (p. 2).

The authors then draw on policy briefs from the *Annenberg Institute for Education Reform* for their methods, defining a "*what is"* and "*what should be"* status for within district resource allocation.

> *What should be (should have received)*: how resources would be allocated across schools within districts, if the districts used the same weighting system adopted to allocate funds from the state to districts.
>
> *What is (actual)*: current distribution of funds across schools within districts.

Next, the authors calculate the correlations between their "what is" measure and the "what should be" measure and the percent of children who are disadvantaged (never clarifying their definition of disadvantage with respect to state data sources) for

approximately 900 schools across 72 Ohio districts having more than 50 percent disadvantaged children. There was an average of only 12.5 schools per district, with most schools in the sample concentrated in a few districts.[17]

The one logical empirical framework proposed by the authors is their framework for evaluating the progressiveness, neutrality or regressiveness of "what is" in relation to student disadvantage. This explanation is provided in their technical appendix (p. 11). In short, the authors describe progressively allocated resources as allocations where higher-poverty schools receive systematically more resources per pupil (positive correlation), neutral systems as systems where there are no systematic differences in resources by poverty (no correlation) and regressive systems as those where spending per pupil is lower in higher-poverty schools (negative correlation).

Next, the authors attempt to show that "what should be" is a preferable approach than "what is." They run two sets of analyses, looking at the correlation between school poverty rates and spending under each approach. More specifically, they use a series of arbitrarily selected thresholds to sort school districts (regardless of their enrollment or number of schools) among the 72 evaluated, based on their cross-school, within-district correlations between "what is" and disadvantage (poverty levels) and "what should be" and disadvantage (Chart 5). That is, the authors count up the number of districts among the 72 in which the correlation between "what is" and poverty is greater than .7, between .7 and .4, between .4 and .25, etc. Then they similarly tally the number of districts for whom the "what should be" calculations are correlated positively with poverty rates at the same correlation thresholds. They show that on average, higher percentages of districts would have higher correlations between spending and poverty if they adopted the "what should be" model for allocating resources within district.

The graphic representation of this effect creates a deceptively oversimplified picture aimed at convincing readers of the authors' contention: that adopting the "what should be" model in place of the "what is" approach would rectify disparities in nearly all Ohio high-poverty districts. In reality, the graph merely represents percentages of school districts, regardless of numbers of children served, that might show a correlation in the assumed correct direction — positive association with school disadvantage rate — whether that correlation is a legitimate one, an erroneous one, or merely a spurious one.

This portion of the analysis is peculiar at best and is subject to a number of potential problems. Stricter adherence to existing methods from peer-reviewed and generally accepted literature[18] on the topic would have provided for more meaningful analysis. Here, I summarize a few key problems with the chosen method.

First, when it comes to the allocation of resources across schools and districts, cost and need factors may interact in unexpected (or even well-understood) ways. It may be insufficient to evaluate the relationship between funding per pupil and disadvantage alone, ignoring such issues as grade-level differences in poverty reporting and operating costs.

As a rule, only schools with similar grade-level configurations should be compared, because there may be legitimate differences in costs associated with operating schools of different grade level.[19] Further, rates of children qualifying for subsidized lunch vary

by grade level, with rates going down in high schools. If these typical patterns play out and a district has higher spending levels for high schools and has actual high school poverty rates equal to elementary schools, but nevertheless reports lower poverty rates for high schools, it will appear that more is being spent on non-qualifying students than is the case.

Second, only a handful of districts in Ohio have a sufficient within-district sample size of schools with similar grade level configurations upon which to estimate correlations between poverty levels and spending. Very small sample sizes will typically reduce correlations. Using 2005-06 enrollment data by school, I identify approximately five Ohio school districts with over 30 elementary schools (only seven with over 30 total schools). In the appendix to this review, I evaluate within-district resource allocation across elementary schools for four of these (Cincinnati, Columbus, Cleveland and Akron).

Limiting the sample to only those districts with at least 50 percent poverty (as in the Buckeye report) yields a sample of districts where several among the remaining 72 have only three or four schools. If these include one elementary, one middle and one high school, with incrementally higher funding per pupil and incrementally lower free/reduced-price lunch reporting rates, an analysis would show a large number of districts having negative correlations between poverty and spending, but these results might be little more than an artifact of school levels.[20]

Third, the authors then uniformly apply a simple weighting structure (based on state policies) across schools by grade level and other factors to achieve their "what should be" estimates of school resources. If that weighting system provides linearly even one cent more per pupil for each 10 percent increase in poverty, it will have a relatively high correlation with poverty across schools (even with a small sample size). But, this very strong resulting correlation would be of questionable policy importance, given the small magnitude of difference in funding that it may reflect.[21]

Existing policy as a "what should be" benchmark

As a general rule, adopting existing state policy as a benchmark for "what should be" in terms of vertical equity is questionable at best, because state aid allocation policies may not reflect legitimate vertical equity objectives, and in some extreme cases may allocate resources in inverse relation to actual need. To their credit, rather than benchmarking "what is" or current expenditures directly against their "what should be" measure, the authors compare both against a single measure of need variation — the percentages of economically disadvantaged children. Despite comparing their simulated adoption of state weights (what should be) and current actual distribution against school poverty rates, the authors recommend that districts should allocate resources according to the state weighting system, rather than attempting to achieve higher correlation between resource allocation and poverty.

The authors' "what should be" is particularly troublesome given recent critiques of state pupil weighting systems, which have found that those systems in some cases can yield even less equitable financing than might exist if there were no weights at all.[22] Further, the types of "political distortions"[23] introduced in state aid policies may be the very types the authors seem to find most offensive — those that endorse seniority policies and keep high-paid teachers in low-poverty settings.

Arizona, for example, provides no weighting for poverty in its school finance formula but does provide a Teacher Experience Index, a weight that drives additional funding into districts with higher average teacher experience. The overall effect of the Arizona school finance system is that higher-poverty school districts receive somewhat less per pupil funding than lower-poverty districts (with more experienced teachers). Similarly, Kansas has a weight for districts with housing unit values over 25 percent above the state average, to help pay for their "higher teacher costs."

If one were to adopt the methods used in the Buckeye report to drive resources across schools in Arizona or Kansas districts, one would have to assume that schools in Arizona districts that have higher average experience should receive more funding, and that schools within Kansas districts that are in the most affluent neighborhoods should also receive more funding. This is plainly illogical where equity is a serious concern.[24]

The authors make no claims of the relevance of their findings from Ohio to other state contexts, but they do propose a seriously flawed framework that might, in fact, be considered by policymakers elsewhere. Further, Ohio's own aid distribution system suffers some of the same problems as those in Kansas and Arizona. For example, as shown in the technical appendix to this Review, rates of identified gifted and talented students are strongly inversely related to economic disadvantage across Ohio schools. As such, allocating resources on the basis of prevalence of gifted-identified children drives funds to schools with fewer disadvantaged students, erasing some of the margin achieved in poverty-based funding. [25]

In Cincinnati, where the inverse relationship between poverty and gifted prevalence is particularly strong (-.88 across elementary schools), allocation of weighted funding for gifted programs erases poverty adjustment entirely. In Cleveland, where there is no variance in measured rates of children qualifying for subsidized lunch across schools, a system of poverty-weighted funding will not vary across schools, even though actual socio-economic conditions range from bad to worse. If the correlation between actual socioeconomic status and gifted program identification rates in Cleveland is consistent with statewide patterns, more money will be driven into schools of more advantaged children. That is, in Cleveland, the gifted and talented weight will drive funding to more advantaged children, but because the poverty threshold is insensitive to differences across Cleveland schools, those with actual higher poverty levels will not receive additional weighted funding. In short, the state system in Ohio may be a highly inappropriate and inequitable system for allocating resources across schools within the state's large urban districts. It also may be an inappropriate and inequitable mechanism for driving state aid to districts.

A more appropriate conceptual and analytical framework for driving aid to districts or schools to achieve vertical equity is to conduct appropriate statistical analysis to determine those school or district factors most associated with risk of poor student outcomes and then estimate via appropriate statistical models, the additional costs associated with achieving desired outcome levels under varied circumstances with varied student populations (see endnote 9). Where such analysis is infeasible due to insufficient or low quality data one might instead turn to the existing literature on marginal costs associated with various student needs and school and district characteristics (see technical appendix).

VII. THE REPORT'S USEFULNESS FOR GUIDANCE OF POLICY AND PRACTICE

The argument that cross-school and even cross-classroom allocation of resources should be equitable, both horizontally and vertically, has merit. It makes sense that if a state constitution requires state legislatures to provide resources to school districts in relation to need, then school districts, as agents of the state operating under the same state constitutional provisions, should be similarly obligated.

On September 23, 2007, three days after the publication of the Buckeye report, the Columbus Dispatch reported that mayoral candidate William Todd had filed a lawsuit against Columbus Public Schools alleging that the district is allocating resources inequitably, in violation of the state constitution. In general, there has been a movement afoot to shift emphasis from state legislative obligations to uphold state constitutions, to district officials' obligations to do the same.[26]

The authors of the Buckeye report argue that the district obligation to uphold the constitution must come first:

> Before asking the state — whether through lobbying or lawsuits—for more money for disadvantaged students, critics of the current school finance system should first advocate for the appropriate allocation of the large amount of money that has already been authorized. (p. 9)

This contention is seriously flawed, both conceptually and technically. It must be recognized that school districts' ability to allocate resources across schools by need is constrained by the extent to which states provide needs-based funding to school districts. This is especially true for high-need urban school districts lacking sufficient additional funding over their lower-need neighboring districts. Imagine two school districts: an urban, high-needs district ("U") and a neighboring suburban, low-needs-district ("S"). The lowest-need school in District U might be relatively high-need in comparison to the highest-need school in District S. It might be harder to staff and have other resource demands. Yet District U would be in the extremely difficult position of having to reallocate resources from such a lower-need school to its higher-need schools. For this high-need District U to reallocate resources to its higher-need schools, that district would have to decrease funds to its lower-need schools and pay its teachers in lower-need schools much less than those in the nearby District S. Having slightly higher funding than neighboring, lower-need districts does not resolve this conundrum for high-need districts.

The Buckeye authors have failed to make their case that sufficient resources have already been allocated across districts, in part because they have failed to conduct any detailed analysis of the margins of additional funding in higher-need districts.

The unfortunate reality is that the higher-need schools under such circumstances fall furthest behind because of constraints on redistribution created by the broader competitive environment. This is why between-district and within-district equity solutions must be implemented simultaneously.

In sum, the Buckeye Institute report is built on the weakest of foundations. It wrongly assumes that improving within-district disparity is the primary if not the sole remaining problem for the Ohio school

finance system. Even more dubiously, it argues that remaining achievement gaps between high- and low-poverty children are mainly a function of within-district financial disparities. As such, high-poverty districts are asked by these authors to bear the burden of correcting those disparities at no additional state expense. The report's weak methodology compounds it shortcomings. If taken seriously, the Buckeye Institute report will only misguide policymaking.

TECHNICAL APPENDIX
More Appropriate and Useful Analyses of the Data

In this Appendix, I explore the 2005-06 Ohio district and school expenditure data, coupled with the district and school demographic data, and I apply methods proposed by Berne and Stiefel[27] for evaluating vertical equity in the distribution of state-to-district, and district-to-school resources.

First, however, I note two intriguing features of the Ohio data that raise concerns in performing such analyses. Rates of limited English proficiency are low statewide, and counts are only reported down to 10 eligible pupils, reported as "<10" otherwise. Most schools in the state and most schools even within large urban districts have fewer than 10 limited English proficient students. Further, in Cleveland, all schools and the entire school district report a 100 percent rate of children qualifying for subsidized lunch. As such, while there is likely substantive variance in economic status across Cleveland schools, it is not picked up by available measures.

Berne and Stiefel propose two methods for addressing vertical equity and vertical-equity adjusted measures of resource variation. I discuss each in turn.

First, they suggest regressing a series of cost and need measures on current spending data in order to evaluate how current spending data vary with respect to the cost and need measures. That is, do needy schools or districts actually receive more resources? This is effectively the same question proposed by the Buckeye authors.

A logical first step with the Ohio data is to run such an expenditure function across school districts statewide as well as across schools within districts. In both cases, spending differences should be predictable according to needs and costs, and need and cost factors should show coefficients with the correct sign and reasonable magnitude (withholding judgment on just how much vertical equity is needed).

In a statewide expenditure model, one must control for differences in costs associated with economies of scale and differences in regional competitive wages, in addition to student need factors, the most common of which include disability shares, poverty rates and limited English proficiency status.[28] I drop LEP/ELL status due to data issues noted above (after finding no relationships at either the school or district level).

First, Table 1 shows that cost factors including student poverty rates and disability rates, along with economies of scale (captured with the natural log of enrollment and natural log of enrollment squared) and regional wage variation, capture with the National Center for Education Statistics comparable wage index (CWI)[29] explain less than 50 percent of the variation in spending across Ohio school districts. Perhaps most importantly, the coefficient on poverty, while positive and statistically significant, is relatively small. That is, the first regression model on statewide expenditure data for 2005-06 shows some state attempt at poverty-related vertical equity, but it also shows overall cross-district expenditures that are not as predictable as one might expect, especially given the assertions in the Buckeye report.

Note that statewide, the correlation between district level subsidized lunch concentration and gifted and talented identification rates is -.51, meaning that state aid for gifted education may be driven in higher amounts to lower-poverty districts, which additional regression analyses do validate. When including a separate measure of gifted student identification rates, the poverty coefficient increases to .28 and the coefficient on percent gifted and talented is +.51. What this tells us is that the positive marginal support related to gifted student populations (+.51) leads to an overall reduction in the margin of difference provided by poverty-based aid, reducing the .28 margin to approximately .14. That is, accounting for additional funding in districts with higher shares of gifted children cuts the effective poverty-based allocation across districts in half.[30]

In Cincinnati, the one school district in Ohio currently implementing a weighted student formula, school level per pupil expenditures in 2005-06 are even less predictable than they are statewide, with an r-squared of only 20 percent (the model accounts for only one-fifth of the variation). And, there is no statistically significant relationship between poverty rates and spending per pupil. But, there are differences in funding by school size. One possible explanation for the lack of poverty-related support in Cincinnati is that the district includes a weight on gifted students (larger than the poverty weight), and across elementary schools in the district, the correlation between gifted identification rates and poverty is -.88. There is a clear inverse relationship between poverty and identified giftedness. Indeed these findings require additional investigation across multiple years of data — another shortcoming of the Buckeye report.

In both Columbus ($p<.05$) and Akron ($p<.10$), within-district expenditures are positively associated with poverty rates across schools and with larger magnitude than the state to district magnitude praised by the Buckeye authors. In Akron, expenditure variation is more predictable than across districts. (In Cleveland, the relationship between poverty rates and spending cannot be estimated because all schools show 100 percent poverty.)

In short, Table 1 shows that the state does no better and no worse than these four selected large districts at driving money to schools on the basis of educational need.

Second, Berne and Stiefel also propose using external cost adjustments, or weights, to adjust current spending data and then calculate a series of conventional school finance equity measures, including *coefficients of variation* (CV) and *Gini coefficients.* That is, first, current spending per pupil data are adjusted for differences in need and cost, and then equity statistics are calculated to determine the degree of inequity or variance in adjusted spending. In the present case, one might first conduct such analysis on statewide, cross-district data and then on within-district, cross-school data.

Here, on the district level analysis I focus only on districts that are large enough to enjoy economies of scale, which according to Andrews, Duncombe and Yinger[31] as well as Baker[32] are those enrolling 2000 or more students. I make this choice because of the lack of a standard cost adjustment for district (or school) size.[33]

Weights used in the analysis include a 40 percent weight for children qualifying for free or reduced price lunch. This weight is conservative (low) compared to existing weights from recent research studies and is based roughly on the low-end weighting from a review of studies by Baker.[34] A 90 percent weight is used for children with disabilities, and is based roughly on patterns of expenditure (not actual cost) on children with disabilities (mild to moderate) from the Special Education Expenditures Project (SEEP), as reported in

Baker, Green and Richards.[35] For statewide, cross-district analysis, the National Center for Education Statistics (NCES) Comparable Wage Index is used to adjust for regional, labor market level, variation in competitive wages. No index for wages is needed within districts because each district falls within a single labor market.[36]

Table 2 reports the coefficients of variation and Gini Coefficients, calculated on cost-adjusted 2005-06 current expenditure data for districts statewide and for elementary schools[37] in Cincinnati, Columbus, Cleveland and Akron. Not all data were available for all schools (sample size reported in Table 2). The Coefficient of Variation is simply the standard deviation divided by the mean. Comparing the statewide CV to the four districts, two have less variation in cross-school resources than existing cross-district variation statewide, and two districts have greater within-district variation than cross-district variation statewide.

The Gini coefficient tells a similar story, measuring the extent to which the object in question — spending per pupil — is distributed equally across schools or districts, after adjustment for cost and need. An ideal Gini coefficient approaches zero, indicating that each one percent of the districts or schools receives an appropriate one percent share of need-adjusted resources. As with the CV, the Gini coefficient indicates the greatest equity within Cincinnati and Akron, and less equity within Columbus and Cleveland. These findings contrast somewhat with the vertical equity indicators in Table 1, which shows Cincinnati's per pupil allocations to be less sensitive to poverty than allocations in Columbus or Akron.

In short it is questionable, at best, how one can assert that the Ohio school finance problem is primarily a within-district problem — the central thesis of the Buckeye report analyses and basis for their conclusions.

Table 1
Expenditure Functions for State and Selected Districts

	State to District			Cincinnati			Columbus		
	Coef.	**SE**		**Coef.**	**SE**		**Coef.**	**SE**	
Students									
% Subsidized Lunch	0.141	0.037	*	-0.035	0.076		0.271	0.117	*
% Disability	1.053	0.208	*	0.382	0.206	**	0.063	0.214	
School/District									
Economies of Scale									
Enrollment (ln)	0.050	0.067		-2.278	1.274	**	-2.127	0.895	*
Enrollment Squared (ln)	0.000	0.004		0.179	0.104	**	0.152	0.075	*
Level									
Elementary									
Middle School							0.096	0.053	**
High School				0.030	0.040		0.204	0.071	*
Other				-0.023	0.033		-0.420	0.124	*
Regional Wage (NCES CWI)	0.521	0.077	*						
Constant	7.899	0.294	*	16.406	3.882	*	16.275	2.713	*
R-squared	0.46			0.20			0.46		
Poverty/Gifted Correlation	-0.51			-0.88			-0.57		

*p<.05, **p<.10
Weighted for district or school enrollment

Table 1 cont'd
Expenditure Functions for State and Selected Districts

	State to District			Cleveland			Akron		
	Coef.	**SE**		**Coef.**	**SE**		**Coef.**	**SE**	**P>t**
Students									
% Subsidized Lunch	0.141	0.037	*	(dropped)			0.204	0.104	**
% Disability	1.053	0.208	*	2.175	0.433	*	0.625	0.196	*
School/District									
Economies of Scale									
Enrollment (ln)	0.050	0.067		2.118	1.762		-0.110	0.881	
Enrollment Squared (ln)	0.000	0.004		-0.182	0.144		-0.009	0.074	
Level									
Elementary									
Middle School				0.249	0.084	*	0.193	0.054	*
High School				0.210	0.121	**	0.259	0.075	*
Other				0.392	0.113	*	0.324	0.062	*
Regional Wage (NCES CWI)	0.521	0.077	*						
Constant	7.899	0.294	*	2.619	5.398		9.872	2.607	*
R-squared	0.46			0.36			0.54		
Poverty/Gifted Correlation	-0.51						0.27		

*p<.05, **p<.10
Weighted for district or school enrollment

Table 2
Equity Comparisons

Measure	Statewide – District Level (Scale Efficient)	Cincinnati Elementary Schools (N=41)	Columbus Elementary Schools (N=77)	Cleveland Elementary Schools (N=74)	Akron Elementary Schools (N=38)
Mean	$6,446	$7,061	$7,518	$6,101	$6,678
St. Deviation	$911	$753	$2,058	$1,084	$724
CV	14.1%	10.7%	27.4%	17.8%	10.8%
Gini Coefficient	0.073	0.060	0.090	0.088	0.059

With 40% weight on subsidized lunch, 90% weight on special education and CWI for statewide analysis

NOTES AND REFERENCES

[1] Carr, M., Gray, N., and Holley, M. (2007, Sept. 20). *Shortchanging Disadvantaged Students: An analysis of intra-district spending patterns in Ohio*. Policy Report No. 14. Columbus: The Buckeye Institute for Public Policy Solutions. Retrieved Oct. 10, 2007, from http://www.buckeyeinstitute.org/docs/Shortchanging_Disadvantaged_Students.pdf

[2] *DeRolph v. State* (1997), 78 Ohio St.3d 193. Retrieved Oct. 10, 2007, from http://www.bricker.com/LegalServices/Practice/Education/SchoolFund/Briefs/majority.asp

"We recognize that disparities between school districts will always exist. By our decision today, we are not stating that a new financing system must provide equal educational opportunities for all. In a Utopian society, this lofty goal would be realized. We, however, appreciate the limitations imposed upon us. Nor do we advocate a 'Robin Hood' approach to school financing reform. We are not suggesting that funds be diverted from wealthy districts and given to the less fortunate. There is no 'leveling down' component in our decision today."

See also: Hunter, M. (2004, May 10). Ohio litigation. *Access Quality Education*. Retrieved Oct. 10, 2007, from http://www.schoolfunding.info/states/oh/lit_oh.php3

[3] The authors fail to acknowledge that the 2003 decision by the state's Supreme Court to end the *DeRolph* litigation was purely jurisdictional; the Court never questioned the basic finding that the finance system remained out of compliance with the state's constitutional requirements

[4] This assumption, if not explicitly laid out, is at least strongly implied by the arguments posed alongside the first several figures of the report, where the authors show first that districts with greater than 50 percent poverty on average spend more than districts with less than 50 percent poverty, but that poverty-related achievement gaps persist. The authors go on to argue that high-poverty districts are in no position to be asking the state for additional funding until they have cleaned up their own act by allocating the funding they have to higher-poverty schools.

[5] In fact, among the handful of authors cited in the Buckeye report, Roza and Hill (2004) have found that salary-related inequities persist to some extent even in the nation's most applauded decentralized, weighted student funding urban system — Seattle Public Schools. Roza, M. and Hill, P. T. (2004). *How Within-District Spending Inequities Help Some Schools to Fail.* Brookings Papers on Education Policy.

Baker and Thomas (2006) also show these inequities in Seattle. Baker, B.D., Thomas, S.L. (2006) *Review of Hawaii's Weighted Student Formula. Hawaii Board of Education*. Preliminary, multiple city analyses using detailed staffing data do find that Seattle fares quite well compared with many other cities on its degree of within-district horizontal and vertical equity, but that some cities using staffing allocation strategies, including Omaha, Nebraska achieve better vertical equity than even Seattle. Analyses available on request.

[6] To support this contention, the authors cite only a working paper from the Center for Reinventing Public Education on why personnel-based allocation systems create inequity. Kelly Warner-King and Veronica Smith-Casem. (2005). *Addressing Funding Inequities Within Districts*. Center on Reinventing Public Education, Working Paper #2005_2, p 12. Warner-King and Smith-Casem state that *most districts allocate personnel resources to individual schools through a set of funding formulas.* Following the citation trail, the Warner-King and Smith-Casem working paper, which overall is reasonably well-grounded in existing literature, cites this assertion to Iatarola and Stiefel, School-Based Budgeting in New York City, 557, 568; Margaret E. Goertz, The Challenges of Collecting School-Based Data, 22 *J. of Educ. Fin*. 291, 300 (Winter 1997); Berne and Stiefel, *Measuring Equity at the School Level*, 405, 406. Yet, this line of work by Stiefel and colleagues in New York City is

specific to New York City, and it is related to work with other coauthors, including Ross Rubenstein, which explored resource allocation in a handful of other cities, most notably Chicago. None of these studies attempt to evaluate broadly the dominant budgeting strategies employed by school districts, and none come to a strong conclusion that there is a single dominant strategy responsible for within-district inequity. Indeed, one can identify thematic problems, such as the influence of seniority on teacher placement. But no definitive analysis has yet been conducted on either (a) the distribution of types of budgeting practices employed by large school districts to allocate resources to schools, or (b) which of those types are more or less susceptible to the seniority/placement problem.

One, if not the only, rigorous analysis of this assumption is Koski, W.S., and Horng, E.L. (2007) Facilitating the Teacher Quality Gap? Collective Bargaining Agreements, Teacher Hiring and Transfer Rules, and Teacher Assignment Among Schools. *Education Finance and Policy*. 2 (3) 262-300.

Koski and Horng find: "Contrary to certain previous research and conventional wisdom, however, this study finds no persuasive evidence that the seniority preference rules independently affect the distribution of teachers among schools or exacerbate the negative relationship between higher minority schools and uncredentialed and low-experience teachers" (p. 262).

[7] Stiefel, L., Rubenstein, R., and Berne, R. (1998). Intra-District Equity in Four Large Cities: Data, Methods and Results." *Journal of Education Finance* 23, 4: 447-467.

Stiefel, L., Rubenstein, R. and Schwartz, A. (2004). "From Districts to Schools: The Distribution of Resources across Schools in Big City School Districts" *Proceedings from the Symposium on Education Finance and Organizational Structure in NYS Schools.* Albany NY: Education Finance Research Consortium, 61-88.

Rubenstein, R. (1998). "Resource Equity in the Chicago Public Schools: A School-level Approach." *Journal of Education Finance* 23, 4, 468-489.

Schwartz, A. (1999). "School Districts and Spending in the Schools," in Fowler, W., ed., *Selected Papers in School Finance, 1997-99.* Washington, DC: National Center for Education Statistics, 55-83.

Burke, S. (1999). "An Analysis of Resource Inequality at the State, District, and School Levels." *Journal of Education Finance*, 24, 4, 435-458

[8] The most obvious resource on this point is Berne, R., & Stiefel, L. (1984) *The Measurement of Equity in School Finance*. Baltimore, MD. Johns Hopkins Press. For a recent application of regression-based methods for evaluating the extent to which state policies advance vertical equity — without measurement of actual costs of vertical equity — see Toutkoushian, R. K., Michael, R.S. (2007) An Alternative Approach to Measuring Horizontal and Vertical Equity in School Funding. *Journal of Education Finance 32* (4) 395-421.

Garms, W.J. & Smith, M.C. (1970). Educational Need and its Application to State School Finance. *The Journal of Human Resources, 5* (3), 304-317.

[9] For articles related to equity analysis controlling for differences in district-level costs, see Duncombe, W.D., and Johnston, J. (2004) The Impacts of School Finance Reform in Kansas: Equity is in the Eye of the Beholder. In J. Yinger (ed.) *Helping Children Left*

Behind: State Aid and the Pursuit of Educational Equity, 147-194. Cambridge, MA: MIT Press.

Reschovsky, A., & Imazeki, J. (2004) School Finance Reform in Texas: A Never-Ending Story? In J. Yinger (ed.) *Helping Children Left Behind: State Aid and the Pursuit of Educational Equity*, 251-282. Cambridge, MA: MIT Press.

For articles applying similar methodology to estimate school level cost variation, see Stiefel, L., Berne, R.,, Iatarola, P.,and Fruchter, N. (2000). "High School Size: The Effects on Budgets and Performance in New York City," *Educational Evaluation and Policy Analysis*, 22 (1), 27-39.

Stiefel, L., Schwartz, A.E., Iatarola, P., & Chellman, C. (2007) How Big is Big Enough: The Cost of Small Schools Revisited. Working Paper, Wagner School, New York University.

The suggestion that vertical equity adjustment be based on reasonable empirical analysis rather than political preference will likely be greeted with the reaction that such analyses are little more than alchemy, and that it is simply infeasible to estimate by any method, the marginal costs of achieving desired outcomes. However, such methods have withstood peer review in high quality journals including the Journal of Policy Analysis and Management and National Tax Journal. Further, such methods are far more likely to yield legitimate representations of marginal costs than weights produced by political deliberation alone. Weights drawn from adopted public policy should be interpreted only as statements of political preference, and not of marginal costs of achieving vertical equity.

[10] Baker, B.D., & Green, P.C. (2005) Tricks of the Trade: Legislative Actions in School Finance that Disadvantage Minorities in the Post-Brown Era American Journal of Education 111 (May) 372-413.

Baker, B.D., & Duncombe, W.D. (2004) Balancing District Needs and Student Needs: The Role of Economies of Scale Adjustments and Pupil Need Weights in School Finance Formulas. Journal of Education Finance, *29*(2) 97-124

[11] Berne, R. & Stiefel, L. (1999). Concepts of School Finance Equity: 1970 to Present. In Ladd, H., Chalk, R., and Hansen , J., eds., *Equity and Adequacy in Education Finance* . Washington, DC: National Academy Press, 7-33

[12] Berne, R., and Stiefel, L. (1984) *The Measurement of Equity in School Finance*. Baltimore, MD. Johns Hopkins Press.

[13] Berne, R., and Stiefel, L. (1984) *The Measurement of Equity in School Finance*. Baltimore, MD. Johns Hopkins Press.

[14] Duncombe, W., and Yinger, J. (2005) How Much more Does a Disadvantaged Student Cost? *Economics of Education Review* 24 (5) 513-532.

Duncombe, W.D. and Yinger, J.M. (2000). Financing Higher Performance Standards: The Case of New York State. *Economics of Education Review*, *19* (3), 363-86.

Duncombe, W., and Yinger, J. (1998) "School Finance Reforms: Aid Formulas and Equity Objectives." *National Tax Journal* 51, (2): 239-63

[15] Reschovsky, A., and Imazeki, J. (2001). Achieving Educational Adequacy through School Finance Reform. *Journal of Education Finance,* 26, (4), 373-96.

Reschovsky, A. and Imazeki, J. (1998). The Development of School Finance Formulas to Guarantee the Provision of Adequate Education to Low-Income Students. In Fowler, W., ed., *Developments in School Finance*, (NCES 98-212). Washington, DC: U.S. Department of Education, National Center for Education Statistics

[16] Berne, R., and Stiefel, L. (1984) *The Measurement of Equity in School Finance*. Baltimore, MD. Johns Hopkins Press.

Berne, R. & Stiefel, L. (1999). Concepts of School Finance Equity: 1970 to Present. In Ladd, H., Chalk, R., and Hansen , J., eds., *Equity and Adequacy in Education Finance* . Washington, DC: National Academy Press, 7-33

[17] Examining the supposed same data on Ohio schools in 2005-06, I find only about 40 of the 72 high-poverty districts to have more than four schools and only about 20 to have more than 10 schools. Further, the authors' analytic approach assumes that low-poverty districts should not be similarly obligated to drive additional resources to their higher-poverty schools. I identify at least eight Ohio schools with greater than 80 percent poverty in districts with less than 50 percent poverty, and 196 schools with greater than 50 percent poverty in districts with less than 50 percent poverty, over 60 of which had greater than 60 percent poverty.

[18] Berne, R., and Stiefel, L. (1984) *The Measurement of Equity in School Finance*. Baltimore, MD. Johns Hopkins Press.

[19] For example, Gronberg, Taylor, Jansen and Booker (2004) find higher district-level per pupil costs in districts with larger shares of children in high schools, indicating a higher per pupil cost of operating high schools (holding outcomes constant) relative to lower grades in Texas. Gronberg, T., Jansen, D., Taylor, L., & Booker, K. (2004) *School Outcomes and Schools Costs: The Cost Function Approach*. College Station, TX: Busch School of Government and Public Service, Texas A&M University. Retrieved October 3, 2007, from http://bush.tamu.edu/research/faculty_projects/txschoolfinance/papers/SchoolOutcomesAndSchoolCosts.pdf. However, acceptance of grade level differences should not be used as excuse for allowing districts to channel inappropriate sums of money to one grade level versus another.

[20] In fact, across the state's largest districts, free/reduced-price lunch reporting rates decline incrementally by grade level (as expected) and spending per pupil is higher in secondary schools than in elementary or middle schools (middle being slightly lower than elementary).

[21] It would be more useful for the authors to present information on the linear trendline between poverty and spending, where the slope might be interpreted as an implicit poverty adjustment. Baker, B.D., and Duncombe, W.D. (2004) Balancing District Needs and Student Needs: The Role of Economies of Scale Adjustments and Pupil Need Weights in School Finance Formulas. *Journal of Education Finance*, *29*(2) 97-124..

[22] Baker, B.D., & Green, P.C. (2005, May) Tricks of the Trade: Legislative Actions in School Finance that Disadvantage Minorities in the Post-Brown Era. *American Journal of Education* 111, 372-413.

Baker, B.D., & Duncombe, W.D. (2004) Balancing District Needs and Student Needs: The Role of Economies of Scale Adjustments and Pupil Need Weights in School Finance Formulas. *Journal of Education Finance, 29*(2) 97-124.

[23] This is a phrase coined by the Kansas Supreme Court in *Montoy v. Kansas* (2005, Jan.) to describe a system of pupil weighting that systematically drove higher funding levels into districts with lower educational needs.

[24] Evaluating testimony provided by Lawrence O. Picus, which adopted such a strategy to show that Kansas school district funding was equitable, Shawnee County District Court Judge Terrence Bullock noted: "Dr. Picus testified he believes Kansas has a "substantial amount" of school equity, but in so opining he also testified that he assumed the Kansas system of weighting was based on actual costs to educate, which it is not." (Montoy v. Kansas, Dec., 2003) The Kansas high court later declared the pupil weighting system "politically distorted" in January, 2005. It would seem illogical, at best, that districts would be required to replicate such political distortions across their own schools. In defense of the Buckeye report authors, they chose to adopt an analytic strategy proposed by *The Annenberg Institute for School Reform.* Annenberg's within-district equity analysis tool provides a step by step walk-through on calculating a weighted student index for schools based on student population characteristics, but it provides no conceptual basis for selecting categories of student needs to be weighted, nor does it provide an empirical basis for setting weights, leading the Buckeye authors down the road of selecting Ohio's adopted state policy weights. That said, authors such as Buckeye's in this case should themselves have read some of the existing literature on marginal costs associated with student needs and methods for measuring and evaluating vertical equity. Relying on a source is not an excuse if one intentionally or negligently blinds oneself to the universe of other, contradictory information.

[25] The role of gifted education and the place of gifted children in this context is particularly problematic. On the one hand, if one adopts a reasonably differentiated services conception of vertical equity, children beyond their own school's norms in terms of individual abilities or overall abilities may require differentiated services that are accompanied by additional costs. However, if assuming general curriculum to be centered on school norms, there should not be disparate distribution of gifted children by school poverty rates. Rather, each school should have its share of children who deviate from school norms. Adopting instead a "costs of achieving specific educational outcomes" perspective, the dominant perspective in recent peer-reviewed literature on marginal costs and vertical equity is that as the share of exceptionally gifted children in a school or district goes up, the costs associated with achieving desired outcomes goes down, not up. In this context, there is no justification for a positive weight on gifted children concentration. This argument is not one against differentiated services for those children who deviate, positively and substantially from localized norms. However, such provisions may be accommodated within school and district budgets, even where additional "weights" per se are not provided. Providing weights for gifted education that systematically drive additional funding to otherwise lower-need districts or schools simply serves to exacerbate the disparities in opportunities for gifted children across higher- and lower-poverty districts. Such weights increase the likelihood of more comprehensive services for gifted children in low-poverty districts and schools while providing little support for gifted children in higher-poverty schools and districts. See Baker, B.D., & Friedman-Nimz, R.C. (2004) State Policy Influences Governing Equal Opportunity: The Example of Gifted Education. *Educational Evaluation and Policy Analysis*, *26*(1) 39-64.

Baker, B.D. & McIntire, J. (2003) Evaluating State School Funding for Gifted Education Programs. *Roeper Review* 26 (3) 173-179.

Baker, B.D., & Friedman-Nimz, R.C. (2003) Gifted Children, Vertical Equity and State School Finance Policies and Practices. *Journal of Education Finance* 28 (4) 523-556.

Baker, B.D., & Friedman-Nimz, R.C. (2002) Determinants of the Availability of Opportunities for Gifted Children: Evidence from NELS '88. *Leadership and Policy in Schools* 1 (1) 52-71

[26] Bush, B. (2007, Sept. 23). School suit is not just city's problem. *Columbus Dispatch*. Retrieved Oct. 10, 2007, from http://www.columbusdispatch.com/live/content/local_news/stories/2007/09/23/SKL_payroll.ART_ART_09-23-07_A1_LP7VML2.html?sid=101

[27] Berne, R., and Stiefel, L. (1984) *The Measurement of Equity in School Finance*. Baltimore, MD. Johns Hopkins Press.

[28] Baker, B.D., and Green, P.C. (2005, May) Tricks of the Trade: Legislative Actions in School Finance that Disadvantage Minorities in the Post-Brown Era *American Journal of Education* 111, 372-413

[29] Taylor, L. L., & Glander, M. (2006). *Documentation for the NCES Comparable Wage Index Data File* (EFSC 2006-865). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

[30] This effect is likely a combination of disproportionate state support for gifted education being driven to lower-poverty districts, and the ability of lower-poverty and higher-wealth districts to provide increased local supplemental support for gifted education. Because of the disparate distribution of gifted and talented identification rates by wealth in Ohio, the share of children identified as gifted in the expenditure model is likely serving as a proxy for wealth.

[31] Andrews, M., Duncombe, W. and Yinger, J. (2002). Revisiting economies of size in American education: Are we any closer to consensus? *Economics of Education Review, 21,* 245-262.

[32] Baker, B.D., & Green, P.C. (2005, May) Tricks of the Trade: Legislative Actions in School Finance that Disadvantage Minorities in the Post-Brown Era *American Journal of Education* 111, 372-413

[33] Bifulco, R. (2005) District-Level Black-White Funding Disparities in the United States 1987 to 2002. *Journal of Education Finance* 31 (2) 172-194

In the school-level analysis, one might also exclude elementary schools enrolling less than 300 students (Andrews, Duncombe and Yinger, 2002) if any were to exist, but such schools might not necessarily exist in large, scale-efficient districts investigated herein, and may be a source of unjustifiable inequity.

[34] Baker, B.D., and Green, P.C. (2005, May) Tricks of the Trade: Legislative Actions in School Finance that Disadvantage Minorities in the Post-Brown Era *American Journal of Education* 111, 372-413

[35] See Table 8.1 in Baker, B.D., Green, P.C., & Richards, C.E. (2008). *Financing Education Systems*. Upper Saddle River, NJ: Pearson-Prentice Hall, 198

[36] Ideally, in place of such individual weights, one would use the approach adopted by Duncombe and Johnston (2004) and estimate a regression-based cost index of marginal costs of achieving comparable outcomes across Ohio schools. Such complexity is well beyond the scope of this review.

[37] Those classified as School Level = 1, under the National Center for Education Statistics Common Core of Data, Public School Universe 2005-06. www.nces.ed.gov/ccd

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The Think Tank Review Project is made possible by funding from the Great Lakes Center for Education Research and Practice.

SUGGESTED CITATION:
Baker, B. (2007). *Review of "Shortchanging Disadvantaged Student: An Analysis of Intra-district Spending Patterns in Ohio."* Boulder and Tempe: Education and the Public Interest Center & Education Policy Research Unit. Retrieved [date] from http://epicpolicy.org/thinktank/review-shortchanging-disadvantaged-students-an-analysis-intra-district-spending-patterns-o