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Cheerleading, Ceramics and Non-Productive Resource Allocation in Low Performing Schools: Really?

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Abstract

The present study seeks to evaluate patterns of resource allocation across school districts in Illinois and in Missouri, using detailed statewide teacher level data on course assignments. Using rich panel data sets from Missouri and Illinois, we apply cost modeling to identify a) resource rich, high performers, b) resource poor, low performers, c) resource rich, low performers and d) resource poor high performers. Then, using statewide data on staffing assignments, we explore 1) the patterns of staffing and course assignments by grade level in each quadrant, 2) at the elementary level, how the patterns of core versus other staffing differ by quadrant, 3) at the secondary level, how the depth and breadth of curriculum differ by quadrant. We find significant deficits of resources allocated to advanced mathematics courses, including calculus and trigonometry, and physical science courses in low resource, low outcome districts and their high schools, when compared with high resource, high outcome districts.

Introduction

A handful of authors, primarily in non-peer reviewed and *think tank* reports posit that poor urban school districts have more than enough money to achieve adequate student outcomes and simply need to reallocate what they have toward improving achievement on tested subject areas. Authors including Marguerite Roza and colleagues of the Center for Reinventing Public Education encourage public outrage that any school district not presently meeting state outcome standards would dare to allocate resources to courses like ceramics or activities like cheerleading. To support their argument, the authors provide anecdotes of per pupil expense on cheerleading being far greater than per pupil expense on core academic subjects like math or English.

> *Imagine a high school that spends $328 per student for math courses and $1,348 per cheerleader for cheerleading activities. Or a school where the average per-student cost of offering ceramics was $1,608; cosmetology, $1,997; and such core subjects as science, $739.*[1]

These shocking anecdotes, however, are unhelpful for truly understanding resource allocation differences and reallocation options, and are an unfortunate and unnecessary distraction. For example, the major reason why cheerleading or ceramics expenses per pupil are seemingly high is the relatively small class sizes, compared to those in English or Math. In total, the funds allocated to either cheerleading of ceramics are unlikely to have much if any effect if redistributed to reading or math.

Further, the requirement that poor urban (or other) districts currently falling below state outcome standards must re-allocate any and all resources from co-curricular and extracurricular activities toward improving achievement on tested outcomes may increase inequities in the depth and breadth of curricular offerings between higher and lower poverty schools – inequities that may be already quite substantial. That is, it may already be the case that higher poverty districts and those facing greater resource constraints are reallocating resources toward core, tested areas of curriculum and away from more advanced course offerings which extend beyond the tested curriculum and enriched opportunities including both elective courses and extracurricular activities. Some evidence on this point already exists.

Lack of depth and breadth of curriculum may significantly disadvantage high school graduates as applicants to selective colleges and universities. Killgore (2009) explains the importance of high school students' academic and non-academic qualifications for acceptance to selective colleges. With regard to non-academic merit, Killgore explains: "Nonacademic merit becomes important to admissions officers at elite colleges because it offers them additional criteria to distinguish the best from among their large pool of applicants who are highly qualified in academic terms. Nonacademic

[1] see: http://www.urban.org/events/firsttuesdays/big-disconnect.cfm

merit consists of extracurricular involvement, such as sports, artistic activities, student organizations, and volunteerism."(p. 471)[2] Further, a substantial body of research points to a positive relationship between highest level of math course taken in high school and persistence in college. Most recently, Long, Iatarola and Conger (2009) find:

> *Using data on students in Florida public postsecondary institutions, we find that differences among college-going students in the highest math course taken explain 28–35 percent of black, Hispanic, and poverty gaps in readiness and over three-quarters of the Asian advantage.*

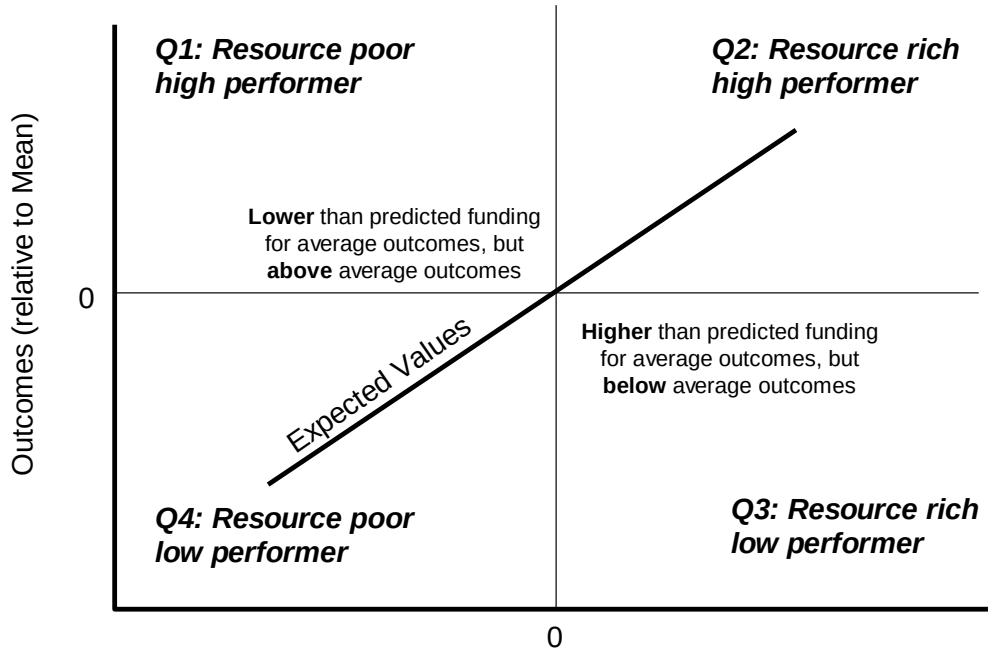
The perspective that low performing districts need merely to reallocate what they already have is particularly appealing in the current fiscal context, where state budgets and aid allocations to local public school districts are being slashed. Accepting Roza and colleague's logic, states under court mandates or in the shadows of recent rulings regarding *educational adequacy,* but facing tight budgets may simply argue that high poverty and/or low performing districts should shift all available resources into the teaching of core, tested subjects. Lower poverty districts with ample resources that exceed minimum outcome standards face no such reallocation obligations, leading to substantial differences in depth and breadth of curriculum. Arguably a system that is both adequate and fair would protect the availability of deep and broad curriculum while simultaneously attempting to improve narrowly measured outcomes.

Goals and Research Questions

The present study seeks to evaluate patterns of resource allocation across school districts in two diverse, adjacent states, Illinois and in Missouri, using detailed statewide teacher level data on course assignments and main teacher assignments. Following the identification framework in Figure 1 below, we explore differences in teacher assignment to different types and levels of courses in districts that we identify as a) resource rich, high performers, b) resource poor, low performers, c) resource rich, low performers and d) resource poor high performers (identification method explained below). That is, do districts that are low performers, resource rich or poor, simply allocate too many teachers to "non-essential" functions, and to resource rich low performers do so even more than resource poor lower performers? Further, do resource rich high performers actually target more to core, essential functions or does their position provide them the latitude to allocate even more resources to non-core, "non-essential" functions? Finally, do resource poor high performers allocate significantly more resources to core functions? If so, to what extent do they significantly sacrifice curricular depth and breadth?

[2] Killgore, L. (2009) Merit and Competition in Selective College Admissions. *The Review of Higher Education* 32 (4) 469–488

Figure 1



In order to identify resource rich and resource poor districts herein, we do not merely compare the nominal financial inputs to schooling. Nor do we adopt a set of a priori specified weights and cost adjustments, as done in recent non-peer reviewed reports for general public consumption. Such methods for cost adjustment are problematic on numerous levels.[3]

Rather, for each state – Missouri and Illinois – we begin by estimating a thorough education cost function model to account for the differences in a) regional competitive wage variation, b) economies of scale and population sparsity, c) a variety of student population characteristics that may influence the costs of achieving specific levels of educational outcomes. In addition, we attempt to correct for differences in the relative efficiency of districts in producing educational outcomes via commonly used indirect measures of the likelihood that districts spend inefficiently.

After applying cost function methods to identify districts in each quadrant, we use multiple years of school level staffing data with detailed information on teacher assignments and specific course assignments to address the following questions:

1) What are the general patterns of "core" instructional and other staffing distribution by grade level in each quadrant?
2) At the elementary level, how the patterns of core versus other staffing differ by quadrant?

[3] See, for example, the recent Center for American Progress Return on Investment index:

3) At the secondary level, how do the depth (higher level and advanced courses) and breadth (electives, arts, music, etc.) of curriculum differ by quadrant?
4) Are there differences in staffing configurations when comparing years prior to, and following adoption of No Child Left Behind?

This particular approach – cost modeling with adjustment for indirect efficiency measures – is particularly appropriate for the exploratory analysis herein because the cost index estimates are based on the amount that "would be spent" to achieve "average outcomes" if a district had "average fiscal capacity" and "average local oversight, or public monitoring." Among districts having similar costs, needs and outcomes, but different spending due to variations capacity and monitoring, there may be resultant differences in aggregate resource availability and allocation. Imagine, for example, two relatively high need districts in the Chicago metropolitan area, each with costs of achieving average outcomes at 25% above average, each achieving average outcomes. Let's assume that one district is right on target, actually spending about 25% above average and achieving average outcomes, and having average capacity to spend and public monitoring. The district may have achieved its targets by allocating an "average" mix of teacher assignments among districts facing similar cost pressures.

The other district may be spending 150% of average levels, because a) it can, or has the local capacity to do so, and b) the local public is willing to support such spending and either is specifically supporting spending to add programs/services that don't contribute directly to the measured outcomes, or the local public is willing to turn those resources over to local school officials to use in ways that may not contribute directly to measured outcomes. In either case, the result is the same, in that we have a second district that spends an additional 25% above the first, but still has average measured outcomes, and has other costs and needs similar to the first district. The difference is in the indirect efficiency measures, which more likely represent differences in demand preferences and capacity for spending differently, which is precisely what we intend to explore herein.

Related Literature on Resource Allocation

Instructional Share and Outcomes

On the heels of late 1980s and early 1990s criticism[4] that public school systems were woefully inefficient and simply not using existing resources wisely, interest in the allocation of resources within school districts increased. It makes sense that there would be better and worse ways to allocate schooling resources toward improving educational outcomes. In the 1990s, however, many studies were conducted with the forgone conclusion that central administrative expenses were necessarily bad (inefficient) and that higher percentages of dollars allocated "to the classroom" were necessarily good

[4] Following the 1984 report *A Nation at Risk.*

(efficient). Software was developed for school districts to track dollars *to the classroom*[5], and studies reported instructional expenditures in New York City schools at only 21.9 percent in an attempt to show the inefficiency of large urban school districts (Speakman et al., 1996). However, few methodologically strong studies linked directly to student outcomes, the allocation of resources between administrative, and other non-instructional expenses and classroom instructional expenses.[6]

Despite lack of consistent evidence supporting specific strategies, political pundits and education consultants have exerted substantial pressure on state legislatures and local district officials to adopt quick-fix strategies related to internal allocation of resources. They have called upon legislatures to require all public school districts to allocate 65 cents of each education dollar "in the classroom;" they have advocated that school districts, especially large urban ones, invariably allocate resources across their schools inequitably and must be required to decentralize governance and control to building-level administrators and to allocate funds to schools on a weighted-student basis; and they have proposed a single *evidence-based* model of public schooling, a largely prescriptive, one-size-fits-all model for reorganizing school resources, which they claim will *double* student performance (Picus & Odden, 2007). Several states and large school districts have jumped hastily onto one bandwagon or the other.

A significant point of confusion in the literature on instructional spending relates to the difference between instructional spending levels and instructional spending as a share of total spending. For example, political proponents of requiring public school funding to be targeted to the classroom frequently point to a policy brief prepared for Texas legislators (Patterson, 2005) citing the research of Wenglinsky (1997) as finding a positive relationship between instructional spending and student outcomes. Wenglinsky, however, does not evaluate trade-offs between instructional and other spending and outcomes, but rather finds that either instructional or administrative spending increases, both of which appear related to increased overall staffing and class-size reduction, lead to improved educational outcomes.

Like Wenglinsky (1997), Ferguson and Ladd (1996) find in Alabama that instructional spending has a positive effect on test scores. Using data from Oklahoma school districts, Jacques and Borsen (2002) evaluate the effects of spending levels on student outcomes across a variety of categories, finding "Test scores were positively related to expenditures on instruction and instructional support, and are negatively related to expenditures on student support, such as counseling and school administration" (p. 997). The authors raise concerns however with deriving causal implications from their findings, noting: "It could be that schools with problems hire more administrators and counselors." (p. 997) These findings together suggest that when adding new money to education systems, dedicating that money to instruction –

[5] Entire states such as Rhode Island adopted these resource tracking systems (IN$ITE)

[6] Though several methodologically weak production function studies did find cross school correlations between % of expenditures on instruction and school aggregate test scores.

holding other areas constant – may improve outcomes. In each case, however, the level, but not trade-offs or potential reallocation of existing levels of resources, were evaluated. A core tenet of both the 65 percent and 100 percent solutions is that more money should not be added, but rather current funds reallocated.

Bedard and Brown (2000), in an unpublished working paper, attempt the leap from evaluating levels of spending across categories to relative proportions, and find that reallocation from administration specifically toward classroom instruction might lead to increased outcomes. "Either the reallocation of $100 from administrative to classroom spending, with no change in overall expenditures, or an $100 increase aimed directly at the classroom moves the average California high school approximately 5 percentage points higher in the state test score rankings." (p. 1) But, two other published, peer-reviewed studies on the specific question of administrative expenses and student outcomes yielded partially conflicting findings. In one, Brewer (1996) found little relationship between non-instructional expenses and student outcomes. Somewhat in contrast with Brewer's non-effects of resource allocation, Marlow (2001) found that: "While numbers of teachers do not influence performance measures, numbers of administrators are shown to positively affect performance – results that suggest that too many teachers, but too few administrators, are employed."[7]

Finally, Huang and Yu (2002) combine NAEP data with NCES Common Core expenditure data to evaluate whether current expenditures per pupil and/or the difference between an individual district's instructional spending rate and the state average instructional spending rate (called DDR in their study) relate to student outcomes in 1990, 1992, and 1996. The authors found overall positive effects of current spending on outcomes but "Net of relevant district factors, DDR was found unrelated to districts' average 8th grade math performance."

Whether we assume that education dollars should go to the classroom or to administration, important trade-offs may be made within either category. The primary trade-off in the allocation of education dollars is the choice to leverage those dollars to increase teacher or administrator quantity or to pay higher wages in an attempt to increase teacher or administrator quality. Existing research provides few insights regarding this trade-off.

Factors Constraining Resource Allocation

A number of studies over the past few decades have addressed the factors that influence the allocation of school district resources. In particular, Baker (2003) finds that school district size and availability of financial resources are primary drivers of the balance of spending between administration and instruction with larger districts and lower spending districts spending proportionately less on administration. Further, specific student populations were associated with allocation differences. Increased

[7] Marlow's finding seems counterintuitive and may be explained by factors overlooked in Marlow's analysis. Among other things, more recent studies have shown that districts with higher overall spending or higher fiscal capacity to spend tend to spend proportionately more on administration. Many of those same higher spending, higher fiscal capacity school districts also serve more advantaged student populations and/or benefit from stronger community support.

prevalence of students with disabilities was tied to significant increases in district staffing levels, from classroom to central office. Increased limited English proficient and low-income populations led to increased allocations to instruction and instruction-related staff, including librarians and school counselors, but not to increases in classroom teachers.

Monk and Hussain (2000) and Brent, Roellke and Monk (1997) also show how location, school size and district wealth may lead to differences in the allocation of resources across specific educational programs. Among other things, these authors find that greater fiscal capacity provides greater opportunity to allocate resources to advanced curricular opportunities. That is, a variety of school district characteristics beyond district control, including district size and student demographic characteristics, appear to influence significantly internal resource allocation. Some of these influences, like increasing marginal costs of overhead or transportation in small districts, are unavoidable. Others, including the apparent escalation of middle level administrators and teaching support staff in higher poverty, urban districts may be *restructurable* in more productive and efficient ways. These findings make clear the potential problems of issuing one-size-fits all mandates regarding shares of budgets to be allocated to *instruction.*

Another area of emerging interest is the equity and neutrality of the distribution of specific educational opportunities, as defined by resources, rather than total per pupil revenues or expenditures, across schools and districts. Some recent research has explicitly addressed this question, while other research on broader issues of resource allocation has revealed intriguing patterns of inequity of specific opportunities. For example, Brent, Roellke, and Monk, in their human resource allocation studies in New York mentioned previously, found that the "small poor" district in their sample of case studies allocated no resources to advanced programs in any of five content areas and allocated comparable resources per pupil to regular and remedial programming in English, Social Studies, Math, and Science. In contrast, their "small wealthy" district allocated substantial resources to advanced programming in four of five content areas and no resources to remedial programming in two (English and Social Studies) of those four program areas (p. 220). This finding raises some concerns regarding horizontal equity and fiscal neutrality of the availability of advanced programming opportunities across New York State high schools.

Accountability Pressures & Resource Allocation in the Post NCLB Era

While there is much talk of the influence of No Child Left Behind and standards and testing on within district and within school resource allocation, there is little empirical research documenting shifts in resource allocation in response to testing regimes adopted by states under NCLB. The common perception is that overemphasis in state accountability systems specifically on reading and math between grades 3 and 8

has led to significant pressure for resource constrained school districts to re-allocate any and all resources to those areas, contracting or shedding other curricular opportunities.

A recent report on participation in the Arts found that participation in Arts education in particular has been in steady decline since 1982 (National Endowment for the Arts, 2011). That is, the decline of arts education began long before adoption of NCLB and the heavy emphasis on reading and math alone.

Numerous studies of school district resource allocation suggest that patterns of resource allocation, especially broad categories into which resources are allocated, are remarkably stable over time, and that even when additional resources are infused into district budgets they tend to be distributed largely across areas where previous resources had been distributed (See Firestone, Goertz & Natriello, 1997).

Dee and Jacob (2010) explore, among other things, changes in pupil to teacher ratios, teacher characteristics and time spent teaching core subject areas. Dee and Jacob found NCLB to be related to a modest uptick in instructional spending and support spending, while other areas remained relatively constant. They also found an increase in numbers of teachers with advanced degrees and found that teachers reported spending more time teaching math and reading (though not one or the other specifically, or academic subjects in general). While these findings imply some curricular narrowing based on time spent by individual teachers of core subject areas, they do not speak to whether actual changes to staffing and curricular offerings occurred, or whether there was differential impact across different types of school settings.

Ballou and Springer (2008) evaluate achievement tradeoffs under NCLB, finding that there appears to be some tradeoff between improving performance of low performing students and reduction of performance of high performing students. Ballou and Springer explore the shifts in outcome distribution, but do not explore underlying changes in resource allocation that may explain these shifts.

Finally, Reback, Rockoff and Schwartz (2010) use the Early Childhood Longitudinal Studies from the National Center for Education Statistics to explore shifts in teacher time allocation and specific opportunities in schools they classify as on the margin for meeting Adequate Yearly Progress, or schools expected to feel the pressures of accountability sanctions. While they find that teacher' perceptions of the pressures and their principals' ability to deal with those pressures are affected and teaching time re-allocated, they also find that "these schools do not substantially alter their provision of physical education classes, recess, or gifted and talented programs, and are not changing the length of the school year." (p. 25)

Data and Methods

This study involves two major stages – first, the identification of districts falling into each quadrant and second, the evaluation of staffing resource allocation of teachers in districts falling into each quadrant. The first stage of our analysis involves use of multiple types of data, primarily from state department of education sources but

supplemented with data from the U.S. Census Bureau and from the National Center for Education Statistics. The second stage of our analysis focuses specifically on multiple years of individual teacher assignment files obtained from Missouri and Illinois state departments of education. In each case, the teacher assignment files used are public use files. Limited information on teacher characteristics is provided in these files.

Data

Missouri and Illinois were chosen for this analysis for a variety of reasons including data availability and substantial heterogeneity of school district types and presence of diverse major metropolitan areas. The two states are contiguous and share one major metropolitan area (St. Louis/E. St. Louis). Further, reasonable cost models were successfully estimated to each state, including one from previous research by the authors. Finally, while poor urban districts in Illinois tend to be systematically resource constrained as a function of state school finance policy, resource constraints are lessened in some though not all Missouri urban districts. In Missouri, poor urban fringe districts are significantly resource constrained but urban core districts have significantly higher funding levels, especially in the St. Louis metropolitan area. Both states also have highly affluent suburban districts.

Because outcome standards were altered, and a new school funding formula adopted in Missouri in 2006, our Missouri models and analysis use data fro 2006 to 2008 (2009 if available). We use data on district level expenditures, student population characteristics, economic context (from U.S. Census), teacher characteristics and wages, and the NCES Education Comparable Wage Index.

For Illinois, we use data from 2003 to 2009, including many of the same elements. We use district level financial data, student population characteristics, teacher characteristics and wages from state department of education sources and we supplement with economic contextual characteristics from U.S. Census and the NCES Education Comparable Wage Index (in some models).

For our staffing resource allocation analysis, in Illinois, we use data from 2005 to 2009 to characterize differences in the most recent years, and we use data from 2000 & 2001, and 2008 & 2009 to compare resource allocation prior to and following adoption of No Child Left Behind. The Illinois staffing data include approximately 160,000 (teacher main assignments) cases per year (168,000 in 2009). For our staffing course assignment resource allocation analysis in Missouri, we use data from 2003 to 2007, including approximately 350,000 assigned courses per year. To compare the period prior to and following adoption of No Child Left Behind, we use data from 1999 & 2000 and from 2006 & 2007.

Methods

Selection via Education Cost Function Modeling

We begin by estimating the "cost" faced by each district in order to achieve current state average outcomes, and more specifically to identify those cost targets holding constant community and contextual characteristics that may permit a school district to operate more or less efficiently. Costs of measured educational outcomes are assumed to vary across districts, settings, and children as a function of desired outcome levels, student population characteristics, school and district structural characteristics (economies of scale, grade ranges offered), prices of labor and other schooling inputs, and the relative efficiency with which school districts apply their resources toward achieving desired outcomes:

Spending = *f*(Outcomes, Students, District, Input Prices, Inefficiency)

where cost is measured by the current spending of school districts. The cost of producing any given level of outcomes is the spending toward achieving those outcomes, less inefficiency in spending.

A growing body of recent education cost modeling literature seeks to identify exogenous characteristics of school districts to explain and ultimately control for inefficiency in school district spending. Those exogenous characteristics are typically grouped as factors associated with fiscal capacity – the ability to spend more, and spend less efficiently – and public monitoring – measures of the extent to which the local public has interest in the efficiency of the local public school district.

Outcomes in the estimated cost models are those measured outcomes most often used in state accountability systems – state assessments in reading and math. As such, the models estimated herein produce a cost target based on current district practices toward achieving specific narrowly measured outcomes. If some districts in the model spend more than others on other things not directly associated with the measured outcomes in the model, that spending will be identified as inefficiency (whether it should or not). In affluent communities with greater fiscal capacity, there may be local public preference for high quality music and arts programs (or Cheerleading and Ceramics) with little concern over whether these programs affect the measured outcomes. These districts already exceed "average" outcome and spending levels. But, these districts might still be able to achieve their current levels on measured outcomes at lower than their current spending, if they did not have the preference and capacity for spending not directly associated with the measured outcomes.

At the other end of the spectrum, there may be those districts with low fiscal capacity, and relatively high student needs among other cost pressures. Some of these districts may find a way to produce average student outcomes even with lower spending than would be predicted in models assuming average fiscal capacity and public monitoring. One explanation is that these districts may be substantially narrowing their curriculum and targeting resources toward the narrowly measured outcomes. To date, no-one has sought resource allocation explanations for why school districts land where

they do with respect to cost function predictions of the cost of producing specific levels of student outcomes.

For each state, we estimate multiple alternative cost models, and generate cost indices for all districts from each cost model, taking the average across cost model predictions for use in subsequent analysis. Cost indices are generated by using the cost function model to generate predicted values of spending holding outcome levels at the state average. That is, how much would each district spend to achieve state average outcome levels? Efficiency measures are also held at the average. Each district's cost index is generated by dividing the district's predicted spending to achieve average outcomes by the average district's predicted spending to achieve average outcomes, at average efficiency.

Staffing and Course Allocation Analysis

We use multiple years of statewide staffing data to evaluate staffing allocations by primary teaching field and course assignments across all grade levels and then specifically at the secondary level. In Illinois, we are able to identify teachers by their primary and secondary positions held, or main assignment. By aggregating position codes into different content areas and levels we are able to generate profiles of the staffing allocation of schools in different quadrants (Figure 1). The analysis is similar to that of Brent, Roellke and Monk (1997) who explored resource allocation across wealthier and poorer, smaller and larger New York State high schools. The major difference is our selection criteria for districts. Also, because our analyses are more exploratory and include courses beyond core academic areas, are categories are somewhat flexible and less well defined. Not all teacher assignments or courses listed fall neatly into the categories in Table 1.

Table 1 shows a sample format for aggregating the teacher assignments by high school (and the aggregation of high schools in districts in each quadrant). Teacher counts in each cell are estimated a) per 1000 pupils and b) as a percent of teaching staff.

Table 1
General approach for reporting staffing assignment distributions

	Math	Science	Social Studies	Language Arts/English	Foreign Language
Advanced					
Regular					
Remedial/Basic					

For most of our staffing analyses, we evaluate the share of total staffing allocated to different subject area courses or assignments. But the ability of a district to

reshuffle shares of resources is somewhat contingent on the total amount of resources available. As such, we also provide baseline figures for the numbers of total students per teacher main assignment and numbers of students per course assignment by district group. One might expect, for example, that in resource rich districts, there would simply be more teachers, teacher main assignments and courses available per child. As a result, these districts would have much greater latitude in the allocation of those resources.

Findings

Cost Models

Table 1 and 2 show the cost model alternatives for both states. In both cases, we have been able to identify cost models where there exists a positive relationship between costs and outcomes – e.g. higher measured outcomes are associated with higher per pupil expenditures, holding efficiency measures constant. Further, in both sets of models we have identified positive relationships between student need factors such as poverty, special education populations and limited English proficient populations and the cost of achieving constant outcomes. Somewhat controversially, we have included racial composition of districts and tested alternative race neutral measures. These factors are important to the analysis herein because black populations in particular are otherwise associated with apparent inefficiency. We argue alternatively that racial composition actually influences costs (not inefficiency) of producing outcomes (Baker, 2011).

All models are estimated using two-stage least squares, or instrumental variables, estimation, where in the Illinois model, both teacher wages and student outcome measures are treated as endogenous. In Missouri, student outcome measures are treated as endogenous, and for teacher wages, we include in the main model, the exogenous measure of competitive wage variation – the National Center for Education Statistics Comparable Wage Index.

The one difference between the two Illinois models is the inclusion, or not, of the National Center for Education Statistics Comparable Wage Index as an instrument for teacher wage variation in the first stage equation. While conceptually appropriate, including the ECWI as an instrument leads to over-identification problems, suggesting that the ECWI might be more appropriately included in the main model. Excluding the ECWI from the instruments produces only small changes in the model.

Differences across the Missouri models involve alternative specifications of our student need measures, specifically, the inclusion or exclusion of race variables, and testing of alternative urban poverty and poverty by density terms to capture the high costs of educating children in the urban core and inner urban fringe districts of Kansas City and St. Louis.

Table 1

Cost Model Parameters for Illinois Cost Models

	Model 1 - No ECWI* in Instruments			Model 1 - ECWI in Instruments		
DV = Oper. Exp. Per Pupil	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Outcomes	0.875	0.162	*	0.799	0.159	*
Regional Salary	0.839	0.130	*	0.550	0.117	*
Student Population						
% Low Income	0.570	0.069	*	0.538	0.067	*
% Special Education	0.812	0.138	*	0.747	0.133	*
% LEP/ELL	0.222	0.109	*	0.305	0.106	*
% Black	0.366	0.073	*	0.396	0.070	*
Year (Inflation)						
Year = 2003						
Year = 2004	-0.028	0.005	*	-0.020	0.005	*
Year = 2005	-0.053	0.014	*	-0.028	0.013	*
Year = 2006	-0.052	0.015	*	-0.022	0.014	
Year = 2007	-0.054	0.020	*	-0.014	0.019	
Year = 2008	-0.055	0.025	*	-0.003	0.023	
District Grade Range						
Elementary						
Secondary	0.273	0.028	*	0.244	0.026	*
Unified	0.215	0.015	*	0.200	0.014	*
District Size (Enrollment)						
Enrollment Under 300	0.227	0.027	*	0.192	0.026	*
Enrollment 300 to 599	0.129	0.022	*	0.102	0.022	*
Enrollment 600 to 999	0.077	0.018	*	0.057	0.018	*
Enrollment 1000 to 1599	0.037	0.017	*	0.024	0.016	
Enrollment 1600 to 1999	0.021	0.018		0.013	0.017	
Enrollment over 1999						
Efficiency Factors						
% Pop betw. 5 & 17	0.374	0.193	**	0.370	0.189	**
District Market Share	0.166	0.089	**	0.016	0.079	
State Aid Share	0.000	0.000		0.000	0.000	
Assessed Value per Pupil (ln)	0.177	0.018	*	0.195	0.017	*
Alternative Formula	0.023	0.017		0.027	0.016	**
Constant	-2.475	1.285	**	0.383	1.160	
Instrument Diagnostics						
Partial F - Outcomes		25.040			21.320	
Partial F - Wages		175.050			202.540	
Hansen J		0.103			0.000	
Model Prediction Tests						
MAPE (All)		0.124			0.118	
MAPE (Large)		0.115			0.104	
Correlation (All)		0.729			0.750	
Correlation (Large)		0.789			0.816	
Centered R-square		0.517			0.556	

*p<.05, **p<.10

Table 2

Cost Model Parameters for Missouri Cost Models

	Black Population			Poor Black Interaction			Urban x Poverty			Poverty x Density		
DV = Log of Current Expend per Pupil	*Coef.*	*R.S.E*	*P>z*	*Coef.*	*R.S.E*	*P>z*	*Coef.*	*R.S.E*	*P>z*	*Coef.*	*R.S.E*	*P>z*
Outcome - MAP Index (z-score)	0.079	0.023	*	0.078	0.023	*	0.054	0.023	*	0.085	0.026	*
Student Population												
% Poverty (SAIPE 2006)	0.212	0.091	*	0.236	0.090	*	0.329	0.105	*	0.308	0.102	*
% Disability	0.548	0.158	*	0.535	0.155	*	0.671	0.162	*	0.650	0.160	*
% Black	0.484	0.080	*	0.591	0.162	*						
% Black x Poverty (Census)				-0.423	0.514							
% Poverty by Urban							0.899	0.274	*			
% Poverty by Pop Density										0.001	0.000	*
Enrollment/Size												
Enrollment under 100	0.258	0.043	*	0.259	0.043	*	0.193	0.044	*	0.222	0.046	*
Enrollment 100 to 299	0.131	0.028	*	0.132	0.028	*	0.079	0.029	*	0.105	0.029	*
Enrollment 300 to 599	0.076	0.022	*	0.077	0.022	*	0.026	0.023		0.057	0.023	*
Enrollment 600 to 999	0.053	0.020	*	0.055	0.021	*	0.011	0.023		0.039	0.022	**
Enrollment 1000 to 1499	0.019	0.019		0.022	0.019		-0.014	0.021		0.009	0.020	
Enrollment 1500 to 1999	0.015	0.027		0.017	0.026		-0.020	0.028		-0.005	0.028	
K-8 District	0.230	0.024	*	0.230	0.023	*	0.236	0.022	*	0.235	0.024	*
Fiscal Capacity/Public Monitoring												
Fiscal Capacity												
Assessed Value per Pupil (ln)	0.322	0.022	*	0.322	0.021	*	0.344	0.022	*	0.330	0.023	*
Median Housing Unit Value (ln)	-0.079	0.031	*	-0.079	0.030	*	-0.087	0.032	*	-0.091	0.032	*
Public Monitoring												
State Aid per Pupil (ln)	0.335	0.034	*	0.337	0.033	*	0.339	0.038	*	0.350	0.037	*
District Market Share	-0.192	0.095	*	-0.188	0.092	*	-0.220	0.135		-0.161	0.114	
NCES Comparable Wage Index	0.210	0.062	*	0.212	0.061	*	0.354	0.074	*	0.271	0.069	*
Year=2007	0.009	0.006		0.009	0.006		0.012	0.006	**	0.008	0.007	
Year=2008	0.000	0.012		0.000	0.012		0.006	0.012		-0.004	0.013	
Constant	3.144	0.497	*	3.120	0.493	*	2.826	0.531	*	2.996	0.523	*
Partial F (Excl. Inst.)		14.960			14.740			17.900		13.740		
Hansen J (p-value)		0.318			0.336			0.679		0.664		
Centered R-squared		0.768			0.770			0.750		0.738		

*p<.05, **p<.10

Sample District Distribution by Quadrant

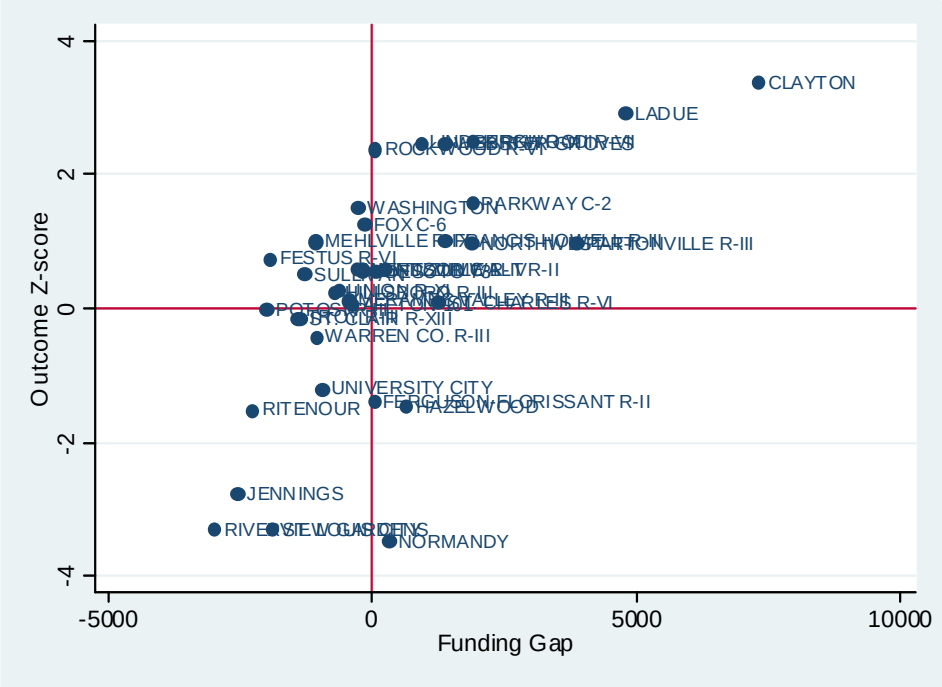
Figure 2 and 3 provide sample distributions of Missouri and Illinois school districts from the St. Louis and Chicago metropolitan areas. The figures display the relationship between a) the difference between spending levels predicted to be needed to achieve average outcome levels and actual current spending, and b) actual outcomes expressed as a z-score (to non-weighted district mean). To the left on the X axis are districts that spend less currently than they are estimated to need in order to achieve average outcome levels. To the right are districts that spend more than needed to achieve average outcomes. Notably, for both the Illinois and Missouri districts, there exists a reasonably strong positive relationship between "funding gaps" per se, and actual outcomes. Using this approach, few districts fall in Quadrants 1 and 3. But there exist obvious extremes and sizeable numbers of districts generally in the expected quadrants 2 and 4.

In Illinois in particular, there exist very few districts that fall into the upper left or lower right quadrants. That is, while we often hear tall tales about districts that are significantly resource constrained, but with very high outcomes, which would appear in the far upper left corner, such districts do not appear all that common, if they exist at all. Similarly, we often hear of those dreadfully inefficient poor urban districts that would populate the lower right corner of these scatter plots – flush with resources yet producing dreadfully low outcomes. Some low performing districts do cross the threshold into higher than average cost adjusted resources, but none fall far into the lower right quadrant.

The most striking contrasts herein might be found between districts such as Clayton and Ladue (upper right) and Riverview Gardens and Jennings, in Missouri and all in the inner urban fringe around St. Louis.

Figure 2

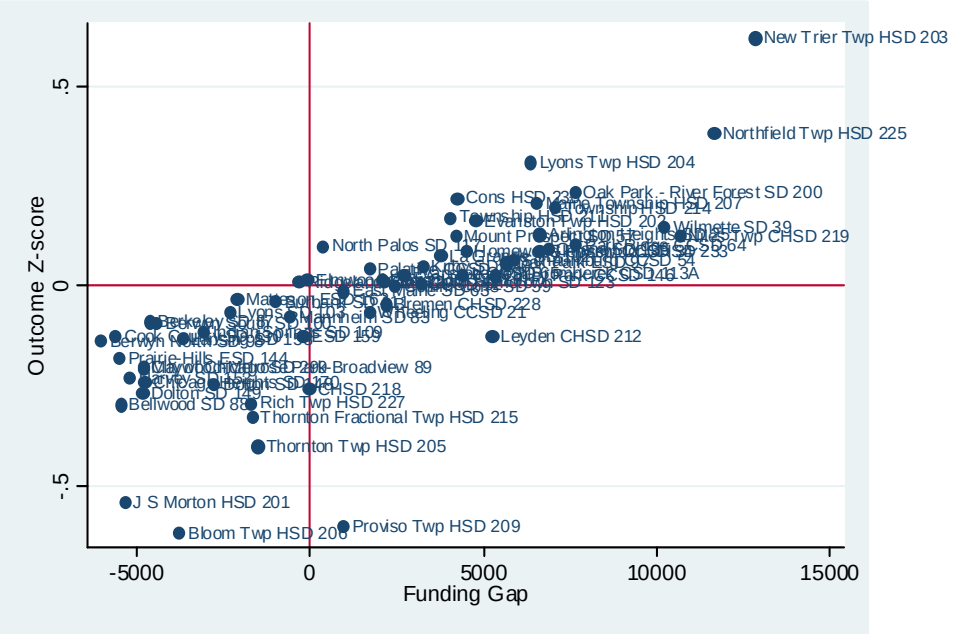
Distribution of Funding Deficits (with respect to Average) and Outcomes for Missouri Districts in the St. Louis Metropolitan Area



One might find similarly striking contrasts in curricular offerings between New Trier and Northfield, and JS Morton and Bloom in the Chicago metropolitan area.

Figure 3

Distribution of Funding Deficits (with respect to Average) and Outcomes for Illinois Districts in the Chicago Metropolitan Area



Sample School and Student Distribution by Quadrant

Table 3 summarizes the characteristics of schools and districts by quadrant, including any and all districts that fall into each quadrant regardless of how far into the quadrants they fall. Notably, the space around the intersection of the quadrants is likely characterized largely by prediction error, and while some districts do fall from that space in the upper right and lower left quadrants, few fall far from the intersection in the lower right and upper left quadrants.

Table 3 shows the distribution of schools, districts and enrollments by quadrant, statewide for each state. In Missouri, the districts and enrollments are distributed more evenly across quadrants, with significant numbers falling into the upper left and lower right quadrants. However, this finding may merely be a function of a more poorly specified model. The least populated quadrant in Missouri is the high spending, low outcomes quadrant. In Missouri, these districts have 15% higher than average spending, and 3% lower than average outcomes (about 1.5 standard deviations below average). The high spending high outcome districts have 14% higher than average spending and 2% higher than average outcomes (about 1 standard deviation above average).[8]

[8] Values on the district MAP index range from 669 to 809.

In Illinois, there are very few districts in the lower right quadrant in particular. In Illinois, spending variation around the mean is greater than in Missouri, with districts in the upper right – high spending high outcomes –quadrant spending on average 23% above average and districts in the lower left – low spending low outcomes – quadrant spending 22% below average. Outcome scales are not directly comparable, but by definition, districts in the lower performing quadrants have lower than average outcomes.

In both states, there are sufficient numbers of schools and specifically sufficient numbers of high schools enrolling 600 or more students in the high spending high outcome and low spending low outcomes quadrants. As explored previously by Brent, Roellke and Monk (1997), small high schools in particular face very different staffing allocation constraints than larger high schools. An interesting difference between the distribution of Missouri versus Illinois schools by quadrant is that in Missouri, the low performing quadrants are on average much higher in student poverty, but in Illinois, only the low performing and low spending quadrant has higher poverty. This occurs in part because there are very few high spending, low performing districts in Illinois, which was one reason for selecting the two states from the outset.

Table 3
Summary Attributes of Districts, Schools and Enrollments by Quadrant

	Low Spending - High Outcomes	High Spending- High Outcomes	High Spending - Low Outcomes	Low Spending - Low Outcomes
Missouri (2007)				
# Districts	142	119	95	165
Enrollment	275,190	277,676	109,015	213,005
Relative Adj. Expenditures	0.92	1.14	1.15	0.89
Actual Expenditures	$7,653	$9,507	$11,058	$8,967
Relative Outcomes	1.02	1.02	0.97	0.98
# Schools	655	642	378	653
# Scale Efficient* High Schools	52	49	19	34
% Low Income	36%	28%	60%	56%
Illinois (2009)				
# Districts	178	296	74	297
Enrollment	206,884	712,988	121,641	1,029,710
Relative Adj. Expenditures	0.91	1.23	1.09	0.78
Actual Expenditures	$8,469	$11,079	$10,582	$10,430
Relative Outcomes	1.06	1.12	0.96	0.83
# Schools	509	1,281	273	1,970
# Scale Efficient High Schools	27	110	20	158
% Low Income	29%	14%	35%	66%

*>600 students

Table 4 shows the overall resource disparities by quadrant and for different levels of schooling. The unit of analysis for each state is different. In Missouri, each course to which a teacher is assigned is listed. Across all schools, there are somewhat less than 3 students for each course to which teachers are assigned. At the elementary level, where self-contained classrooms dominate, there are about 7 students per teacher course assignment. In high spending, high outcome districts, there are 6.76 children per course assignment at the elementary level. This is actually higher than in low spending, low outcomes districts. Differences flip at the secondary level, where in high spending high outcome districts in Missouri, there are 1.98 students per teacher course assignment and in low spending low outcomes districts there are 2.09 students per course assignment. High spending, low outcome districts appear to leverage more course assignments in lower grades and fewer in upper grades. Low spending high outcome districts appear to leverage more course assignments in higher grades (though still not low) and fewer in elementary grades.

Table 4
Summary Attributes of Teacher Assignments (Illinois) and Course Assignments (MO) by Quadrant

	Low Spending - High Outcomes	High Spending- High Outcomes	High Spending - Low Outcomes	Low Spending - Low Outcomes
Missouri (2003-2007) Students per Teacher Course Assignment				
All Schools	2.85	2.59	2.65	2.74
High Schools >600 Enrollment	2.07	1.98	2.03	2.09
Middle Schools >400 Enrollment	2.26	1.93	2.34	2.06
Elementary Schools >300 Enrollment	7.18	6.76	6.54	6.51
Illinois (2005-2009) Students per Main Teacher Assignment				
All Schools	14.18	12.92	12.93	14.77
High Schools >600 Enrollment	15.38	13.40	14.13	14.83

In Illinois, ratios are expressed as students per teacher main assignment, including all certified staff, and are therefore more comparable to pupil to teacher ratios, but include administrative staff and other certified staff who might not otherwise be included in a pupil to teacher ratio (therefore somewhat lower). In Illinois, high spending, high outcome districts have much lower pupil to teacher main assignment ratios, and low spending districts have much higher pupil to teacher main assignment ratios. That is,

even before parsing within district resource allocation there exist disparities in the total available teaching resources across districts.

Courses and Staffing by Quadrant

In this section, we explore the differences in staffing allocation across schools by quadrant. It is important to consider, however, that in each comparison, low resource schools have fewer resources to begin with, including fewer staff assignments and fewer course assignments per student, or more students per course assignment. The following comparisons evaluate the shares of staffing allocated to different subject areas.

The first four columns of Table 5 provide the % of total (identified) course assignments in each area across all schools in districts in the identified quadrant. For example, in high spending high performing districts 2.1% of course assignments were in gifted programs or enrichment. In low spending low outcome districts, 1.3% of course assignments were in gifted programs or enrichment. The disparity ratio for this course assignment category is 1.31:1, indicating that high resource high outcome districts have a 31% greater share of teacher course assignments in gifted programs and enrichment. Table 5 is sorted from highest to lowest disparity ratio for comparing quadrant 2 – high resource high outcomes – to quadrant 4 – low resources low outcomes.

Between the high spending high outcome and low spending low outcome quadrants, the most disparately allocated course assignments are in other foreign languages, advanced math electives, driver's education and gifted programs. Physics and Chemistry are also disparately allocated. More common allocations in low resource low outcome districts include Junior ROTC, Basic Social Studies, Basic, Basic or Remedial Math and Basic or General Language Arts. Course assignments in Calculus and Trigonometry, as well as instrumental music are also somewhat more common in high resource, high outcome districts.

Table 5

Distribution of Course Assignments by Quadrant across All Missouri Schools

COURSE	Low Spending - High Outcome	High Spending- High Outcome	High Spending - Low Outcome	Low Spending - Low Outcome	2 over 4 Disparity Ratio	1 over 3 Disparity Ratio
Foreign/Other Languages-General	0.1%	0.2%	0.1%	0.1%	3.36	0.88
Consult/Support/Assessment	0.6%	0.7%	0.3%	0.3%	2.48	2.03
Arts-Other	0.2%	0.2%	0.0%	0.1%	2.23	3.72
Speech/Speaking/Debate/Drama	1.1%	1.4%	1.1%	0.7%	1.97	0.97
Advanced Math - Elective	0.1%	0.1%	0.1%	0.1%	1.80	1.07
Drivers Education	0.3%	0.2%	0.1%	0.1%	1.79	4.44
Tech Director	0.0%	0.0%	0.0%	0.0%	1.70	0.88
Library/Media -incl. admin.	0.0%	0.0%	0.0%	0.0%	1.70	0.40
Foreign/Other Languages	0.8%	1.0%	0.6%	0.6%	1.66	1.43
computer programming	0.1%	0.2%	0.2%	0.2%	1.63	0.52
ELA-other	0.1%	0.1%	0.1%	0.0%	1.61	0.75
Gifted/Enrichment	1.7%	2.1%	1.3%	1.3%	1.60	1.31
Admin-Special Ed	0.0%	0.0%	0.0%	0.0%	1.55	0.54
History-Elective	0.4%	0.3%	0.3%	0.2%	1.48	1.16
Math-other	0.1%	0.1%	0.0%	0.0%	1.38	1.30
Foreign/Other Languages-Spanish	1.6%	1.7%	1.4%	1.2%	1.37	1.11
Writing Elective	0.4%	0.5%	0.9%	0.4%	1.36	0.42
Career-Engineering/Tech/Indust	1.6%	1.8%	1.1%	1.3%	1.35	1.45
Physics-Other	0.0%	0.0%	0.0%	0.0%	1.27	0.14
Supervisor	0.0%	0.0%	0.0%	0.0%	1.26	0.42
Physics-General	0.2%	0.3%	0.2%	0.2%	1.25	1.13
Elective Language/Literature	0.5%	0.6%	0.5%	0.5%	1.25	1.05
Chemistry-General	0.7%	0.8%	0.6%	0.6%	1.23	1.07
Science-Other	0.1%	0.0%	0.0%	0.0%	1.22	3.51
Advanced Math - Trig-Calc	0.7%	0.8%	0.6%	0.7%	1.21	1.08
Disability	3.5%	3.8%	2.6%	3.2%	1.21	1.33
contract/after school	1.4%	2.1%	2.1%	1.8%	1.19	0.67
Bilingual/ESL	0.2%	0.3%	0.5%	0.2%	1.19	0.33
Science-Elective	0.1%	0.1%	0.0%	0.1%	1.18	2.69
Medical/Health/Safety Career	1.3%	1.6%	1.3%	1.4%	1.17	0.95
Science-Psych/Behavior	0.4%	0.4%	0.3%	0.3%	1.17	1.31
Career	2.6%	2.9%	2.6%	2.5%	1.16	1.01
Instrumental Music	1.5%	1.6%	1.3%	1.4%	1.14	1.08
Social Studies-Other	0.2%	0.2%	0.2%	0.2%	1.10	0.89
Basic/Life Skills	1.7%	1.8%	2.1%	1.7%	1.10	0.81
Biology-General	1.2%	1.2%	1.2%	1.2%	1.06	0.99
Physical Education	5.7%	5.6%	5.1%	5.2%	1.06	1.10
History-World	1.1%	1.0%	1.1%	1.0%	1.04	1.01
History-US/MO	1.5%	1.4%	1.3%	1.4%	1.01	1.09
Civics/Government	1.1%	1.0%	1.1%	1.0%	0.99	0.98
art/design/arch	3.6%	3.6%	3.6%	3.6%	0.99	0.98
Detention	0.3%	0.3%	0.5%	0.3%	0.99	0.54
Vocal Music	1.8%	1.6%	1.8%	1.7%	0.98	1.02
Earth/Life/Physical Basic Science	3.9%	3.9%	3.9%	4.1%	0.94	0.99
General Math - Algebra-Geometry	2.9%	2.5%	2.7%	2.7%	0.93	1.05
Advisor/Homeroom/Planning	27.3%	26.2%	28.1%	28.3%	0.93	0.97
graphics	0.1%	0.2%	0.1%	0.2%	0.91	0.80
Coll. Prep Language/Literature	0.4%	0.3%	0.2%	0.3%	0.91	1.72
Reading Supplemental	0.8%	0.8%	0.7%	0.9%	0.91	1.03
career	1.9%	2.0%	1.9%	2.2%	0.90	0.99
Social Studies-General	2.1%	2.2%	2.2%	2.4%	0.90	0.94
Biology-Elective	0.4%	0.4%	0.4%	0.4%	0.88	1.04
Basic or Remedial Math <Algebra	3.3%	3.2%	3.6%	3.6%	0.88	0.91
Computer support	1.1%	0.9%	1.1%	1.0%	0.88	0.98
business/finance	1.0%	0.9%	1.1%	1.1%	0.88	0.84
General Language/Literature	8.4%	7.4%	7.9%	8.4%	0.87	1.06

COURSE	Low Spending - High Outcome	High Spending- High Outcome	High Spending - Low Outcome	Low Spending - Low Outcome	2 over 4 Disparity Ratio	1 over 3 Disparity Ratio
Social Science-Econ/Soc/Anth	0.3%	0.3%	0.4%	0.3%	0.86	0.92
Case/Community/Work Support	3.0%	2.5%	2.6%	3.0%	0.86	1.13
Trades	0.6%	0.9%	1.0%	1.0%	0.85	0.59
Departmental Duties	0.1%	0.1%	0.1%	0.2%	0.76	0.70
Health/Physical/Support	0.0%	0.0%	0.0%	0.0%	0.71	0.67
Social Studies-Basic	0.1%	0.1%	0.0%	0.1%	0.69	1.02
Other Music	0.3%	0.4%	0.5%	0.6%	0.68	0.74
Geography	0.5%	0.4%	0.4%	0.6%	0.63	1.21
Career/Acad Support	0.4%	0.3%	0.3%	0.4%	0.61	1.20
agriculture	0.9%	0.8%	1.2%	1.4%	0.54	0.77
Guidance/Psych/Social	0.0%	0.0%	0.0%	0.0%	0.45	0.86
Administration	0.0%	0.0%	0.0%	0.0%	0.44	0.75
Library/AudioVisual	0.0%	0.0%	0.1%	0.0%	0.44	0.16
Dance	0.0%	0.0%	0.0%	0.0%	0.39	-
JROTC	0.3%	0.1%	0.5%	0.3%	0.29	0.52

Table 6 focuses on high schools enrolling 600 or more students in Missouri. The findings in Table 6 largely corroborate those in Table 5, which include all staffing districtwide. Again, the subject areas that are most disparate between high resource high outcome and low resource low outcome districts are foreign languages, chemistry and physics and math electives. Calculus and trigonometry are somewhat less disparate though still more heavily weighted in high resource high outcome districts. Basic social studies, life skills and basic earth/life sciences are large shares of allocations in low resource low outcome high schools.

Table 6

Distribution of Course Assignments by Quadrant across Scale Efficient High Schools

COURSE	Low Spending - High Outcome	High Spending- High Outcome	High Spending - Low Outcome	Low Spending - Low Outcome	2 over 4 Disparity Ratio	1 over 3 Disparity Ratio
Admin-Special Ed	0.0%	0.0%	0.0%	0.0%		
Foreign/Other Languages-General	0.0%	0.0%	0.0%	0.0%		
Supervisor	0.0%	0.0%	0.0%	0.0%	8.44	0.22
ELA-other	0.1%	0.1%	0.2%	0.0%	3.46	0.55
Consult/Support/Assessment	0.2%	0.3%	0.1%	0.1%	2.87	2.09
History-Elective	0.8%	0.7%	0.5%	0.3%	2.66	1.71
Library/Media -incl. admin.	0.0%	0.0%	0.0%	0.0%	2.45	2.74
Computer programming	0.2%	0.4%	0.5%	0.2%	2.22	0.41
Advanced Math - Elective	0.2%	0.3%	0.3%	0.2%	1.92	0.92
Drivers Education	0.8%	0.5%	0.2%	0.3%	1.79	4.71
Arts-Other	0.5%	0.4%	0.1%	0.3%	1.70	5.58
Library/AudioVisual	0.0%	0.0%	0.0%	0.0%	1.68	0.08
Elective Language/Literature	1.1%	1.3%	1.1%	0.8%	1.62	0.96
Math-other	0.1%	0.1%	0.1%	0.1%	1.55	0.69
Social Studies-Other	0.3%	0.4%	0.3%	0.3%	1.48	1.07
Physics-Other	0.0%	0.0%	0.0%	0.0%	1.47	-
Writing Elective	0.7%	1.3%	2.4%	0.9%	1.45	0.29
Speech/Speaking/Debate/Drama	1.8%	2.2%	2.5%	1.5%	1.45	0.73
Career	3.6%	4.1%	3.5%	3.1%	1.34	1.03
Chemistry-General	1.6%	1.8%	1.6%	1.5%	1.24	1.01
Advanced Math - Trig-Calc	1.5%	1.9%	1.2%	1.5%	1.24	1.24

COURSE	Low Spending - High Outcome	High Spending- High Outcome	High Spending - Low Outcome	Low Spending - Low Outcome	2 over 4 Disparity Ratio	1 over 3 Disparity Ratio
Career-Engineering/Tech/Indust	2.4%	2.3%	2.0%	1.9%	1.19	1.21
Science-Psych/Behavior	0.9%	0.8%	0.7%	0.7%	1.18	1.31
Foreign/Other Languages	1.9%	1.9%	1.3%	1.6%	1.18	1.41
Foreign/Other Languages-Spanish	3.0%	2.7%	2.8%	2.3%	1.15	1.08
Physics-General	0.5%	0.7%	0.4%	0.6%	1.14	1.30
Social Science-Econ/Soc/Anth	0.6%	0.6%	0.7%	0.5%	1.12	0.87
Medical/Health/Safety Career	1.3%	1.7%	1.7%	1.5%	1.11	0.73
Biology-General	2.6%	2.9%	2.8%	2.6%	1.11	0.94
Health/Physical/Support	0.0%	0.0%	0.0%	0.0%	1.10	
Physical Education	5.7%	5.4%	5.5%	5.0%	1.08	1.03
History-US/MO	2.5%	2.5%	2.6%	2.4%	1.03	1.00
art/design/arch	3.4%	3.7%	3.4%	3.7%	1.02	0.99
Instrumental Music	1.1%	1.0%	0.9%	1.0%	1.00	1.24
Advisor/Homeroom/Planning	17.8%	18.4%	16.6%	18.4%	1.00	1.07
Coll. Prep Language/Literature	0.9%	0.6%	0.3%	0.6%	1.00	2.67
contract/after school	1.5%	3.0%	1.7%	3.0%	1.00	0.91
Science-Elective	0.2%	0.1%	0.0%	0.1%	1.00	4.21
History-World	2.3%	2.3%	2.7%	2.4%	0.99	0.84
Gifted/Enrichment	0.2%	0.3%	0.7%	0.3%	0.98	0.30
Basic or Remedial Math <Algegra	1.3%	1.2%	2.3%	1.2%	0.97	0.57
Civics/Government	2.2%	2.0%	2.6%	2.1%	0.97	0.85
graphics	0.1%	0.2%	0.2%	0.2%	0.96	0.59
Computer support	0.6%	0.5%	0.6%	0.5%	0.96	1.07
General Language/Literature	8.5%	7.3%	8.3%	8.1%	0.91	1.03
career	2.9%	2.8%	2.5%	3.1%	0.91	1.15
Vocal Music	1.0%	0.7%	0.9%	0.8%	0.90	1.08
Detention	0.4%	0.3%	0.4%	0.3%	0.88	0.90
business/finance	1.7%	1.4%	1.6%	1.6%	0.88	1.06
Biology-Elective	1.0%	0.7%	0.9%	0.9%	0.87	1.08
General Math - Algebra-Geometry	5.9%	5.0%	6.5%	5.8%	0.87	0.90
Basic/Life Skills	1.6%	1.7%	1.6%	2.0%	0.87	0.98
Disability	2.3%	2.5%	1.4%	2.9%	0.87	1.64
Earth/Life/Physical Basic Science	2.7%	2.6%	3.4%	3.2%	0.83	0.80
Departmental Duties	0.1%	0.2%	0.2%	0.3%	0.83	0.63
Case/Community/Work Support	1.5%	1.4%	1.2%	1.8%	0.78	1.26
Bilingual/ESL	0.1%	0.2%	0.5%	0.3%	0.74	0.16
Other Music	0.3%	0.4%	0.4%	0.5%	0.73	0.96
Dance	0.0%	0.0%	0.1%	0.1%	0.61	-
Reading Supplemental	0.1%	0.1%	0.1%	0.1%	0.61	0.71
Social Studies-Basic	0.1%	0.1%	0.1%	0.2%	0.59	0.99
Career/Acad Support	0.4%	0.3%	0.5%	0.5%	0.49	0.90
Geography	1.0%	0.5%	0.5%	1.1%	0.47	1.89
Administration	0.0%	0.0%	0.0%	0.0%	0.39	1.14
Science-Other	0.3%	0.0%	0.0%	0.1%	0.29	31.13
Guidance/Psych/Social	0.0%	0.0%	0.0%	0.0%	0.23	
Trades	0.2%	0.1%	0.3%	0.3%	0.22	0.72
Social Studies-General	0.0%	0.1%	0.4%	0.4%	0.20	0.03
agriculture	0.7%	0.1%	0.0%	0.6%	0.20	15.49
JROTC	0.8%	0.2%	1.3%	1.1%	0.18	0.61

Table 7 returns to districtwide data for Missouri districts, but focuses on those furthest into the upper right and lower left quadrants, or those with the highest resources and outcomes and lowest resources and outcomes. Here, the disparity ratios are quite striking, with high resource high outcome districts have substantially more course assignments in gifted education and enrichment, in math electives and in

calculus and trigonometry, college prep language arts and in foreign languages. For example, the share of staff allocated to courses in calculus and trigonometry in high resource high outcome schools is 3.25 times the share of staff allocated to these courses in low resource low outcome schools. The differential for gifted programs is nearly 10x.

Table 7

Distribution of Course Assignments by Quadrant across Extreme High/High and Extreme Low/Low Missouri Districts

COURSE	120% Funding & 105% Outcomes	80% Funding & 95% Outcomes	120% Funding & 105% Outcomes	80% Funding & 95% Outcomes	Disparity Ratio
Bilingual/ESL	127	0	0.43%	0.00%	
Case/Community/Work Support	58	0	0.19%	0.00%	
Consult/Support/Assessment	18	0	0.06%	0.00%	
Disability	106	0	0.36%	0.00%	
Drivers Education	100	0	0.34%	0.00%	
Foreign/Other Languages-General	52	0	0.17%	0.00%	
Physics-Other	11	0	0.04%	0.00%	
Science-Other	1	0	0.00%	0.00%	
Supervisor	49	0	0.16%	0.00%	
Agriculture	30	0	0.10%	0.00%	
Arts-Other	118	3	0.40%	0.02%	20.00
Computer programming	39	1	0.13%	0.01%	13.00
Advanced Math - Elective	34	2	0.11%	0.01%	11.00
Gifted/Enrichment	1356	75	4.55%	0.46%	9.89
Foreign/Other Languages	750	45	2.52%	0.27%	9.33
Departmental Duties	98	9	0.33%	0.05%	6.60
Coll. Prep Language/Literature	52	5	0.17%	0.03%	5.67
Basic/Life Skills	971	98	3.26%	0.60%	5.43
Social Studies-Other	49	7	0.16%	0.04%	4.00
Foreign/Other Languages-Spanish	1029	157	3.45%	0.96%	3.59
Elective Language/Literature	398	68	1.34%	0.41%	3.27
Advanced Math - Trig-Calc	350	59	1.17%	0.36%	3.25
History-Elective	163	30	0.55%	0.18%	3.06
Career/Acad Support	15	3	0.05%	0.02%	2.50
Speech/Speaking/Debate/Drama	551	124	1.85%	0.75%	2.47
Instrumental Music	587	133	1.97%	0.81%	2.43
Computer support	376	104	1.26%	0.63%	2.00
Guidance/Psych/Social	5	2	0.02%	0.01%	2.00
Biology-Elective	100	32	0.34%	0.19%	1.79
Career-Engineering/Tech/Indust	655	211	2.20%	1.28%	1.72
Science-Elective	37	11	0.12%	0.07%	1.71
contract/after school	814	265	2.73%	1.61%	1.70
Career	727	250	2.44%	1.52%	1.61
Chemistry-General	302	103	1.01%	0.63%	1.60
Physics-General	114	44	0.38%	0.27%	1.41
Science-Psych/Behavior	127	53	0.43%	0.32%	1.34
Medica/Health/Safety Career	433	184	1.45%	1.12%	1.29
Physical Education	1824	824	6.12%	5.01%	1.22
Vocal Music	413	188	1.39%	1.14%	1.22
ELA-other	17	8	0.06%	0.05%	1.20
Social Science-Econ/Soc/Anth	102	48	0.34%	0.29%	1.17
Administration	14	8	0.05%	0.05%	1.00
History-US/MO	271	152	0.91%	0.92%	0.99
History-World	363	204	1.22%	1.24%	0.98
art/design/arch	1110	669	3.72%	4.07%	0.91
Advisor/Homeroom/Planning	7898	4840	26.50%	29.44%	0.90
graphics	31	21	0.10%	0.13%	0.77
Geography	34	26	0.11%	0.16%	0.69
Writing Elective	346	281	1.16%	1.71%	0.68

COURSE	120% Funding & 105% Outcomes	80% Funding & 95% Outcomes	120% Funding & 105% Outcomes	80% Funding & 95% Outcomes	Disparity Ratio
Biology-General	327	288	1.10%	1.75%	0.63
Earth/Life/Physical Basic Science	996	945	3.34%	5.75%	0.58
General Math - Algebra-Geometry	795	773	2.67%	4.70%	0.57
Other Music	99	100	0.33%	0.61%	0.54
Social Studies-General	651	662	2.18%	4.03%	0.54
Civics/Government	254	261	0.85%	1.59%	0.53
General Language/Literature	1994	2068	6.69%	12.58%	0.53
Basic or Remedial Math <Algegra	684	752	2.29%	4.57%	0.50
Library/Media -incl. admin.	3	4	0.01%	0.02%	0.50
Reading Supplemental	309	352	1.04%	2.14%	0.49
business/finance	157	217	0.53%	1.32%	0.40
Career	309	477	1.04%	2.90%	0.36
Math-other	4	8	0.01%	0.05%	0.20
Detention	0	58	0.00%	0.35%	-
Health/Physical/Support	1	2	0.00%	0.01%	-
JROTC	0	116	0.00%	0.71%	-
Social Studies-Basic	0	8	0.00%	0.05%	-

Table 8 summarizes the distribution of teacher main assignments across Illinois school districts by quadrant. Assignments are sorted from highest to lowest on the disparity ratio between high spending, high outcome districts and low spending, low outcomes districts. Notably, the high spending, high outcome districts have far greater shares of personnel allocated to advanced math, advanced literature, advanced science and foreign language. By contrast, low spending, low outcomes schools have significantly greater shares allocated to alternative and bilingual education, and larger shares of districtwide staff allocated to elementary classrooms.

Table 8

Distribution of Teacher Main Assignments by Quadrant across All Illinois Schools

	Low Spending - High Outcome	High Spending- High Outcome	High Spending - Low Outcome	Low Spending - Low Outcome	2 over 4	1 over 3
Advanced Math	0.2%	0.4%	0.2%	0.2%	2.61	1.12
Family/Consumer	0.5%	0.4%	0.3%	0.2%	2.35	1.29
Technology	0.1%	0.2%	0.1%	0.1%	2.00	1.57
Advanced Lit & Journalism	0.0%	0.1%	0.1%	0.1%	1.95	0.55
Advanced Science	0.3%	0.6%	0.4%	0.3%	1.90	0.95
Drivers Ed	0.7%	0.5%	0.6%	0.3%	1.75	1.31
Foreign Language	2.1%	3.1%	2.2%	1.9%	1.63	0.97
Advanced Social Science	0.7%	0.7%	0.4%	0.5%	1.57	1.58
Health Education	0.5%	0.6%	0.4%	0.4%	1.55	1.16
Childcare	0.2%	0.1%	0.2%	0.1%	1.51	0.90
Algebra/Geometry	3.0%	2.9%	2.8%	2.0%	1.46	1.07
Music Theatre Drama D	3.4%	3.6%	3.3%	2.5%	1.42	1.02
Phys Ed	5.5%	5.7%	5.5%	4.1%	1.37	1.00
Library/Media	1.3%	1.7%	1.4%	1.2%	1.35	0.91
Basic Science	3.4%	3.0%	2.7%	2.3%	1.32	1.26
Guidance/Counseling	3.5%	5.2%	4.5%	4.2%	1.25	0.77
Biology/Chemistry	2.1%	2.2%	1.9%	1.8%	1.23	1.10
Art	2.0%	2.3%	2.2%	1.9%	1.21	0.91
Trades	2.7%	2.2%	2.7%	1.9%	1.14	1.00
Graphics	0.1%	0.1%	0.1%	0.1%	1.08	0.83
History US & World	2.1%	2.1%	2.0%	2.0%	1.07	1.04
General English/Language	8.0%	8.0%	7.3%	7.6%	1.05	1.10
Basic Computing	1.0%	0.8%	1.0%	0.8%	1.04	1.03
Basic Social Science	1.8%	1.7%	1.4%	1.6%	1.03	1.29
Basic Reading/Language	3.3%	2.7%	3.8%	2.7%	0.99	0.87
Basic Math	3.6%	3.2%	3.4%	3.3%	0.96	1.05
Disability	11.1%	12.4%	13.1%	13.8%	0.89	0.84
Dean	0.1%	0.2%	0.2%	0.2%	0.89	0.71
Computer Programming	0.0%	0.0%	0.0%	0.0%	0.88	0.92
Administration	4.5%	4.4%	4.5%	5.1%	0.87	1.01
Elementary Classroom	28.6%	25.3%	24.6%	29.2%	0.87	1.16
Geography	0.5%	0.3%	0.3%	0.3%	0.76	1.49
Bilingual Education	0.7%	1.7%	3.7%	2.9%	0.58	0.18
Alternative Ed	0.3%	0.2%	0.4%	0.4%	0.56	0.68
At Risk PreK	1.7%	1.0%	1.7%	2.1%	0.47	0.99
Curriculum Specialist	0.1%	0.2%	0.2%	0.5%	0.40	0.34
Reading Specialist	0.3%	0.2%	0.3%	0.9%	0.25	0.93
Other	0.0%	0.0%	0.1%	0.4%	0.09	0.57

Districtwide, basic level courses are similarly distributed across high resource, high outcome and low resource low outcome districts. The major shift occurs in the allocation of elementary teaching staff, which make up the largest single share, and where low resource, low outcome districts allocate significantly more staff.

Table 9 summarizes the staffing main assignments for schools enrolling 600 or more students in grades 9 to 12. Here, the ratio of main assignments in advanced math between high spending, high outcome districts and low spending low outcome districts is 2.57:1. That is, teacher assignments in advanced math are 2.5X as likely in high resource, high outcome districts than they are to exist in low resource, low outcome districts. When elementary classroom and all other lower grades teachers are removed from the resource allocation mix, we can see that in high schools, the biggest

differences between high resource, high outcome high schools and low resource low outcome high schools is in advanced courses, dominant in high resource, high outcome districts - and in basic courses - dominant in low resource low outcome districts.

Physical education is also disparately allocated, with the advantage going to high resource, high outcome districts, as are foreign languages, guidance and counseling and computer programming. Courses in music and the arts remain relatively equitably distributed.

Looking specifically at those districts that would be considered relatively "efficient" (low resource, high outcome) and relatively "inefficient" (high resource, low outcome), the biggest allocation differences are in advanced math and advanced social science (with high schools in "efficient" districts having higher shares). High schools in "efficient" districts also have much higher shares allocated to "reading specialist" assignments, and to geography and roughly equal shares to art, music and physical education.

Table 9

Distribution of Teacher Main Assignments by Quadrant across Scale Efficient Illinois High Schools

	Low Spending - High Outcome	High Spending- High Outcome	High Spending - Low Outcome	Low Spending - Low Outcome	2 over 4	1 over 3
Advanced Math	0.6%	1.4%	0.5%	0.6%	2.57	1.36
Family/Consumer	0.8%	0.7%	0.5%	0.4%	2.00	1.83
Advanced Lit & Journalism	0.2%	0.5%	0.3%	0.3%	1.84	0.46
Drivers Ed	2.1%	1.3%	1.5%	0.7%	1.75	1.41
Advanced Science	1.2%	1.9%	1.3%	1.1%	1.70	0.88
Health Education	1.2%	1.2%	1.1%	0.8%	1.59	1.08
Advanced Social Science	2.7%	2.4%	1.7%	1.8%	1.37	1.64
Foreign Language	6.4%	6.9%	5.6%	5.1%	1.34	1.15
Childcare	0.4%	0.4%	0.6%	0.3%	1.31	0.69
Algebra/Geometry	9.4%	8.6%	8.6%	6.5%	1.31	1.09
Guidance/Counseling	6.2%	7.4%	7.0%	5.8%	1.27	0.89
Technology	0.2%	0.1%	0.2%	0.1%	1.19	1.32
Phys Ed	6.8%	6.9%	6.7%	5.8%	1.19	1.02
Computer Programming	0.1%	0.1%	0.1%	0.1%	1.18	0.62
Administration	5.2%	5.3%	5.0%	4.8%	1.12	1.06
Biology/Chemistry	6.3%	6.9%	5.9%	6.4%	1.08	1.08
Library/Media	1.4%	1.2%	1.3%	1.1%	1.08	1.09
Dean	0.3%	0.6%	0.4%	0.6%	1.02	0.59
Music Theatre Drama D	2.4%	2.7%	2.3%	2.7%	1.01	1.04
Graphics	0.4%	0.2%	0.4%	0.2%	0.98	0.82
Basic Science	2.8%	2.0%	2.1%	2.1%	0.95	1.36
General English/Language	12.2%	12.0%	11.4%	12.8%	0.94	1.07
History US & World	5.6%	6.0%	6.1%	6.5%	0.92	0.92
Alternative Ed	0.6%	0.6%	1.3%	0.6%	0.92	0.45
Trades	6.4%	5.3%	6.9%	5.8%	0.92	0.92
Art	2.3%	2.3%	2.3%	2.5%	0.92	1.00
Disability	10.7%	10.6%	13.2%	13.3%	0.79	0.81
Bilingual Education	0.6%	1.0%	1.6%	1.4%	0.67	0.36
Geography	1.2%	0.7%	0.7%	1.1%	0.62	1.72
Basic Reading/Language	0.5%	0.6%	0.5%	1.1%	0.59	0.87
Basic Computing	0.6%	0.6%	1.0%	1.1%	0.50	0.62
Basic Math	1.8%	1.4%	1.6%	4.2%	0.33	1.11
Basic Social Science	0.0%	0.0%	0.0%	0.0%	0.29	
Curriculum Specialist	0.1%	0.1%	0.1%	0.4%	0.15	0.59

Reading Specialist	0.1%	0.1%	0.1%	0.5%	0.13	1.92

Table 10 explores the extremes of the Illinois distributions, or those districts with very high relative spending levels and outcome levels, and very low relative spending and outcome levels. In table 10, high resource high outcome districts have nearly 3X the allocation of advanced math teacher main assignments as low resource, low outcome districts, nearly 2.5X the allocation of advanced literature and journalism, and over 2X the allocation of advanced science and social sciences. By contrast, low resource, low outcome districts have 3X the allocation of basic computing, nearly 2X the allocation of basic reading and language and nearly 10X the allocation of basic math.

Table 10

Distribution of Teacher Main Assignments by Quadrant across Extreme High/High and Extreme Low/Low Districts

Assignment	120% Funding & 120% Outcomes	80% Funding & 80% Outcomes	120% Funding & 120% Outcomes	80% Funding & 80% Outcomes	Disparity Ratio
Drivers Ed	185	94	1.1%	0.3%	4.32
Advanced Math	278	218	1.7%	0.6%	2.80
Childcare	72	58	0.4%	0.2%	2.72
Health Education	157	128	1.0%	0.4%	2.69
Advanced Lit & Journa	104	92	0.6%	0.3%	2.48
Advanced Science	376	401	2.3%	1.1%	2.06
Family/Consumer	85	91	0.5%	0.3%	2.05
Advanced Social Scien	460	493	2.9%	1.4%	2.05
Computer Programming	12	13	0.1%	0.0%	2.03
Administration	1025	1374	6.4%	3.9%	1.64
Algebra/Geometry	1413	1918	8.8%	5.4%	1.62
Guidance/Counseling	1328	1868	8.2%	5.3%	1.56
Foreign Language	1171	1880	7.3%	5.3%	1.37
Library/Media	207	357	1.3%	1.0%	1.27
Phys Ed	1036	1861	6.4%	5.3%	1.22
Biology/Chemistry	1167	2264	7.2%	6.4%	1.13
Bilingual Education	225	471	1.4%	1.3%	1.05
Music Theatre Drama D	480	1011	3.0%	2.9%	1.04
Alternative Ed	46	103	0.3%	0.3%	0.98
General English/Langu	1937	4933	12.0%	14.0%	0.86
Trades	659	1690	4.1%	4.8%	0.86
Dean	57	149	0.4%	0.4%	0.84
History US & World	1028	2711	6.4%	7.7%	0.83
Art	366	968	2.3%	2.7%	0.83
Basic Science	259	690	1.6%	2.0%	0.82
Graphics	40	115	0.2%	0.3%	0.76
Disability	1561	4681	9.7%	13.3%	0.73
Basic Reading/Languag	97	415	0.6%	1.2%	0.51
Geography	65	409	0.4%	1.2%	0.35
Basic Computing	73	482	0.5%	1.4%	0.33
Curriculum Specialist	21	261	0.1%	0.7%	0.18
Reading Specialist	18	317	0.1%	0.9%	0.12
Basic Math	93	1894	0.6%	5.4%	0.11
Basic Social Science	0	7	0.0%	0.0%	-

The next several graphs explore changes in the comparative distribution of resources between high resource, high outcome, and low resource low outcome districts in the period immediately prior to adoption of No Child Left Behind, and in the most recent two years of available data. The question at hand is whether the substantial curricular disparities identified above have simply been in place for years, or whether these disparities are somewhat or significantly induced by emphasis on core content areas under No Child Left Behind. Following the findings of Ballou and Springer in particular, one might expect to see increased disparity in advanced courses over time, or low resource, low performing districts shifting more of their scarce resources away from advanced courses in math and English and toward basic courses, as well as into elementary general instruction.

Figure 4 displays the pre-NCLB and post-NCLB disparity ratios for specific course assignments in Missouri school districts. Missouri had already adopted its own standards and statewide assessment system by 1999. Figure 4 considers the full range of disparities, whereas figure 5 focuses on disparity ratios of less than 2.0, to sort out the jumbled courses at the intercept of the figure. Courses in the upper right quadrant of Figure 4 or 5 are courses that were more prevalent in high resource, high outcome districts both before and after NCLB. Courses in the lower left are courses that were more prevalent in low resource, low outcome districts both before and after NCLB. The diagonal line represents courses that are distributed similarly both before and after NCLB. A course that is above the diagonal line is a course that has shifted toward being more common in high resource, high outcome districts between 1999-2000 and 2006-07. The size of the bubbles or triangles represent the total number of course assignments (with the largest group - elementary classroom teachers - left out of the picture, but not of the disparity calculations).

Certain courses are identified as red triangles and labeled for illustrative purposes. In figure 4 we can see that General Foreign Language (FL-Gen.) courses were very disparate (more prevalent in high resource, high outcome districts) in 1999-00 and less disparate in 2006-07 (falling below the diagonal but within the same quadrant. By contrast, Other Science elective courses (Astronomy, Geology) became more disparate, and appear above the diagonal line. Other Arts (Photography) courses remained equally disparate before and after NCLB.

Figure 4
Relationship between "Disparity Ratios" pre and post-NCLB (1999-00 & 2006-07)
[All courses]

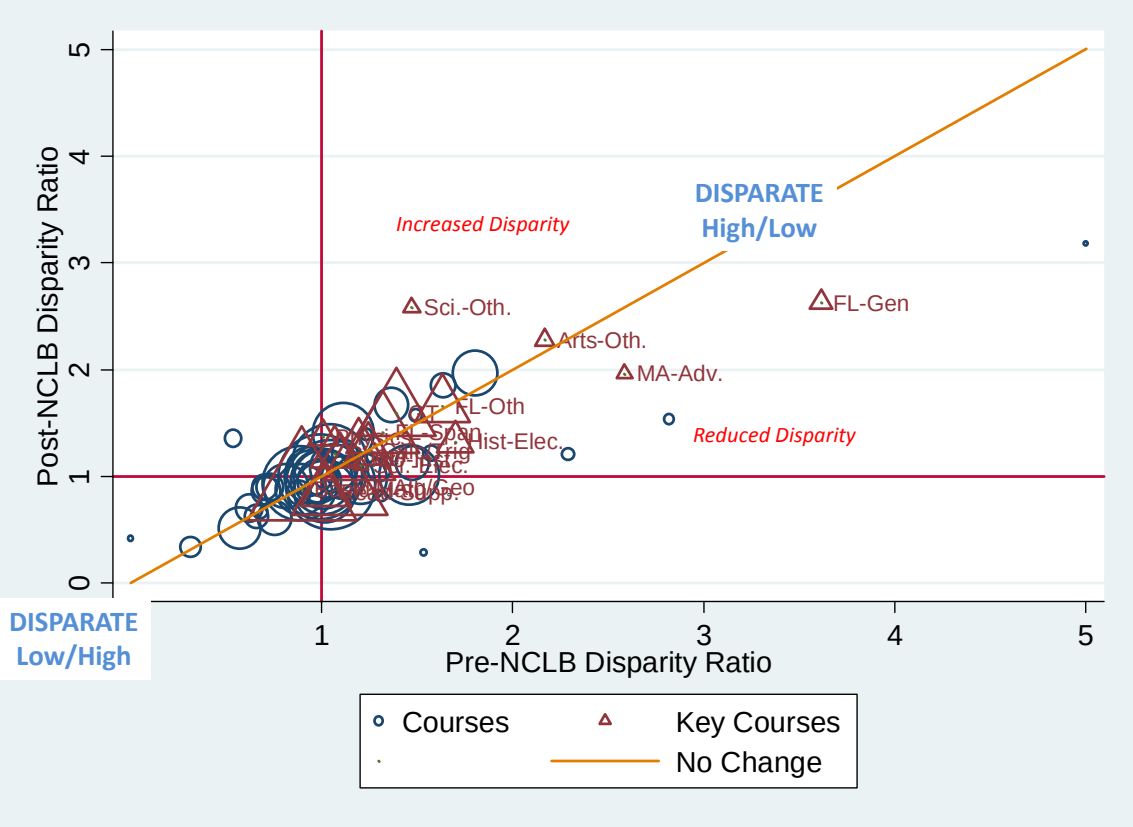
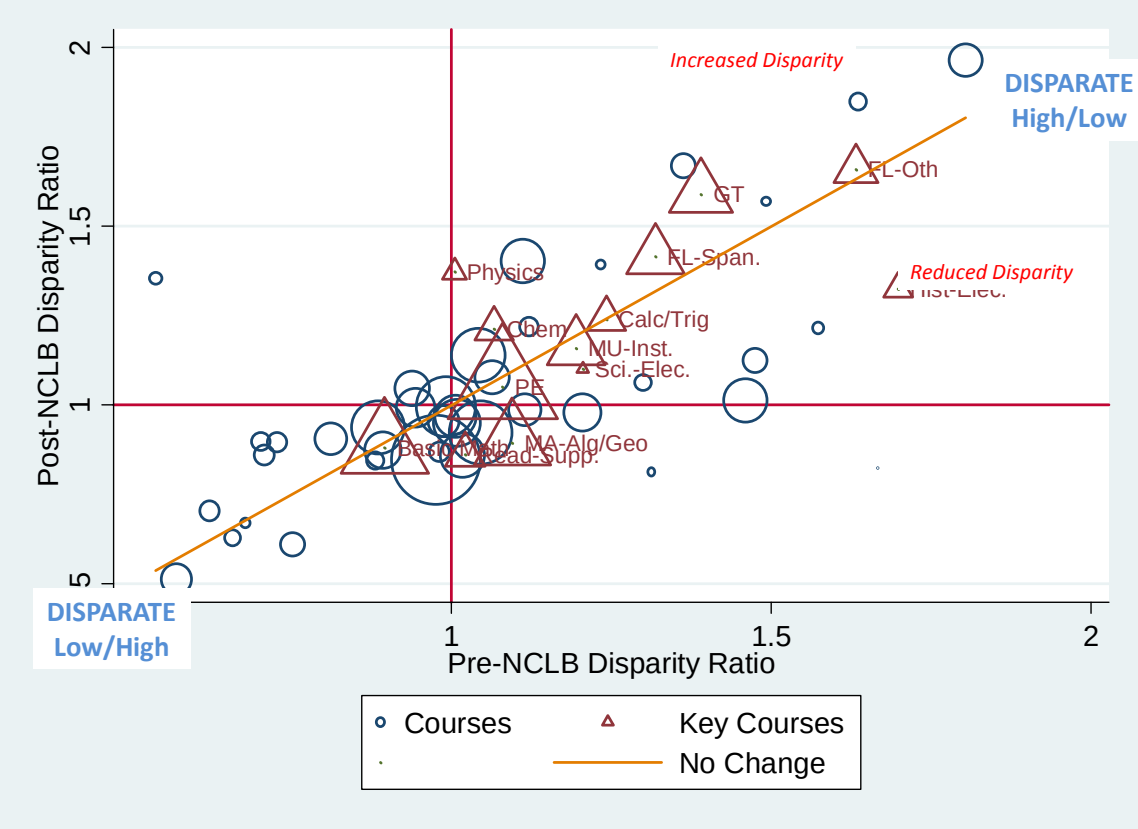


Figure 5 focuses on courses where initial disparity ratios between high resource, high outcome districts and low resource, low outcome districts were less than 2. That is, where high resource high outcome districts had less than double the allocation of low resource, low outcome districts. Here, we can see that gifted and talented (GT) course offerings became more disparate over time, as did, some course offerings in Math (MA) and most course offerings in Physical Science (Chemistry and Physics). Physical science course offerings were not necessarily disparate in 1999-00 (near the vertical line), but were disparate by 2006-07 (above the horizontal line). Physical science offerings in Missouri school districts have become disparately distributed - with the advantage bestowed on high resource, high outcome districts and the deficit on low resource, low outcome districts. Physical education courses have largely remained equally disparate. Calculus/Trigonometry offerings have remained equally disparate over time, but disparate nonetheless.

Figure 5
Relationship between "Disparity Ratios" pre and post-NCLB (1999-00 & 2006-07)
[Disparity ratios <2.0]



Illinois Pre-Post NCLB – Quadrant 2 to Quadrant 4 Disparities

Figure 6 and Figure 7 display the changing distributions of teacher main assignments in Illinois. Figure 6 considers the entire range of disparate allocations and figure 7 focuses on those allocations with less than 2:1 disparity between high resource, high outcome districts and low resource, low outcome districts. Note that significant changes to staffing coding between 2000-2001 and 2007 & 2009 complicate the Illinois analysis. It would appear from Figure 6 that advanced math course offerings were substantially more disparately distributed in 2000 than in 2009, with a 6:1 ratio between high resource, high outcome districts and low resource low outcome districts in 2000, but only a 2:1 by 2009. This seems like an excessive shift, perhaps due to different coding schemes. Greater clarity on other assignment areas is provided in Figure 7.

Figure 6
Relationship between "Disparity Ratios" pre and post-NCLB (2000-01 & 2008-09)

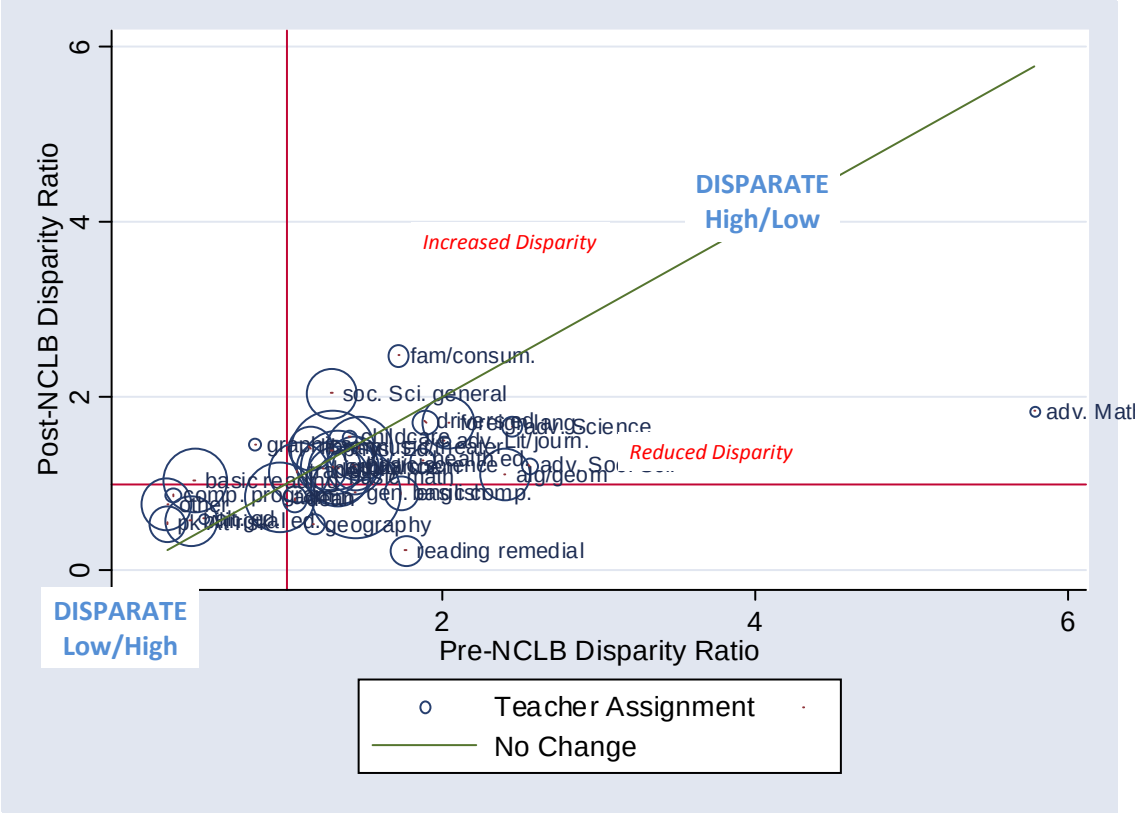
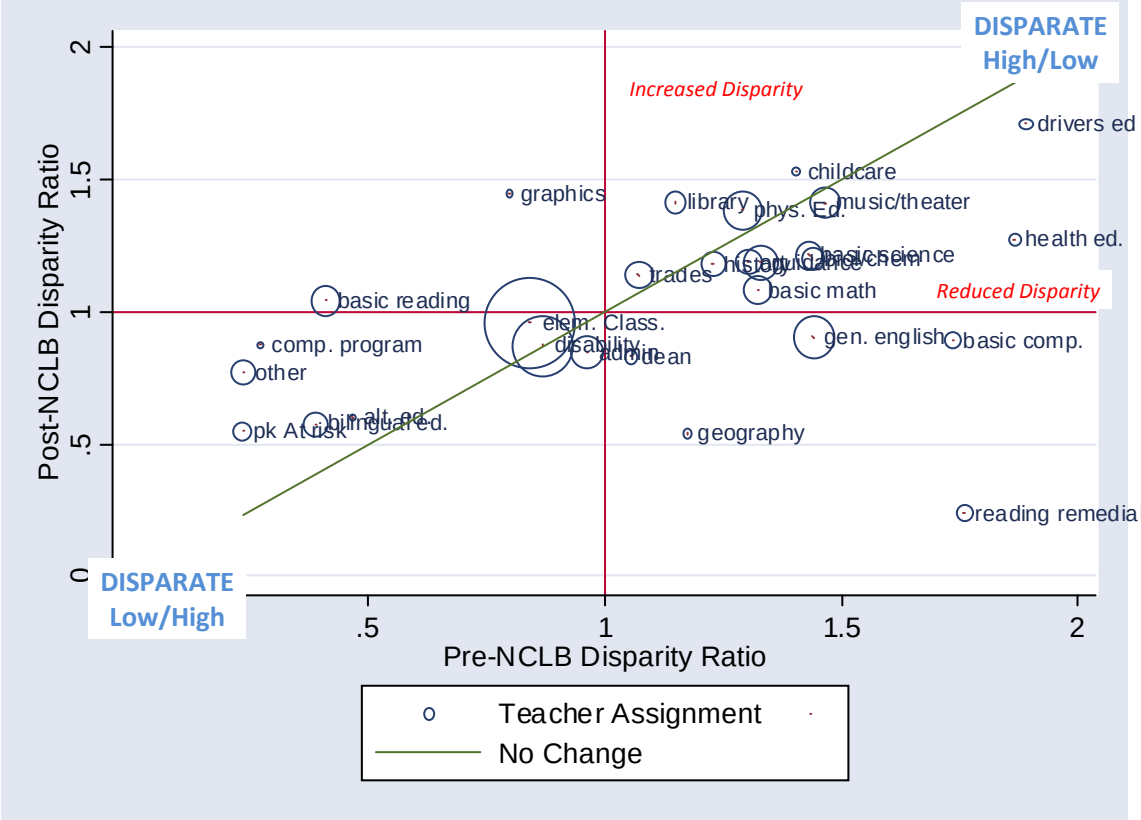


Figure 7 focuses in on those assignment areas where the disparity ratios between high resource, high outcome and low resource low outcome districts was less than 2.0. Overall, it would appear that differences in resource allocation have lessened, with those resources in the upper right quadrant sliding below the diagonal line and those in the lower left quadrant sliding above the diagonal line - both toward the horizontal line - the parity line for post-NCLB. Some assignments such as librarians were disparate and have become more disparate. But overall, it would appear that low resource low outcome districts have been catching up on allocation of health education and other basic courses while high resource, high outcome districts have been shifting allocations to elementary classrooms, at risk programs for pre-k and especially basic reading. Pre-NCLB, basic reading assignments were 2X larger share in low resource, low outcome districts than in high resource, high outcome districts. Post-NCLB, basic reading assignments are comparable across theses two groups. Some of this shift may involve reclassification of remedial reading teachers, which shifted sharply in the opposite direction. Allocations to elementary classrooms shifted modestly toward greater parity, but even a modest shift of such a large share can dramatically affect other allocations.

Figure 7
Relationship between "Disparity Ratios" pre and post-NCLB (2000-01 & 2008-09)
[Disparity ratios <2.0]



Conclusions and Policy Implications

In general, we find that after fitting a comprehensive model for cost adjustment, very few Illinois school districts in particular fall into the high spending, low outcomes, or low spending, high outcomes quadrants. In Missouri, a larger number of districts fell into the low spending, high outcomes quadrant. But, for the most part, districts were identified as low spending with low outcomes and higher spending with higher outcomes, along the expected trajectory. This finding then limits our ability to distill clear patterns of behavior among, and differences between low spending, high outcome (efficient) and high spending low outcome (inefficient) districts. In fact, few coherent patterns were found when comparing the highly efficient (quadrant 1) to the least efficient (quadrant 3) school districts or their respective high schools.

Rather, the emergent story from the data in both states was the contrast between high spending, high outcome districts, and low spending low outcome districts and their respective high schools. On average, high spending, high outcome districts were as one might expect much lower in student poverty concentration and low

spending, low outcome districts much higher in poverty. That is, after applying thorough cost adjustment including adjustments for differences in student needs. Interestingly, the most striking differences between these groups of districts were not in the availability of assigned teachers or courses in the arts, but rather in the distribution of advanced versus basic course offerings in curricular areas such as math and physical science.

Note that to begin with, low spending, low outcome schools had fewer teacher main assignments and fewer course assignments per pupil. As such, they were, from the outset, more constrained in their allocation options. Further, there is at least some evidence that when evaluating district wide resource allocation, low resource, low outcome districts see greater necessity or feel greater pressure to allocate a larger overall share of resources to elementary classrooms (based on Illinois findings).

A relatively surprising finding was that the disparity between low resource low outcome and high resource high outcome districts did not systematically worsen across both states over the period since implementation of No Child Left Behind. If anything, there was modest evidence that even high resource, high outcome Illinois districts began allocating more staff to basic areas and to elementary classrooms, proportionately.

This analysis presents only a preliminary exploration into the use of such state administrative data to uncover differences in resource allocations – from both an equity and from an efficiency perspective – across local public school districts. Ultimately, we hope to use similar information to identify resource configurations of K-12 school districts and high schools in particular that not only produce measured K-12 outcomes at reasonable cost, but also produce students able to access and succeed in postsecondary education. In particular, our finding that low resource, low outcome districts, which tend to be high poverty districts, have much lower levels of resource allocation to advanced math and physical science is of concern.

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