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Quantification, Inequality, and the Contestation of School Closures in Philadelphia

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Abstract

Public education relies heavily on data to document stratified inputs and outcomes, and to design interventions aimed at reducing disparities. Yet despite the promise and prevalence of data-driven policies and practices, inequalities persist. Indeed, contemporary scholarship has begun to question whether and how processes such as quantification and commensuration contribute to rather than remediate inequality. Using the 2013 closure of 24 Philadelphia public schools as a case study, I employ a mixed-methods approach to illuminate quantification and commensuration as nuanced processes with contingent, dualistic, and paradoxical relationships to inequality. The quantified approach to selecting schools for closure predisposed poor and minority communities to institutional loss because academic underperformance, a key selection metric, was correlated with disadvantage. Paradoxically, academic performance measures, coupled with commensuration strategies, also enabled advocates to successfully overturn closure recommendations. I offer an evidentiary account of how quantification can perpetuate inequality, and I complicate prevailing understandings of quantification as a technology of power.

Keywords

quantification, inequality, education policy, community involvement, mixed-methods, performance metrics, commensuration, school closure

Across the country, public education policy and practice are increasingly guided by the use of data and quantitative metrics. Standardized assessments of student proficiency mandated by federal law (Every Student Succeeds Act [ESSA] 2015; No Child Left Behind Act [NCLB] 2001), teacher evaluations undergirded by measures of student learning (Chetty, Friedman, and Rockoff 2014), and the allocation of educational resources based on computations of merit and demand[1] all evince the heightened quantification and rationalization of the field. The shift toward quantification in public education was motivated by a desire to measure and equalize disparate academic opportunities and outcomes uncovered by studies like the 1966 Coleman Report, but some argue that rationalization has at best failed to remediate these inequities and at worst, exacerbated them (Darling-Hammond 2007; Hursh 2007; Jennings and Sohn 2014). Furthermore, scholars of quantification contend that numbers, particularly as instruments of government, are technologies of social control that produce and maintain unequal power relations and enable domination (Colyvas 2012; Foucault 1977; Porter 1995; Rose 1999).

School closures exemplify the confluence of quantification, education governance, and social inequality. At the highest levels of policy, closures manifest quantification: The No Child Left Behind Act specified that schools could be shut down for repeatedly failing to meet minimum academic

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proficiency standards. Simultaneously, research demonstrates that school closures are both inequitably distributed across different types of communities and can precipitate negative consequences for students and neighborhoods (Billger and Beck 2012; Burdick-Will, Keels, and Schuble 2013; Kirshner, Gaertner, and Pozzoboni 2010; Valencia 1980; Witten et al. 2003). Much less is known about how schools are selected for closure and what implications the selection process has for equality of educational access, opportunity, and outcomes. Given the links between quantification and school closure and between school closure and inequality, a deeper investigation of how quantification relates to inequality is needed to better understand its effects in other educational or policy settings and suggest ways that decision-making processes might be optimized for equity.

Using the 2013 closure of 24 Philadelphia public schools as a case study, this article examines how quantification variably reproduces and remediates inequality. The study was motivated by the prevalence of quantification in public schooling and education reform initiatives and by recent scholarship urging a better understanding of the relationship between quantification and social inequality. Compelled by economic inefficiency and academic underperformance, Philadelphia's closures present a particularly interesting puzzle. The district's data-driven selection process initially recommended the closure of 38 schools, yet over the course of the community engagement process, 14 of these recommendations were overturned. Using a unique school-level data set that merges district administrative data with national survey data, and qualitative data from public meetings and hearings, this analysis weaves together logistic regression techniques and qualitative analyses to address two research questions. First, how did the quantified approach to decision making influence the distribution of closure recommendations across communities? And second, how did communities' campaigns to preserve their schools succeed or fail in the context of quantified approaches to decision making?

SCHOOL CLOSURES: UNEQUAL DISTRIBUTION AND PERNICIOUS CONSEQUENCES

Although they are often defended as a means of improving educational opportunities for underserved students, school closures invariably spark controversy and contestation. A report authored by a coalition of activists across 21 cities argues that closures represent a systematic dismantling of the public institutions that serve communities of color (Journey for Justice Alliance 2014). Research confirms that closures are unequally distributed across communities. Numerous case studies describe the disproportionate effect of closures on low-income and minority communities (Kirshner et al. 2010; Kretchmar 2011; Valencia 1980, 1984; Walker Johnson 2012; Witten et al. 2001). Several quantitative analyses confirm these claims; the stratified distribution of school closures was documented three decades ago—one study found that New York neighborhoods where schools had closed had higher population density, older housing stock, and higher rates of public assistance receipt (Dean 1983). Analyses of contemporary closure projects like the "Renaissance 2010" closures in Chicago (Burdick-Will, Keels, and Schuble 2013) and longitudinal statewide closure patterns (Billger and Beck 2012) demonstrate the persistent association between neighborhood disadvantage and school closure.

There is also reason to be skeptical that closures achieve their stated objective of improving educational opportunities and outcomes. Rather, research suggests that closing schools can negatively affect students and neighborhoods. Multiple studies have found that school closure is associated with learning loss for displaced students. Although this loss is sometimes recouped, students' achievement only improves above the level of their prior school when their new school is substantially higher performing (Engberg et al. 2012; Kirshner et al. 2010; Sherrod and Dawkins-Law 2013; de la Torre and Gwynne 2009). Notably, one evaluation of Philadelphia's recommended closures found that most displaced students would transition to schools no better than the schools from whence they came (Research for Action 2013). Other studies link closure with more long-lasting negative academic consequences and a heightened likelihood of dropping out (Kirshner et al. 2010), and a related body of work suggests that closures also affect the communities in which they occur, dissolving social capital, feelings of efficacy, and social resources (Dean 1983; Valencia 1984; Witten et al. 2001).

The suggestion that school closures may reinforce existing inequalities in the education system heightens the imperative to understand how schools are selected for closure. Boyd (1983:255) writes,

"[A]t the heart of the politics and management of declining public services is the question of who will bear the immediate and long-term cutbacks . . . whose schools will be closed?" In the intervening years, few studies have interrogated how schools are selected for closure; those that do investigate these processes highlight the role of data in managing closure decisions (Bartl and Sackmann 2016; Basu 2004; Bondi 1987; Burdick-Will et al. 2013; Paino et al. 2014). For example, several years before Philadelphia's closures, Chicago used quantitative data to close underutilized and underperforming schools and in so doing also preferentially closed schools in disadvantaged and highly segregated neighborhoods (Burdick-Will et al. 2013).

THE CASE: PHILADELPHIA, 2012–2013

In December 2012, the school district of Philadelphia announced recommendations to close 38 of its 241 schools. As in many urban centers across the country, Philadelphia's closures were proposed as a remedy for massive inefficiency. A declining urban population, budget cuts, and the proliferation of charter schools had left the district with more than 50,000 empty seats and a budget shortfall of $1.35 billion over five years (Jack and Sludden 2013).

With crisis looming, the district hired a consulting firm to guide the closure and consolidation process. Following other urban districts, Philadelphia took a highly quantified approach to selecting schools for closure. A 2011 draft report nominated two principal criteria for issuing recommendations: utilization and a building condition metric called Facilities Condition Index (FCI) (URS 2011). By the time closure recommendations were presented to constituents in 2012, this list of criteria had expanded to include projected savings and academic performance.

According to the superintendent and district representatives, an initial list of 180 schools was identified using the aforementioned metrics. This list was then narrowed to 50 schools through conversations with community members that incorporated concerns about transportation, feeder patterns, and neighborhood school options. Further review of data and individual cases narrowed this list again to 38 schools.[2] After an extensive community engagement process that included public meetings, formal hearings, and a solicitation of written proposals, 14 schools were removed from the closure list. In the summer of 2013, 24 schools were shut down after a vote by the state-appointed School Reform Commission (SRC).

QUANTIFICATION AND THE (RE)PRODUCTION OF INEQUALITY

Extant scholarship identifies several ways quantification may be implicated in the production and reproduction of inequality. First, scholars argue that quantification constructs identities and classifications of measured entities. Far from offering a neutral reflection of reality, "political judgments are implicit in the choice of what to measure, how often to measure it, and how to present and interpret the results. . . . Numbers, like other inscription devices, actually constitute the domains they appear to represent" (Rose 1999:198). Once classified through quantification, measured entities become subject to judgment, stigma, and material consequences. In the case of public schooling, quantification, through choices regarding what to measure and the institutionalization of measurement practices, does not identify but instead creates the "failing school," a type of institution that is constructed and perceived as being worthy of punitive sanctions, including closure (Deeds and Pattillo 2015; Walker Johnson 2012).

Relatedly, scholars have demonstrated that choices regarding how to measure a construct can also have significant computational consequences. Using comparative case studies, Fourcade (2011) illuminates how different approaches to measuring the same construct (damages caused by oil spills) in France and the United States yielded vastly different remunerative outcomes for communities in the two settings.

As results of this study will show, the four metrics Philadelphia officials used to select schools for closure had different meaning-making and computational consequences. In their explanations of individual closure recommendations, the district deployed measures of academic performance, utilization, building condition, and financial concerns interchangeably, yet it is important to note that these four criteria reflect two distinct justifications for shutting down schools. Measures of building condition, utilization, and projected savings reflect the district's resource management imperative, a largely agnostic attempt to improve

efficiency by consolidating students into fewer buildings. Academic underperformance, on the other hand, sanctions particular schools for their individual failings. The rationale for closure varied across individual proposals, and distinctions between resource management and academic justifications proved critical for the distribution of closure recommendations and communities' abilities to preserve their schools.

Finally, commensuration, which Espeland and Stevens (2008) describe as the rank-ordering of objects using a common metric, compromises equity by obscuring significant contextual factors underlying the data. Commensuration, they argue, transforms "qualities into quantities, difference into magnitude" (Espeland and Stevens 2008: 316). Colyvas (2012:169), for example, characterizes achievement scores, upon which education policy has come to rely heavily, as "formalized abstractions" that bring a "patina of objectivity" to comparison, benchmarking, and decision making. She argues that quantification often "undermin[es] the identity, mission, and, ironically, accomplishments of organizations." The repeated use of rankings and quantitative metrics reinforces understandings of schools as isomorphic organizations (Meyer and Rowan 1977; Rowan 1982); it lines schools serving elite youth from affluent communities up against those contending with devastating socioeconomic disadvantage, arranging them hierarchically as if they were equivalent and easily comparable.

These effects were evident throughout Philadelphia's school closure process. Raw comparisons of schools' academic performance grouped all schools together regardless of populations served, concealing contextual details such as the proportion of students who are English Language Learners, have special needs, or are living below the poverty line, all factors that sociologists have linked to lower test scores (Coleman 1966; Ladd 2012; Reardon 2011). Consequently, as results of this study will show, commensuration—especially using academic performance metrics—contributes to the concentration of closure recommendations in disadvantaged communities.

THE PRESENT STUDY

I offer several contributions to a growing literature examining the linkages between cultural processes (including quantification) and inequality (Asad and Bell 2014; Lamont, Beljean, and Clair 2014). First, I bolster extant research on school closure processes by presenting a detailed account of how the social and mechanical facets of quantification collude to unequally distribute closure recommendations across communities. Philadelphia's quantified process predisposed schools in low-income and minority communities to closure, and it obscured that predisposition as neutral, objective, and inevitable. Quantitative results reinforce the role of academic performance measures in concentrating school closures in disadvantaged communities (Burdick-Will et al 2013), and qualitative analyses expose decision makers' insistence on the unassailable impartiality of data in closure decisions.

Second, by illuminating the ways in which quantification equipped some communities with the tools to successfully resist closures, I expand current understandings of quantification as a technology of power. Although scholarship to date consistently characterizes quantification and commensuration as instruments of power and domination in the hands of authority (Espeland and Stevens 2008; Foucault 1977; Rose 1999; Salais 2012), several authors suggest that laypersons might access power through quantification (e.g., Desrosières 2014). Espeland and Stevens (1998: 332) posit that commensuration can "arm dissenters," and Porter (1995) hazards the democratizing character of quantification, illustrating how new professional classes eke out legitimacy in the shadow of parochial regimes of expertise. Despite these claims, however, both studies devote the bulk of their attention to quantification's predilection toward technical inscrutability and distancing the subject from the agent, undercutting the value of local knowledge. Moreover, the subjects Porter (1995) describes as empowered by quantified objectivity are far from powerless: accountants, technocrats, engineers, scientists. This project reconsiders the unmet ideals of these scholars' democratization hypothesis, and it contributes an alternative understanding of the relationships linking constituents, quantification, and the authority of decision makers to the equity of distributive outcomes.

Finally, I offer a populated account of quantification as a nuanced set of processes and structures whose relationship to inequality is highly contingent. Specifically, I demonstrate just how much metrics matter for the crystallization of relationships between quantification and inequality. In

Philadelphia, the coexistence of academic performance and resource management metrics in a decision-making framework and the varying significance of each factor across closure recommendations created conditions that both stratified the distribution of closure recommendations and furnished advocates with effective tools of resistance. Absent academic performance as a metric for closure recommendation, proposed closures might have been less concentrated among disadvantaged communities. Yet, absent academic performance, these same communities may also have been less successful in saving their schools.

DATA AND METHODS

This project uses a mixed-methods approach to investigate the relationship between quantification and inequality through the lens of school closure decisions in Philadelphia. Qualitative and quantitative analyses inform each other in a multiphase design (Creswell and Plano Clark 2007; e.g., Desmond 2012). My initial explorations of descriptive and geospatial data revealed racial and socioeconomic inequalities between schools recommended and not recommended for closure. Subsequent investigations of the qualitative data illuminated the importance of quantified decision-making frameworks in making recommendations and the variable use of resource management and academic performance rationales in justifications of individual closure recommendations. I proceeded to test the relationships between school and neighborhood disadvantage, quantitative selection criteria, and the likelihood of closure recommendation using logistic regression techniques. I found that closure logics and their corresponding selection criteria varied in their effect on the relationship between closure recommendation and disadvantage and that quantitative differences failed to explain variation in recommended schools' closure outcomes. I then used qualitative data from the community engagement process to examine whether and how communities' participation in debates over school closures determined which schools were preserved and which were shut down.

Administrative and Survey Data

The data set for the quantitative analysis is composed of data from a variety of sources, including the Philadelphia Public Schools Facilities Master Plan (FMP), the NCES Common Core of Data (CCD; 2009–2010),[3] and the decennial census from 2000 and 2010. The district-produced FMP data report a broad range of school-level variables describing school facilities, climate, utilization, and academic performance. I linked student demographic data from the Common Core of Data to Facilities Master Plan data using school identification numbers, school names, and street addresses. I used latitude and longitude coordinates for each school included in the Common Core of Data to link schools to neighborhood-level (census tract) data on socioeconomic conditions drawn from the 2000 and 2010 decennial census using GIS software.

The analytic sample does not include the 87 charter schools in the data set as they are not subject to the same governance structures and processes as traditional public schools. For seven schools with missing data on key independent variables, I used the MI package in Stata 14 to create five imputed data sets using multivariate normal regression to estimate missing values. The final sample includes 240 public schools in the School District of Philadelphia that were subject to the closure decision-making process in 2012.

Qualitative Data

Qualitative data were generated by the FMP community engagement process and were accessed through the School District of Philadelphia's website.[4] Sources include videos of 15 public meetings (~30 hours total) and five formal hearings (~24 hours total) as well as 43 written proposals and 44 individual communications responding to closure recommendations. I uploaded these data into NVivo 10 for coding and analysis. Although some might argue that video misses key dimensions of a social setting, Jones and Raymond (2012) contend that video presents researchers with opportunities to access moment-by-moment records of settings and interactions. Recordings of community meetings provide a detailed catalog of individual testimonies and district responses—data crucial to the following analyses.

I began by taking comprehensive field notes and transcribing relevant sections of recorded meetings. Quantification and commensuration emerged early as important argument tactics for both district personnel and community members.

These constructs and associated subthemes, including academic- and resource-related claims, formed the core of my codebook. Qualitative data were also coded to specific schools, which allowed me to use queries and matrices to compare schools individually and by closure status.

MEASURES

Dependent variables

Recommendation for closure. I assigned all schools a binary variable indicating whether they were recommended for closure. Because the Facilities Master Plan made a broad range of recommendations, including grade reconfiguration, merger, relocation, and closure, I define school closure in this study by *program* closure. Qualitative data indicate that building closure was significant for reasons of convenience and community resource, but the real wound of school closures was inflicted by dismantling the school as a social organism: a faculty and student body who established a shared culture and identity under a common name. Thus, schools that retained their names and moved to new buildings with student and teacher populations intact are coded as not recommended even if the building they left behind was shut down. Facilities where the program was disbanded but the building remained open to accommodate a new school were coded as recommended for closure.

Preservation. Schools recommended for closure were assigned an additional binary variable indicating their preservation status. Schools that were recommended for closure but left open are coded as preserved (1), and those ultimately shut down are coded as not preserved (0).

Independent variables. The four criteria the district used to select schools for closure—utilization, Facilities Condition Index (FCI), savings, and academic performance—comprise key independent variables for this analysis. The first two of these criteria and the background information in the following first appear in a draft report published by URS Corporation, an engineering, design, and construction firm hired by the Philadelphia School District to guide their Imagine 2014 long-range facilities planning campaign (URS 2011). A separate analysis could productively interrogate whether different metrics would have yielded a different set of closure recommendations and borne a different relationship to disadvantage, but here I am concerned with the specifics of how the district's actions and choices distributed closure recommendations across communities.

Utilization. Utilization is calculated by dividing school enrollment by school capacity. Capacity for each school was calculated by multiplying the number of classrooms in the building by the maximum students per classroom (28 for middle and high school, 26.5 for elementary school) and then adjusting the total downward (75 percent) to account for classrooms that require additional space for curricular activities or do not operate at maximum capacity.

Facilities Condition Index. Facilities Condition Index is a common facilities management industry metric that measures building condition by dividing the cost to repair the building by the cost to replace the building. To calculate repair costs, URS Corporation inflated the required renovation costs identified in a 2005 Facilities Condition Assessment to 2010 values and then deducted investments made in facilities in the intervening years. They calculated replacement cost by multiplying a cost per square foot value by the overall square footage of the building. Buildings with low FCI (<33 percent) are considered to be in good condition; those with FCI above 75 percent are in poor condition.

Savings. Savings metrics are not included in the URS Corporation draft report on long-range planning, but FMP data include numerous savings measures for each school, including operational, facilities, and total savings as well as per-pupil computations of each. In the present analyses, the savings variable measures the district's projection of total savings associated with closing each school. This choice reflects the district's focus on reducing the deficit by any means possible, as opposed to a specific per-pupil, facilities, or operational savings goal.

Academic performance. Academic performance measures reflect the proportion of students scoring proficient or above on Pennsylvania System of School Assessment (PSSA) reading tests. These data were reported in the district's FMP data set.

Other key independent variables measure school and community disadvantage. At the school level, the proportion of the student body that is black and the proportion receiving free or reduced-price lunch are drawn from the CCD. I include a measure of the proportion of the student body who come from within the attendance boundary as a proxy for school desirability and families' capacity to navigate the choice process. Additionally, communities' capacity to organize may be influenced by geographic proximity or underlying political and human capital. Neighborhood (census tract) measures of median household income, proportions of households headed by women, and proportions of adults without high school diplomas are drawn from the 2010 decennial census.

Table 1 presents descriptive statistics for the analytic sample. The table presents separate statistics for schools recommended and not recommended for closure to highlight the variation between these two groups. As existing research on school closure would suggest, schools recommended for closure appear less utilized (50 percent vs. 77 percent), less academically proficient (29 percent vs. 77 percent), in worse structural condition (FCI 44 percent vs. 38 percent), and more expensive on a per-pupil basis ($2,126 vs. $1,160) than schools not recommended for closure. However, recommended schools also received less investment between 2003 and 2012 ($1,036 vs. $2,706) and serve a higher proportion of poor (90 percent vs. 82 percent of students receiving free or reduced-price lunch), minority (85 percent vs. 60 percent of students are black), and neighborhood (69 percent vs. 66 percent in-boundary) students than schools not recommended for closure. The characteristics of the neighborhoods in which schools are situated also show some variation between recommended and not recommended schools. In neighborhoods surrounding schools facing closure, the median household income is lower by nearly $10,000 ($26,430 vs. $36,310), and rates of family poverty and other indicators of disadvantage are higher than in neighborhoods around schools not recommended, although the magnitude of some of these differences is small.

METHODS

The quantitative analysis uses logistic regression techniques to establish whether and how quantification influenced the likelihood of disadvantaged communities losing their schools. I begin by using binary logistic regression to evaluate how school- and neighborhood-level indicators of disadvantage (Models 1 and 2, respectively) are associated with a school's likelihood of being recommended for closure. To test whether there is a spatial element to the stratification of school closure recommendations, I introduce school- and neighborhood-level measures of disadvantage sequentially in Models 1 and 2. The two subsequent models introduce the district's selection criteria to test how the relationship between disadvantage and recommendation for closure changes in the context of quantification. To distinguish between the effects of two underlying justifications for school closure (resource management and academic underperformance) on this relationship, I introduce the resource management criteria in Model 3 and add academic performance in Model 4.

The model used in this phase of the analysis can be expressed as follows:

$$\log\left[\frac{Recommended}{(1-Recommended)}\right]=n$$

$$n=\beta_0+\beta_1 School\ Factors+\beta_2 Neighborhood\ Factors+\beta_3 SelectionCriteria+\varepsilon,$$

where *SchoolFactors* represents multiple variables describing the school's demographic characteristics, and *NeighborhoodFactors* represents multiple variables describing the surrounding neighborhood's social and demographic environment. *SelectionCriteria* are school-level scores on the district's four metrics used to identify schools for closure.

FINDINGS AND RESULTS

Quantification and the Unequal Distribution of Closure Recommendations

Table 2 shows results from four logistic regressions predicting schools' likelihood of recommendation for closure. Results from Models 1 and 2 affirm prior findings that schools serving disadvantaged populations are more vulnerable to closures than their peer institutions. Model 1 demonstrates that schools with high concentrations of black students are disproportionately likely to face closure. In a school of 100 students, each additional black

Table 1. Descriptive Statistics: Philadelphia Public Schools Recommended and Not Recommended for Closure, 2012–2013.

	Recommended for Closure N = 38		Not Recommended N = 202	
School Characteristics	Mean/Percent	SD	Mean/Percent	SD
Facilities				
Utilization (enrollment/capacity)	50.29	20.49	77.02	21.88
Capacity	826.81	475.87	776.31	421.36
Facilities Condition Index (FCI)	43.82	21.95	38.15	24.38
Capital investment 2003–2012 ($1,000)	1,036.04	2,440.70	2,706.04	9,336.24
Demographics				
Percent black	84.97	24.42	59.61	32.2
Percent in boundary	69.26	28.26	66.8	33.02
Percent free/reduced lunch	89.78	13.01	82	22.68
Academics/climate				
Percent students proficient in reading	29.08	10.1	47.2	19.04
Percent students absent 10+ days	54.29	14.38	44.97	14.04
Percent students suspended	16.66	8.28	10.54	8.1
Savings				
Total savings ($1,000)	742.06	441.11	831.25	369.02
Savings per student ($100)	2,126.71	974.62	1,610.18	621.84
School configuration				
Elementary	24.32		25.12	
K–8	37.83		39.9	
Middle	13.51		8.87	
High	24.32		20.19	
Neighborhood characteristics				
Median household income ($1,000)	26.43	11.81	36.31	71.27
Unemployment rate	17.73	6.93	14.57	7.77
Percent below poverty line	27.73	15.08	22.74	16.03
Percent female-headed households	13.7	7.58	12.48	8.52
Percent lower than high school	18.02	7.72	15.27	7.23

student would increase the school's likelihood of being recommended for closure by 3.1 percent.

The addition of neighborhood-level characteristics in Model 2 reveals that although school-level poverty was not a significant predictor of recommendation for closure, median household income at the neighborhood level was negatively and significantly associated with recommendation. A $1,000 increase in median neighborhood household income reduced a school's likelihood of recommendation for closure by 4.5 percent. Note that relationships between school disadvantage and likelihood of closure recommendation persist when neighborhood-level controls are added.

The addition of the district's resource management criteria to these regressions in Model 3 yields several interesting findings. First, resource management criteria, at least in part, drive closure recommendations. Consistent with Burdick-Will and colleagues' (2013) findings, school utilization is especially predictive of a school's recommendation status. All else being equal, a 1 percentage point increase in a school's utilization decreases its likelihood of recommendation for closure by roughly 5 percentage points. In this model, neither facility condition nor projected savings are predictive of closure recommendation. Correlation between the three resource management measures is low ($< .17$), suggesting that insignificance is not the result of multicollinearity.

In an exploratory set of models that predict building closure instead of program closure (Appendix

Table 2. Odds Ratios Predicting Relationships between Indicators of Disadvantage, District Closure Selection Criteria, and Likelihood of Recommendation for Closure.

	Model 1	Model 2	Model 3	Model 4
School characteristics				
Percentage black	1.031***	1.030***	1.018*	1.012
	(.008)	(.008)	(.009)	(.009)
Percentage free and reduced lunch	1.012	1.005	.997	.978
	(.012)	(.014)	(.017)	(.022)
Percentage students in boundary	1.372	1.639	3.033	.687
	(.895)	(1.171)	(2.623)	(.714)
Neighborhood characteristics				
Median household income ($1,000)		.954*	.955*	.958
		(.018)	(.019)	(.021)
Percentage female-headed household		.961	.968	.934
		(.029)	(.029)	(.034)
Percentage no high school diploma		1.003	.987	.981
		(.036)	(.041)	(.046)
District closure criteria				
Facilities Condition Index (FCI)			1.016	1.020
			(.010)	(.011)
Utilization			.952***	.957***
			(.010)	(.012)
Total projected savings ($1,000)			.999	.998*
			(.001)	(.001)
Percentage proficient in reading				.899***
				(.024)
Constant	.006	.068	5.694	12070.03

Source: NCES Common Core of Data (2009–2010), the Philadelphia Public Schools Facilities Master Plan, and the decennial census (2000, 2010).
*$p \leq .05$. ***$p \leq .001$.

A), the Facilities Condition Index does predict recommendation. This suggests that although building closure decisions were tightly coupled to selection criteria, recommendations of program closures disrupted the relationship between building condition and building closure recommendation. In other words, schools recommended for program closure were recommended for reasons beyond resource management; academic logics weighed more heavily on program closures than building closures.

Negligible or weak relationships between savings or facility condition and closure recommendation persist in Model 4, where the projected savings coefficient becomes significant, although in the opposite direction from what one would anticipate. We would expect the district to recommend the most expensive schools for closure, but the likelihood of a school's recommendation in fact decreases marginally as projected savings increase. This may reflect a subset of highly funded or expensive schools that are unlikely to close for underlying reasons, such as housing expensive and difficult to move career and technical education (CTE) programs, recent large capital investments, or their political status as highly funded Promise Academies. When overall projected savings is replaced with a per-pupil measure of savings, the already small coefficient becomes insignificant.

Second, the relationship between disadvantage and closure recommendation persists with the addition of resource management selection criteria. The coefficient on schools' racial composition is somewhat reduced in size, from a 3 percent to 1.8 percent increase in the likelihood of closure recommendation for each additional percent of the student body that is black; nonetheless, the relationship remains significant. The size and strength of the relationship between median household income and likelihood of closure recommendation holds constant with the addition of the new variables.

Taken together, the results of Model 3 imply that resource management criteria are indeed used to make closure recommendations and that they are largely independent of school and community disadvantage. While it is simultaneously true that disadvantaged schools and communities are likelier to be exposed to closure recommendations and that quantitative measures related to resource management are used to drive those recommendations, results indicate that these patterns are unrelated.

Results from Model 4 add nuance to our understanding of the relationship between quantification and the unequal distribution of closure recommendations. Academic performance, the final criteria used to select schools for closure, is strongly associated with closure recommendation. For every additional percent of the student body scoring proficient or above on state reading tests, the likelihood of closure recommendation decreases by over 10 percent. However, in contrast to Model 3, the addition of academic performance metrics to the model causes previously significant relationships between disadvantage and closure recommendation to disappear. This disappearance demonstrates a strong correlation between academic performance and measures of disadvantage. However unsurprising, the implications of this correlation and the theoretical considerations for quantified approaches to closure decision making are worth making explicit. Specifically, schools in poorer neighborhoods serving higher proportions of minority students will always be more likely to face closure when academic performance is used as a selection criterion (Burdick-Will et al. 2013).

Changes between Models 2, 3, and 4 illustrate how quantitative selection criteria operate as indirect mechanisms for unequally distributing closures across disadvantaged schools and communities. By abstracting the relationship between school and neighborhood disadvantage and the likelihood of closure recommendation, benign-seeming metrics designed to facilitate decision making simultaneously construct and conceal the relationship between disadvantage and school closure. Importantly, not all quantitative measures are equally responsible. These results show that whereas academic performance metrics ensure a disproportionate distribution of closure recommendations, allocation of closures based on resource management concerns occurs largely independent of school and community disadvantage.

The preceding analyses affirm that quantified approaches to selection directed closure recommendations, but the preservation of 14 schools over the course of the community engagement process raises questions about how schools were removed from the list. One possibility is that the district used selection metrics to close the most underutilized, worst performing schools. Alternatively, underlying disadvantage may have played a role in schools' divergent outcomes. However, a comparison of criteria scores and demographics (Table 3) reveals few significant differences between closed and preserved schools. Data-driven decision-making processes may have largely predicted recommendation for closure, yet mechanical quantification processes failed to govern final decisions. To explain the variation in closure outcomes, I turn to the qualitative data generated by the community engagement process.

Pursuing Preservation: Advocates' Engagement with Quantification in Struggles over School Closures

In keeping with other quantified policy domains, school district representatives did their best to characterize the data-driven selection process as streamlined, formulaic, and objective. At the opening of one community meeting, Superintendent Hite dispelled the notion that closure recommendations were subjective, vindictive, or random. Using data to prove the imperative of school closures and legitimate the process of closure selection, he contrasted his administration's approach with the image of an autocratic district: "This is not a superintendent exerting his will upon a set of schools and communities, this is a necessary process in Philadelphia. . . . If we don't close schools now, we could be talking about closing the whole district." He went on to explain that the district was carrying too many empty seats (53,000), it could not pay for the programs students needed, and that "[t]his meeting will cover the criteria that were used to come up with [closure] recommendations."

The central role of numbers and the implication of their infallibility were echoed by other district personnel throughout the community engagement process. When asked about individual closures in community meetings, district representatives rattled off a string of metrics that justified the recommendation to close a given school as if the outcome were self-evident. Yet, qualitative analyses reveal two distinct fissures in the

Table 3. Comparisons of Closed and Preserved Schools.

	Closed	Preserved	One-tailed *t* Test
District closure criteria			
Facilities Condition Index (FCI)	46.76	40.07	.185
Utilization	50	50.79	.456
Total projected savings ($1,000)	801.47	640.24	.142
Percentage proficient/advanced in reading	27.96	31.93	.124
School characteristics			
Percentage black	81.47	90.95	.121
Percentage free and reduced lunch	90.58	88.51	.313
Percentage in boundary	65.75	75.28	.161
Neighborhood characteristics			
Median household income ($1,000)	25.72	27.65	.316
Percentage female-headed household	15.18	11.15	.057
Percentage no high school diploma	18.71	16.83	.238
N	24	14	

Source: NCES Common Core of Data (2009–2010), the Philadelphia Public Schools Facilities Master Plan, and the decennial census (2010).

mechanical objectivity of the district's quantified approach to decision making. First, comparing explanations for individual schools' closure recommendations reveals that authorities used the four selection criteria inconsistently across schools. The relative importance of each metric varied by case, with some closures ultimately assured by resource management rationales and others by academic underperformance.

Second, the meaning and legitimacy of academic performance measures in directing closures was unstable and contested. At one formal hearing, a commissioner interrupted proceedings to ask how performance was used to make recommendations and how it should be evaluated more generally in making closure decisions. Mr. Kihn, a school district staff member, responded:

Mr. Kihn: We did the original filtering of the four areas of the school that we described, utilization, costs, academic performance, and the condition of the facilities and we didn't assign each of those particular weight. So, it wasn't as though we were over indexing on one or the other, but we did try to look at the whole picture.

Commissioner Dworetzky: Well, I am not sure what that means. Is it a factor in making the proposal?

Mr. Kihn: Yes, it's a factor.

Commissioner Dworetzky: And it has weight, but you can't say what exactly the weight is because you didn't have like a grid in which you put a certain amount of weight on it.

Later, Commissioner Dworetzky returned to this point:

> By the time we get to the end of these hearings, I hope we'll have more clarity around how academic performance should be used in this context. I am not sure we have a meeting of the minds on what weight it should be given, but I do observe that in a situation where it's both a criteria for closure, and then we're going to replicate much of the same scenario, it doesn't make a great deal of sense to me and I want to understand better what the thinking is on that. . . . Closure of a building, to me, I'm not sure what that does for academic performance. It's a question then of the students. Where are they going to go? What opportunities are they going to have in the place that they go to? (Closure hearings, day two)

This exchange illuminates both the malleability of the quantified decision-making process and the contested and politically unstable nature of

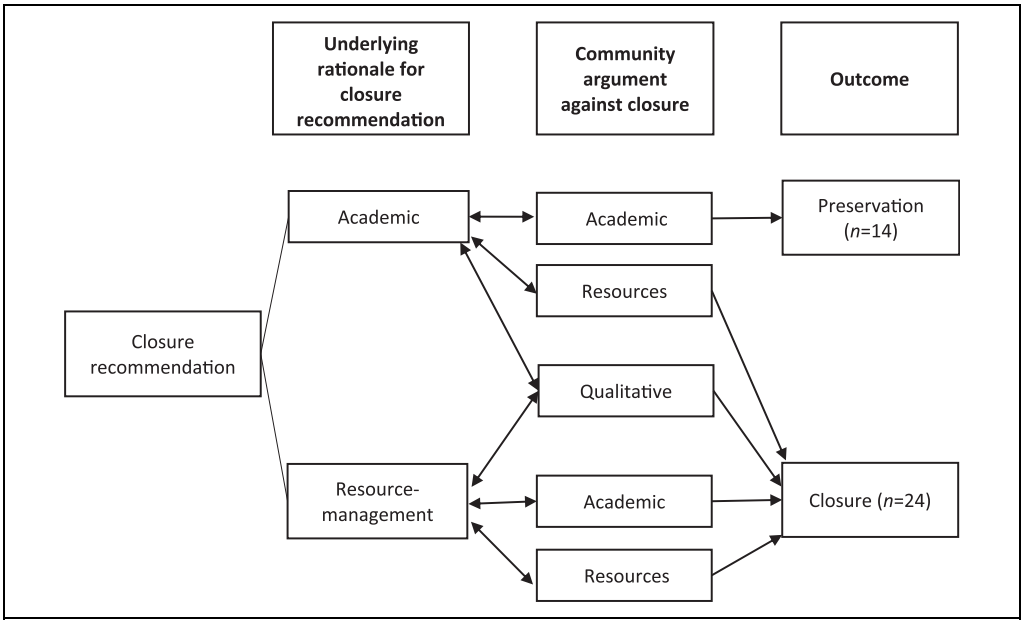

Figure 1. Pathways to preservation in recommended schools.

academic performance as a closure criterion. Malleability enabled closure rationales and the importance of individual criteria to vary across schools. Because officials used data to look at the "whole picture," they could flexibly adjust the weight of a given factor in each case; some closures were substantiated by resource concerns, whereas others were undergirded by academic underperformance. The political instability of using academic performance to justify school closure in conjunction with the measure's distinctiveness from and simplicity compared to the chorus of the three resource management metrics likely contributed to its vulnerability in the face of quantified resistance campaigns. Together, variation in underlying rationales for individual closures and the contested nature of academic performance measures in closure deliberations set the stage for communities' variable success in their campaigns for preservation.

Like the district's rationalization of individual closure recommendations, communities' strategies for arguing against closure also varied. Some deployed data and commensuration to argue for the preservation of their schools, making arguments that spoke to both resource and academic rationales for closure, whereas others contested quantification as a valid framework for decision making. Together, the variation in the district's justifications for closures and communities' argumentation strategies mattered for schools' fates in the closure process. Figure 1 plots the various interactions between the district's underlying reasons for closure recommendation, communities' arguments against closure, and closure outcomes.

For communities to succeed in getting a school removed from the closure list, advocates had to wage a quantified campaign that aligned with the district's underlying rationale for closing the school. Yet it was not always clear to advocates which factors drove the closure recommendation of specific schools, rendering successful campaigns all the more difficult to design, even when the imperative for leveraging quantification was clear.

Successful campaigns consistently used academic performance measures, which enabled simplistic commensurative claims. In cases where closure recommendations were justified by resource issues, advocates could not secure preservation through commensurative academic arguments, even if there were an academic case to be made, because such claims did not align with the underlying rationale for closing that specific school. Yet, communities' quantified resource management

arguments also failed to preserve schools slated for closure, even when resource issues undergirded recommendations, because the resource management landscape of school closures was too complex to contest with either normative or commensurative arguments. For example, claims that schools should be preserved because they had received significant investment in recent years (normative) or their building was in better condition than other schools (commensurative) failed because they oversimplified the broader ecosystem of school resources. This pattern is somewhat counterintuitive as "school quality" is often thought of as difficult to measure, whereas economic indicators are less nebulous. However, in this instance of data-driven decision making, academic performance constructs were simplistic and easy to commensurate, whereas measures of schools' efficiency were mathematically complex, interdependent, and drew on information that was beyond advocates' reach. Finally, given the critical role of data in both making and refuting closure recommendations, it is not surprising that advocates attempting to secure preservation through qualitative arguments were never effective in resisting closure.

No Data, No Chance: Failures of Qualitative Arguments

School closures in Philadelphia evoked fervent pleas to preserve schools based on unquantifiable aspects of their character. Advocates portrayed schools as historical and invaluable community spaces, families, bastions of safety in chaotic neighborhoods, and critical sources of stability in students' unpredictable lives; they challenged closures on the grounds of racial justice. In so doing, they promoted, sometimes explicitly, an alternative to the quantification narrative. One advocate's testimony simultaneously acknowledged and challenged the dominance of the quantitative approach to decision making:

> I had come to talk about budgets and the economic side of this, but then I asked myself—that would be useless . . . numbers can be manipulated to look any way that you want them to look. One thing you can't manipulate is the human side to these proposed school closures. There is a human side to every argument. And if Dr. Hite, Mayor Nutter, and the SRC Board actually took a moment to consider the human side, this conversation of school closures would be over. The human side of this is safety, strain on families, and education just to name a few. (Community activist and parent, closure hearings, day one)

Others were less explicit in their opposition to quantification, endeavoring instead to qualitatively construct their schools as worthy of preservation. They attempted to validate the contextual factors and other ways of valuing entities that quantification and commensuration obscure (Espeland and Stevens 2008; Lamont 2012).

Despite the emotional power and the persuasiveness of these types of arguments, however, they failed to secure schools' preservation. For example, advocates argued that there was far more to George Pepper Middle School than data conveyed:

> If you look at the first set of pictures after my testimony, you'll see the multipurpose fields, tennis and basketball courts, and the beautiful greenery surrounding the school . . . the beautiful Heinz National Wildlife Refuge. This is Southwest's equivalent to the schools . . . in the suburbs. This is an experience that inner-city children rarely have a chance to partake. Now, look at the picture of Tilden [proposed receiving school]. This school has none of the amenities associated with Pepper. Why take students away from this environment to an environment that does not have this greenery and open air? (Community activist, closure hearings, day two)

Advocates portrayed Pepper as a unique and pastoral school with unquantifiable value to the students and community. Data-driven approaches to decision making, their arguments implied, overlooked the value of experiencing a college-like setting, especially for low-income students. Notably, even this qualitative construction of Pepper's value is commensurative. Advocates established Pepper's exceptionalism by comparing it against Tilden. Despite this commensuration, which subsequent analyses will demonstrate was critical for securing preservation of some schools, the SRC voted to close Pepper.

Pepper's closure demonstrates the limits of both qualitative argumentation and commensuration as tools of resistance. Commissioners were

not entirely deaf to claims that schools were qualitatively valuable to their constituents, expressing concerns about closing a school that "offers things that no other school in the district does" (closure hearings, day three), but they would not preserve a school based on these qualities alone. Instead, commissioners urged the district to reevaluate enrollment projections, transportation plans, and engineering concerns in an attempt to quantitatively justify preservation.

Qualitative arguments failed even when they relied on comparisons against receiving schools. Subsequent analyses will demonstrate that commensuration was a successful tactic for preserving schools, but only when advocates used metrics that the district deemed relevant in decision making. The district's quantified approach to selecting schools for closure dictated the things that mattered (e.g., utilization, academic performance) and how meaning was made (commensuration). As we will see, communities' campaigns against closure were sometimes successful when they fully adopted quantification *and* commensuration, but they fell short of their goals when they adopted the tactics without the terms.

Pathways to Preservation: Commensurating Academic Performance

Quantitative analyses demonstrate that the use of academic performance measures in decision-making processes concentrated school closures in disadvantaged communities. Paradoxically, these same metrics also enabled communities to successfully advocate for the preservation of their schools. In numerous cases, advocates gained traction with the district and School Reform Commission by using academic performance data to argue against their school's closing. These arguments relied heavily on commensuration, often comparing the academic performance of the recommended school against that of the school(s) slated to receive its displaced students. At an early community meeting, a mother arguing against the closure of Jay Cooke Elementary testified:

> I went directly off of you guys' website, and the two schools you have selected for elementary grades is Steel and Logan, and the other school is Grover Washington. For Steel, their scores have dropped 40 percent in four years of straight downward incline. For Logan, theirs was a dramatic drop from 2005 'til now . . . Cooke's scores had a slight drop, then a major increase. . . . Their attendance is 96 percent for both staff and students; two times more entries than withdrawals from 2004 'til now. Steady decreases in suspensions, violent incidences, number of children with more than two suspensions and an increase in the number of students passing with Algebra at the 8th grade for their exam. Now, closing Cooke school when you have the two schools that you've selected that are having a downward incline in their test scores, behavioral issues, and attendance issues and you're keeping the school that should be open to close. (Field notes, Facilities Master Plan meeting, December 18, 2012)

Cooke Elementary's written proposal to the district included 12 slides of tables comparing its test scores in multiple grades and years to those at the proposed receiving schools. Other schools' supporters also successfully used this strategy. Advocates for the preservation of Tanner Duckrey vociferously argued that sending their students to Stanton, the proposed receiving school, meant sending them to a school that was worse than the one they presently attended. District personnel revised their closure recommendations ahead of the SRC's final vote, removing Cooke from the recommendation list and reversing their decision to close Duckrey. They proposed closing Stanton instead. Asked about the latter change by the SRC, Superintendent Hite explained that it was brought to the district's attention that Stanton was a lower performing school than Duckrey and that there was space to accommodate Stanton's students at Duckrey instead (SRC vote, March 7, 2013).

Succumbing to Closure: Argument Misalignment and Resource Ecosystem Complexity

Commensurative arguments that leveraged academic performance data did not always overturn school closure recommendations. When these arguments failed, it was often because of underlying and wider reaching resource management issues that the community struggled to navigate and could not overcome. For example, Edward Bok Technical High School was slated for closure

despite the fact that it was a relatively high-performing and fully utilized school that offered popular CTE programs. Although the building had sustained considerable damage to its roof, rendering the seventh and eighth floors unusable, Bok's FCI was roughly equivalent to the mean value for all schools recommended for closure.

Bok's supporters, like advocates for Cooke and Duckrey, used the district's data to argue for its preservation on the grounds that its proposed receiving school was academically inferior. One of Bok's teachers gave the following testimony at a closure hearing:

> Bok outperforms Southern in all measurable categories in its current form. The School District is asking the students and parents of Bok to transfer to a lower performing school. According to the data there is an 18 percent difference in graduation rate between the two schools, and students are six times more likely to drop out at Southern. South Philadelphia was recently listed as a persistently dangerous school and is in the 10th year of Corrective Action II while Bok has a history of making AYP [Annual Yearly Progress]. One of the goals of the FMP is to maximize usage of buildings. . . . When looking at data, it appears that Bok has steady enrollment. Each year Bok receives over 2,000 freshman applications. Bok has a 97 percent utilization rate compared to a 25 percent utilization rate of Southern. (Teacher at Bok, closure hearings, day three)

A parent sent a similar message by e-mail:

> I researched other technical schools that offer Carpentry on the school district website and I found it very disheartening when I researched the test scores for Math and English and found most to be below the 50th percentile. The scores for South Philadelphia High School were very dismal. (Bok parent, by e-mail)

These and other arguments generated considerable discussion among SRC commissioners. When questioned, Superintendent Hite explained that the district could save money on building and administrative costs by closing Bok and moving its students to South Philadelphia High, which stood nearly empty. "I get it," Commissioner Dworetzky said, "it's not a result of Bok's inefficiency, it's the fact that we have capacity elsewhere that can fully absorb this program and, therefore that could be true for any school that was being transferred to a big high school that had lots of space" (Closure hearings, day one).

The deliberation and ultimate decision to close Bok illuminates two aspects of the closure process in Philadelphia. First, it presents evidence that quantitative selection criteria are not equally weighted across cases. Commensurative academic arguments overturned the closure recommendations for Cooke, Duckrey, and others, but the same arguments were unsuccessful in reversing the recommendation to close Bok. Second, it elucidates the complexity of the resource management landscape and consequently the near impossibility of overturning a closure recommendation based on resource concerns. Bok was closed despite high utilization, strong academic performance, and average FCI because another school in its catchment area was large and empty enough to absorb all of its students and programs. In effect, no argument demonstrating Bok's quality or superiority would likely have succeeded because its closure was driven not by its own metrics but by another school's. Bok's advocates made a strong quantitative and commensurate case for the preservation of their school. Given the outcomes of Cooke and Duckrey, they had every reason to believe their school would be spared, yet variation in underlying rationales for recommendations and the complexity of managing district resources assured its closure.

Bok's academic and commensurative campaign for preservation failed because it was misaligned with the district's resource management rationale for recommending closure; however, other communities sought this alignment by directly engaging with resource-related data. Numerous advocates, for example, attributed low utilization at Ferguson to the demolition of a nearby public housing complex, which cost the school 125 families. At the SRC hearings, the school's principal pointed out that construction of a new housing development was underway. The new building was not on the footprint of the demolished one but was two blocks from the school and would likely boost the school's enrollment upon completion. SRC commissioners requested written follow-up information from the district about the development's size, composition,

and implications for Ferguson's recommended closure. The district's response confirmed the principal's descriptions of the development's size and attractiveness to families, but it dismissed the relevance of the project because it was in another school's catchment area, despite its proximity to Ferguson.

Even when advocates made resource management arguments that aligned with the district's reasons for closing specific schools, they failed to secure preservation because resource management is intricate and complicated. Boundaries of catchment areas, feeder patterns of students, and prior investments in and utilization levels of other buildings all complicated the quantified decision-making process around school closures and thus affected communities' effectiveness in challenging closures undergirded by logics of resource allocation.

DISCUSSION AND CONCLUSIONS

The contemporary education policy landscape is characterized by an "outsized faith" in data-driven management, which "seems to promise that the answer can be found without confronting difficult questions of distributive justice" (Mehta 2013:5). This analysis calls that outsized faith into question by deepening our understanding of how quantification variably contributes to and remediates inequality in the setting of school closures. Two prevailing ideas have dominated policy and scholarship on the subject to date. Measurement and quantification have been promoted as objective approaches to addressing educational inequality. A sharpened focus on institutional accountability has aimed to close racial and socioeconomic achievement gaps. However, quantification scholars argue that choices regarding what to measure have important implications for the distribution of social and political power.

The quantification of the school closure decision-making process in Philadelphia had nuanced and sometimes paradoxical implications for inequality. I demonstrate that by using quantitative selection criteria to identify schools for closure, district officials assured the unequal distribution of closure recommendations across communities, all while maintaining the appearance of fairness and objectivity. Simultaneously, however, quantification provided some disadvantaged communities with tools to successfully advocate for the preservation of their schools. Importantly, metrics mattered; measures of academic performance played a critical role in both concentrating closures in disadvantaged communities and enabling those communities to reverse closure recommendations.

Like many urban school districts, Philadelphia faced serious resource problems: Funding cuts, depleted enrollments, and crumbling facilities resulted in financial inefficiencies and weak program offerings. Consolidating underutilized buildings to achieve scale and improve academic offerings was, according to the superintendent, imperative. However, by introducing academic underperformance as a justification for school closure into a calculation purportedly focused on maximizing efficiency, the district altered both the meaning and the distribution of closures. Academic performance measures recast closure as a type of punishment and construct certain schools as "deserving" (Deeds and Pattillo 2015; Walker Johnson 2012). Long proven correlations between demographics and achievement predisposed majority black schools in poor neighborhoods to closure recommendation. Moreover, academic performance measures eclipse the precursors to and correlates of academic underperformance, including legacies of underinvestment in school resources, racial segregation, and the unraveling of housing, health, and other social welfare programs. Using these measures as decision factors simultaneously absolves the government and other social forces of responsibility for the racially and socioeconomically patterned stratification of outcomes that foment school closures and marks low-income and minority schools as deserving of punishment.

The reversal of closure recommendations in 14 cases enables examination of whether and how quantified approaches to decision making can be successfully contested. I argued that quantification equipped communities with tools of resistance against closure. Successful campaigns, however, were highly specific in their features. Communities preserved their schools when (1) the closure recommendation rested on academic underperformance and (2) advocates made commensurative arguments that their school was academically superior to the school slated to receive displaced students. In cases where closure recommendations were justified by resource management logics, even quantified campaigns aligned with resource rationales failed because the ecosystem of

resource allocation was too complex for advocates to interpret and negotiate. In these cases, commensuration—which proved a critical tactic in contesting academically motivated closures—oversimplified a network of students, buildings, and boundaries.

It is ironic that communities preserved their schools by leveraging measures of academic performance, the very metric that most tightly linked school and community disadvantage with the likelihood of closure recommendation. In the case of Philadelphia's closures, the democratizing potential of quantification was activated by its stratifying effects. Had academic performance measures not factored into closure recommendations, these recommendations may have been less concentrated among disadvantaged communities. Yet paradoxically, this same measure armed marginalized dissenters with a critical tool for saving their schools.

The prevalence of commensuration strategies among successful preservation campaigns deepens this paradox. Effective advocates often secured preservation by comparing their school's performance against the school slated to receive displaced students. These arguments effectively engaged schools in competition against one another in struggles for legitimacy and the right to exist. Because of the geographic and demographic-cum-quantitative factors that rendered schools vulnerable to closure, advocates argued for the preservation of their disadvantaged school at the expense of another just like it. Commensurative arguments left the landscape and calculus of closures unchanged; they simply shifted the burden of institutional loss to another building and another block, often in the same neighborhood. This zero-sum game of overturning closure recommendations truncated opportunities for a more collective resistance, legitimated the quantified approach to decision making, and overshadowed other types of knowledge and judgment.

This analysis suggests several takeaways applicable to other rationalized domains of education and social policy, especially areas faced with difficult decisions likely to affect communities. First, measures matter. When critical decision-making metrics are associated with underlying social and economic conditions, quantified policy regimes can perpetuate or worsen existing inequities under the guise of mechanical objectivity. Second, quantification and what Bartl and Sackmann (2016) term "democratic numeracy" can present a (limited) path to power for advocates. When the rules and the currency of the economy are explicit, constituents may be empowered to mount a defense that alters the course of governance. Yet, these defenses may compromise opportunities for radical rethinkings of or collective resistance against quantified frameworks.

Finally, it is worth considering the implications of tradeoffs between transparency, consistency, and deliberative democracy. In Philadelphia, a quantified approach to selecting schools for closure was far from formulaic; the factors underlying closure recommendations varied across cases. Justifications for closure, and thus arguments for preservation, varied in complexity, giving some schools an advantage in overturning recommendations. Weighing criteria equally across schools and standardizing the quantified decision-making process may have limited communities' influence in directing individual decisions. Yet, greater case-by-case discretion and less mechanical uniformity in making closure decisions could have opened opportunities for deliberative democracy and the valuation of factors beyond numbers, precipitated a slide toward autocracy, furthered rifts between the district and its constituents, or severed community power entirely. Adjudicating between these tradeoffs should be a central focus of policymakers and administrators concerned with the implications of data-driven management for distributive justice.

RESEARCH ETHICS

The research reported here was conducted using only publicly available data and did not involve human subjects. As such, it was not subject to review by the institutional review board for the protection of human subjects. Individuals, especially government and school district officials named herein, participated in public meetings with the knowledge that they were being recorded and that recordings would be made public. Individual community members who participated in these meetings have not been named here in an effort to protect their privacy.

Appendix A. Odds Ratios Predicting Relationships between Indicators of Disadvantage, District Closure Selection Criteria, and Likelihood of Recommendation for Building Closure.

	Model 1	Model 2	Model 3	Model 4
School characteristics				
Percentage black	1.026***	1.026***	1.016	1.010
	(.008)	(.008)	(.009)	(.009)
Percentage free and reduced lunch	1.014	1.008	.999	.985
	(.012)	(.013)	(.015)	(.017)
Percentage students in boundary	.760	.999	1.001	.991
	(.465)	(.017)	(.008)	(.008)
Neighborhood characteristics				
Median household income ($1,000)		.975	.977	.983
		(.017)	(.018)	(.019)
Percentage female-headed household		.947	.957	.938
		(.030)	(.030)	(.032)
Percentage no high school diploma		1.034	1.026	1.030
		(.037)	(.041)	(.043)
District closure criteria				
Facilities Condition Index (FCI)			1.020*	1.021*
			(.010)	(.010)
Utilization			.959***	.964***
			(.010)	(.010)
Total projected savings ($1,000)			.999	.999
			(.001)	(.001)
Percentage proficient in reading				.941**
				(.019)
Constant	.008	.015	.124	41.818

Source: NCES Common Core of Data (2009–2010), the Philadelphia Public Schools Facilities Master Plan, and the decennial census (2010).
*$p \leq .05$. **$p \leq .01$. ***$p < .001$.

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NOTES

1. See, for example, the Urban Institute's analysis of local and state school funding formulas in their features: "How Do School Funding Formulas Work" (Tilsley, Blagg, and Chingos 2017) and "School Funding: Do Poor Kids Get Their Fair Share?" (Tilsley, Chingos, and Blagg 2017).
2. The Philadelphia School District employed a consulting firm in early phases of the facilities planning process to guide the "rightsizing" of the district. Consultants did include some demographic information in their proposal, most notably population projections by neighborhood, but there is no evidence that they used sophisticated statistical approaches (e.g., weighting, controlling for neighborhood socioeconomic characteristics) in identifying schools for closure.
3. I considered using data from the 2011–2012 NCES Common Core of Data, but the number of missing values precluded their use in this study.
4. Since this manuscript was first written, the school district website has been updated, and neither video recordings of public meetings and hearings nor written documents pertaining to the community engagement process remain posted. In 2014, I secured DVD and digital copies of all materials included in

the qualitative analysis, and I uploaded them to the Brown Digital Repository.

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