Evaluation of New York School Funding

Report Brief 1: Equity for Students

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Introduction

In most states, a majority of funds are distributed to public schools according to a statewide formula. Although the details of these formulas vary widely from state to state, they are all meant to account for differences in the costs of providing students an equal opportunity to educational success across schools and districts based on the students that they serve (e.g., some schools and districts serve larger shares of students from low-income families).

Districts and schools differ with respect to the populations they serve, leading to in differential needs for educational programming and services to offer the same opportunities to students. In recent years, researchers and prominent educational organizations have reached a common understanding that state school finance systems should provide substantially more resources per pupil to districts serving greater shares of students in poverty (Baker & Green, 2008; Baker & Levin, 2014).[1] School funding systems that systematically provide more resources (i.e., funding) to districts and schools with higher student poverty rates can be considered relatively "progressive" whereas those that provide fewer resources to districts with higher student poverty rates can be considered relatively "regressive."[2] Given the mounting evidence that money matters for educational outcomes, and particularly for students from economically disadvantaged families (Baker, 2016; Jackson, 2018; Jackson et al., 2016; Johnson & Tanner, 2018; Lafortune et al., 2018), maintaining a progressive distribution of resources is an important step toward ensuring that students have access to an equal opportunity to achieve educational success.

Key Equity Terms

Progressive: An education funding system that provides more resources or funding to districts or schools with the highest needs (often operationalized as economic disadvantage). A positive relationship between resource levels and student needs.

Regressive: An education funding system that provides less resources or funding to districts or schools with the highest needs. A negative relationship between resource levels and student needs.

In this report brief, we first describe New York State's existing approach to adjusting funding to account for differences in student need and other factors that may affect the cost of providing educational services. We follow this with a short description of our approach to evaluating the equity of school funding. Last, we present the results of our analyses of the existing distribution

[1] These educational organizations include The Education Trust, the Urban Institute, and the School Finance Indicators Database.
[2] This report refers generally to student poverty and in various analyses makes use of measures meant to serve as a proxy for poverty. New York State's measure of economic disadvantage is defined as students who participate in, or whose family participates in, one or more of the following economic assistance programs: free or reduced-price lunch programs, Social Security Insurance (SSI); food stamps, foster care, or refugee assistance (cash or medical assistance); Earned Income Tax Credit (EITC), Home Energy Assistance Program (HEAP), Safety Net Assistance (SNA), Bureau of Indian Affairs (BIA), or Temporary Assistance for Needy Families (TANF).

of education spending and revenue in New York with respect to student needs to examine the progressiveness of the current system of funding.

SUMMARY OF KEY FINDINGS

In this brief, we demonstrate that New York's foundation aid formula establishes progressively distributed funding targets. However, the progressiveness of the foundation aid targets does not result in a progressive distribution of spending or revenue with respect to the pupil needs index or economic disadvantage. In fact, the districts and schools serving the highest percentages of economically disadvantaged students spend less and are provided less in state and local revenues, on average, compared with otherwise similar districts and schools with low percentages of economically disadvantaged students.

New York's School Funding Model–Addressing Student Need

This section describes New York's current approach to differentiating funding across districts to account for student and district contextual needs. New York's education funding formula is known as a foundation formula, whereby the state calculates a target funding amount per student for each district, accounting for differences in student needs and other contextual cost factors such as geographic price differences. The state then determines the share of the target per-student funding amount that will be paid by the state by subtracting the expected minimum local contribution. The state share is then multiplied by the number of qualifying students to determine the total amount of state foundation aid funding provided to each district. In this brief, we focus on the adjustments the state makes to account for student needs and other contextual cost factors. A subsequent brief will examine the minimum local contribution and state share.

The target funding amount in New York is known as the adjusted foundation amount (AFA) and is the product of a base foundation amount, a pupil needs index, and a regional cost index, as follows:

$$Adjusted\ Foundation\ Amount = Base\ Amount * Pupil\ Needs\ Index * Regional\ Cost\ Index$$

where the *Base Amount* is the prior year's base amount multiplied by an inflation adjustment represented by the Consumer Price Index; the *Pupil Needs Index* (PNI) is an index between 1 and 2 that accounts for the level of poverty, prevalence of English language learner (ELL)

students, and district sparsity (defined as the number of students per square mile); and the *Regional Cost Index* accounts for differences in labor market costs across nine labor market regions in New York, ranging from 1.000 to 1.425. In 2023–24, the base amount per pupil was $7,821 (New York State Education Department, 2024).

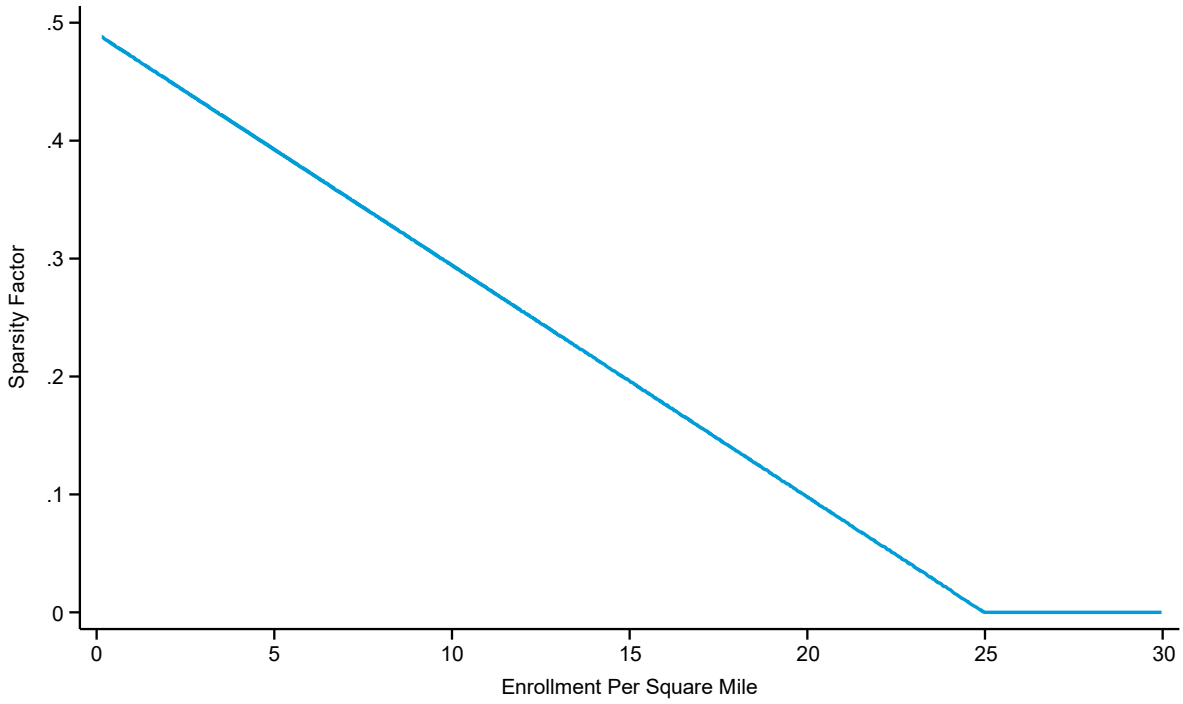
Examining the PNI in more detail, the level of poverty is defined by applying both a 3-year average free or reduced-price lunch percentage and the district poverty rate from the 2000 census to the prior school year's enrollment to generate a *Lunch Count* and *Census Count*. An overall poverty count is then calculated by multiplying both counts by 0.65 and adding the resulting products, as follows:

$$Poverty\ Count = (0.65 * Lunch\ Count) + (0.65 * Census\ Count)$$

The ELL count is the number of ELLs in the district in the prior school year, defined as students who speak a language other than English at home and whose English language proficiency levels are below proficient.

Districts where the enrollment per square mile is less than 25 have a sparsity factor that is greater than 0. Just over half of all districts in the state in 2023–24 had enrollment densities less than 25 and therefore had a sparsity factor greater than 0. Exhibit 1 shows the relationship between the sparsity factor and enrollment per square mile. A sparsity count is generated by multiplying district enrollment from the prior year by the sparsity factor.

Exhibit 1. Sparsity Factor in Relation to Enrollment per Square Mile



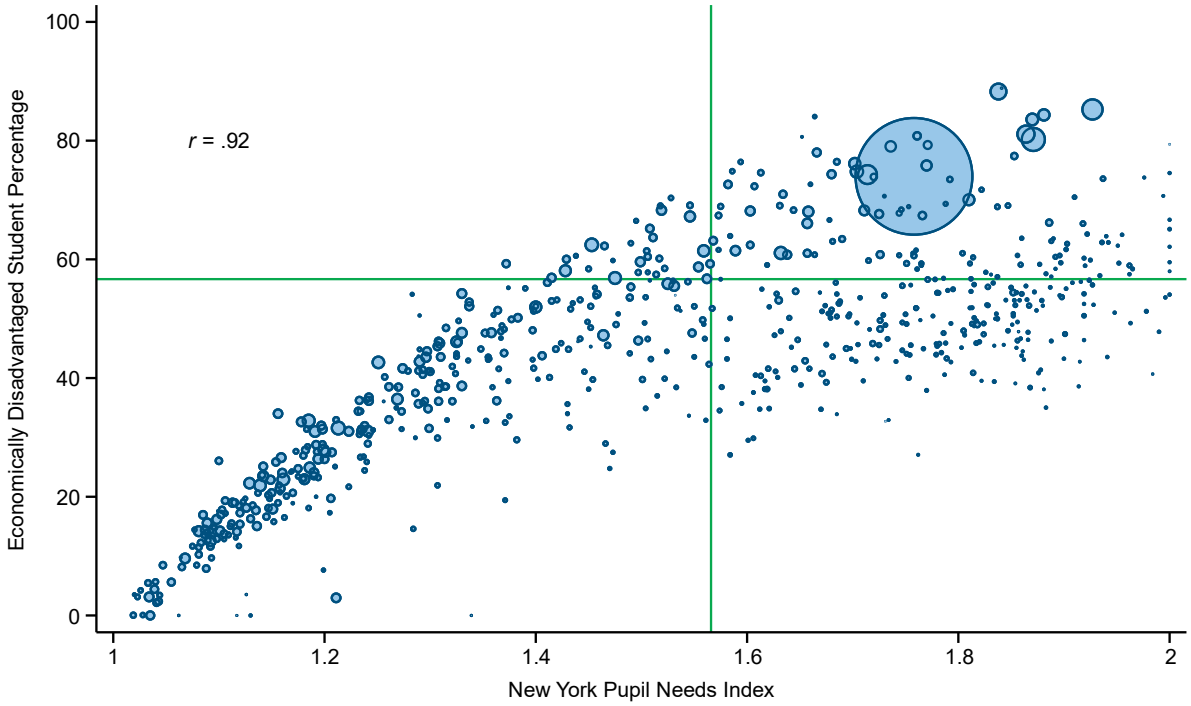
Note. Enrollments per square mile greater than 30 are not shown. All districts with an enrollment per square mile greater than 25 have a sparsity factor of 0.

After these counts of students with various needs are established (collectively termed students with extraordinary needs by New York), the PNI is calculated as follows:

$$Pupil\ Needs\ Index = \frac{Poverty\ Count + (ELL\ Count * 0.5) + Sparsity\ Count}{K12\ Public\ School\ Enrollment}$$

In large part, the PNI is driven by the level of economic disadvantage or poverty. Exhibit 2 shows the relationship between the percentage of economically disadvantaged students in a district and the PNI. When weighted by enrollment, the two measures of need have a correlation of .92. By contrast, the correlation between the PNI and the ELL percentage is .60 (Exhibit A3 in Appendix A shows the correlations between student need variables aggregated at the district level).

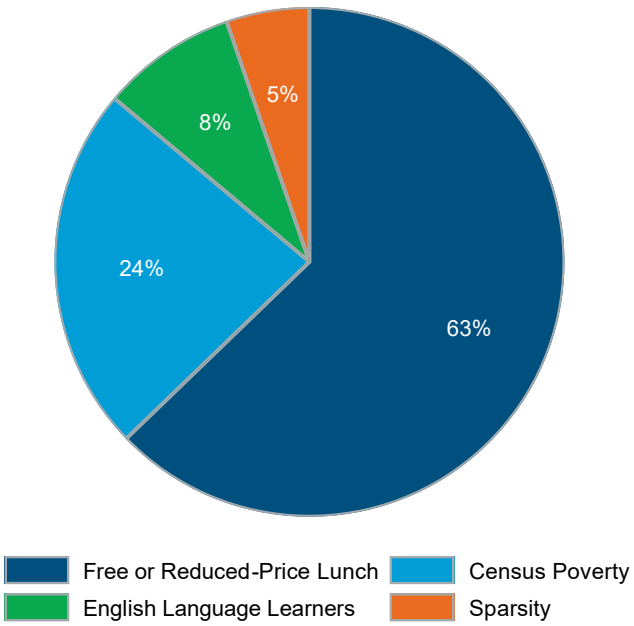
Exhibit 2. The Relationship Between District Economically Disadvantaged Student Percentages and New York Pupil Needs Index (2022–23)



Note. Each dot represents a district. The size of the dots reflects the relative size of each district. The horizontal green lines show the average economically disadvantaged student percentage and vertical green line shows the average pupil needs index. The correlation coefficient is denoted by *r*.

Another way to show that economic disadvantage is the main driver of the PNI is to decompose the share of PNI attributable to counts of students in each extraordinary needs student category. We did this by calculating the average percentage of the numerator in the above PNI formula that is attributable to the free or reduced-price lunch count, the census poverty count, the ELL count, and the sparsity count. As shown in Exhibit 3, 63% of the PNI is attributable to the free or reduced-price lunch count and 24% is attributable to the census poverty count, on average. Therefore, collectively, 87% of the PNI is attributable to the two variables contributing to the *poverty count* in the PNI formula. Only 8% and 5% of the PNI is attributable to ELLs and sparsity, respectively, on average.

Exhibit 3. Percentage of the New York Pupil Needs Index Attributable to Various Student Needs (2023–24)



Note. Percentages are calculated out of the statewide extraordinary needs pupil count, which is represented by the numerator of the pupil needs index formula.

Importantly, the calculation of the AFA does not account for students with disabilities (SWDs). Instead, New York's formula accounts for SWDs as part of the determination of pupil counts to which the AFA applies, which New York calls Total Aidable Foundation Pupil Units (TAFPU). TAFPU is the sum of each district's average daily membership (ADM), summer school ADM multiplied by 0.12, and a weighted count of SWDs. For the weighted count of SWDs, each qualifying full-time equivalent SWD is multiplied by 1.41, in which qualification is determined by receiving a minimum threshold of special education services. In addition, students who have been recently declassified (i.e., used to receive special education services but no longer do) count as 0.5 TAFPU. Accounting for summer school enrollment and additional weighting for SWDs means that a district's TAFPU is generally higher than its enrollment count. In the 2022–23 school year, the statewide TAFPU was approximately 25% higher than the total enrollment count.[3]

Although New York's foundation formula constitutes the main source of state aid distribution, districts receive state aid for other programs, such as transportation, school construction

[3] More details on the calculations for the AFA and TAFPU can be found in New York's State Aid Handbooks. The handbook for 2024–25 can be found here: https://stateaid.nysed.gov/publications/handbooks/Handbook_2425.pdf.

projects, high-cost SWDs, textbooks, library materials, and technology. In the 2023–24 school year, foundation aid constituted approximately 71% of total state aid.

Evaluating Equity of School Funding

Our approach to evaluating the equity of financial inputs starts with using regression analysis to determine the relationship between educational resources (defined as spending or revenue) and the factors that would be expected to explain variation in costs across districts or schools, with an emphasis on student needs. This type of model shows whether levels of education spending or revenues are associated with differences in student needs and other cost factors. The advantage of using regression is that we can include multiple cost factors in a model simultaneously to try to isolate the independent relationship of each cost factor on the level of educational resources. Our model accounts for the following cost factors: (a) the share of students from families in poverty, (b) the share of SWDs, (c) the share of ELLs (d) the distribution of students by grade range, (e) the size of the district or school, (f) sparsity or locale, and (g) geographic differences in the price of resources. We supplement the regression analysis with data visualizations that depict the relationships between spending or revenue and student needs.

Of primary interest is whether and to what extent schools and districts serving higher need student populations have access to more resources (spending or funding per student) to support those needs, after controlling for the other factors that influence costs. In other words, is the system progressive with respect to student poverty and other student characteristics indicative of greater need, or is it regressive?

Data

Data for the analyses contained in this brief come from three main sources:

1. School District Fiscal Profiles from the New York State Education Department's Fiscal Analysis and Research Unit from 2018–19 through 2022–23.[4] These data contain district-aggregated expenditures and revenues.
2. New York School Report Card Data from 2018–19 through 2022–23.[5] These data contain school-aggregated expenditures, enrollments, and demographic characteristics including the percentages of economically disadvantaged students, ELLs, and SWDs.
3. State aid calculations from 2018–19 through 2023–24.[6] These datasets contain the data and calculations underlying state aid distributions to districts, including AFA and TAFPU.

We supplemented these main data sources with publicly available data from federal data collections, such as the Comparable Wage Index for Teachers (CWIFT).[7] Exhibits A1 and A2 show the means and standard deviations of the variables included in the analyses for this brief.[8]

Results: Equity of Education Spending and Funding in New York

This section begins with presenting equity analyses using district-level data. Much of the financial recordkeeping for education occurs at the district level. The state funding system provides revenues to districts, and districts then determine how to disburse resources across schools. One limitation of the use of district-level data is that it masks any variation in education spending and student needs that occurs within districts. In the case of New York, this

[4] See https://www.nysed.gov/fiscal-analysis-research/school-district-fiscal-profiles.
[5] See https://data.nysed.gov/.
[6] See https://eservices.nysed.gov/publicsams/reports.do.
[7] The CWIFT is a regional cost index estimated nationally by the National Center for Education Statistics. See https://nces.ed.gov/programs/edge/Economic/TeacherWage.
[8] The various sources of expenditures report different expenditure amounts. For example, the aggregation of school-level expenditures from the school report card data to the district is less than the district-level reported expenditures from the School District Fiscal Profiles because additional categories of spending are excluded from the school-level reported expenditures. For the purposes of our analyses, we considered the reported expenditures from the School District Fiscal Profiles as the "true" level of spending. The School District Fiscal Profiles reports expenditures in a number of categories. Our analyses exclude the following expenditure categories: tuition payments (defined in the data as Tuition 1 and Tuition 2), community service, other (including interfund transfers), transportation, and debt service. To ensure that our analyses of school-level expenditures are comparable to our analyses of district-level spending, we inflated the reported school-level spending from the School Report Card Data to match the spending from the School District Fiscal Profiles. We did this by calculating a ratio of the district-level expenditures to school-level spending aggregated to the district. For example, if the reported district-level expenditures amounted to $50M and the aggregation of school-level spending to the district amounted to $40M, that results in a ratio of 1.25 ($50M divided by $40M). We then multiplied the reported school-level spending of each school by the ratio, so that the adjusted sum of school-level spending equaled the district-reported spending.

is a particularly salient issue because New York City Public Schools includes almost 40% of the state's total enrollment but represents only one of New York's almost 700 districts. As such, we supplement the district-level analysis with an analysis of school-level spending.

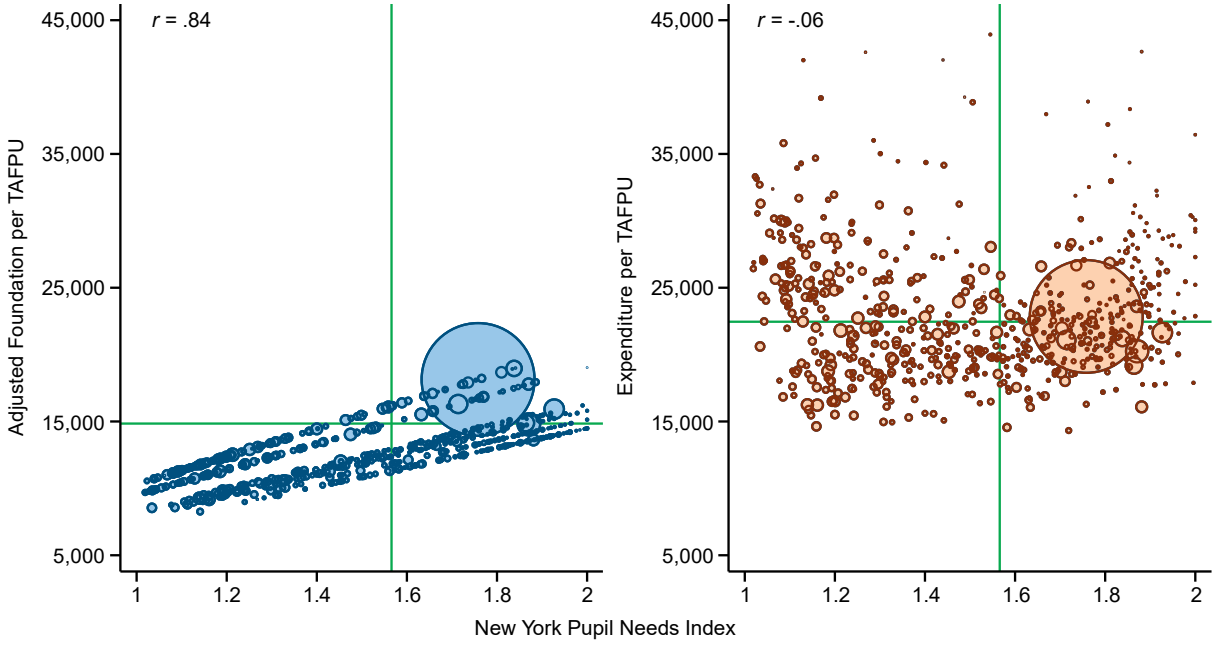
Equity Analyses With District-Level Data

We start by examining the foundation target and spending across districts in relation to the pupil needs index. We use this as the starting point for our analyses because the setting of the foundation target (the AFA defined per TAFPU) based on the PNI is New York's primary mechanism for adjusting revenue distributions based on the level of student economic disadvantage and the prevalence of ELLs served by districts. Therefore, it demonstrates whether the actual mechanism is working as intended. We compare this to spending per TAFPU to examine whether the foundation targets for higher need districts translates into higher spending using a consistent enrollment metric. Our analyses then examine revenue across districts examined on a per pupil basis. The examination of revenue allows us to assess whether specific sources of revenue (state, local, and federal) are contributing to progressiveness or a lack of progressiveness in the distribution of resources. Lastly, we turn back to spending (defined on a per student basis) to better understand patterns of spending across multiple student need measures and the extent to which student need drives differences in spending across districts using both data visualization and regression analysis.

Exhibit 4 shows these relationships, defining both the target foundation amount and spending on a per-TAFPU basis because TAFPU is the enrollment measure used in New York's formula. As shown in the left panel of Exhibit 4, foundation aid has a linear relationship with the PNI. The districts fall on a series of lines, with each line representing districts in regions of the state with different regional cost indexes. Across all districts, there is a strong positive correlation (r = .84) between the foundation target and the pupil needs index, with districts having the lowest PNI having foundation targets around or under $10,000 per TAFPU, and districts with the highest PNI having foundation targets at or above $15,000 per TAFPU.

The right panel of Exhibit 4 shows spending per TAFPU in relation to the PNI. Throughout the state, the average spending per TAFPU is about $8,000 more than the foundation targets, on average. There also is no relationship between the PNI and spending per TAFPU. In other words, the progressive foundation targets do not translate into progressiveness of actual spending, after accounting for all other funding streams. In large part, this finding is due to districts' preferences to having their spending being much higher than the foundation targets, regardless of where districts fall on the PNI.

Exhibit 4. The Relationships Between Foundation Aid Targets and Spending per Total Aidable Foundation Pupil Units (TAFPU) and New York Pupil Needs Index (2022–23)



Note. Each dot represents a district. The size of the dots reflects the relative size of each district. A small number of districts with more than $45,000 per pupil in spending per TAFPU are omitted from the right panel. The horizontal green line shows the overall averages for the adjusted foundation or expenditure per TAFPU and the vertical green line shows the overall average pupil needs index. The correlation coefficient is denoted by *r*.

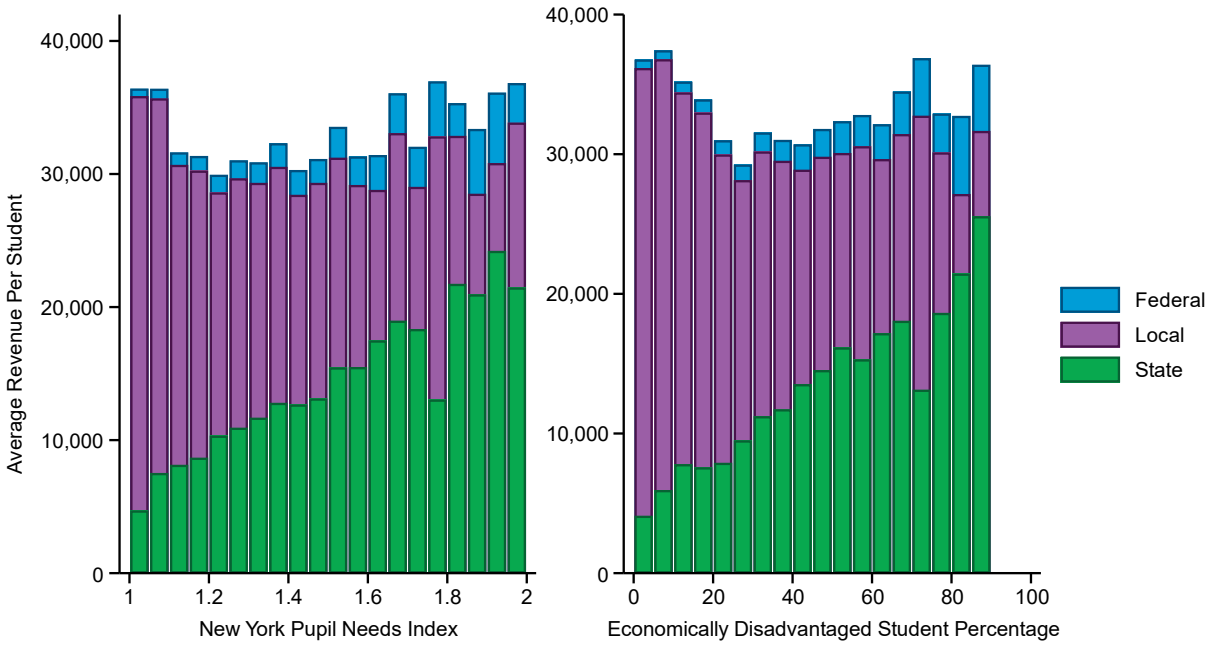
To further investigate why there is a lack of relationship between spending per TAFPU and the PNI, we examined the relationships between revenue per student and the PNI as well as the relationship between revenue per student and the percentage of students who are economically disadvantaged (Exhibit 5). For this analysis, we disaggregated revenues according to source (i.e., state, local, federal) and define revenues on the basis of pupil counts rather than TAFPU.[9] As with spending per TAFPU, there is little overall relationship between total revenue per student and the PNI (left panel of Exhibit 5). There is also little relationship between total revenue per student and percentage of students who are economically disadvantaged (shown in the right panel).

Looking at the disaggregated revenues by revenue stream, there are strong relationships between revenue per student and both the PNI and economic disadvantage. Specifically, as PNI and economic disadvantage increase, the amount of state revenue per student among districts

[9] As noted previously, because TAFPU accounts for summer school enrollment and contains additional weighting for SWDs TAFPU is larger than pupil counts. Therefore, defining spending or revenue on a per TAFPU basis results in smaller per pupil amounts. Defining spending per pupil on a pupil count basis is more representative of how spending per pupil is typically defined.

increases, such that the lowest-need districts receive less than $5,000 per student in state revenue and the highest-need districts receive approximately $20,000 per student in state revenue. The positive relationship between need and state revenue, however, is completely offset by a negative relationship between need and local revenue. The lowest-need districts raise approximately $30,000 in local revenue per student whereas the highest-need districts raise $10,000 or less, on average, in local revenue per student.

Exhibit 5. Average Revenue per Student by Revenue Source Across Districts With Varying Pupil Needs Index Values and Economically Disadvantaged Student Percentages

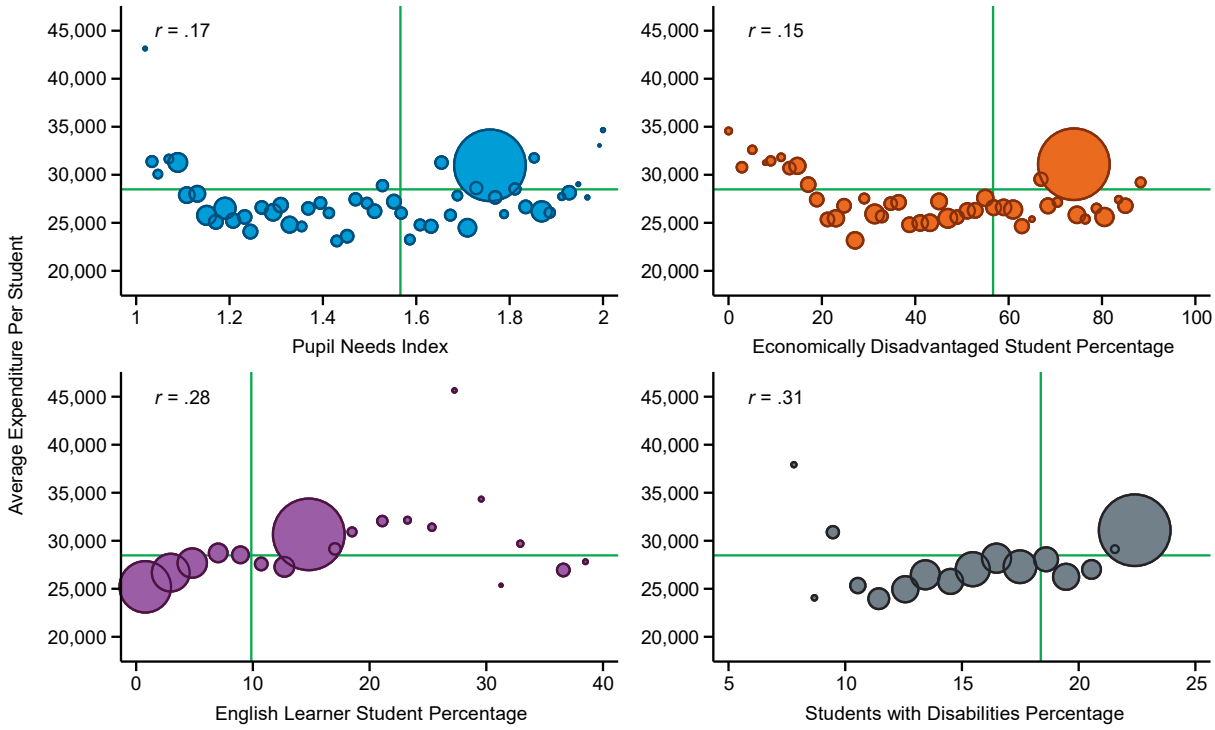


Note. Each column represents the average revenues per student of districts within a given bin. Each bin for the pupil needs index has a width of 0.05 and each bin for the economically disadvantaged student percentage has a bin of 5 percentage points. For example, the leftmost column in the left chart shows the average spending per student in districts where the pupil needs index is between 1.00 and 1.05 and the leftmost column in the right chart shows the average spending per student in districts where the economically disadvantaged student percentage is between 0% and 5%. Averages within bins are weighted by student enrollment.

In Exhibit 6, we further explore the relationship between spending per student and student needs looking across multiple student need measures. In addition to showing spending per student in relation to the PNI and economic disadvantage, we also include the percentage of ELLs and the percentage of SWDs. Again, we see a relatively weak relationship between the PNI and spending per student and the level of economic disadvantage and spending per student. The districts with the lowest needs on both variables are among the highest spending districts, on average. However, discounting the high spending among these districts on these variables, the relationship for the remaining districts is slightly positive. The overall effect is a weak U-

shape distribution with weak positive correlations (r = .17 for the PNI and r = .15 for the level of economic disadvantage). In contrast, the relationships between spending and ELLs and SWDs are positive and slightly stronger.

Exhibit 6. Average Spending per Student in Relation to Student Needs



Note. Each dot in the scatter plots represents the average spending per student of districts within a given bin. Bins are defined using a width of 0.02 for the pupil needs index, 2 percentage points for both the economically disadvantaged student percentage and English language learner student percentage, and 1 percentage point for the students with disabilities percentage. For example, the leftmost dot in the Pupil Needs Index panel shows the average spending per student in districts where the pupil needs index is between 1.00 and 1.02. Averages within bins are weighted by student enrollment. The size of the dots are weighted by the total enrollment of districts in a given bin. The horizontal green lines show the overall average spending per student and the vertical green lines show the overall average for the given student need variable. The correlation coefficient of the underlying district data (non-binned) is denoted by *r*. A small number of districts with more than 40% English language learners and more than 25% students with disabilities are not shown in the panels respective to those student needs.

The relationships observed in prior data visualizations become more apparent in the regression analysis when various cost factors are accounted for simultaneously. In Exhibit 7, we present two regression models with spending per pupil as the outcome variable and two regression models with state and local revenue as the outcome variable. The first model in each case includes the PNI as a student needs variable, excluding the proportions of economically disadvantaged students and ELL. The second model includes the proportions of economically

disadvantaged students and ELLs, but excludes the PNI. The constant term represents the predicted level of spending or revenue when the values of all predictor variables are 0. In other words, it represents the expected level of spending for (a) a large district, (b) in a city locale, (c) in a low-cost area, (d) serving only elementary grade students, and (e) with no students who qualify for any of the student needs variables. The coefficients in the regression model for each predictor variable are multiplicative of the constant term and are relative to 1, meaning that coefficients smaller than 1 represent lower levels of spending or revenue and coefficients larger than 1 represent higher levels of spending or revenue.

Focusing on Spending Model 1, we see that the pupil needs index is not statistically significantly related to spending per student and trends in a negative direction (i.e., the coefficient is less than 1). In contrast, the coefficient for SWDs trends positively (i.e., the coefficient is greater than 1) and is statistically significant. The coefficient of 3 can be loosely interpreted as meaning that spending on SWDs is about three times what is spent on otherwise similar students without disabilities. Spending Model 2 shows that spending in relation to economic disadvantage is negative but spending in relation to ELL percentages is positive. Because economic disadvantage and ELLs are moderately correlated, the opposite relationships for these two variables offset each other for many districts.

The patterns with respect to revenue are similar to those for spending. In Revenue Model 1, the coefficient for the pupil needs index is negative and statistically significant, indicating that higher-need districts based on the PNI receive less state and local revenue than lower-need districts. When representing student needs as both the level of economic disadvantage and proportion of ELLs, the relationship between ELLs and revenue is slightly weaker than with spending. This is also the case for SWDs. This suggests that some portion of the strong progressive relationship between these student needs variables and spending is the result of federal dollars, which we have excluded from the analysis of revenue.

Another interesting finding across all models is with respect to the CWIFT geographic cost index. The CWIFT itself is meant to be a multiplier of cost (in the same way as New York's regional cost index). In other words, there should be no more than a 1:1 relationship between spending and the CWIFT. In the event that spending increased commensurately with the CWIFT, the regression coefficient on the CWIFT would be 2, meaning an increase in the CWIFT of 1 point would result in double the amount of spending. We see, however, that the coefficient for the CWIFT is around 3 across models. This suggests that spending in high-cost areas is disproportionately greater than the increase in spending that the CWIFT suggests is needed to account for differences in cost. Conversely, this means that districts in lower-cost areas of the state are not spending at equivalent levels as those in high-cost areas of the state, after accounting for differences in the costs needed to hire comparably qualified staff.

Exhibit 7. District-Level Regressions Examining Relationships Between Cost Factors and Spending or Revenue

	Spending model 1		Spending model 2		Revenue model 1		Revenue model 2	
	Coef.	*SE*	Coef.	*SE*	Coef.	*SE*	Coef.	*SE*
Student needs								
New York pupil needs index	0.925	(0.047)			0.901 **	(0.044)		
Economic disadvantage proportion			0.774 **	(0.058)			0.790 **	(0.060)
English language learner proportion			1.620 **	(0.263)			1.407 **	(0.233)
Students with disabilities proportion	3.342 **	(1.223)	3.939 **	(0.947)	2.467 **	(0.662)	2.869 **	(0.590)
Proportions of enrollment by grade								
Grades 6 to 8	0.834	(0.349)	1.020	(0.338)	1.765	(0.802)	1.998 *	(0.812)
Grades 9 to 12	1.316 *	(0.191)	1.273 *	(0.162)	1.076	(0.177)	1.050	(0.158)
CWIFT geographic cost index	3.490 **	(0.312)	3.037 **	(0.314)	3.287 **	(0.296)	2.965 **	(0.315)
District size (scale)								
District < 300	1.930 **	(0.131)	1.865 **	(0.105)	2.021 **	(0.135)	1.953 **	(0.120)
District 300 to < 600	1.310 **	(0.039)	1.291 **	(0.031)	1.365 **	(0.047)	1.333 **	(0.040)
District 600 to < 2,000	1.115 **	(0.019)	1.112 **	(0.017)	1.145 **	(0.020)	1.138 **	(0.019)
Locale								
Suburb	0.974	(0.040)	0.947	(0.031)	0.954	(0.035)	0.940.	(0.031)
Town	1.003	(0.036)	0.997	(0.031)	0.984	(0.034)	0.980	(0.031)
Rural	1.002	(0.034)	0.987	(0.031)	0.993	(0.033)	0.981	(0.031)
Constant	16977.6 **	(2640.1)	16342.0 **	(1835.2)	19022.2 **	(3014.5)	17643.4 **	(2139.2)
Number of district *X* year observations	3,351		3,352		3,351		3,352	
Number of unique districts	675		675		675		675	
Pseudo R^2	0.670		0.684		0.600		0.609	

Note. Coef. = coefficient; *SE* = standard error; CWIFT = Comparable Wage Index for Teachers. The coefficients shown are exponentiated Poisson coefficients and are interpreted relative to 1, such that values less than 1 represent lower spending and values greater than 1 represent higher spending. The models also include year fixed effects, which are not shown in the regression results. The constant term reflects spending in the 2022–23 school year. Revenue models account for state and local revenues and exclude federal revenue. The regressions are weighted by district enrollment.

* $p < .01$, ** $p < .05$.

To help interpret the regression results, we translated the results into average predicted dollar amounts of spending across districts, when adjusting for one student need factor at a time (Exhibit 8). For example, if we changed all districts in the state to have a PNI at the 10th percentile (i.e., a PNI of 1.13), districts would be expected to spend $29,470 per student, on average. In contrast, if we changed all districts in the state to have a PNI at the 90th percentile (i.e., a PNI of 1.88), districts would be expected to spend $27,798 per student, on average.

Exhibit 8. Predicted Spending and Revenue per Pupil at the 10th and 90th Percentiles of District-Level Student Need Variables (2022–23 Spending/Revenue Levels)

Student need variable	Prediction percentile	Level of student need variable at prediction percentile	Average predicted spending per pupil	Difference in predicted spending per pupil, dollar and percent	Average predicted revenue per pupil	Difference in predicted revenue per pupil, dollar and percent
New York pupil needs index	10th	1.13%	$29,470	−$1,672 (−5.7%)	$33,008	−$2,498 (−7.6%)
	90th	1.88%	$27,798		$30,510	
Economically disadvantaged students	10th	16.9%	$31,510	−$3,656 (−11.6%)	$34,590	−$3,719 (−10.8%)
	90th	65.2%	$27,855		$30,871	
English language learners	10th	0.0%	$27,112	$1,314 (+4.8%)	$30,448	$1,037 (+3.4%)
	90th	9.8%	$28,425		$31,485	
Students with disabilities	10th	11.3%	$25,874	$3,177 (+12.3%)	$29,294	$2,727 (+9.3%)
	90th	19.7%	$29,050		$32,021	

Note. Spending and revenue predictions for the New York pupil needs index are based on the regression results presented in Spending and Revenue Models 1 of Exhibit 7. Spending and revenue predictions for the remaining student need variables are based on the regression results presented in Spending and Revenue Models 2 of Exhibit 7.

The translation of the regression results into dollar amounts shows that, for the most part, student needs only account for small differences in spending or revenue across districts. Even in the case of SWDs, where the regression coefficients were seemingly large and highly statistically significant, the resulting dollar amounts between districts at opposite ends of the distribution for SWDs are modest (a $3,177 difference in spending per student and a $2,727 difference in state and local revenue between the 90th and 10th percentiles of SWD percentage) because for most districts, the percentage of SWDs falls within a narrow range (the difference between the 10^{th} and 90^{th} percentiles for SWDs across districts is only 8.4 percentage points).

In contrast with student needs, district size and geographic cost differences appear to play a substantial role in the differences in spending and revenue per pupil across districts.[10] For example, there is an expected difference in state and local revenue of more than $20,000 per student between districts with enrollments of fewer than 300 students and districts with enrollments of more than 2,000 students. In addition, there is an expected difference in revenue of about $7,000 per student due to geographic cost differences in the area surrounding Buffalo compared to the area surrounding New York City.

Equity Analyses With School-Level Data

This section examines equity with respect to student needs at the school level. As previously mentioned, representing New York City as a single district, which accounts for a large share of the state's overall enrollment, has the potential to distort the results. Examining the data at the school level allows us to capture the variation in student needs and spending across schools within districts as well as the variation that exists between districts.

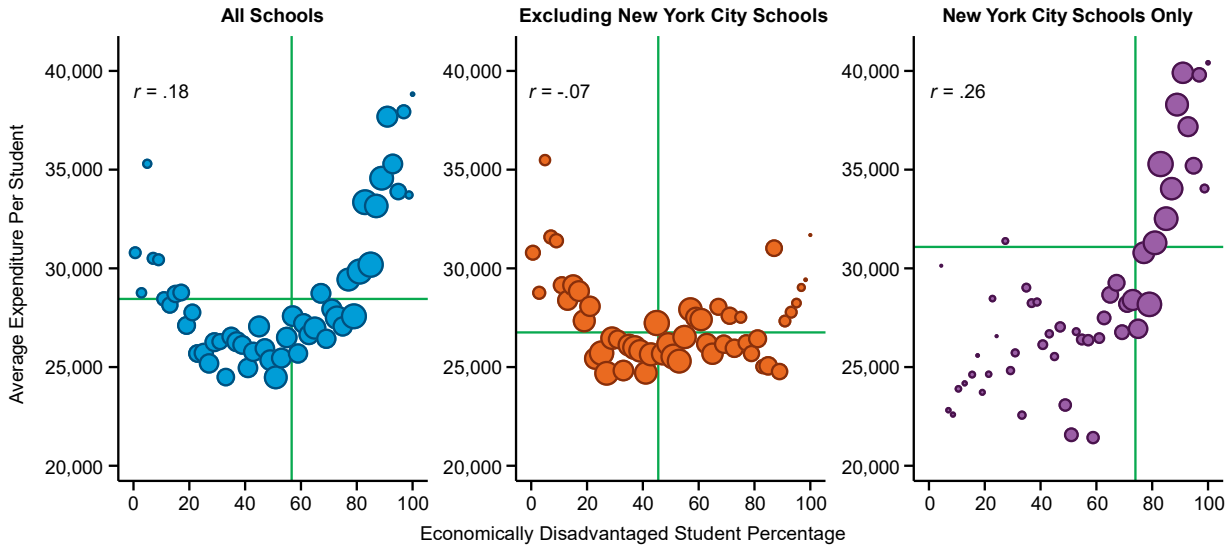
We start by presenting several visual representations of the relationships between student needs and spending across schools. Exhibit 9 shows how spending across schools is related to the share of economically disadvantaged students in schools. Across all schools (the first panel), there is a clear U-shape distribution in the relationship so that the schools with the smallest and greatest percentages of economically disadvantaged students tend to spend more than schools with more moderate levels of economic disadvantage. That said, the right side of the U-shape appears to be a bit higher than the left side and represents more students (represented by the size of the dots). As a result, the overall correlation is small and positive (r = .18).

In the middle panel, we exclude New York City schools. When this is done, the overall relationship becomes slightly negative, as the New York City schools represent a large share of

[10] When we exclude student needs from the revenue regression models, the Pseudo R^2 of the model including only the remaining contextual cost factors is 0.583. This suggests that the inclusion of the student needs variables explains less than 3 percentage points additional variation to the model containing only contextual cost factors.

the higher spending schools with high rates of economic disadvantage. This is confirmed in the right panel that shows only New York City schools. Among New York City schools, those with the highest rates of economic disadvantage are also the highest spending, on average. The positive correlation and the relatively clear upward trending relationship are evidence that New York City distributes resources across its schools in a progressive fashion with respect to economic disadvantage.

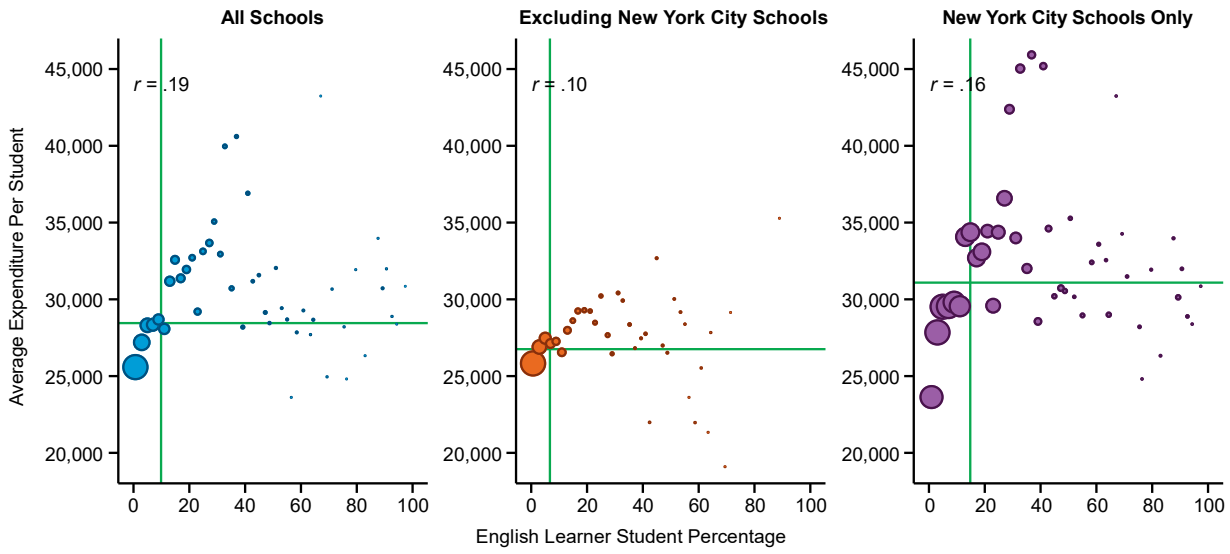
Exhibit 9. School-Level Spending per Student by Economically Disadvantaged Student Percentage



Notes: Each dot in the scatter plots represents the average spending per student of schools within a given economically disadvantaged student percentage bin. Each bin has a width of 2 percentage points. For example, the leftmost dot in each panel shows the average spending per student in schools where the economically disadvantaged student percentage is between 0% and 2%. Averages within bins are weighted by student enrollment. The sizes of dots are weighted by the total enrollment of schools in a given bin. The horizontal green lines show the overall average spending per student and the vertical green lines show the overall average percentage of economically disadvantaged students. The correlation coefficient of the underlying school data (non-binned) is denoted by *r*.

Exhibit 10 shows the relationship between spending across schools with respect to the percentage of ELL students. The strongest correlation between spending and ELL percentage is among all schools (the left panel). However, in all three panels, the relationship between the percentage of ELLs and spending while positive is rather weak. Also apparent is that the overall percentage of ELLs in the state is fairly modest—around 10%—and the modal percentage of ELLs is between 0% and 2%, as shown by size of the dot farthest left in the *All Schools* panel. That said, there are also schools that serve very sizable shares of ELLs.

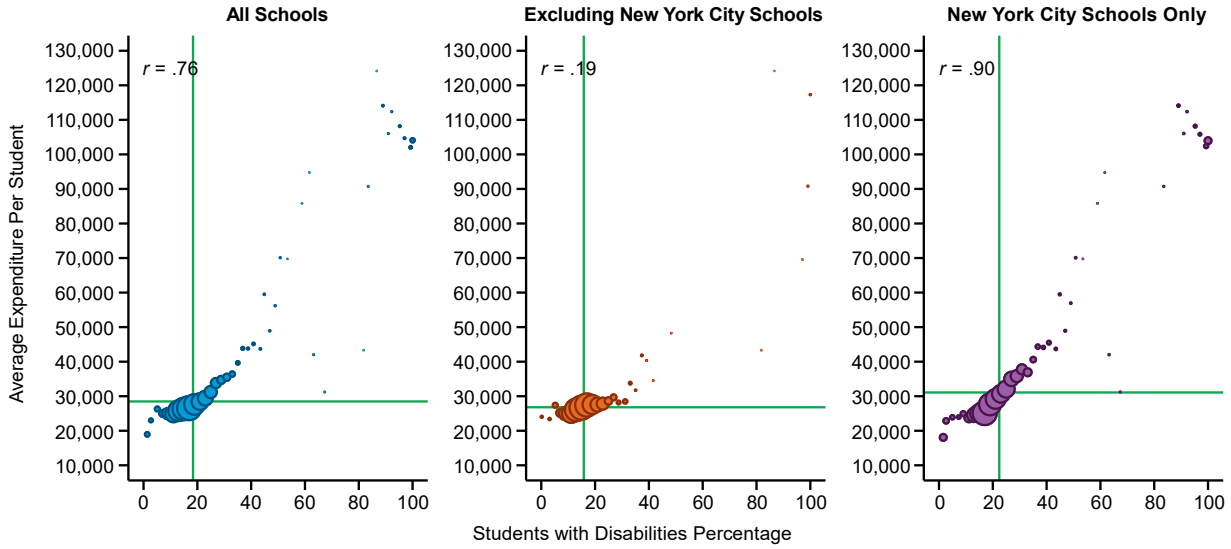
Exhibit 10. School-Level Spending per Student by English Language Learner Student Percentage



Note. Each dot in the scatter plots represents the average spending per student of schools within a given English language learner (ELL) student percentage bin. Each bin has a width of 2 percentage points. For example, the leftmost dot in each panel shows the average spending per student in schools where the ELL percentage is between 0% and 2%. Averages within bins are weighted by student enrollment. The sizes of dots are weighted by the total enrollment of schools in a given bin. The horizontal green lines show the overall average spending per student and the vertical green lines show the overall percentage of ELLs. The correlation coefficient of the underlying school data (non-binned) is denoted by *r*.

In this last series of scatter plots, we show the spending across schools with respect to SWD percentages (Exhibit 11). Although we see a fairly strong correlation (r = .76) and a clearly positive relationship between SWD percentages and spending across all schools, when we separate New York City schools from the rest of the state, we find that this relationship is largely driven by a strong correlation between spending and SWD percentage within New York City (r = .90). The correlation between SWD percentages and spending among the remaining schools in the state is only .19.

Exhibit 11. School-Level Spending per Student by Students With Disabilities Percentage



Note. Each dot in the scatter plots represents the average spending per student of schools within a given students with disabilities percentage bin. Each bin has a width of 2 percentage points. For example, the leftmost dot in each panel shows the average spending per student in schools where the students with disabilities percentage is between 0% and 2%. Averages within bins are weighted by student enrollment. The sizes of dots are weighted by the total enrollment of schools in a given bin. The horizontal green lines show the overall average spending per student and the vertical green lines show the overall average percentage of students with disabilities. The correlation coefficient of the underlying school data (non-binned) is denoted by *r*.

When examining equity through a school-level regression model (Exhibit 12), we see similar trends to those estimated at the district level (see Exhibit 7). After controlling for other student needs and contextual cost factors, we see that schools with higher proportions of economically disadvantaged students spend less, on average, than those with lower proportions of economically disadvantaged students. In contrast, schools with higher proportions of ELLs and SWDs spend more, on average, than schools with lower proportions of those students. In Model 2, we also include the proportion of students who are homeless as a student need variable. Schools with more homeless students, as a proportion, tend to have higher spending when accounting for other cost factors.

Exhibit 12. School-Level Regressions Examining Relationships Between Cost Factors and Spending

	Model 1		Model 2	
	Coef.	*SE*	Coef.	*SE*
Student needs				
Economic disadvantage proportion	0.862 *	(0.014)	0.832 *	(0.014)
English language learner proportion	1.449 *	(0.036)	1.378 *	(0.034)
Students with disabilities proportion	5.918 *	(0.160)	5.977 *	(0.167)
Homeless proportion			1.647 *	(0.093)
Proportions of enrollment by grade				
Grades 6 to 8	1.028 *	(0.008)	1.022 *	(0.008)
Grades 9 to 12	1.022 *	(0.007)	1.017 *	(0.007)
CWIFT geographic cost index	2.929 *	(0.102)	2.784 *	(0.099)
School and district size (scale)				
School < 200	1.341 *	(0.017)	1.312 *	(0.016)
School 200 to < 400	1.136 *	(0.007)	1.120 *	(0.007)
School 400 to < 600	1.047 *	(0.006)	1.039 *	(0.006)
District < 300	1.465 *	(0.047)	1.485 *	(0.048)
District 300 to < 600	1.160 *	(0.024)	1.168 *	(0.024)
District 600 to < 2000	1.067 *	(0.012)	1.071 *	(0.012)
Locale				
Suburb	1.082 *	(0.010)	1.096 *	(0.010)
Town	1.097 *	(0.015)	1.106 *	(0.015)
Rural	1.090 *	(0.014)	1.102 *	(0.014)
Charter indicator	1.120 *	(0.013)	1.119 *	(0.013)
Constant	13608.5 *	(237.2)	13820.7 *	(241.5)
Number of school *X* year observations	23,456		23,456	
Number of unique schools	4,801		4,801	
Pseudo R^2	0.748		0.752	

Note. Coef. = coefficient; *SE* = standard error; CWIFT = Comparable Wage Index for Teachers. The coefficients shown are exponentiated Poisson coefficients and are interpreted relative to 1, such that values less than 1 represent lower spending and values greater than 1 represent higher spending. The models also include year fixed effects, which are not shown in the regression results. The constant term reflects spending in the 2022–23 school year.

* $p < .05$.

As with the district-level regression results, we translated the school-level regression results into average predicted dollar amounts of spending across districts when adjusting one student

need factor at a time (Exhibit 13). In doing so, we see that if all schools were at the 90th percentile of economic disadvantage (that is, having almost 90% of students being economically disadvantaged), they would be expected to spend $3,645 (12.1%) less, on average, than if all schools were at the 10th percentile of economic disadvantage (that is, with 19.9% of students being economically disadvantaged), which is a comparable difference to the district-level regression analysis. While the other three student needs variables result in higher spending as the proportion of students in those categories increase, the largest difference in spending is for SWDs, where schools at the 90th percentile of SWD percentage (e.g., 28.3% of students having disabilities) are expected to spend almost $9,000 more per student than schools at the 10th percentage of SWD percentage (e.g., 10.8% of students with disabilities).

Exhibit 13. Predicted Spending per Pupil at the 10th and 90th Percentiles of School-Level Student Need Variables (2022–23 Spending Levels)

Student need variable	Prediction percentile	Level of student need variable at prediction percentile	Average predicted spending per pupil	Difference in predicted spending per pupil, dollars and percent
Economically disadvantaged students	10th	19.9%	$30,183	−$3,645 (−12.1%)
	90th	89.8%	$26,538	
English language learners	10th	0.0%	$27,221	$2,286 (+8.4%)
	90th	25.2%	$29,507	
Students with disabilities	10th	10.8%	$24,144	$8,915 (+36.9%)
	90th	28.3%	$33,059	
Homeless	10th	0.0%	$27,492	$2,011 (+7.3%)
	90th	14.2%	$29,503	

Note. Spending predictions are based on the regression results presented in Model 2 of Exhibit 12.

In contrast to the district-level models, the student need variables do explain a sizable share of the variation in spending across schools.[11] This is in part due to more variation in student needs across schools than across districts. For each of the student need variables, the 10th to 90th percentile range is wider at the school level than at the district level. The stronger explanatory power of student needs in the school-level model is also likely the reflection of more intentional distribution of resources with respect to student needs within districts compared with between districts. This was evident in the previously presented scatter plots (Exhibits 9–11) in which the

[11] A regression model excluding the student need variables results in a pseudo R^2 of only 0.272 compared with a pseudo R^2 of 0.752 when all student needs variables are included.

correlations between student needs (particularly SWDs) and school spending were quite strong when restricted to New York City schools.

Conclusions and Discussion

New York's foundation aid school funding formula is designed to promote equity by providing more funding to high-need districts serving larger proportions of students who are economically disadvantaged, ELLs, and SWDs. The main driver of the intended equity in the formula is the PNI, which defines the level of students needs of districts according to the level of economic disadvantage and ELLs as well as district sparsity—although the main driver of the PNI is economic disadvantage. Mechanically, the formula works because it mathematically defines higher target funding levels (i.e., AFAs) for districts with higher PNIs. In practice, however, districts with a higher PNI and those with higher levels of economic disadvantage do not achieve higher levels of spending compared with those with fewer economically disadvantaged students as a share of their enrollment. To the contrary, districts with the highest levels of economic disadvantage spend less and have lower state and local revenues, on average, than otherwise similar districts with the lowest levels of economic disadvantage.

The lack of a progressive relationship with respect to economic disadvantage is largely the result of a highly regressive distribution of local revenue that more than offsets the progressive distribution of state revenue. In other words, the spending preferences for districts, and particularly low-need districts, are much higher than what is suggested by the AFA. Low-need districts, which are also presumably high-wealth districts, have the capacity to raise enough revenue locally to counteract the equity intent of the foundation formula. We conduct further investigation into how New York's foundation aid school funding formula accounts for district capacity to raise local revenue in a subsequent brief.

Although we find that the student need variables account for little of the variation in spending across districts, student needs account for a sizable portion of the variation in spending across schools. This appears to be the result of (a) much more variation in the prevalence of student needs across schools than across districts, and (b) a relatively stronger patterns of distribution of resources according to student needs within districts (and within New York City Public Schools in particular) than between districts.

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Appendix A. Additional Exhibits

Exhibit A1. District-Level Variables

	All years		2022–23 Only	
Variable	**Mean**	***SD***	**Mean**	***SD***
Spending per pupil	$25,954	$5,468	$28,479	$6,297
Spending per Total Aidable Foundation Pupil Units (TAFPU)	$20,644	$3,534	$22,458	$3,250
Adjusted foundation amount per TAFPU	$14,041	$3,079	$14,843	$3,224
New York pupil needs index	1.57	0.26	1.57	0.26
Economic disadvantage %	56.0%	22.6%	56.7%	22.1%
English language learners %	9.4%	7.4%	9.9%	7.9%
Students with disabilities %	17.9%	4.0%	18.3%	4.0%
Homeless %	4.0%	3.7%	4.6%	3.8%
Migrant %	0.1%	0.4%	0.1%	0.4%
Foster %	0.3%	0.3%	0.3%	0.3%
Middle school enrollment %	22.7%	1.5%	22.5%	1.5%
High school enrollment %	30.6%	4.9%	31.0%	4.9%
District enrollment < 300	0.4%		0.4%	
District enrollment 300 to < 600	1.5%		1.6%	
District enrollment 600 to < 2000	13.4%		13.9%	
District enrollment > = 2000	84.7%		84.1%	
Comparable Wage Index for Teachers (NY centered)	0.29	0.11	0.28	0.10
Locale: City	47.2%		46.0%	
Locale: Suburb	35.9%		37.1%	
Locale: Town	6.2%		6.4%	
Locale: Rural	10.7%		10.6%	
Number of districts	**3,352**		**669**	

Note. Averages are weighted by student enrollment. *SD*s of binary variables are not shown. The statistics in the All years column are based on data from 2018–19 through 2022–23.

Exhibit A2. School-Level Variables

	All years		2022–23 Only	
Variable	**Mean**	***SD***	**Mean**	***SD***
Spending per pupil	$25,954	$10,987	$28,452	$10,671
Economic disadvantage %	56.0%	26.1%	56.7%	25.5%
English language learners %	9.4%	11.9%	9.9%	12.4%
Students with disabilities %	17.9%	10.1%	18.3%	10.2%
Homeless %	4.0%	5.6%	4.6%	5.8%
Migrant %	0.1%	0.4%	0.1%	0.4%
Foster %	0.3%	0.5%	0.3%	0.5%
Middle school enrollment %	22.7%	35.3%	22.5%	35.1%
High school enrollment %	30.6%	43.5%	31.1%	43.6%
School enrollment	842	717	819	704
School enrollment < 200	1.9%		2.4%	
School enrollment 200 to < 400	19.5%		20.7%	
School enrollment 400 to < 600	27.3%		27.5%	
School enrollment ≥ 600	51.3%		49.4%	
District enrollment < 300	0.4%		0.4%	
District enrollment 300 to < 600	1.5%		1.6%	
District enrollment 600 to < 2000	13.4%		13.9%	
District enrollment ≥ 2000	84.7%		84.1%	
Comparable Wage Index for Teachers (NY centered)	0.29	0.11	0.28	0.10
Locale: City	47.2%		46.0%	
Locale: Suburb	35.9%		37.1%	
Locale: Town	6.2%		6.4%	
Locale: Rural	10.7%		10.6%	
Charter	6.4%		7.0%	
Number of schools	23,456		4,683	

Note. Averages are weighted by student enrollment. *SD*s of binary variables are not shown. The statistics in the All years column are based on data from 2018–19 through 2022–23.

Exhibit A3. District-Level Correlations Between Student Need Variables

	Pupil needs index (PNI)	Economic disadvantage %	English language learners (ELLs) %	Students with disabilities (SWDs) %	Homeless %
PNI	1.00				
Economic disadvantage	.92	1.00			
ELLs	.60	.69	1.00		
SWDs	.61	.62	.41	1.00	
Homeless	.67	.73	.63	.75	1.00

Exhibit A4. School-Level Correlations Between Student Need Variables

	Economic disadvantage %	English language learners (ELLs) %	Students with disabilities (SWDs) %	Homeless %
Economic disadvantage	1.00			
ELLs	.52	1.00		
SWD	.32	.14	1.00	
Homeless	.61	.49	.29	1.00

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