



TECHNICAL APPENDIX

Updated 10/1/2020

[Making the Grade 2019: How Fair is School Funding in Your State?](#) analyzes the condition of school finance systems using three indicators of fair school funding: funding level, funding distribution and funding effort. States are both ranked and graded on these indicators, providing important information on how states perform *relative to other states*. The report does not include any specific benchmarks in terms of the level of funding, how that funding is distributed, or how much effort states should be making to fund their schools. The answers to these questions vary according to each state's unique circumstances.

- Funding levels must be sufficient to meet each state's curricular standards.
- Funding distribution should always be progressive, but the degree of progressivity is also unique to the conditions in each state.
- The appropriate funding effort is dependent on the level of funding required and the size of the state's economy.

The fair funding indicators are interrelated and complex. Each of the indicators is important on its own, but any analysis must also consider the interplay between measures. The sections below describe both the technical details of how indicators were constructed and how they should be interpreted.

General Notes

All data are from the 2006-17 school year, the most recent data available. Rankings in this report, therefore, should be viewed in light of school funding activity that may have occurred within the last three annual budget cycles and therefore not reflected in this report.

The District of Columbia, Hawaii, as well as other territories in the U.S. are excluded from our rankings because those jurisdictions fund all of their schools as a single district or governance unit, which is not compatible with the method we adopted to enable us to compare the other 49 states.

Poverty is measured using the U.S. Census Bureau's [Small Area Income and Poverty Estimates](#), calculated at the school district level and restricted to school-aged children (age 5 – 17). This a more conservative measure of poverty than free (130% Census poverty) or reduced lunch (185%) eligibility under the National School Lunch Program (NSLB). Although the NSLB is the more common metric of school poverty, the measure is becoming increasingly inconsistent as many districts move to community eligibility and are therefore not required to collect family income information for all students.

Grades are assigned using the typical “curve.” A standardized score is calculated as the state’s difference from the mean, expressed in standard deviations. Grades are as follows: A = 2/3 standard deviation above the mean ($z > 0.67$); B = between 1/3 and 2/3 standard deviations above the mean ($.33 < z < .67$); C = between 1/3 standard deviation below and 1/3 standard deviation above the mean ($-.33 < z < .33$); D = between 1/3 and 2/3 standard deviations below the mean ($-.33 > z > -.67$); F = 2/3 standard deviation below the mean ($z < -.67$).

Funding Level

Funding level is calculated from the U.S. Census Bureau’s [Annual Survey of School System Finances](#) (F33). We include total state (TSTREV) and local (TLOCREV) revenue. Federal revenue is not included, except for Impact Aid (B10) and Native America education revenue (B12), as they are intended to replace state and local funds. We also exclude revenue for capital outlay and debt service programs (C11). These revenues tend to be uneven from year to year; one-time or short-term investments may obscure more prevalent funding patterns. Revenues are then divided by student enrollment (V33) to calculate per pupil funding levels.

These funding levels are then adjusted by National Center for Education Statistics’ (NCES) [Comparable Wage Index for Teachers](#). This index measures regional variations in wages and salaries of non-teachers to account for geographic differences in the costs of running a school district. Adjusting revenues by this index allows us to compare revenue levels among states while accounting for the fact that in some states it costs a lot more, and other states a lot less, to staff their schools.

Interpretation

States are ranked from highest funding level to lowest, with grades assigned using the grading methodology discussed above. Again, because there is no national benchmark defining an adequate level of school funding, the findings are simply comparative. They should be used to compare the relative funding levels of states and not to assess whether any state is meeting its obligation to adequately fund its schools.

Funding Distribution

Describing the pattern of funding distribution relative to student poverty requires advanced statistical methods. We utilize a modified version of the regression-based method developed by Bruce Baker and published in *Is School Funding Fair? A National Report Card (eds 1-7)*.¹ The analysis essentially asks, once we account for differences in costs related to district size and geography, do states provide more or less funding to districts as the poverty rate increases?

A fixed effects linear regression model is used to identify the state-specific relationships between poverty and funding levels.² The dependent variable is the natural log of district-level state and local

¹ See Baker, B.D., Danielle Farrie, David Sciarra. [Is School Funding Fair? A National Report Card, 7th Ed.](#), EDUCATION LAW CENTER/RUTGERS GRADUATE SCHOOL OF EDUCATION (Feb. 2018).

² In 2015, Vermont began reporting some of its data to the federal government at the supervisory union level instead of the individual school district level. As a result, the SAIPE data reports include 276 districts in 2014, but only 60 districts from 2015 on. The F33 continues to report financial data using the smaller district units. Some school districts split across the supervisory unions, making it difficult to aggregate the district units up to the supervisory unions. NCES provided us with recoded F33 files that allocate the enrollment and financial data from

revenue, as described in the funding level section above. The model controls for two main education cost-drivers: district size and regional wage variation. District size is a categorical variable measured using the enrollment variable (V33) from the F33 and included as categorical variable using deciles. Wage variation is measured using the NCES wage index. The model is weighted by district enrollment so that small districts do not unduly influence the findings. A very conservative approach was taken to exclude outlier districts. Districts with per pupil revenues over \$100,000 or enrollments less than 10 were excluded from the models. Estimates are produced setting the enrollment category to districts with between 750 and 1000 students.

The funding distribution measure is calculated as the difference in predicted per pupil funding levels in low poverty (5%) and high poverty (30%) districts.

Interpretation

States are ranked and graded by the predicted per pupil funding gap between high and low poverty districts. States that provide higher per pupil funding levels to high poverty districts are deemed progressive, states that provide less to high poverty districts are regressive, and states where there is no meaningful difference are “flat”. A state may be classified as flat because districts are all funded at relatively similar levels or because there is fluctuation in funding levels, but that fluctuation is not related to student poverty.

Because the funding distribution measure is attempting to create a simple summary from the complex interactions of many factors, the findings should be interpreted with caution. The complicated relationship between funding and poverty is difficult to distill. There will inevitably be districts within each state that don’t match the overall pattern presented. The funding distribution measure is intended to provide a high-level view of the relationship between funding and poverty and cannot substitute for a deeper analysis of the specific state conditions that influence the distribution of funding. View the [report online](#) for interactive tools that explore the relationship between the funding distribution measure and the raw district-level data for each state.

Update (10/1/2020)

After this report was published, it came to our attention that the Census membership definition leads to incorrect per pupil revenue figures for some districts in some states. The F33 Survey’s membership count does not include students who are residents of a district but attend independent charter schools. In many states, these districts are financially responsible for those charter students and make payments to the charter schools their resident students attend. Because the F33 data include the revenues that will ultimately be passed to charter schools, but exclude the charter students in the membership count, per pupil revenues in districts with significant charter populations are incorrectly inflated. For example, the F33 reports Philadelphia’s membership as approximately 134,000, excluding more than 70,000 students who are funded through the district but attend charter schools.

the district level to the appropriate supervisory union and included the correct wage index data. We are grateful to Stephen Cornman and William Sonnenberg for their assistance.

Data are not available to adjust the membership count in all states, but the F33 does include an expenditure category for payments to charter schools. By subtracting this expenditure from state and local revenue, we can calculate more accurate district revenues per pupil. In Philadelphia this results in a per pupil revenue of \$15,714, instead of the previously reported \$21,534.

This correction to per pupil revenues has a minimal effect on the rankings of our funding level measure but does have a significant effect on the distribution measure for six states: Massachusetts, New Jersey, New York, Ohio, Oregon, and Pennsylvania. These states have reasonably large charter populations that are concentrated in high poverty districts. The inflated per pupil revenues in mostly high poverty districts made these states look more progressive than they actually are. The table below shows the change in the funding distribution measure for these states.

State	Reported Ratio	Revised Ratio	Reported Rank	Revised Rank	Reported Grade	Revised Grade
Massachusetts	1.10	1.01	10	18	B	C
New Jersey	1.06	1.00	14	23	C	C
New York	1.08	1.02	13	17	B	C
Ohio	1.18	1.06	7	11	A	C
Oregon	1.03	0.97	20	31	C	C
Pennsylvania	1.02	0.87	22	43	C	F

Future editions of the Making the Grade report will use this revised methodology.

Funding Effort

Funding effort is measured as total state (TSTREV) and local (TLOCREV) revenue from the F33 divided by the state's gross domestic product (GDP). State GDP is measured from the [Bureau of Economic Analysis](#) (table SAGDP9).

Interpretation

GDP is the value of all goods and services produced by each state's economy and represents the state's economic capacity to raise funds for schools. While states are ranked and graded by the percentage of GDP allocated to K-12 education, those rankings must be placed in the context of the fairness of the state's funding system and its comparative wealth. For example, a low-wealth state could exert high effort, but still produce low funding levels. Conversely, a high-wealth state could exert low effort and still generate higher than average funding levels. A low effort grade combined with either low funding levels or poor funding distribution indicates that the state could do more to improve their finance system. Likewise, a high effort grade combined with low funding levels or poor funding distribution indicates that the state may not have the economic capacity to improve its finance system without additional help from federal resources.