Systemic Racial Bias in Latest Pennsylvania School Funding

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In June, 2016, Pennsylvania joined 47 other states in enacting a formula for distributing state education funding among its school districts. The formula itself, recommended unanimously by a bipartisan commission in June, 2015, is widely viewed as fair and comprehensive. However, the law implementing this formula, rather than ushering in an era of fairly distributed school funding, ***guarantees that school districts will continue to have huge inequities in their state funding levels, including systematic racial bias***. The extent to which districts get more or less than their fair share of state funding correlates strongly with the percentage of their students who are white. On average, ***the whitest districts get thousands of dollars more than their fair share for each student, while the least white districts get thousands less*** for each student than their fair share, according to the formula.

The formula gives, for the first time in decades, a broadly accepted and unbiased prescription for how to distribute funds to schools in a fair way, taking into account numerous student-based factors for each district, such as the number of students, English language learners, and students living in poverty, as well as district-based factors such as local taxing capacity and population sparsity. The bipartisan commission that authored the formula did not prescribe how it should be implemented into law, avoiding the politically charged question of what portion of overall education funding should be distributed through the formula.[1] The recently passed legislation mandates that the first $5.5B in Basic Education Funding (BEF) in all future years be distributed in exactly the same way it was in the 2014-15 school year. Previous research revealed systemic racial disparities in that year's funding. Only any incremental funding above that amount in future years is to be distributed according to the formula, thereby locking in racial disparities in perpetuity.

Inequity and Race

The following analysis[2] uses the formula itself to determine each district's "fair share" of the 2016-17 entire Basic Education Funding of $5.9B.[3] The graph in Figure 1 shows, in order from highest to lowest, how per-student state funding would be distributed for all 500 districts if each district received all of its state funding according to the formula. [4]

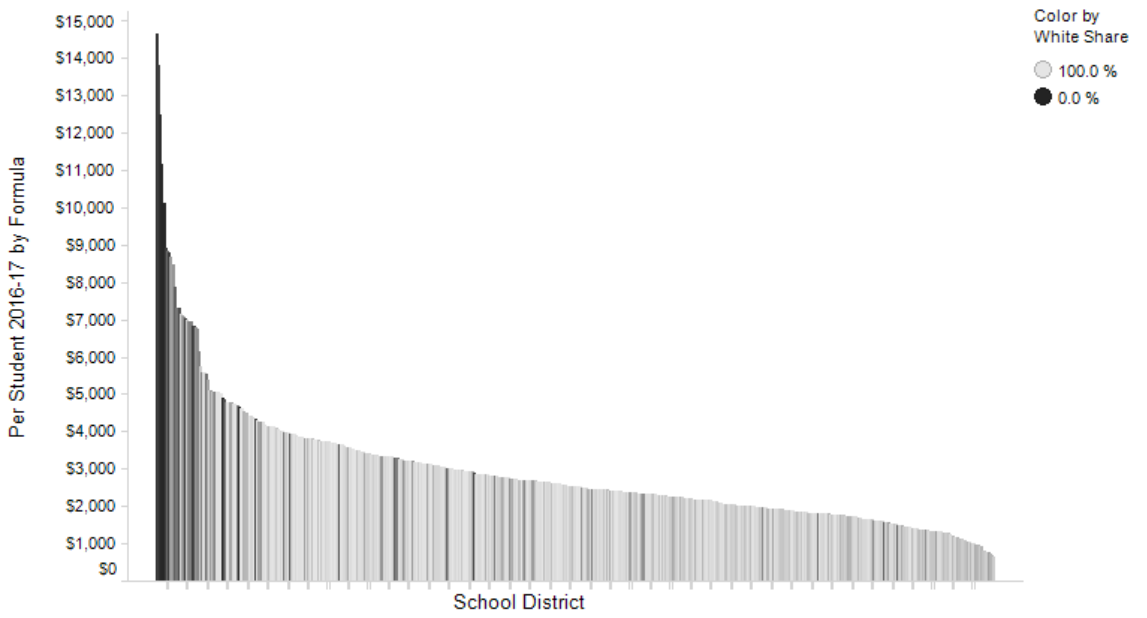

Figure 1. The state funding each district would receive per-student if the entire 2016-17 BEF budget were allocated using the formula. The bars are ranked by funding amount, and shaded according to the percentage of white students in each district.

The bar representing each district is shaded according to the percentage of white students enrolled in the district. We can observe that the districts with the highest formula-derived per-student funding tend to be less-white districts, reflecting the formula's calculation of higher costs for educating students in those districts, which tend to have higher poverty rates.

As a comparison, Figure 2 shows ***actual*** 2016-17 per student state funding for each district, in order from highest to lowest. The districts appear in a different order than Figure 1, and the shading shows no obvious trend by race[5].

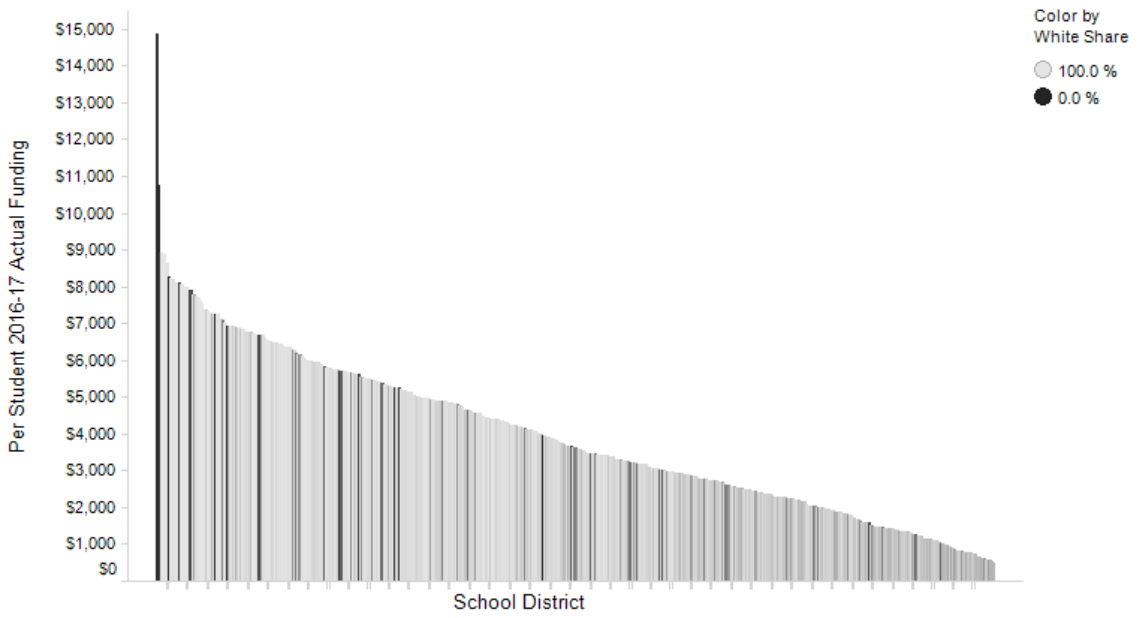

Figure 2. Actual 2016-17 per-student state funding for each district. The bars are ranked by funding amount, and shaded according to the percentage of white students in each district.

Next we compare fair share funding for each district (calculated by the formula) with its actual funding to derive an inequity measure, which indicates the extent to which each district is getting more or less than its fair share. For example, the Upper Darby school district will receive $3,013 per student in 2016-17, and it would receive $3,935 per student if all funding were distributed using the formula, so it received $922 per student less than its fair share (i. e., its per-student inequity is -$922). Figure 3 plots the inequity of each district, in order from most over their fair share to most under fair share. Some districts received as much as $7,200 more than their fair share per student, while others received as much as $5,700 less than their fair share per student.

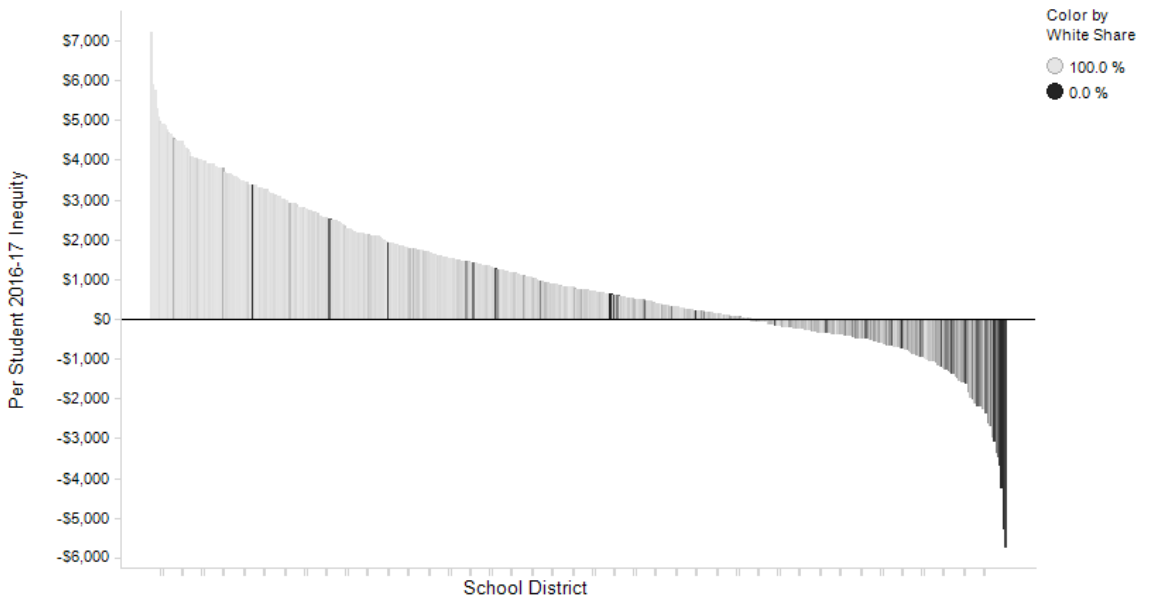

Figure 3. Per-student funding inequity for each district, calculated as the difference between actual 2016-17 funding and purely formula-based funding. Positive inequity values indicate districts receiving more than the formula dictates, negative values are districts receiving less than their formula-based share. The bars are ranked by inequity, and shaded according to the percentage of white students in each district.

From the shading in the graph, it is apparent that whiter districts tend to get more than their fair share, and less-white districts less. But this graph does not reveal the full extent of the trend, in part because districts vary widely in size, with some serving tens of thousands of students and many serving fewer than 2,000 students. To get a more quantitative measure of the correlation of race with funding inequity, we split the districts into 5 groups, or quintiles, based on ranking districts by the proportion of their students who are white. The quintiles are student weighted, meaning that each quintile contains approximately the same number of students. We then compute the average funding inequity in each race quintile.

The graph below depicts the steady and robust relationship between funding inequity and the racial composition of the districts. The whitest districts get the biggest windfall of funding above their fair share, districts that have an average proportion of white students get approximately their fair share of funding, and the least white districts are shortchanged the most relative to their fair share. ***The 20% of students in the whitest districts receive $1,934 per student more than their fair share of funding, and the 20% of students in the least white districts receive $1,912 per student less than their fair share.***

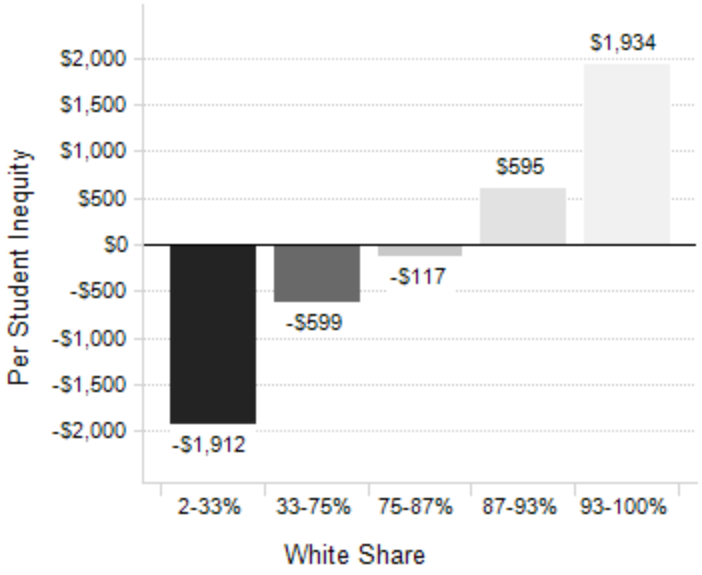

Figure 4. Funding inequity by race. Bars show the average per-student difference between actual and formula-based funding for 2016-17 state funding. Negative numbers indicate actual funding less than formula-based funding. Districts are sorted and grouped by their percentage of white students, with each bar representing around 340,000 students, 20% of the entire public school population. [6]

To give an overview of how individual districts fare, Figure 5 plots the actual vs. fair funding for each district, with each point shaded according to the racial makeup and sized according to the number of students in the district. The dashed line indicates actual funding equal to formula funding; it is where every district would fall if all funding were distributed fairly according to the formula. Districts below the line are receiving less than their fair share, and districts above the line more. Note the preponderance of less-white and larger districts below the line.

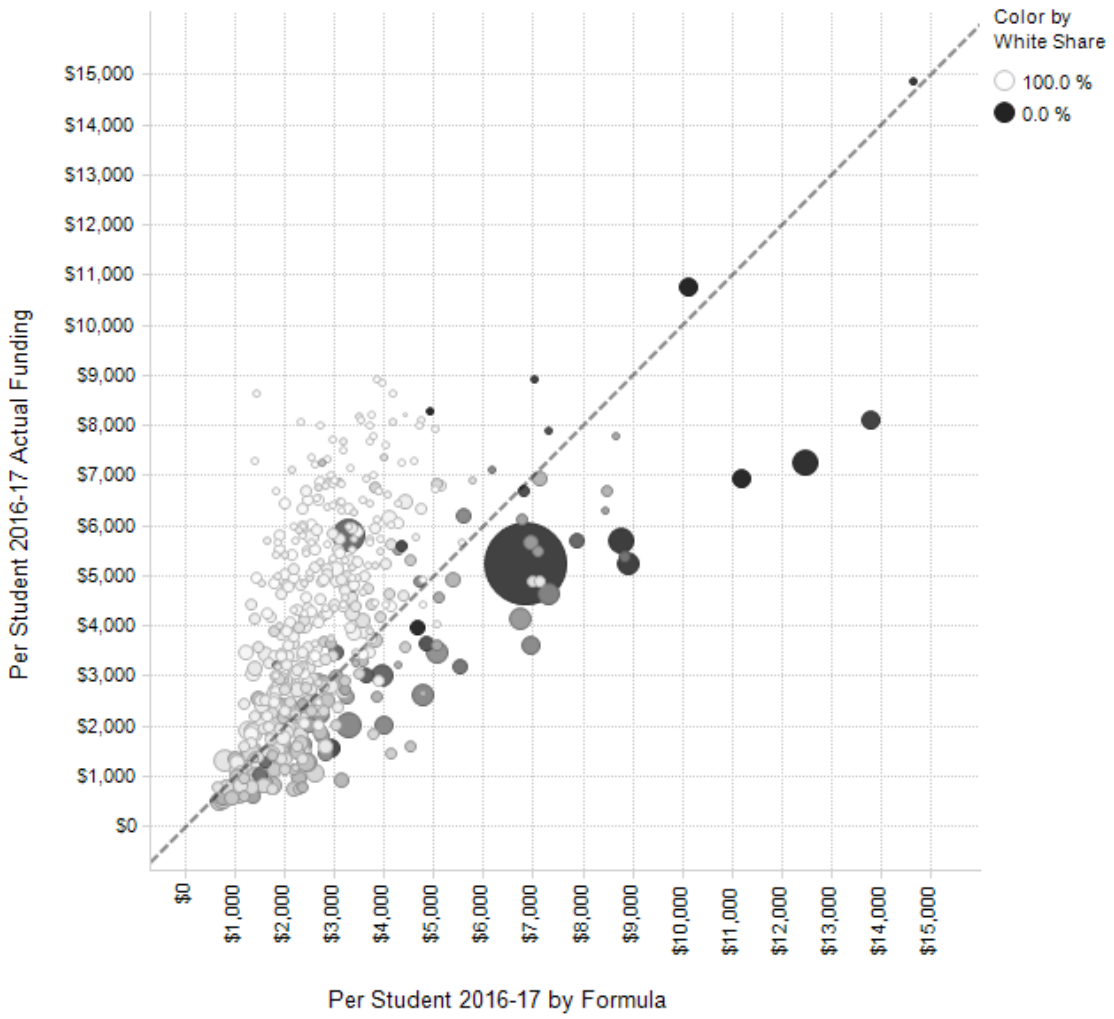

Figure 5. Each district's formula-based (X axis) vs. actual (Y axis) funding. The dashed line represents actual funding equal to formula-based funding. Each district's dot is sized according to its total number of students, and shaded according to the percentage of its students who are white.

Inequity and Poverty

There is also a relationship between inequity and poverty, but it is not as simple or robust as the relationship with race. We perform a similar analysis as above, but looking at how funding varies with poverty instead of race. Figure 5 shows the funding inequity in each district, as in Figure 3, but this time shaded by the percentage of students from households below the poverty line.

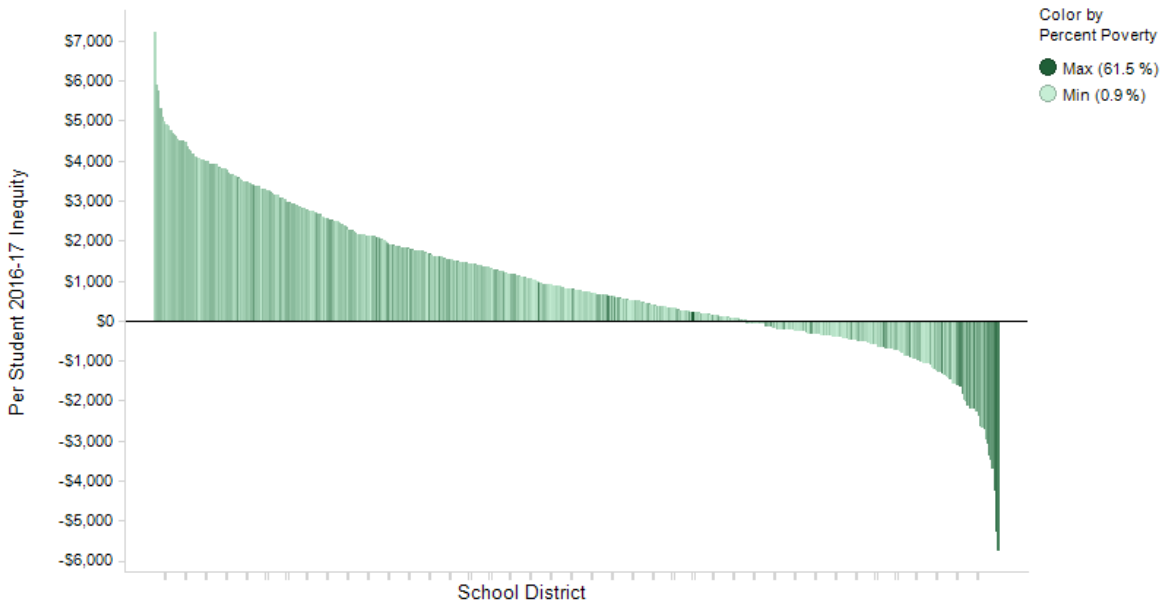

Figure 6 Per-student funding inequity as in Figure 3, but shaded according to the percentage of students in poverty rather than the percentage of white students.

While it seems the very poorest districts are receiving far less than their fair share of funding, it's not obvious how inequity correlates with poverty. As above, we can examine this more quantitatively, while also taking into account district size, by ranking districts by poverty and grouping districts into student-weighted quintiles, similar to the race-based quintiles above. Figure 7 confirms that the poorest districts are getting far less than their fair share of state funding, but among other districts, the wealthiest are getting close to their fair share, and districts serving students in the middle of the poverty spectrum are getting more than their fair share.

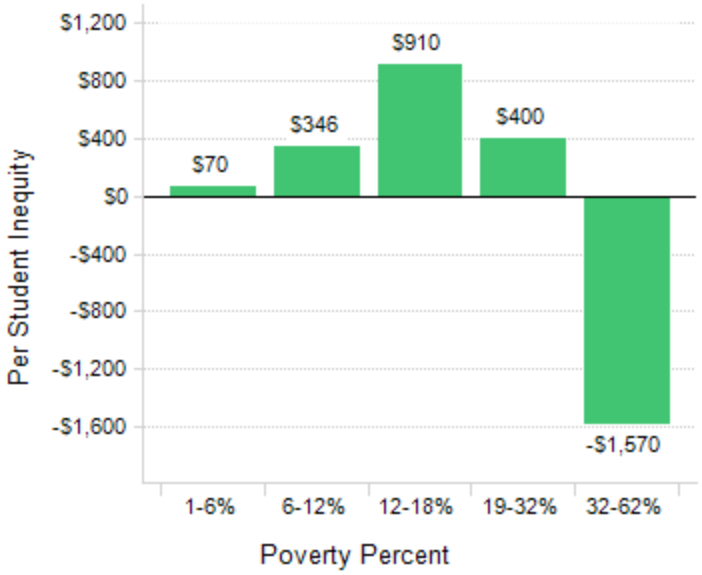

Figure 7 Bars show the average per-student difference between actual and formula-based funding for 2016-17 state funding. Negative numbers indicate actual funding less than formula-based funding. Districts are sorted and grouped by their percentage of students living below the poverty line, with each bar representing around 340,000 students, 20% of the entire public school population.[7]

Indeed, weighted multiple linear regression shows that even when controlling for poverty, race is a robust predictor of funding inequity. For each 10% increase in proportion of white students, actual funding increases on average $447 per student relative to fair-share.[8]

Inequity and Poor Rural Districts

It is sometimes assumed that poor rural districts are also getting shortchanged in funding. While many poor rural districts, like nearly all poor districts, are struggling with inadequate state funding, these districts overall do not exhibit a pattern of getting less than their fair share. Figure 8 is a subset of Figure 5, showing fair vs. actual funding for only poor rural districts, specifically the 96 districts that have more than 20% poverty and sparsity/size ratio > 0. We see that most of these districts are above the line, meaning they are receiving more than their fair share of state funding. And we note that of the districts below the line (i.e. receiving less than their fair share), most are darker, indicating a higher proportion of students of color.

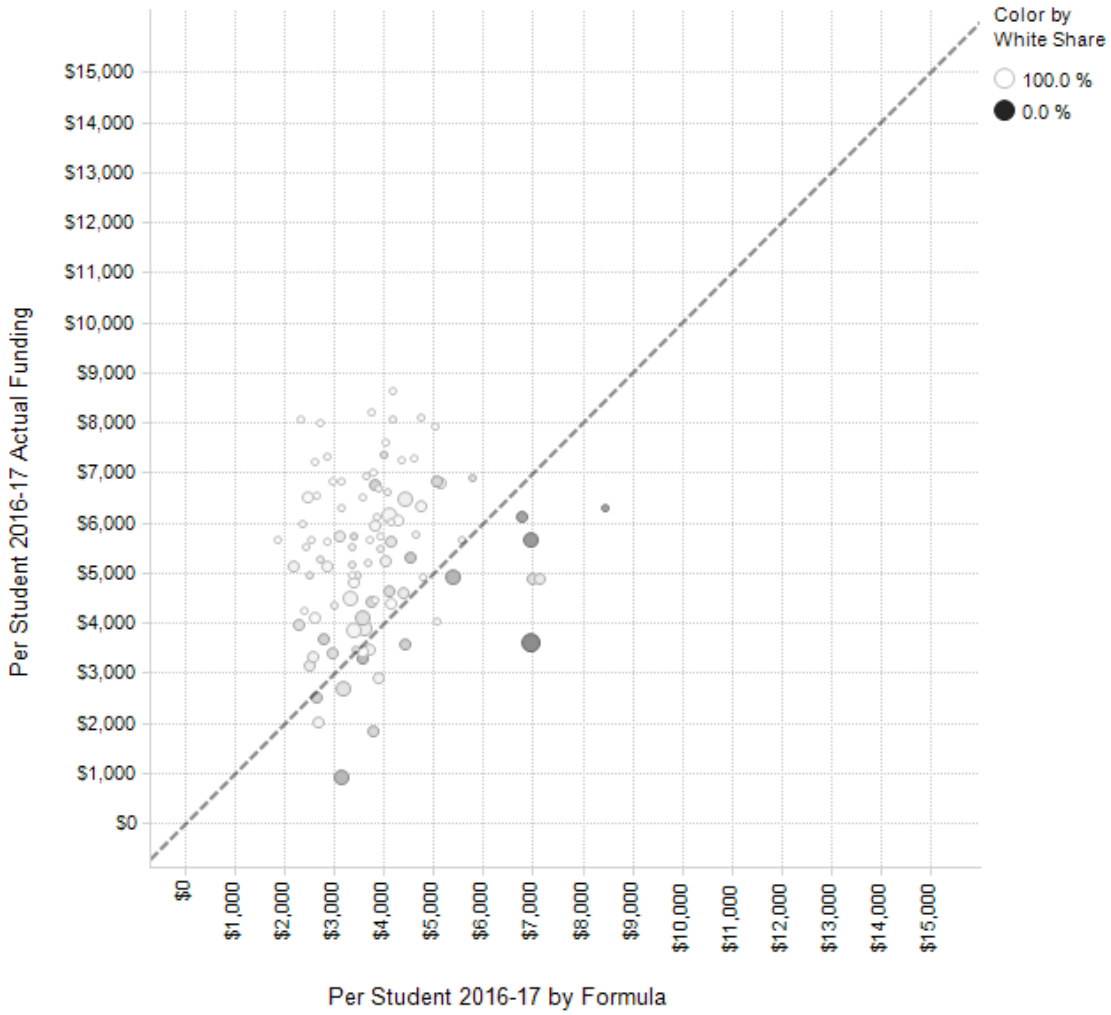

Figure 8. A subset of Figure 5 showing only poor rural districts (those with >20% of students living below the poverty line, and with Sparsity/Size Ratio > 0).

Conclusion

Pennsylvania has a formula that defines the most equitable way to distribute state Basic Education Funding (BEF) among its 500 districts[9]. By applying the formula only to education dollars in excess of the 2014-15 budget, recent legislation locks in systematic racial discrimination in the distribution of state funds. Even if the overall BEF budget increases in future years, current law prescribes that the whitest districts continue to receive thousands of dollars per student more than their fair share, while the least white districts receive thousands per student less than their fair share. This systematic bias will remain in place in perpetuity until the law is changed.

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[1] The commission recommended that "hold-harmless", the practice of protecting any district from receiving less state funding than it received the previous year, be discontinued going forward and that all "new funding" be distributed through the new formula. Although the commission did not take a stand on whether "old" (baseline 2014-15) funding should be distributed through the formula, it did document two possible solutions for how "the

entire basic education funding appropriation" could be gradually distributed through the formula over time. http://basiceducationfundingcommission.pasenategop.com/files/2014/08/final-report-061915-.pdf.

[2] The calculations in this report were independently verified and duplicated by Research For Action, a nonprofit education research organization.

[3] Since the commission's formula takes into account many factors about the cost of educating students and local district characteristics, but gives no consideration to historical state funding levels, the formula is by definition the fair way to divide up any amount of funding, whether incremental increases or the full basic education budget line.

[4] Data sources: Budget and formula data: Final2EdBudget 2016-17 BEF July2016 web rev.xlsx) downloaded from http://www.education.pa.gov/Teachers%20-%20Administrators/School%20Finances/Education%20Budget/Pages/default.aspx#.V0zkQ_krJQJ
Racial composition (aggregated using only numbers for district schools, not charter schools, since it was not possible to map charter students to their funding district): Enrollment Public Schools 2014-15.xlsx downloaded from http://www.education.pa.gov/Data-and-Statistics/Pages/Enrollment%20Reports%20and%20Projections.aspx

[5] The lack of racial pattern in Figure 2 is due to its failure to reflect the actual needs of each district.

[6] Detailed data on quintiles in Figure 4, in which districts are sorted and grouped according to the percentage of their students who are white. The quintiles contain more or fewer than the target 340,000 students because no district is split across 2 bins.

Quintile	Min White Share	Max White Share	3-yr avg ADM	# of districts	Avg Per Student BEF	Avg Per Student BEF by Formula	Avg Inequity
1	1.8 %	32.5 %	324,201	20	$5,408	$7,321	-$1,912
2	33.1 %	75.0 %	362,883	74	$2,721	$3,320	-$599
3	75.0 %	86.5 %	343,315	85	$1,846	$1,963	-$117
4	86.6 %	93.4 %	340,915	108	$2,703	$2,108	$595
5	93.4 %	100.0 %	348,872	212	$4,583	$2,649	$1,934

[7] Detailed data on quintiles in Figure 7, in which districts are sorted and grouped according to their percentage of their students living below the poverty line. The quintiles contain more or fewer than the target 340,000 students because no district is split across 2 bins.

Quintile	Min Poverty Percent	Max Poverty Percent	3-yr avg ADM	# of districts	Avg Per Student BEF	Avg Per Student BEF by Formula	Avg Inequity
1	0.9 %	5.7 %	343,416	75	$1,440	$1,371	$70
2	5.8 %	11.5 %	346,080	110	$2,324	$1,978	$346
3	11.6 %	18.4 %	339,510	136	$3,421	$2,512	$910
4	18.5 %	31.9 %	321,095	146	$4,143	$3,743	$400
5	31.9 %	61.5 %	370,085	32	$5,686	$7,255	-$1,570

[8] Coefficients for the regression weighted by student count: (rsq=0.46, p=5.3e-67)

Name	Estimate	StdError	t.value	p.value
(Intercept)	-3419.2	295.1	-11.6	1.2E-27
White Share	4471.9	280.3	16.0	1.5E-46
Poverty Percent	1985.6	652.5	3.0	2.5E-03

Correlation Matrix:

	Inequity	White Share	Poverty Percent
Inequity	1.00		
White Share	0.71	1.00	
Poverty Percent	-0.58	-0.74	1.00

[9] It is important to note that Pennsylvania's dubious distinction of having by far the greatest gap between combined state and local education spending in poor versus affluent school districts (https://www.washingtonpost.com/news/local/wp/2015/03/12/in-23-states-richer-school-districts-get-more-

local-funding-than-poorer-districts) is due not only to the unfair way state funding is distributed, but also to the state's high reliance on local (as opposed to state) funding for basic education. Wealthier regions are able to fund their districts adequately through local taxes, while poorer districts are more reliant on state funding. Even if the inequity demonstrated in this report were eliminated by distributing the entire current BEF budget using the fair formula, many districts would remain inadequately funded unless the state dramatically increases its share of education funding. See http://www.pilcop.org/befc-adequacy-calculation/.