

TAKING MEASURE OF OHIO'S ADEQUACY GAP IN SCHOOL FUNDING

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Contents

Executive Summary.....	1
I.Introduction	3
II.The Link Between School Funding and Academic Achievement	3
III.The National Context for Funding Adequacy and Equity.....	4
IV.Adequacy Gap and Funding Equity in Ohio	12
V.The Equity of Ohio School Funding.....	22
VI.Conclusion and Policy Discussion.....	25
Reference	28

About the C. William Swank Program in Rural-Urban Policy

The C. William Swank Program in Rural-Urban Policy is a nationally and internationally recognized research and outreach program focused on priority issues related to rural and urban communities and their growth and prosperity. It is named after Dr. C. William Swank who was long-time Executive Director of the Ohio Farm Bureau and served on numerous state and national public-service committees.

Led by Professor Mark Partridge, the Swank Program combines innovative approaches in economic theory, planning, advanced statistical research, and geographical information systems to create products that can be used by the academic community, stakeholders, policymakers, students, and the public. In turn, the Swank Program will help inform and facilitate teaching and student research at Ohio State and elsewhere.

The Swank Program conducts and supports research, teaching, and outreach within the College of Food, Agricultural, and Environmental Sciences; the Ohio Agricultural Research and Development Center; and Ohio State University Extension.

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Executive Summary

There has been a continuous debate over funding adequacy gap for Ohio public education for twenty years. The “unconstitutional” court ruling over the *DeRolph* cases along with subsequent studies suggests Ohio had not built an efficient system to fund its public schools. “Hunted” by the “phantom revenue”¹ and challenged by charter schools, many school districts found themselves in need of more financial resources from the state than ever before. **Despite the state’s best effort, the 2017 funding level of 205 (out of 610) school districts has not fully recovered from the Great Recession.** To be sure, Ohio is one of the state’s whose funding has risen faster than the typical state in the last decade. Yet, when it comes to how much funding each school district actually needs, there are rarely concrete numbers derived from evidence-based approaches people can rely upon to support their arguments. This study aims to fill some of these gaps. Overall, Ohio has improved its relative performance both in terms of funding and equity, something for which its political leadership deserves credit.

In this policy brief, we aim to contribute to the understanding of the adequacy gap in Ohio school system and to provide the public with an estimated amount of funding adequate for each district conditional on their own socioeconomic characteristics.

A review of recent economic literature reveals a clear link between increased school funding and improved academic performance. While not always advocating for more resources, research does support the notion of providing “adequate” funding to achieve desired performance, especially for those from disadvantaged backgrounds. We base our research on the observation that disadvantaged students require more educational resources to catch up with their advantaged peers. As expected, we find that school districts where there are larger percentages of students in poverty, with limited English proficiency, and minority, especially African American and Hispanic, tend to exhibit lower academic performances. Using the Performance Index (PI) from the Ohio Department of Education as the academic performance measure, **we estimated that 329,742 students in 34 school districts require more funding to achieve a “passing” grade (PI 60%) in 2017. The average funding gap per pupil according to our estimation is \$32,250, which amounts to \$10.6 billion a year for the state, which is certainly not feasible.**

Any effort to further improve the academic performance of districts would demand even more financial resources. Yet, this analysis suggests that demographic factors are far more important than financing, something that policy cannot tangibly influence in the short term. In addition, after accounting for financing and demographic characteristics, we find that urban schools tend to be overperforming, whereas rural schools, especially those in Appalachia tend to underperform. An additional look at the funding equity issue in Ohio public schools also suggests

¹ “Phantom Revenue” refers to the additional revenue due to property appreciation the State includes in funding formula which is not actually received by local school districts due to HB 290.

the current funding system is far from equitable, although several indicators of funding equity imply that the state has reduced inequities in recent years.

We offer three policy suggestions based on our analysis. **In the short run, the state should reevaluate its funding formula to eliminate or mitigate the “phantom revenue” problem.** This would require the Department of Education to adopt more “evidence-based” approaches to determine the funding needs of each district, and to recognize that appreciation of property values do not translate into actual greater revenue for districts, as the House Bill 290 prevents districts from doing so by decoupling property value increases from taxes collected on those properties. **Second, while Ohio has made gains in improving K-12 funding and reducing inequities between rich and poor districts, the state should strive to increase its share of funding to take some of the burden off local property owners.** **Third, in the long term, the state could increase its economic development through enhancing its investment in K-12 education, especially in regions that lack funding capacity.** First, investing in education will produce a well-trained local labor force, and a more dynamic local economy, which attracts business from outside Ohio and benefit the state economy in the long run. Indeed, more emphasis on vocational education and community colleges would further help disadvantaged students. Second, good public schools enhance local economies by attracting parents interested in their children’s education, and these parents are likely to be the high-skilled workers that would support the state’s economy. Such workers are geographically mobile and can locate anywhere. Poor public schools would not be conducive to attracting them.

I. Introduction

In the United States, it is a long-held notion that education is a right and all students are entitled to free education at least from kindergarten to 12th grade, while there are growing calls to provide free education beyond high school. Nonetheless, providing access to education to all students does not necessarily imply that the education system, as a whole, is fair and that students from poor districts receive the same quality and opportunities as those in wealthier areas. All students have access to education, but not all have access to the same quality of education. And whereas most states try to allocate resources in ways that allow them to benefit proportionally more poorer students, few states can claim they have successfully funded their education systems in terms of both adequacy and equity. Ohio is unfortunately, perceived as being one of those states. For decades, the Buckeye state has struggled with its school funding system, with frequent changes in the funding scheme, countless tax levies on local ballots, and multiple “unconstitutional” rulings from the Ohio Supreme Court on the adequacy of state support.

For these reasons, there has been growing concern over whether all students receive sufficient educational resources, and whether they receive a fair share. The current Ohio funding formula for public schools tries to achieve the goals of adequacy and equity by providing baseline funding for state education objectives for each student, as well as additional adjustments for districts with high shares of students with special needs. Yet, there are ongoing demands for further changes and additional state funding, as the current funding system, according to its critics, is remains inadequate and inequitable.

The purpose of this policy brief is to provide an overview of the school-funding system regarding its adequacy and equity at both the national and the state level. We first provide a summary of research findings on the effectiveness of school funding on improving student achievements, which is then followed by a description of the *status quo* of school funding in a national context to gain perspective on where Ohio is positioned among other states. Next, we analyze whether Ohio public schools enjoy adequate and equitable funding by emphasizing the basic observation that equal funding levels across districts does not guarantee similar academic success. The last section provides policy suggestions and concludes this brief.

II. The Link Between School Funding and Academic Achievement

Funding is believed to be one key element in affecting school quality, but evidence regarding the effect of funding on achievement has been inconclusive. In fact, whereas the effects of school funding on educational achievement are perceived to be positive (Hart and Teeter, 2004), most empirical evidence shows either none or a very small positive relationship between these two variables (Neymotin, 2010). Even among studies who provide some evidence of a positive link

between funding and performance, the results are normally localized to one or two specific places, so that usually very few conclusions can be generalized across places.

More recent studies, however, provide relatively conclusive evidences of a larger positive correlation. Following the Michigan 1994 school finance reform, Hyman (2017) finds a long-term funding effect signaling that public schools spending more increase the likelihood of students of earning a postsecondary degree. More comprehensively, by analyzing nationwide changes in school funding during the so-called ‘adequacy era’ (the post-1990 reforms), Lafortune et al. (2018) find a significant association between increases in public funding and student achievement. Since the adequacy reforms² were associated with more spending in schools with the most disadvantaged populations, they found that the positive effects were concentrated in those districts.

Henry et al. (2010) also found that targeted funding to educationally disadvantaged students significantly improves the performance of at-risk students. Specifically, they examined North Carolina’s reforms during the 2004-2005 period, concluding that the new resources worked to reduce the performance gap between rich and poor districts.

Among these studies, Candelaria and Shores (2017) provide the soundest evidence regarding the positive link between funding and educational outcomes by analyzing national adequacy-based court rulings. First, the post-1990 reforms increased per-pupil spending and they are directly linked to higher graduation rates, especially among the poorest districts. Second, the reforms substantially equalized graduation rates and spending within states. More importantly, those reforms help us understand how achievement gaps can be closed and how to reduce inequalities across social classes.

As a result, it is important to have in mind that these improvements in funding have important results, especially for disadvantaged students, insofar as schools serving these students lag in the funding to provide adequate quality. Yet, to be clear, these studies are not necessarily *always* advocating for more resources, but to provide schools with sufficient funding to achieve the desired educational outcomes.

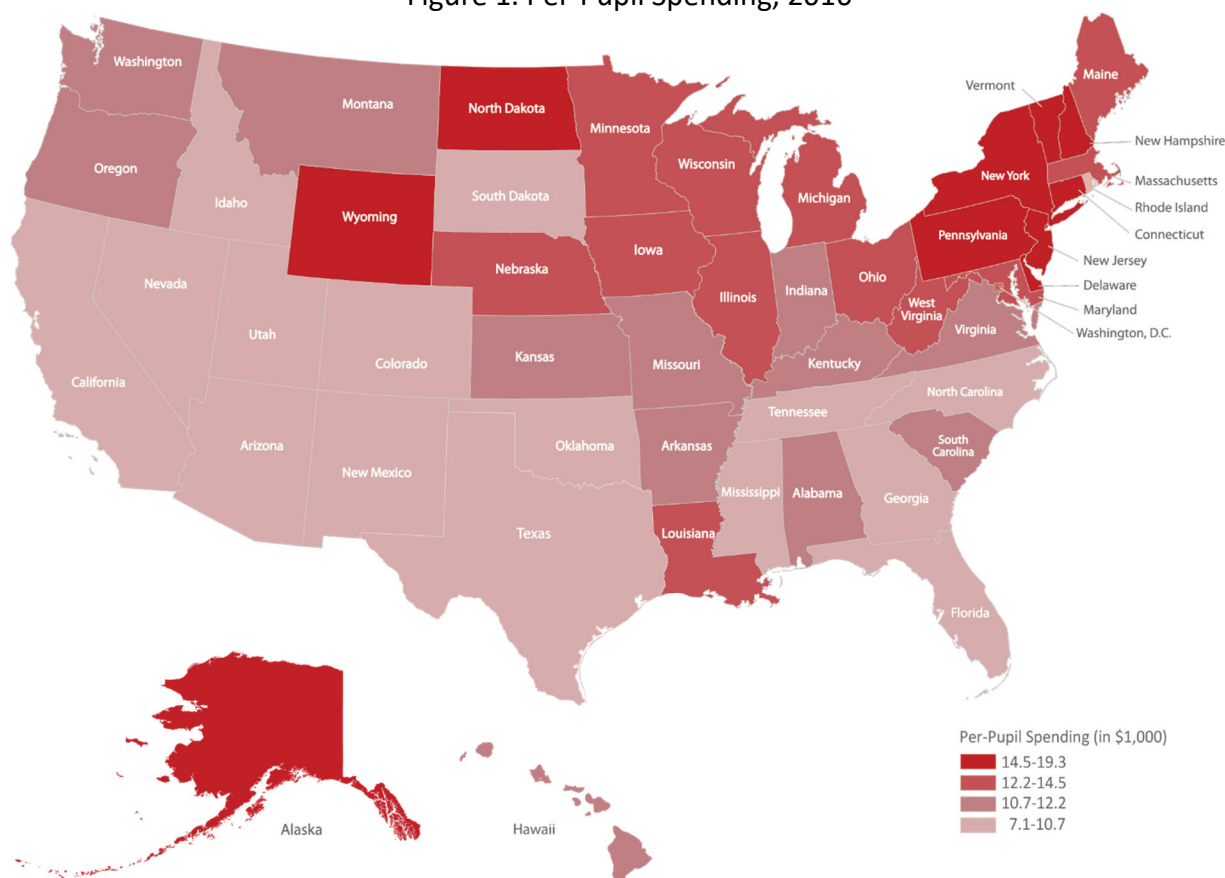
III. The National Context for Funding Adequacy and Equity

Having established the importance of school funding for students’ achievement and the reduction of inequalities, the next question is whether *states are providing enough funding to schools?* Then, if they are not, *are they at least moving to reach that minimum required to provide schools with the tools needed for a successful teaching environment?* The answers obviously vary across districts and states.

² The 1989 *Rose v. Council for Better Education* ruling marked the beginning of the so-called “Adequacy Era,” in which the states were believed to be responsible for providing adequate levels of funding to ensure that all students achieve minimum education standards. During this period, several court cases were filed against the states and many reforms took place. A good description of this era and of its effects on educational outcomes can be found in Candelaria and Shores (2017).

K12 Education Expenditures

At the state level, per-pupil spending tends to be higher in the Northeast (Figure 1), particularly in New York, Pennsylvania, Vermont, and Connecticut. North Dakota and Wyoming are also among the highest per-pupil spending. Ohio and other Midwestern states have per-pupil spending close to the national average. Ohio spends \$13,552 per-pupil, or \$6,000 less than the highest spending state (New York) and \$6,000 more than Utah and Idaho, who are at the bottom of the distribution. With these numbers, Ohio ranks 15th in per-pupil spending.³ Moreover, among neighboring states, Ohio spends more than West Virginia (\$12,889), Michigan (\$12,506), Kentucky (\$11,233), and Indiana (\$10,915), and ranks fourth among the 12 Midwestern states.

Figure 1. Per-Pupil Spending, 2016⁴

Source: 2016 Annual Survey of School System Finances, US Census Bureau.

Though nearly half (22) of the states have reduced real per-pupil spending in the last eight years,

³ This ranking does not consider the District of Columbia, that spends \$16,531, above Ohio. A similar situation can be observed with respect to the changes in per-pupil spending between 2008 and 2016 presented in Figure 2.

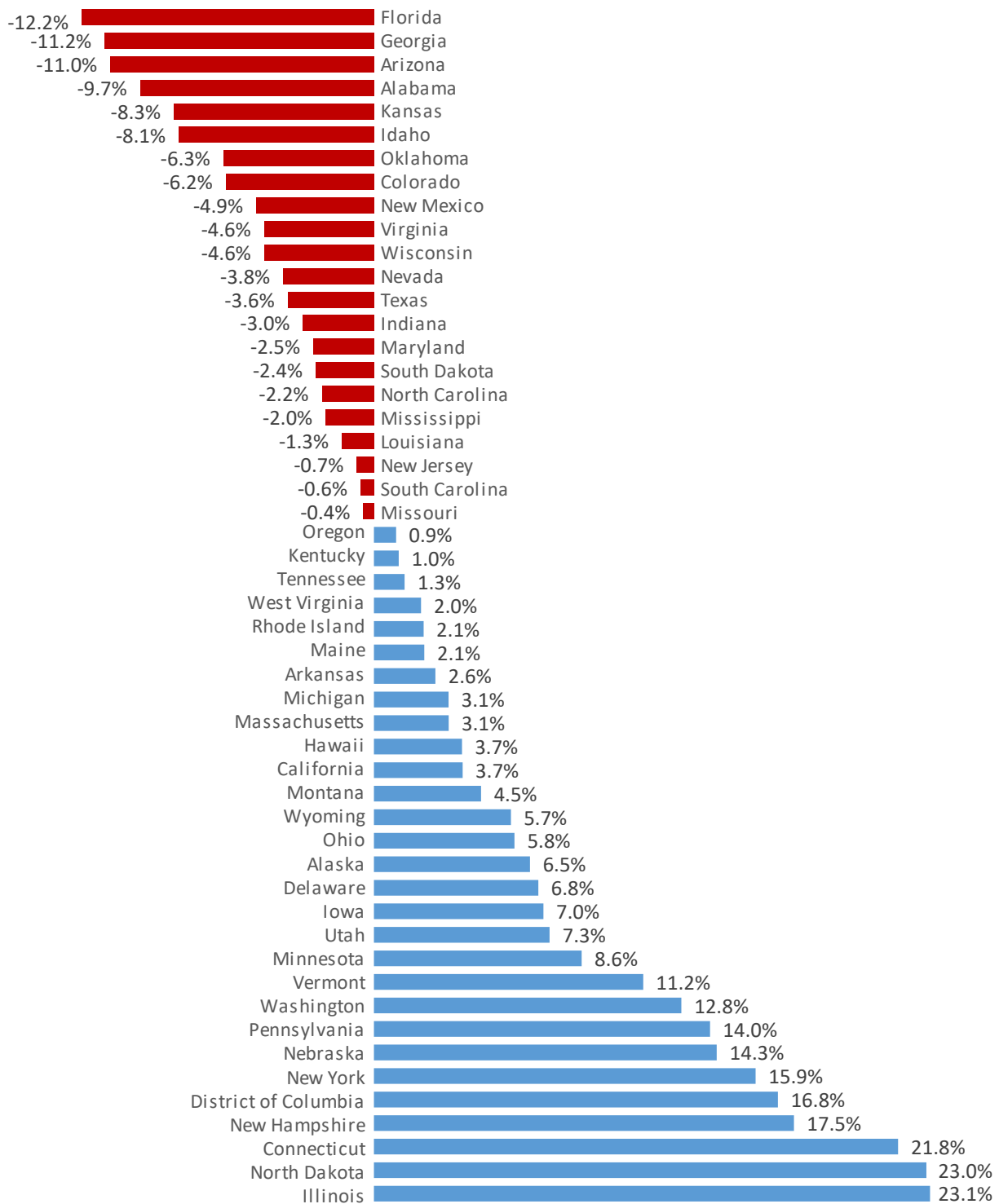
⁴Due to higher cost livings, we use the Regional Price Parities in 2016 from Bureau of Economic Analysis to account for price differences across states. For details see https://www.bea.gov/newsreleases/regional/rpp/rpp_newsrelease.htm

Ohio has recovered from the Great Recession and increased its spending by 5.8% between 2008 and 2016 (Figure 2), again ranking 15th in the list of states with the highest increases. Among the Midwestern states, Ohio is one of the seven states that has increased its spending over time, and has the faster growth rate of the neighboring states.

It is also important to consider whether those states spending more on education are also the states with the highest incomes. One should expect that states with higher income would spend more on everything, including education, without necessarily reflecting a special effort to improve educational outcomes. A relative measure is provided by Figure 3, where we map spending per \$1,000 state personal income. Before the Great Recession, Ohio was ranked 19th in 2006-7 with a per pupil current spending (PPCS) of \$9,799 (\$11,343 in 2016 dollars). In fiscal year (FY) 2016 ranks 20th with a PPCS of \$12,102.

Note how in Figure 3 states previously perceived as spending less than the national average are in fact states that spend relatively large amounts of money with respect to the own state's income. In particular, southern states such as Mississippi, Georgia, and South Carolina are now in the upper end of the distribution. Something similar happens to Ohio and neighboring states such as West Virginia, Kentucky, and Illinois. Ohio spends \$50 per \$1,000 personal income, slightly below West Virginia (\$54), Kentucky (\$52), and Illinois (\$55), ranking 11th across the U.S., and 3rd in the Midwest.

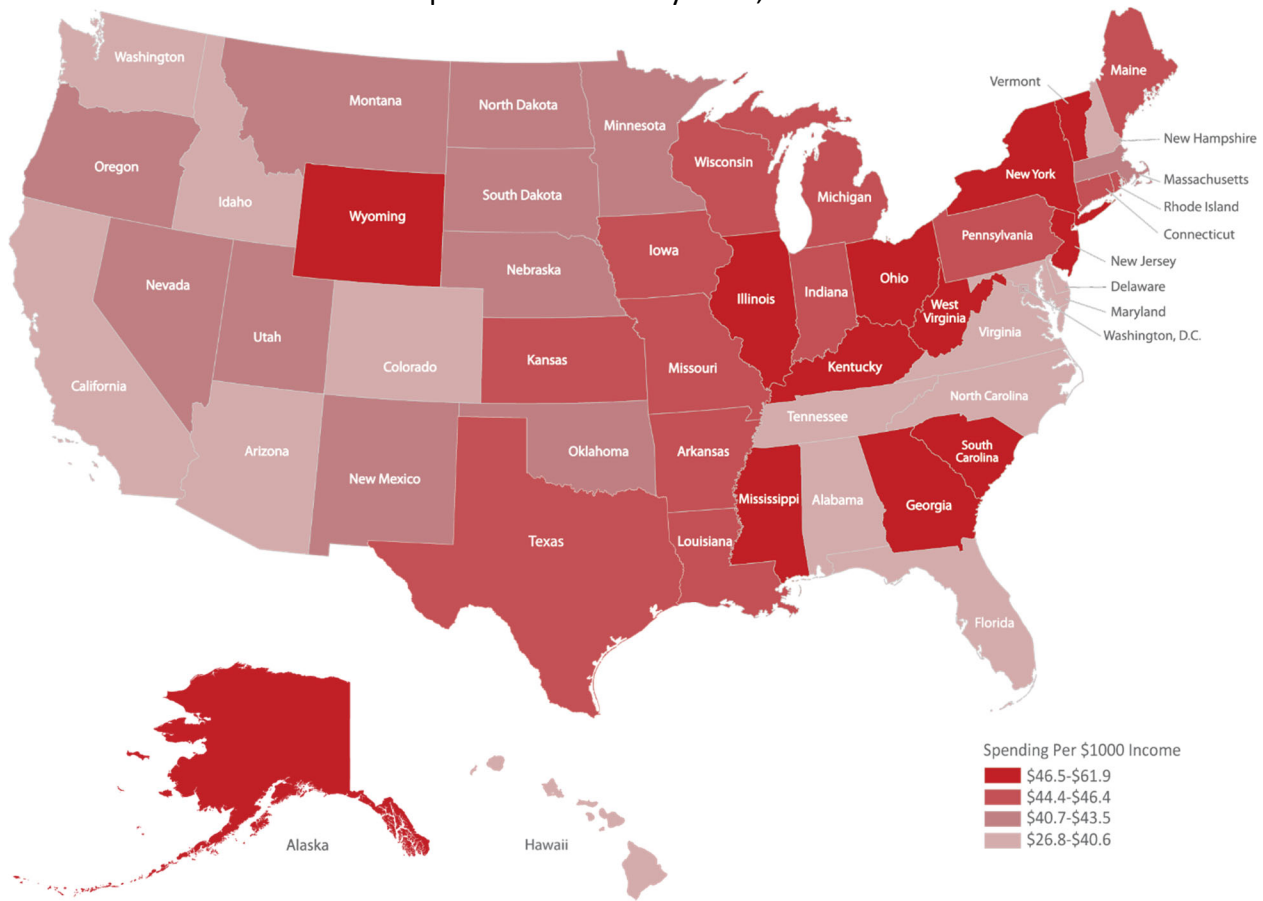
Figure 3 allows us to conclude two important things. First, Ohio is outperforming several other more-wealthy states in terms of education expenditures relative to its own income, denoting the importance of the issue within the state; and second, that there is still room for improvement as neighboring states, where the absolute per-pupil spending is lower, are outperforming Ohio in this relative measure. While we are admittedly speculating, but one possible reason that Ohio's Republican party, despite the unfavorable national political climate, performed well statewide in the 2018 midterm elections is that the Republican leadership maintained K-12 education funding and reducing inequities while other states such as Wisconsin lagged.

Figure 2 Percentage Change in Real Per-Pupil Spending from 2008 to 2016⁵

Source: 2016 Annual Survey of School System Finances, US Census Bureau.

⁵ Numbers are adjusted to inflation.

Figure 3. Relation of public elementary-secondary school system finance amounts to \$1,000 personal income by state, 2016



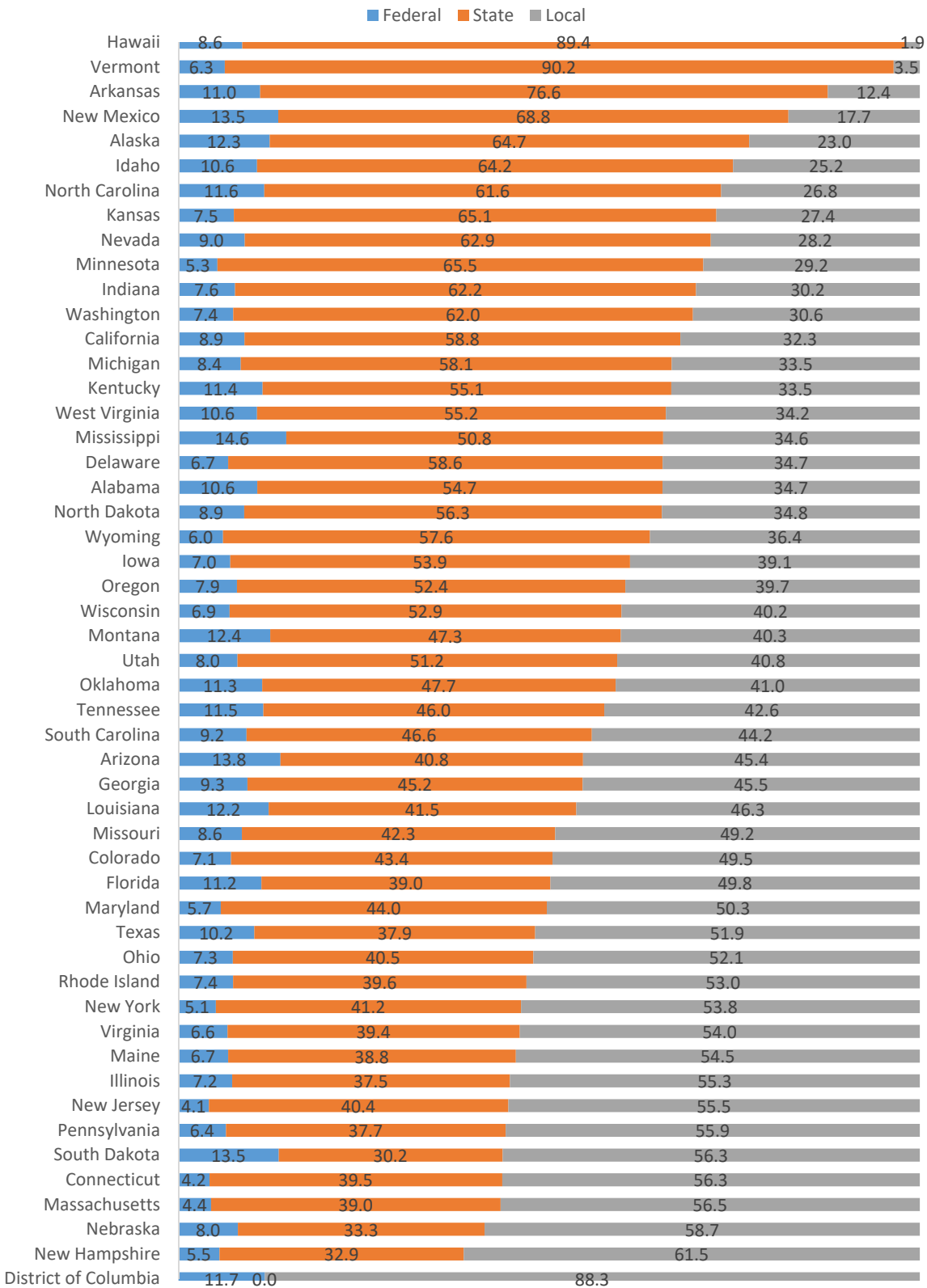
Source: 2016 Annual Survey of School System Finances, US Census Bureau.

Sources of Revenue for K-12 Education

As we showed, there is a large variation in the amount spent on education, and in how this spending has changed over time. As we might expect, there is also a large variation and not a unique formula to provide schools and school districts with funding. Some states rely more on local funds such as property taxes, while others rely heavily on state funding. Federal funds normally account for around 10% of the total funding across states, with a maximum of 14.6% in Mississippi and a minimum of 4.1% in New Jersey and 4.2% in Connecticut (Figure 4).

States like New Hampshire, Nebraska, Massachusetts, Connecticut, and South Dakota among others rely heavily on local sources to fund their schools, with more than 56% of local districts funds come from local taxes. At the other end of the distribution, in Hawaii, Vermont, and Arkansas, less than 13% of the funds come from local sources. In Ohio, 52.1% of funding comes from local sources—which is generally funded by property taxes.

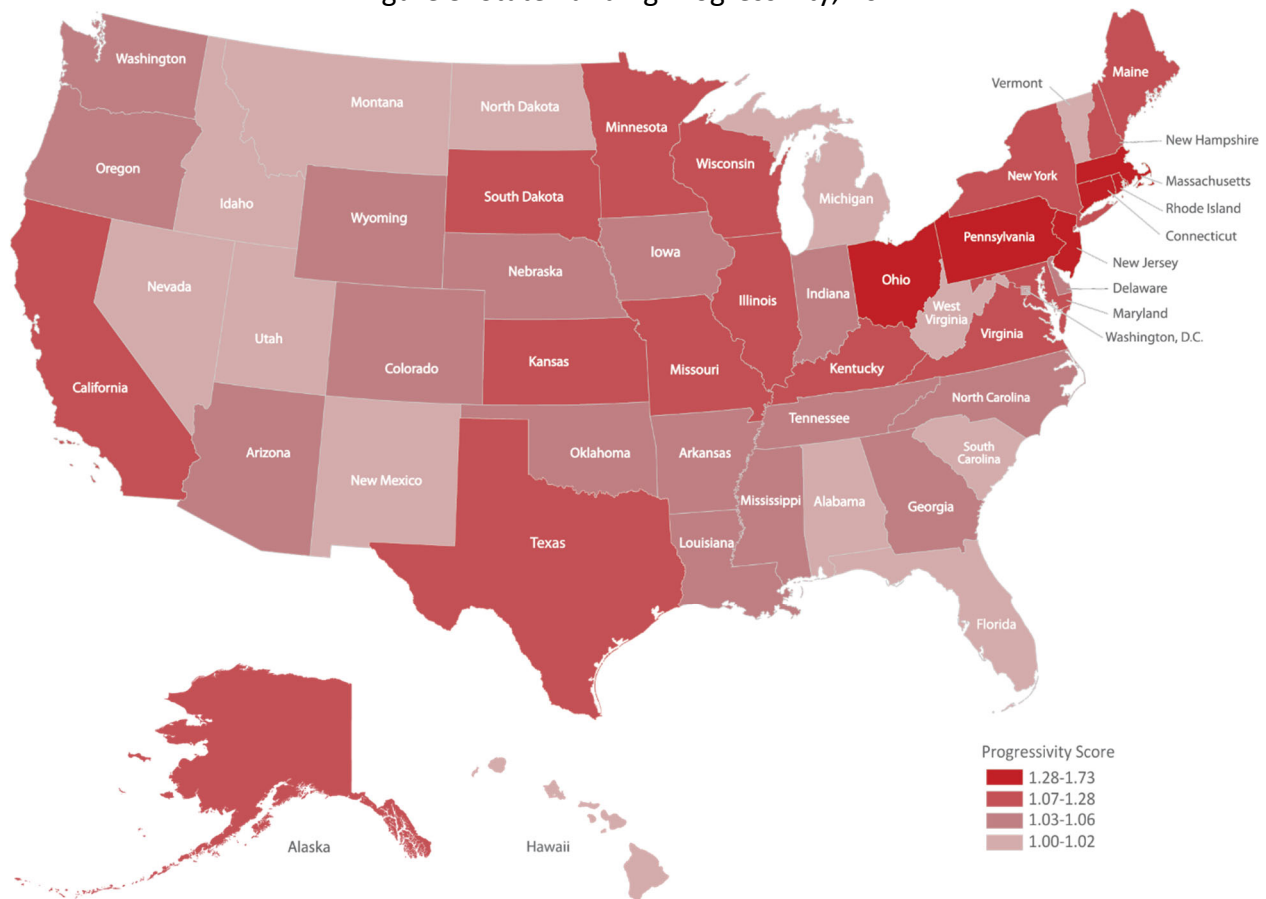
Figure 4. Sources of spending in elementary-secondary school system by state, 2016



Source: 2016 Annual Survey of School System Finances, US Census Bureau.

Similarly, to achieve equity states can choose to distribute relatively more resources to poorer areas, redistributing funding progressively. According to Figure 5, states in the northeast such as Massachusetts, Rhode Island, Connecticut, New Jersey, and Pennsylvania, and Ohio are among the states where funding is allocated progressively, i.e. relatively more to poorer students. This pattern follows to a lesser extent in Texas, Alaska, California and most of the other Midwestern states. On the other hand, states in the south, particularly those in the cotton belt and Plains states are less likely to redistribute resources to poorer districts.

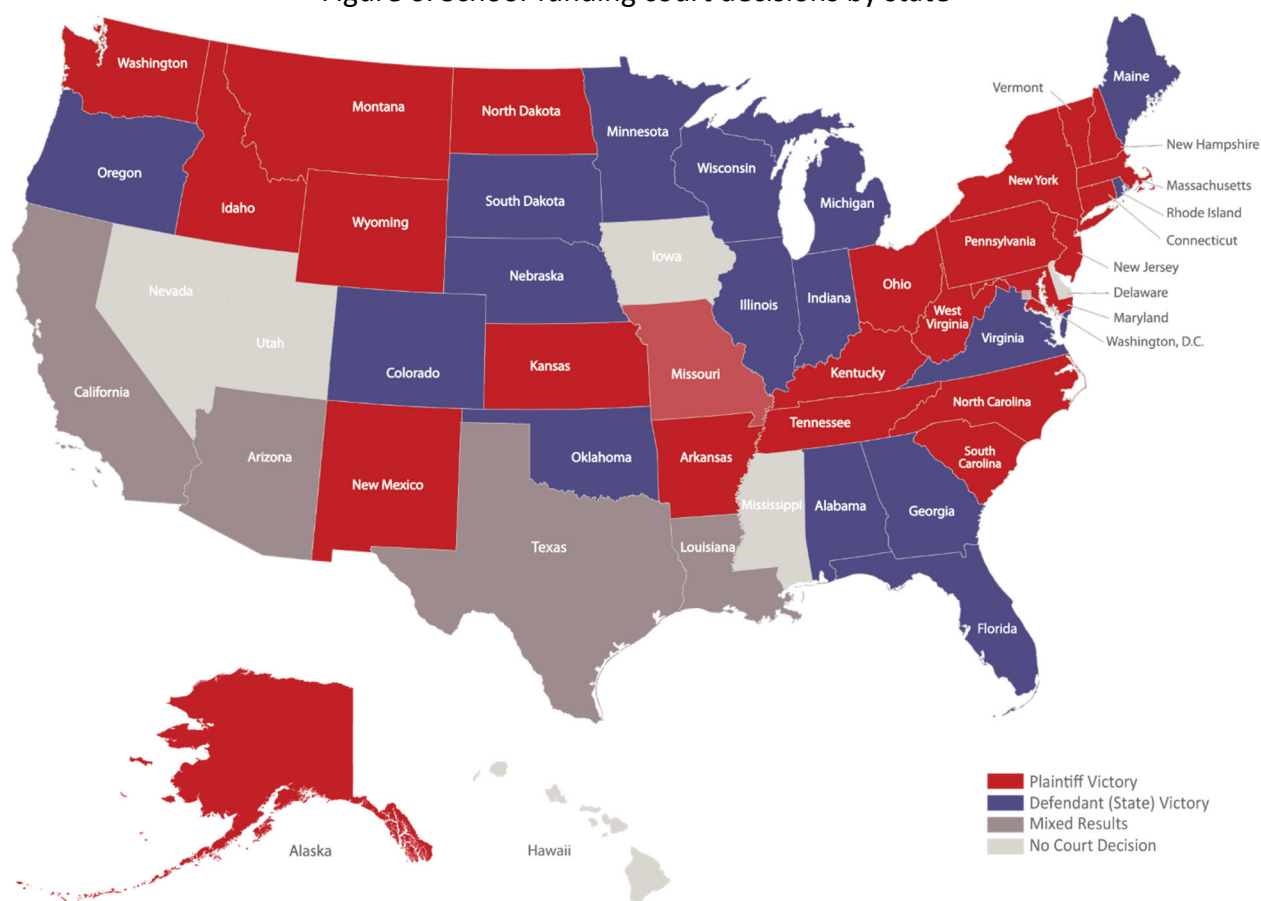
Figure 5. State Funding Progressivity, 2014



Source: Chingos and Blagg (2017)

Some reasons for this better allocation of resources and more equity can be found in school-funding court decisions that changed the way states distribute funding. As equity and adequacy are important concerns, the fact that local funding is a primary funding source has led to many court cases arguing that public education funding formulas are unconstitutional. According to

Figure 6. School-funding court decisions by state



Source: SchoolFunding.Info

SchoolFunding.Info of the Center for Educational Equity,⁶ between 1973 and 2017, 46 states heard cases arguing that the state funding for public education was unconstitutional (Figure 6). Only in Hawaii, Mississippi, Nevada, and Utah have there been no such court cases. In 22 states, including Ohio, state courts have ruled that the state's funding system is unconstitutional. In 5 states (California, Arizona, Texas, Louisiana, and Connecticut) cases have yielded ambiguous results, whereas in 17 states the courts ultimately ruled in favor of the States.⁷

In fact, and though the correlation is far from perfect, Figures 5 and 6 show a similar pattern. In states where courts dictated a plaintiff victory—i.e., states were required to redistribute resources to achieve equity including Ohio—there is a higher progressivity in the allocation of resources. The opposite is true for states where there was a defendant (state) victory. As it was shown, the evidence presented here suggest that these cases filed against the states have had important consequences in improving equity within the states and across school districts, as after

⁶ Schoolfunding.info/litigation-map/ Consulted on July 19th, 2018 at 4:00pm ET.

⁷ It is important to note two special cases. In Hawaii, there is only one school district and it has full state financing of public education. In Vermont, on the other hand, "SchoolFunding.Info" documents that in a 1995 court case, the ruling led to a statewide property tax that yielded an "equalized yield" for local taxes above the state level. A detailed discussion of each state's case can be found in schoolfunding.info.

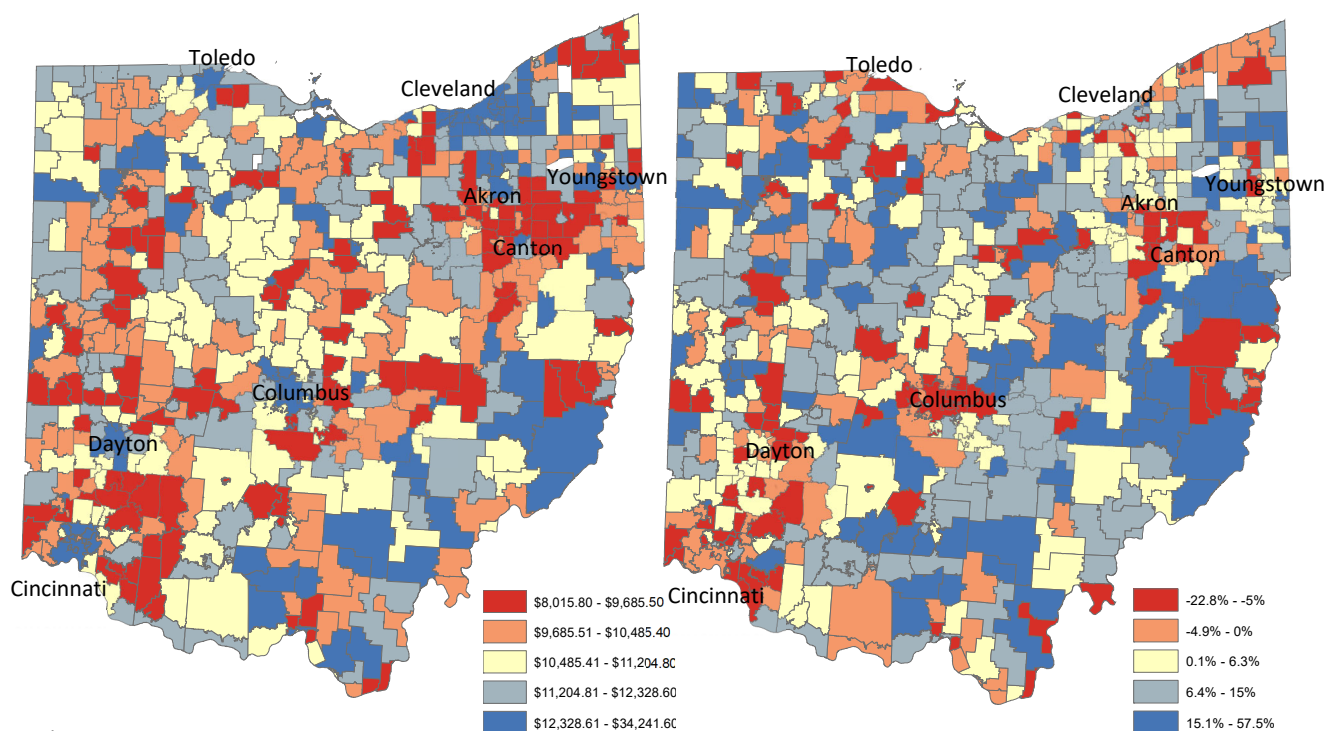
these rulings, states allocated more resources to high-needed districts. In fact, in states where a plaintiff victory was ruled, the progressivity score was on average 0.42% higher than in states where a defendant victory was declared.

IV. Adequacy Gap and Funding Equity in Ohio

School Funding in Ohio

Ohio has moved faster than over half of the states in providing adequate funding in disadvantaged districts. The school funding within the state, however, paints a more complicated picture (Figure 7). Most urban and suburban school districts are among those with the highest per-pupil spending in 2017. Yet, since the Great Recession and after adjusting for inflation, there are 188 districts with an at least 10% increase in spending since 2008, of which 88% are rural or small-town districts (Table 1). At the same time, 205 districts have less real expenditures than before the Great Recession. There is a -0.14 correlation between 2008 per-capita income and increases in educational expenditures, showing that there is a trend for the poorest districts to have the larger expenditure increases. In fact, Figure 7 makes this apparent. For example, poor southeast Ohio districts show some of the largest percentage education expenditure increases.

Figure 7. Per-Pupil Spending in 2017 (Left) & Its Percentage Change from 2008 to 2017 (Right)⁸



*Data source: ODE

⁸ Adjusted for the CPI from Federal Reserve Bank of St. Louis.

Table 1. Inflation Adjusted Growth of Per-Pupil Spending 2008-2017⁹

Top 10 Districts			
District	County	District Type	% Change 2008-2017
Noble Local	Noble	Rural	57.5%
Upper Scioto Valley Local	Hardin	Rural	49.6%
East Guernsey Local	Guernsey	Rural	46.6%
New Miami Local	Butler	Rural	42.7%
Windham Ex Vill	Portage	Rural	40.9%
Newbury Local	Geauga	Small Town	37.8%
Wellsville Local	Columbiana	Small Town	34.9%
Stryker Local	Williams	Rural	33.7%
Southeast Local	Portage	Rural	33.2%
Bristol Local	Trumbull	Rural	32.6%
Bottom 10 Districts			
District	County	District Type	% Change 2008-2017
Princeton City	Hamilton	Suburban	-22.8%
Toronto City	Jefferson	Small Town	-17.4%
Jefferson Township Local	Montgomery	Small Town	-16.7%
Fairborn City	Greene	Urban	-16.2%
Middletown City	Butler	Urban	-16.1%
Ontario Local	Richland	Small Town	-15.9%
Tri-Village Local	Darke	Rural	-15.8%
Williamsburg Local	Clermont	Rural	-15.7%
Springboro Community City	Warren	Suburban	-15.2%
Cuyahoga Heights Local	Cuyahoga	Suburban	-15.1%

*Data source: ODE

The Adequacy of Ohio School Funding

Ohio public schools have generally suffered from inadequate funding for decades. Since the state legislature passed House Bill 920 in 1976, the amount of property tax revenue that can be generated to finance local public schools has been fixed, while education expenditures exploded along with the inflation. Insufficient funding forced local school districts to push more new levies on ballots, but the majority of them failed.¹⁰ What makes it worse is the so-called “Phantom Revenue,” which is the additional amount of tax revenue the state “assumes” districts would have based on actual property value appreciated over time, but that in reality does not increase because of the House Bill 920 that limits and decouple tax revenue from property values.¹¹ This

⁹ The difference between rural and small town districts are that small town districts often have an average population and enrollment (low in rural districts), an average parental educational attainment (low in rural districts) and a mix of agricultural and professional employment (significant agricultural tax base in rural districts). See <http://education.ohio.gov/getattachment/Topics/Data/Frequently-Requested-Data/Typology-of-Ohio-School-Districts/2013-School-District-Typology-Methodology-and-Descriptors.docx.aspx> for details.

¹⁰ <https://www.ohioschoolboards.org/sites/default/files/OSBAUnderstandingLeviesFactSheet.pdf>

¹¹ See Schiess et al. (2017)

confliction between state property tax law and school finance regulation led to a potentially underfunded education system. The phase-out of tangible personal property tax since 2005 further drained a funding source of local school districts.¹²

In 1997, the Supreme Court of Ohio ruled in the *DeRolph I* case that the foundation-based method the state used to fund public education was unconstitutional because it overly relied on local property taxes and failed to “provide for a thorough and efficient system of common schools” as demanded by the Ohio Constitution. Despite the legislature’s attempts, subsequent *DeRolph* cases led to state Supreme Court rulings that the funding system remained unconstitutional (*DeRolph v. State of Ohio*, 2002). In 2009, then Governor Ted Strickland proposed a new funding approach using Evidence-Based Model (EBM) to estimate adequate levels of funding using the actual educational needs of each school district, and at the same time eliminate the “Phantom Revenue.” The state, however, failed to sufficiently fund this system (Edlefson, 2010), leading to a new approach under Governor Kasich.

The current funding system is based on a foundation formula for per-pupil funding. This system includes state funding that allows districts to raise per-pupil expenditure above the foundation amount through local tax revenues. Although this formula takes into account students with special needs (e.g. disability, limited language proficiency and poverty), research has found that actual expenditure of school districts failed to match the proportion of students that fall in these categories. In a study focusing on Ohio’s major urban schools, Baker (2009) finds that the expenditure patterns across Cincinnati schools can only be explained by the percentage of students with disability and Columbus is the only city with a positive correlation between per-pupil spending and proportion of students in poverty.

Estimating the Adequate Funding Level for Ohio Schools

Traditionally, researchers have adopted two main methods to estimate funding adequacy: resource-oriented and performance-oriented approaches, although combinations are often used (Sweetland, 2015). A resource-oriented approach usually involves professional judgements. It is very popular for policymakers due to its simplicity, but it may not be evidence driven. Alternatively, the performance-oriented approach often starts with the outcome data, such as test scores or other measures of academic performance, and bases the analysis on empirical observations.

Most research in Ohio uses “successful schools” to conduct adequacy estimation, in which only schools that meet certain criteria are included in the analysis. In the first Ohio “adequacy” study, an expert panel deemed successful standards to be the performance of students on proficiency tests for 9th and 12th grades, as well as specific dropout rates (Alexander et al., 1995). A more

¹² http://obm.ohio.gov/Budget/operating/doc/fy-16-17/OBM-TAX_letter_TPP_replacement_payment_phase-out.pdf

recent study excludes school districts that fail to maintain more than 93% attendance rate and less than 3% dropout rate (Sweetland, 2015). Nevertheless, “failing schools” often face challenging socioeconomic conditions. Adequate funding based on the experience of “successful schools” may not be sufficient for “failing schools” as students from disadvantaged backgrounds often require much more resources to catch up with their advantaged peers.

We use a different approach to estimate the adequate level of funding for K-12 education in Ohio. Using data for all 610 local school districts^{13,14} in Ohio from 2010 to 2017, we estimate a “production function” (statistical regression) in which the academic performance of each school district measured by a “Performance Index” (PI)¹⁵ is the “output,” while impact factors, such as total expenditures, share of students with limited English proficiency, shares of three minority groups, and share of students in poverty are treated as “inputs” to predict differences in academic performance across school districts. We also include special indicators for each school district (fixed effect) to represent district specific characteristics not explained by those impact factors (“inputs”). The merit of this approach is that we utilize data for all districts and consider the variation in student demographics of each district—though we acknowledge that these are imperfect factors but data availability and comparability of importance to the state funding formula drove us to use these factors. We evaluate the effects on PI (“output”) of these characteristics (“input”), other than spending, and then calculate how much funding a district would need to achieve the required PI.

Table 2 shows that per-pupil total expenditures are not the most impactful factor correlated with the performance index. Holding other factors constant, an increase of one standard deviation in per-pupil expenditure is correlated with 0.36% increase in Ohio’s Performance Index (PI), or alternatively a \$1,000 increase in per-pupil expenditure associates with an uptick of 0.2% in PI. Money is not the only solution, but it provides a baseline to understand how much funding a district needs to educate its students, conditional on other factors. Indeed, demographic factors are more important. Districts populated with African American students, usually in disadvantaged school environments, or from families in poverty, require more financial resources on average to achieve the same academic standard as their peer districts with larger shares of white and affluent student populations.

¹³ Although we focus on the adequacy and equity among local school districts in Ohio, the per-pupil funding gap between traditional public schools and charter schools in Ohio is also important. See Rembert et al. (2016) for more detailed discussion of Ohio’s charter schools.

¹⁴ Due to missing data, the actual number of districts used in our analysis is 607 in 2017.

¹⁵ Performance Index (PI) is a measure of school district performance. ODE gives points to each district for the achievement of their students, and then converts total points earned by a district into percentage to assign the letter grade, A (90%-100%), B(80%-89.9%), C(70%-79.9%), D(50%-69.9%) and F(<50%). Despite its limitations (e.g. including untested students), it is the most comprehensive measure of performance often used by policymakers. For details regarding the calculation of PI, see ODE’s website <http://education.ohio.gov/Topics/Data/Report-Card-Resources/Achievement-Component>.

Table 2. Correlation with Performance Index (%)¹⁶

Per-Pupil Total Expenditure (in Thousand Dollars)	0.2
% Student in Poverty	-3.7
% Student w/ Limited English Proficiency	-19.6
% African American	-19.6
% Hispanic	-25.0
% Asian	44.0

Figure 8, Correlation between District Special Indicator and Performance Index

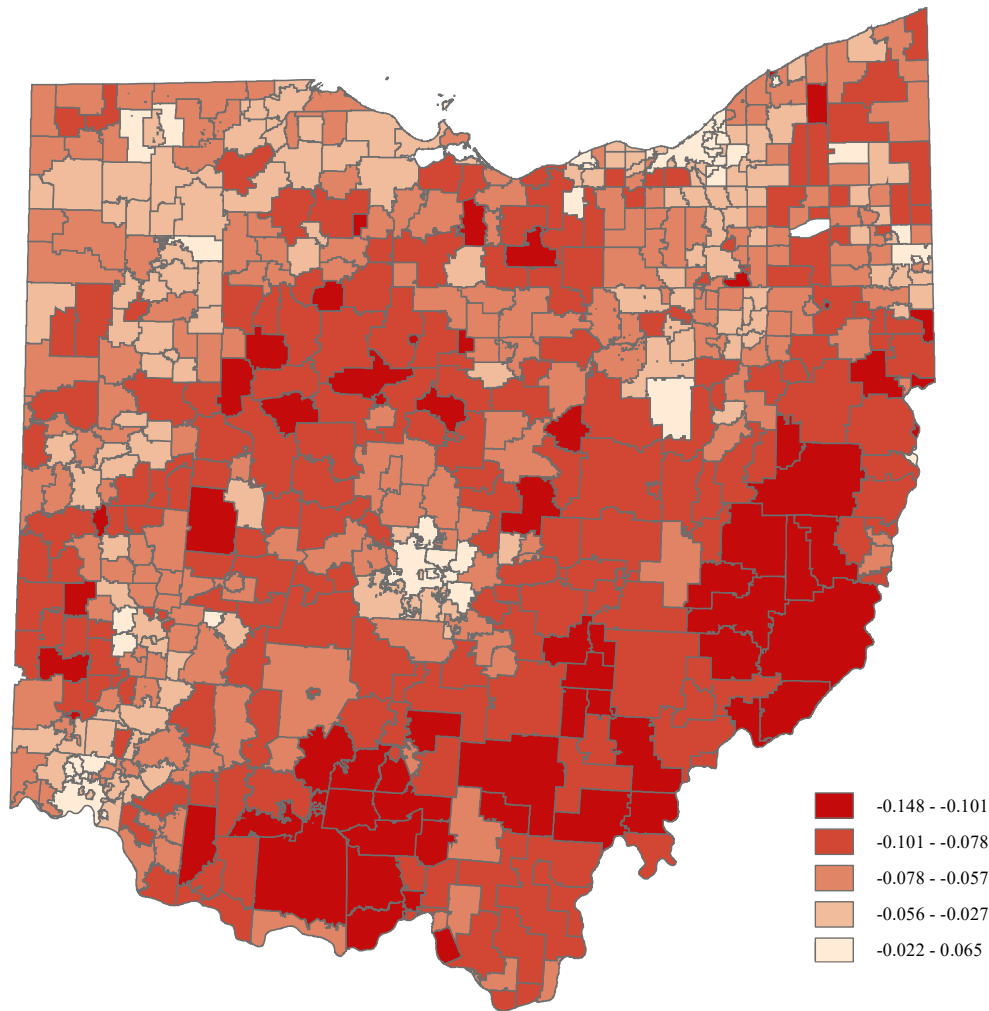


Figure 8 shows how much unobserved district characteristics (as a bundle) *not* reflected by our selected factors (“inputs”) are correlated with their PIs. The unobserved district component is

¹⁶ These numbers are derived from a regression model. A simple correlation between total per-pupil spending and academic performance index is -0.23, but it only means low performing districts spend more on per-pupil basis. After accounting for factors that require districts to spend more, e.g. more students in poverty, we then get a positive correlation between expenditures and academic performance.

one measure of how the district is doing compared to others *after* accounting for demographic and income characteristics—i.e., is the districting under- or over-performing. Urban districts often have higher shares of student demographics that are negatively correlated with PI, particularly African American students, Hispanic students, students in poverty and students with limited English proficiency. **When controlling for the effects of these students, urban districts perform much better. In rural districts, however, especially those in Appalachia, this is not the case. Performance is low even after controlling for these other factors.**¹⁷ As higher shares of students in rural districts are white and English-speaking, this leads us to conclude that students in urban areas fare better than their rural counterparts due to unobserved characteristics of those districts.

Adequacy Gap in Ohio School System

An important criterion in adequacy research is the standard at which funding is considered “adequate.” Here, we use a PI with four levels of academic performance (A, PI above 90%; B, PI 80%-89%; C, PI 70%-79%; D, PI 60%-69%) as benchmarks to assess whether current spending levels are “adequate” and if not, how much revenue is needed to achieve the targeted performance level. If actual spending of a district is less than the expected spending to achieve one letter grade, we treat this district as having a funding gap.

According to our estimation (Figure 9), the number of districts with funding gaps using “D” grade as the standard increased from 0 in 2011 to 34 in 2017, meaning 34 school districts in 2017 did not receive enough funding to help them achieve a “D” passing grade.¹⁸ The number of students affected in those districts were 329,742 in 2017, although it has decreased since 2015. There are many causes of why these districts fail to meet the minimum standard of performance, but inadequate funding appears to be one reason.

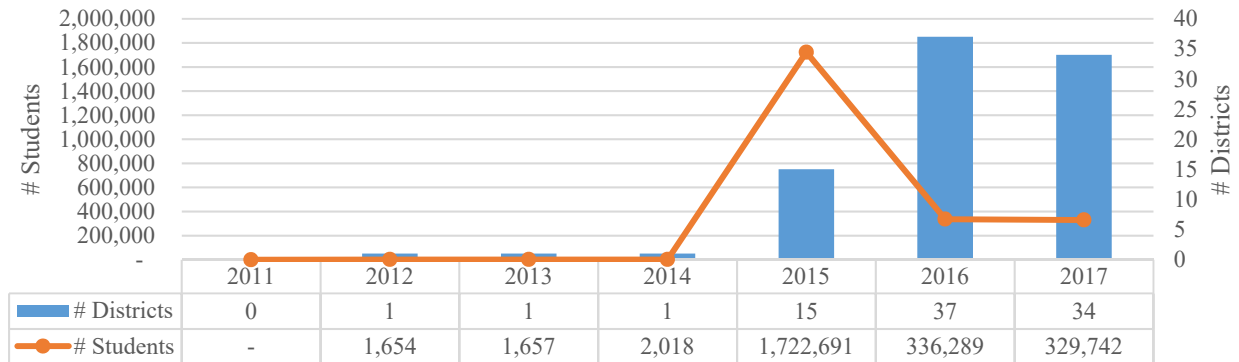
As shown in Figure 10, if the passing grade (60%) is the standard for Ohio districts, the majority of districts had sufficient financial resources to meet their educational needs in 2017. Only 37 out of 607 districts were below the level of funding adequacy, and most are urban school districts. However, the total funding needed to fill the gap amounts to \$10.6 billion per year, as each student in an underfunded district requires \$32,251 to catch up with their peers. This gap is more population of disadvantaged students who are in urban districts (Table 3). Large sums are needed to level the playing field for districts with students who were born to families with financial disadvantages. Given the so-called economic law of “diminishing returns to scale,”¹⁹ if money is the only resource, the actual financial input may be much bigger than estimated here.

¹⁷ The bundle of unobserved district characteristics may include teacher qualifications, community attitudes toward education and long lasting historical effects that we do not account for due to lack of data.

¹⁸ Following conventional wisdom, we use 60% of the PI as the acceptable “passing grade,” although ODE chooses 50% of PI as the passing standard, under which only 3 school districts (27,885 students) would have needed more funding in 2017.

¹⁹ Meaning output will increase by less than the proportional increase in inputs.

Figure 9, Districts and Students in Funding Gap for Grade “D” (60%)



What would happen if we do not limit our expectation to a passing grade? According to our estimation, 150 districts would lack funding to achieve a grade C (70%) and 497 districts would demand more for a grade B (80%). Only two districts in 2017 met the required level of financial input for grade A (90%).²⁰

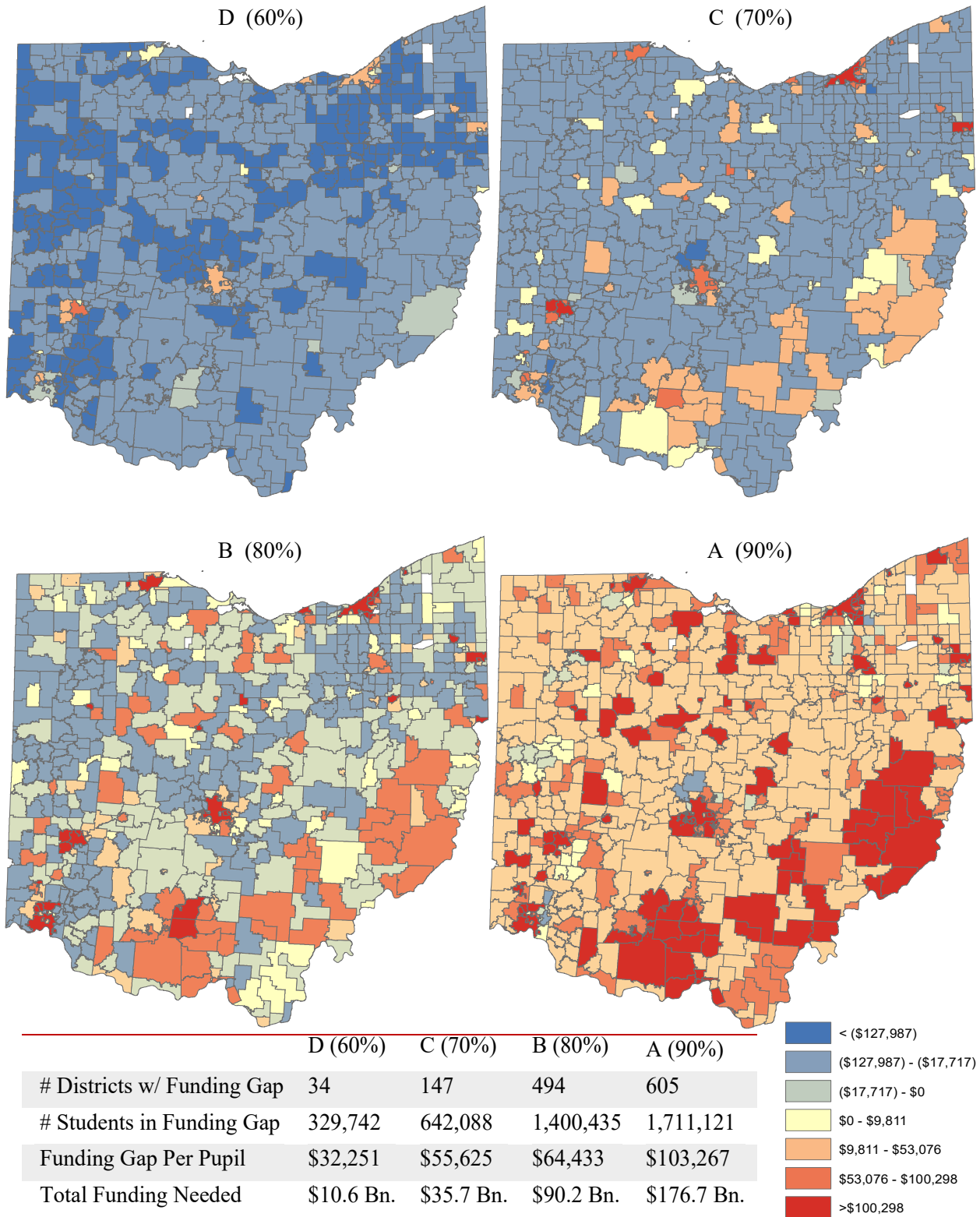
Table 3. Top 10 School Districts in Adequacy Per-Pupil Funding Gap

District	County	D (60%)	C (70%)	B (80%)	A (90%)
Warrensville Heights City	Cuyahoga	\$ 66,600	\$ 120,948	\$ 175,296	\$ 229,644
East Cleveland City	Cuyahoga	\$ 62,966	\$ 117,314	\$ 171,662	\$ 226,010
Dayton City	Montgomery	\$ 56,423	\$ 110,771	\$ 165,119	\$ 219,467
Cleveland Municipal	Cuyahoga	\$ 51,925	\$ 106,273	\$ 160,620	\$ 214,968
Trotwood-Madison City	Montgomery	\$ 51,210	\$ 105,558	\$ 159,905	\$ 214,253
Youngstown City	Mahoning	\$ 48,441	\$ 102,789	\$ 157,137	\$ 211,484
Lockland City	Hamilton	\$ 46,356	\$ 100,704	\$ 155,052	\$ 209,399
Lorain City	Lorain	\$ 36,070	\$ 90,418	\$ 144,766	\$ 199,114
Columbus City	Franklin	\$ 33,524	\$ 87,871	\$ 142,219	\$ 196,567
Maple Heights City	Cuyahoga	\$ 32,371	\$ 86,719	\$ 141,066	\$ 195,414

*These figures represent extra annual per-pupil funding needed to help each district achieve corresponding grades.

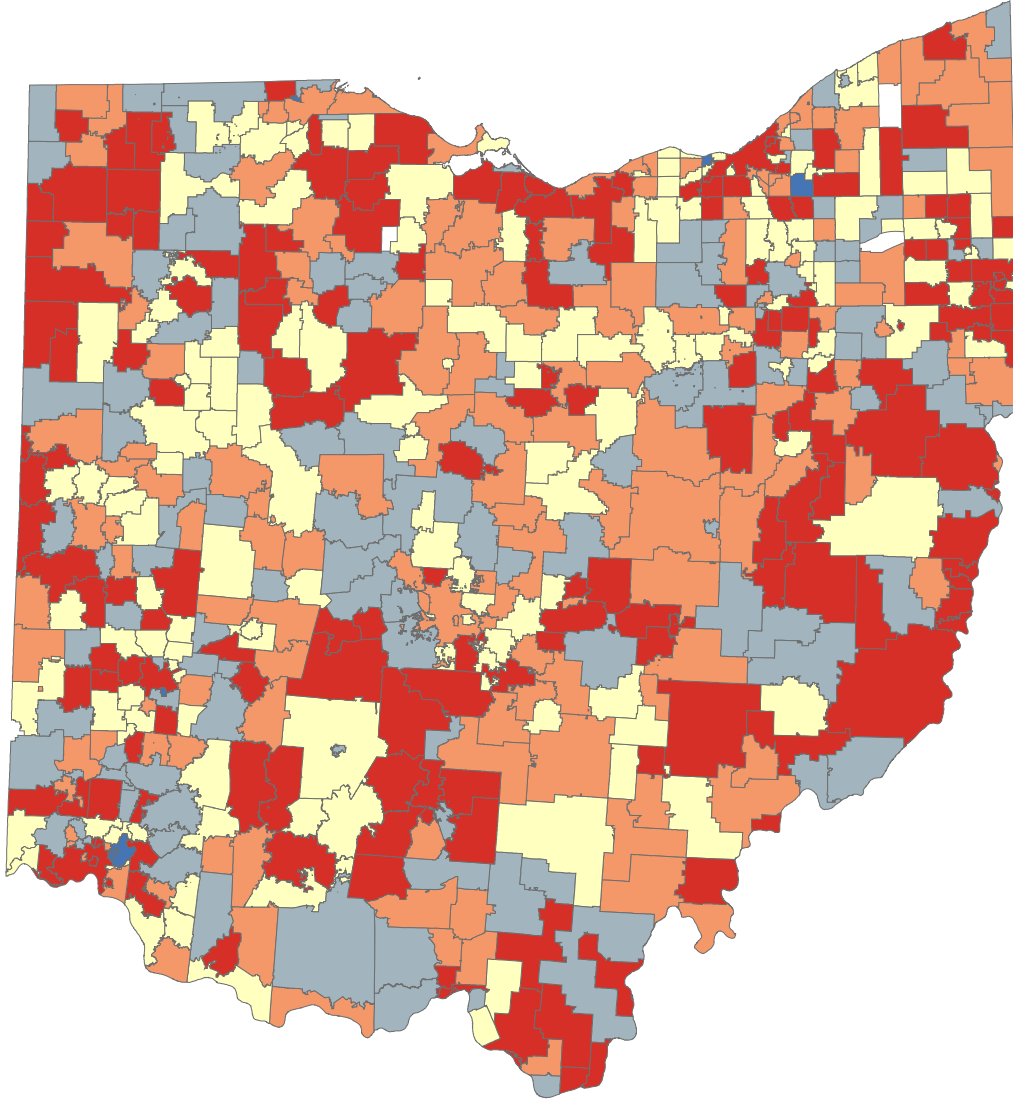
²⁰ Another 4 districts also graded A by ODE, as they had outperformed against their expenditure level. See discussion on page # for details.

Figure 10. Ohio Adequacy Gap by Performance Index (2017)



We also estimate the cost for all districts to move up on the performance index by one letter grade (Figure 11). Other than the six districts that already achieved an A grade, it would cost 111 districts another \$13 billion to move from “B” to “A,” \$20.2 billion for 347 districts from “C” to “B,” and \$7.4 billion for 113 districts from the passing grade to “C” on an annual basis. The total number would be \$51.3 billion for all districts to achieve one higher letter grade.

Figure 11, Extra Funding Needed for Districts to Move Up by 1 Letter Grade (2017)



	F to D	D to C	C to B	B to A	All
# Districts	34	113	347	111	605
# Students	865,337	1,942,077	3,701,580	4,621,467	11,130,460
Total Funding Needed	\$10. 6 Bn.	\$7.4 Bn.	\$20.2 Bn.	\$13.0 Bn.	\$51.3 Bn.

*Negative number means a district has already achieved grade A and still has extra funding to further help its students.

Using the same model, we calculate the predicted performance of each school district based on their current funding level and other educational “input” (e.g. demographics), and compare their predicted performances with their actual performances (Figure 12 and Table 4). In 2017, 25 districts failed to achieve the academic performance given their funding levels as well as other predetermined “inputs,” whereas 15 districts outperformed against their funding levels (Table 4).²¹ We are unable to identify the specific reasons why some districts perform better or worse against their actual funding levels, but further case studies on those “successful” and “unsuccessful” districts would shed light on how to use public funding more efficiently. Nonetheless, while funding matters, it is clear that other factors, that are also probably related to funding, matter more.

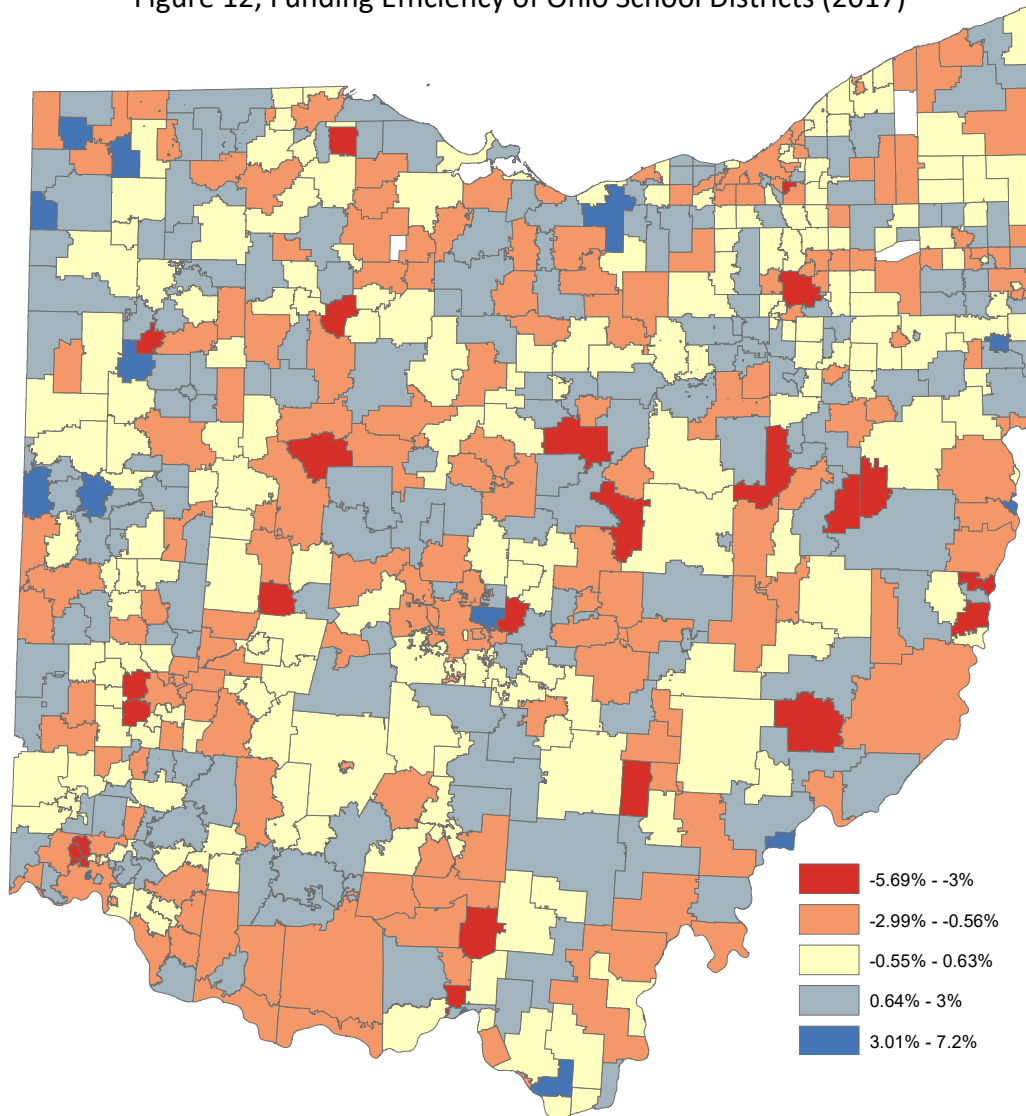
Table 4. Bottom 10 and Top 10 Districts in Funding Efficiency.

Top 10		
District	County	% Diff. btw. Pred. Performance & Actual Performance
New Boston Local	Scioto	7.2%
Firelands Local	Lorain	7.1%
Montpelier Ex Vill	Williams	6.9%
Dawson-Bryant Local	Lawrence	4.8%
Steubenville City	Jefferson	4.8%
Hicksville Ex Vill	Defiance	3.9%
Marion Local	Mercer	3.9%
Stryker Local	Williams	3.8%
Gahanna-Jefferson City	Franklin	3.5%
St Bernard-Elmwood Place City	Hamilton	3.4%
Bottom 10		
District	County	% Diff. btw. Pred. Performance & Actual Performance
Garaway Local	Tuscarawas	-5.7%
Martins Ferry City	Belmont	-5.1%
Jefferson Township Local	Montgomery	-4.9%
Nelsonville-York City	Athens	-4.7%
East Knox Local	Knox	-4.7%
Trotwood-Madison City	Montgomery	-4.7%
Maple Heights City	Cuyahoga	-4.5%
Claymont City	Tuscarawas	-4.4%
Conotton Valley Union Local	Harrison	-4.4%
Clay Local	Scioto	-4.2%

*Data source: ODE

²¹ We only include districts outperformed or underperformed their predicted PIs by more than 3%, as less than 3% is within the range of error.

Figure 12, Funding Efficiency of Ohio School Districts (2017)



*Percentage here means how much a district has over-performed or underperformed against its predicted PI based on its current expenditure level. A positive percentage signals the district has achieved a better performance index than what is predicted based on its expenditure and other socioeconomic factors. The opposite is true for negative percentages. We recommend that attention be paid to districts with a performance below -3% (color red) or above 3% (color blue) the predicted level, as -3%~3% is within the range of error.

V. The Equity of Ohio School Funding

While the concept of “adequacy” only concerns whether students have enough financial resources, “equity” addresses whether they receive their fair share. Table 5 provides traditional measures of funding equity. Restricted Range is the difference between per-pupil spending of districts at 5th percentile and that of districts at 95th percentile, whereas Federal Range Ratio is the spending of districts at the 95th percentile divided by the Restricted Range. Although there has been changes in these two measures along with formula adjustments, Ohio did record the

lowest Federal Range Ratio in 2017, meaning the funding disparity measured by the difference between 5th and 95th percentile is slightly better than when Governor Kasich came into office. McLoone Index is the ratio of total amount spent on students below the median and the amount needed to grant to all students in the bottom half to reach the median spending level. The index remains relatively the same, suggesting that the resources concentrated in the bottom half relative to the median have not been changed over the years. The last indicator is Wealth Neutrality Score, a correlation between the total funding received by a district and the local property value. The significant decline in the score from 0.6 in 2011 to 0.29 in 2017 indicates that Ohio districts are increasingly relying less on local wealth to finance education. In other words, the state has been shouldering more responsibilities of school funding.²²

Table 5. Per-Pupil Funding Statistics and Major Equity Measures

	2011	2012	2013	2014	2015	2016	2017
# Districts	609	607	609	609	607	606	607
Mean	\$9,962	\$9,972	\$9,826	\$10,456	\$10,466	\$10,688	\$11,166
Median	\$9,568	\$9,599	\$9,450	\$10,031	\$10,095	\$10,352	\$10,824
Stdev	\$1,826	\$1,850	\$1,799	\$1,882	\$1,838	\$1,809	\$1,904
5 th Percentile	\$8,052	\$7,962	\$7,805	\$8,358	\$8,427	\$8,560	\$8,944
95 th Percentile	\$13,484	\$13,634	\$13,413	\$14,094	\$13,692	\$14,122	\$14,364
Restricted Range	\$5,432	\$5,672	\$5,608	\$5,736	\$5,264	\$5,561	\$5,419
Federal Range Ratio	0.67	0.71	0.72	0.69	0.62	0.65	0.61
McLoone Index	0.92	0.90	0.92	0.92	0.91	0.91	0.91
Wealth-Neutrality Score	0.60	0.55	0.44	0.46	0.41	0.33	0.29

*Data source: ODE

In addition to these traditional measures of funding equity, we provide more information concerning both equity and adequacy in school funding. Following Steinberg and Quinn (2015), we calculate the ratio of adequacy gap over actual spending of each school district in 2017. This ratio (“EQ” ratio by Steinberg and Quinn, see Table 6 and footnote 21) delivers information from both adequacy and equity aspects.²³

²² Local school districts also receive funding from the federal government, but the federal contribution was only 6.5% of the total funding in 2017, and has been declining for years.

²³ If Ohio’s funding system is both adequate and equitable, we will have EQ ratio equal to zero for all districts; if the system is inadequate but (absolute) equitable, EQ ratios for all districts would be the same and bigger than zero; if the system is adequate but inequitable, EQ ratios would be bigger than zero for all districts and at least two districts have different EQ ratios; if the system is inadequate and inequitable, EQ ratios would larger than zero and at least two districts would have different EQ ratios (see Table 6 for detailed description).

Figure 13. Ohio “EQ” Ratio by Performance Index (2017)

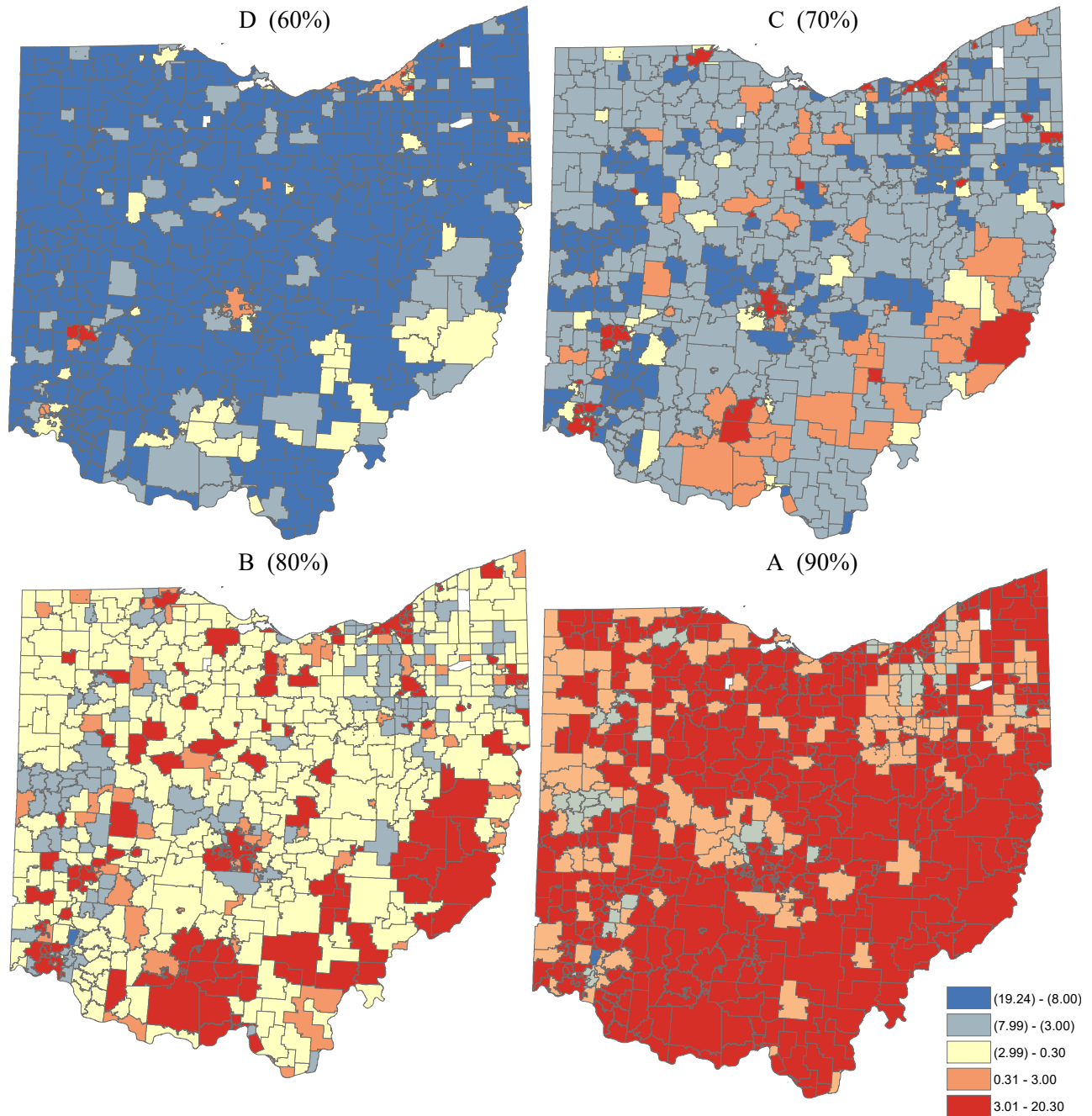


Figure 13 shows that the current K-12 Ohio funding system is neither adequate nor equitable. For the system to be adequate, the “EQ” ratio should equal zero or be negative, while for it to be equitable, we should see most school districts with the same or similar “EQ” ratios (Table 6), reflected by more districts with the same color (Figure 13). Lowering performance standards may help with adequacy issues (more districts with the same color), but the funding level, especially conditional on district-specific characteristics, is far from equitable regardless of performance standards we choose. Two districts may both have sufficient levels of funding, but one could have 19.24 times more than what is needed to secure a passing grade, while others may barely make ends meet.

Table 6. “EQ” as a Measure of Adequacy and Equity

	Adequate	Inadequate
Equitable	$EQ_i = 0$ for all i districts	$EQ_i > 0$ for all i districts $EQ_i = EQ_j$ for all $i \& j$ combinations
Inequitable	$EQ_i < 0$ for all i districts $EQ_i \neq EQ_j$ for at least one $i \& j$ combination	$EQ_i > 0$ for all i districts $EQ_i \neq EQ_j$ for at least one $i \& j$ combination

* Modified from Steinberg and Quinn (2015)

VI. Conclusion and Policy Discussion

Through this policy brief, we provided a comparison of the funding situation in Ohio and other states in the nation and elaborated on the differences across districts in Ohio with our estimated adequacy gap and measure of equity. Ohio has developed a funding system leaning toward student needs and has become one of the most progressive states in term of school funding. While we applaud the state’s effort to promote equal opportunities for all students, there is still a long way ahead to achieve funding adequacy and equity across Ohio school districts. Nonetheless, Ohio and its political leaders deserve credit for increasing its real funding after inflation more than most U.S. states and for being in the top-third in terms of per-capita local spending for education.

The state altogether has recovered from the Great Recession, but we find over 200 school districts are below 2008 funding levels (after adjusting for inflation). Once conditional on districts’ specific characteristics, like poverty rates and racial composition, more than 300,000 students are in need of extra funding to reach the minimum academic standard (60% PI).

It is equally important to recognize that improvement of the funding situation would depend on both state economic growth (or tax revenue growth) and the priorities of policymakers and administrators who are facing multiple challenges such as the opioid crisis. There is not a silver

bullet for this problem. But we believe Ohio can strengthen its school funding policy in several ways:

Resolve Conflicts in Legislations and Reevaluate Funding Scheme

It has been a mystery to many that the conflict between state tax law and school finance legislation has persisted, but the state share of funding. In the 1970s, House Bill 920 limited the amount of revenue local school districts could receive from property value appreciation. Its aim was to protect Ohio home owners from double-digit inflation. However, the state funding formula assumes districts benefit from the extra revenue due to property appreciation and reduces the state's share accordingly. Despite a temporary effort in 2010, there has been no concrete plan to resolve this legislative conflict despite an increasing demand for eliminating so-called phantom revenue.²⁴

One area where the state can alleviate the pressure would be to recognize local shares by their actual local revenue received in the state formula, given the difficulties in amending tax legislations. Such adjustment would likely result in an increase in the state education budget, but provide students with adequate funding that would certainly require this conflict to be resolved before any fundamental changes can be made to the funding scheme.

The state deserves credit for its constant improvements in the funding formula, but the formula has also become increasingly complicated and erratic across budget years for local school officials' decision-making. Special grants along with caps and guarantees further exacerbate these issues (Schiess et al., 2017). While the formula tries to take care of disadvantaged groups, the appropriate funding amount is often based on vague numbers rather than evidence-based approaches.

The state should reevaluate its funding scheme and justify its appropriation to each school district with empirical evidences. The Ohio Department of Education has accumulated decades of rich data which can be used to conduct more thorough analyses on how much funding a school district would need conditional on its own socioeconomic characteristics. As we have documented, disadvantaged students require more resources to match the academic performance of their less disadvantaged peers. This fact should be carefully considered in the formula, even if a return to the Evidence-Based Model is not politically possible. In addition, the state should not be satisfied with a lowered academic standard (50% PI as the passing grade), which would only improve the adequacy on paper, but dangerously disguise the ballooning inequity among the haves and the have-nots.

²⁴ <https://www.ohioschoolboards.org/sites/default/files/18LegislativePlatform.pdf>

Enhance Education Investment

Education spending is an investment expenditure that generates future value for the whole economy. Academic research has long found a strong tie between human capital and a state's economic growth (Reed, 2008). Investing in education is among the most important ways to boost human capital

It is always the concern of local policymakers that investing in education would be in vain if students left their local communities for better opportunities elsewhere. But even if there is a “brain drain” for post-secondary investment, improving K-12 education would strengthen the growth of local economy through an increase in both quality and quantity of local labor supply. It would encourage former students as young adults to remain in the state (Cho et al., 2015), and also increase the labor supply of parents who could spend less time on parenting and more on other productive activities (Bartik, 2014). Good schools also attract highly educated parents who are interested in the quality of education for their children. Since these people can locate anywhere, good schools enhance the local economy.

Other than the direct impact on the economy, more education investment, especially for public schools, benefits local social mobility as well, because it helps level the playing field for those from disadvantaged backgrounds (Feng and Partridge, 2018). Many believe that the high social mobility in Great Plains states (Chetty et al., 2014) are at least partially due to their long-standing tradition of investing in their public schools.

Yet, like most investments that do not produce immediate benefits, education budgets are always a soft target for cutback threats during tough years. To cope with the Great Recession, the majority of states chose to divert resources away from education system, which began the subsequent decade-long funding inadequacy that adversely affected human capital which underpins the foundation of state and local economies. Knowing its importance, not many states have held education to a pivotal position in their vision of future development. It might be the time to rethink the nature of education, not only seeing it as a right or an expense, but rather a major investment that would lead to economic and social prosperity in the future. We need to think more strategically in terms of growing the local economy and playing the long game by investing more in education.

²⁵ Recent research finds students tend to stay in the state where they attend college (Winters, 2017).

²⁶ This is especially true for the case of early childhood investment, such as free childcare and parenting programs. See Bartik (2014) for details.

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