Effectiveness And Efficiency Of Kentucky School Districts

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Foreword

KRS 157.310 states that it is the intention of the General Assembly to provide an efficient system of public schools as prescribed in the Kentucky Constitution and to assure substantially equal public school educational opportunities for students. KRS 158.645 delineates the capacities the General Assembly intends all students to acquire within the public education system. This study conducts a longitudinal analysis of Kentucky school expenditures and outcomes associated with student academic and postsecondary success. Education expenditures are examined at the state and district level. Elements include, but are not limited to, student assessment data, graduation rates, staffing, and postsecondary indicators of success taking into account student and district characteristics.

Office of Education Accountability staff would like to acknowledge the assistance of many individuals whose cooperation and expertise contributed to this report. Professors Dr. Michael Clark, Dr. Ronald Zimmer, and Dr. JS Butler at the University of Kentucky were instrumental in providing advice and technical expertise in the methodology used in this report.

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Overview of Report

The Kentucky General Assembly, like legislatures across the nation, must provide school funding sufficient to support the state's educational goals for all students. It must also consider school funding amounts in light of other budget priorities and be mindful of some taxpayers' concerns about rising costs and questions about whether school funds are being used effectively. This study uses lessons learned from existing research on effectiveness and efficiency in education to analyze differences in educational spending and outcomes among Kentucky's 171 school districts and between Kentucky and the nation.

Among other questions, the study seeks to understand:

- how Kentucky's education spending and outcomes compare with the nation;
- which factors explain spending differences among Kentucky districts;
- the relationship between district spending and student outcomes; and
- characteristics of districts that are relatively more or less effective at impacting student outcomes.

Data

Data used for this report come primarily from the Kentucky Department of Education (KDE). Staff analyzed KDE data that include student outcomes; student demographic characteristics and program eligibility; district per-pupil spending; district personnel; and teacher working conditions as reported by teachers in KDE's biennial survey of all certified educators.[a] In addition, staff analyzed data from the National Assessment of Educational Progress; the National Center for Education Statistics; the American Community Survey; and the Kentucky Center for Statistics.

Methods

The report compares Kentucky and national spending and reading and mathematics achievement over time and in 2022. The Kentucky district analysis uses reading and mathematics data from the 2018, 2019, and 2022 school years to analyze district effectiveness and its relationship with spending. [b] District effectiveness is calculated based on "impact" scores that compare the performance of students in each district with demographically similar students across the state.[c] Effectiveness categories of individual districts are generated for research purposes only and are not reported for individual districts. [d]

[a] In this report district per-pupil spending reflects current per pupil spending.

[b] Due to the COVID-19 pandemic, no assessment data were available for the 2019-2020 year and assessment data for 2020-2021 school year were incomplete.

[c] This approach is standard among efficiency researchers and has been used by organizations representing a variety of education policy perspectives.

[d] The impact analysis provides data that are important for interpreting the relationship between spending and outcomes for districts overall. As noted in the report, however, the methodology has limitations which in some cases

In addition to district effectiveness and spending, the report analyzes characteristics of relatively more and less effective districts using data available for all districts in areas such district size, district geographic dispersion, labor markets, salaries, teacher working conditions, and numbers of certified and classified staff.

Findings of the report based on district effectiveness as measured by impact are also true for district effectiveness as determined by actual, unadjusted reading and mathematics scores. District data used in this analysis are from as far back as 2018 and may be outdated for some districts. At the district level, findings from this analysis can be most appropriately used to interpret current district performance using updated data available on the KDE website and in OEA's District Data Profiles.[1]

Summary of Findings

Overall, the report finds that Kentucky's spending and student outcomes make it neither much more nor much less efficient and effective, on average, than other states. Among Kentucky district's, OEA found very little relationship overall between district per-pupil spending and district effectiveness at impacting reading and mathematics achievement and great differences in effectiveness among districts, independent of spending. Of the data available for this report, OEA found that teacher working conditions and teacher turnover are critical factors associated with district effectiveness. The report also found that small districts of 1,000 students or less experience challenges related to efficiencies of scale that are beyond administrators' control and may negatively affect student achievement in some districts.[e]

Spending And Outcomes In Kentucky And The Nation

Between 1990 and 2015, both revenue and student achievement increased in Kentucky relative to the nation. Despite increases over time, Kentucky's per-pupil spending has continued to lag the nation's, however. Although spending levels were relatively stable, student reading achievement in Kentucky and the nation began to decline in 2015 and, following the COVID-19 pandemic, achievement in reading and mathematics dropped steeply.

Both Kentucky's per-pupil spending and its student achievement in reading and mathematics are slightly below the nation's. While comprehensive analyses of spending and outcomes among US states have not been published, available data suggest that student outcomes in Kentucky compared with the nation, relative to its spending, are neither much more nor much less than would be expected from such an analysis.

might represent individual districts in relatively more positive or negative terms. The impact analysis is not intended as an alternative means of ranking districts .

[e] For analytic purposes, this report considers small districts to be those with 1,000 or fewer students. Many of Kentucky districts above that threshold would still be considered small by national standards.

Spending Differences Among Kentucky Districts

In the 2018, 2019, and 2022 school years, average district per-pupil spending ranged from a low of just under $11,000 to a high of over $24,000. The overwhelming majority of districts (92 percent) were in a narrower range between $11,000 and $15,000.

Differences in per-pupil spending among districts reflect differences among districts in sources of revenue. These are explained largely by differences among districts in student populations; property wealth; and local tax rates.

Spending And Student Outcomes In Kentucky School Districts

Data from the 2018, 2019, and 2022 school years show that district per-pupil spending is negatively associated with districts' actual reading and mathematics scores. On average, as district per-pupil expenses increases, reading and mathematics performance decreases. This trend is explained, in part, by the fact that higher-spending school districts, on average, have higher percentages of economically disadvantaged students and students eligible for special education services. In Kentucky and in every US state, these populations have lower reading and mathematics achievement than all students.

After statistically adjusting for student and community characteristics, staff found very little relationship overall between district per-pupil current spending and districts' impact on reading and math outcomes; similarly spending districts differ greatly amongst each other in their impact on students' reading and mathematics achievement. Even after adjusting for differences in student populations, however, highest-spending districts were more likely to be in lower impact categories than other districts.

Districts Characteristics Associated With Effectiveness

Small Size. Small districts are present in every impact category—they are among the state's highest- and lowest- impact districts. Small districts are, however, 1.5 times more likely than other districts to be in lower- versus higher-impact categories. Smaller districts, on average, spend a lower percentage of available revenue on instructional services than do other districts. National research indicates that small districts are more costly to operate than other districts. They face challenges related to efficiencies of scale that are beyond administrator's control. Depending on the revenue they receive, some small districts may have difficulty affording instructional services and supports available to students in other districts. Small districts that face additional challenges such as geographic dispersion or higher labor market costs may be especially challenged.

Most (28 out of 38) of Kentucky's small districts are independent school districts (ISDs) whose boundaries are not defined by county lines. Of Kentucky's 171 districts, 51 are ISDs. While most

(28) of ISDs are small, membership in the remaining ISDs range as high as 5,000 and exceed membership in many county districts. [f]

Teacher Turnover. On average, lower- versus higher-impact districts have higher teacher turnover rates and less experienced teachers. Lower-impact districts are more than ten times as likely to have higher teacher turnover rates of 15 percent or more than are higher-impact districts (39 percent and 3.6 percent, respectively). Districts paying relatively less competitive wages—especially those districts located in higher-cost labor markets—experience greater turnover than other districts.

Teacher Working Conditions. Districts in lower impact categories are over five times more likely than higher-impact districts to have relatively less favorable teacher working conditions as reported by teachers on KDE's biennial working conditions survey (67 percent and 13 percent, respectively). Differences among higher- and lower-impact districts were greatest on questions related to school climate; feedback and coaching; and school leadership.

Conclusions

Findings of the report related to small districts; higher teacher turnover; and less favorable teacher working conditions present clear barriers to effectiveness and efficiency in the state. Addressing these challenges may take actions by the General Assembly, local leaders and local communities. As noted in KRS 158.645, public education involves shared responsibilities and

> [s]tate government, local communities, parents, students and school employees must work together to create an efficient school system…The cooperation of all involved is necessary to assure that desired outcomes are achieved.

Small Districts

As noted in the report, small districts are among the state's highest and lowest impact districts. The fact that small districts are more likely than other districts to be in lower-impact categories may reflect challenges related to efficiencies of scale that lie beyond administrator's control. Local communities as well as the General Assembly might take action to address these challenges.

Potential Of ISDs To Merge With County Districts. Small ISDs that are struggling to generate revenue sufficient to support their costs have the option to request merger with the larger county district in which they are located.[g] OEA's "Kentucky's Independent School Districts: A Primer" describes the process by which this may occur in detail.[2]

[f] As noted in the report small districts that are ISDs, on average, have similar district impact scores as small county districts. On average, ISDs that are not small have higher district impact scores than county districts that are not small.

[g] Students' reading and mathematics performance data alone may not be sufficient to inform such decisions as they do not capture many important outcomes that might matter to local voters and boards.

Additional Funding For Small Districts. Under current law, the ten small districts that are county districts do not have the option to request merger. The General Assembly may wish to consider providing small districts—many of which are also geographically dispersed—with additional funding through the Support Educational Excellence in Kentucky (SEEK) formula. Such a consideration should be informed by data beyond the data provided in this report for small Districts of 1,000 or under. Research suggests that challenges related to efficiencies of scale may also affect districts beyond that threshold. An external study might recommend thresholds and associated funding weights for districts that are considered small or dispersed. [3]

Teacher Turnover And Working Conditions

Data presented in the report shows that district effectiveness varies independent of spending and is associated with factors such as teacher working conditions and competitive salaries over which local leaders and communities have influence. Actions taken by local boards and district leaders—especially those that target resources to support teacher working conditions or relatively competitive salaries—may have made some similarly-spending districts more successful than others at providing students with a stable, experienced, effective teacher workforce.

Local leaders may ultimately be limited in their ability to retain and support teachers, however, if they lack sufficient revenue to ensure that teacher salaries and benefits keep pace with labor market demands or that teachers are provided with whatever additional supports might be associated with favorable working conditions. When considering budget allocations to support SEEK funding, the General Assembly may consider the degree to which increases in SEEK funding over time are sufficient to allow local districts to keep pace with changing labor market demands.

[1] Kentucky. Legislative Research Commission. Office of Education Accountability. *Kentucky's Independent School Districts: A Primer*. Research Report No. 415 September, 2015. Web.
[2] Kentucky. Legislative Research Commission. Office of Education Accountability. *Kentucky District Data Profile, School Year 2022*. Research Report No. 482 July, 2023. Web; Kentucky. Department of Education School Report Card. n.d. KDE. Web; Kentucky. Impact Kentucky. *2022 Impact Kentucky Working Conditions*. n.d. Web.
[3] Lori Taylor et al. "A Study on Geographic Education Cost Variations and School District Transportation Costs" Texas A&M University. Jan., 2021; Tammy Kolbe et. al. "Pupil Weighting Factors Report" Report to the House and Senate Committees on Education, the House Committee on Ways and Means. Updated, Jan, 2020, p. 11.

Chapter 1

Introduction And Overview

Like legislatures across the nation, the Kentucky General Assembly must balance considerations of school funding with other priorities. Policymakers must provide school funding sufficient to support the state's educational goals for all students while also ensuring that state revenue is available to support other priority programs. In addition, policymakers face concerns of some taxpayers that tax revenue not exceed what is necessary and that school funds be used effectively.

As the cost of education in the nation increased in the last decades of the twentieth century, so did concerns from policymakers and taxpayers about whether increased spending was helping to improve student outcomes and whether funds were being spent efficiently. Decades of educational research on effectiveness and efficiency followed these concerns.

While school districts account for a relatively small amount of variation in student outcomes compared with schools and classrooms, they are the primary focus of effectiveness and efficiency studies because they are the administrative unit through which revenue flows.[a] [1] Research on school districts' effectiveness and efficiency, while leaving many questions unanswered, have identified important factors that must be taken into account when analyzing the relationships between spending and outcomes.

This study uses lessons learned from existing research on effectiveness and efficiency in education to analyze differences in educational spending and outcomes among Kentucky's 171 school districts and to present available data on spending and outcomes among US states and between Kentucky and the US over time.

Among other questions, the study seeks to understand:

- how Kentucky's education spending and outcomes compare with the nation;

[a] A 2013 10-year study of school districts in North Carolina and Florida found that 59 percent of variation in school district performance was associated with unexplained student-level factors. Of the factors that could be explained, 31.4 percent were explained by student-level controls, such as economic disadvantage or race. Of the factors under educators' control, 6.7 percent was explained by teachers, 1.7 percent was explained by schools, and only 1.1 percent was explained by districts.

- which factors explain spending differences among Kentucky districts;
- the relationship between district spending and student outcomes; and
- characteristics of districts that are relatively more or less effective at impacting student outcomes.

Description Of This Study

Study Request

In March, 2023, the Education Assessment and Accountability Review Subcommittee (EAARS) requested that the Office of Education Accountability (OEA) conduct a longitudinal analysis of expenditures and outcomes at the state and district levels. The committee requested the study review elements that include, but are not limited to assessment data, graduation rates, staffing, and postsecondary indicators of success and that it take into account student characteristics.

Organization Of The Report

The remainder of Chapter 1 describes data, methods, and major findings of the report; reviews literature on efficiency and effectiveness; and compares per-pupil spending and academic outcomes in Kentucky and the nation over time and in 2022.

Chapter 2 describes differences among higher- and lower-spending districts in number of students, demographic characteristics of students, major revenue sources, and efficiency challenges related to district size; geographic dispersion; and high-cost labor markets.

Chapter 3 shows the relationship between district effectiveness, as measured by impact on reading and mathematics scores, and per-pupil spending. It identifies factors that may offer partial explanation for differences in the outcomes achieved by districts relative to what they spend.

Data And Methods

Data Used For The Report

Data used for this report come primarily from the Kentucky Department of Education, including

- student-level assessment and enrollment data,
- district-level data on district finances and personnel as calculated by OEA from Kentucky Department of Education data and contained in OEA's District Data Profiles,
- Support Education Excellence in Kentucky (SEEK) transportation calculations, and
- Kentucky teacher survey data.

The majority of the reports' analyses combine data from the 2017-2018, 2018-2019, and 2021-2022 school years. The report combines three years of data to increase the validity of conclusions drawn about spending and performance in the state's many smaller districts. Outcomes and expenditures in smaller districts vary more year to year than do those in larger districts. Due to the COVID-19 pandemic, no assessment data were available for the 2019-2020 year and assessment data for 2020-2021 school year were incomplete.

The rest of this report will refer to school years by the year in which the school year ended. For example, the 2017-2018, 2018-2019, and 2021-2022 school years are referred to as the 2018, 2019, and 2022 school years.

Data also include student-level data on career and technical education (CTE), postsecondary enrollment, and postsecondary degree completion from the Kentucky Center for Statistics.

The report also uses state-level data from the National Center for Education Statistics; the National Association of State Budget Officers; and the Stanford Education Data Archive.

Methods

Methods used to analyze effectiveness and efficiency are informed by research described later in this chapter and by the way in which efficiency has been interpreted in Kentucky.

Effectiveness. The report uses district "impact" scores in reading and mathematics to determine district effectiveness and the relationship between spending and outcomes. Impact scores compare the actual scores of students in each district to those with similar demographic characteristics across the state. The impact analysis includes student-level achievement and demographic data for all students who took regular state tests in reading and mathematics in grades 3 through 8 and the 11th grade ACT in 2018, 2019, and 2022.[b]

Impact scores are calculated based on the difference between actual reading and mathematics assessment scores and those that are predicted from a statistical model that takes into account students' and communities' demographic characteristics. Higher-impact school districts are those in which students' reading and mathematics achievement exceeds the performance of demographically similar students across the state whereas lower-impact districts are those in which students perform below demographically similar students. [c] The statistical model used to determine district impact, along with others used to validate its findings, are explained in Appendix A.[d2]

Efficiency. Efficiency is often understood in fiscal terms to identify organizations that achieve relatively better outcomes per dollar invested. As will be explained later in this chapter, the term *efficiency*, as it has been legally interpreted in Kentucky, has implications for school funding and financial management as well as school quality; efficiency and effectiveness are not entirely separate concepts in the commonwealth.

The report summarizes differences among relatively higher- and lower-spending districts by a variety of metrics but does make assumptions about districts' overall efficiency.[e] It also shows how

[b] The analysis does not include data for the less than 2 percent of special education students who take an alternate assessment.

[c] Use of impact scores to determine district effectiveness is for research purposes only; OEA is not suggesting that the state's reading and mathematics achievement goals for students should differ based on student or community demographic characteristics.

[d] The incorporation of student demographic data in methods used to determine effectiveness and efficiency is common in research and policy analysis.

[e] Districts' overall effectiveness related to the state's many educational goals are not reflected in reading and mathematics data alone. The data in this report are therefore insufficient to conclude that a lower-spending effective district is necessarily more efficient than a higher-spending effective district.

efficiency challenges identified in research apply to districts with different spending levels.

Standard Scores. The report places districts in categories for student outcomes; per-pupil spending; and a variety of efficiency-related challenges such as expensive labor markets and student economic disadvantage. These categories are based on "standard scores" that are valid for comparison across different data sets. Appendix B provides additional detail about standard scores and the method used to place districts in categories.

Limitations

Consistent with published research, the statistical model used by OEA in its district "impact" analysis does not explain most of the variance observed in outcomes among students.[f] While the results from the model provide important information about district performance that is not available from actual, unadjusted scores, it is not intended to provide an alternative means of ranking districts and does not report impact scores for individual districts. All statistical models have their own limitations which may affect some school districts more than others. [g]

Districts cannot be considered effective or efficient based on reading and mathematics data alone as these data do not address all of the capacities set as goals for the educational system as outlined in KRS 158.645 and described later in this chapter; valid and reliable outcome data are not available for all indicators. [h] As shown in Chapter 3, districts that are higher-impact in reading and mathematics are not always higher-impact on other important outcomes such as high school graduation or career readiness.[i]

[f] As noted in Appendix A, the impact analysis explains approximately 20 percent of the variance between students' reading and mathematics outcomes and their demographic characteristics. This is relatively high by social science standards. Consistent with published research, however, variation in outcomes among students remain largely unexplained by the model.

[g] For example, these models may favor districts with very high percentages of disadvantaged students who are typically lower-performing. Districts with lower percentages of disadvantaged students must score at extremely high levels to have positive impact scores. In addition, as explained in Appendix A, the model may favor districts that identify students for special education at very high rates over those that identify at lower rates.

[h] For example, outcome data that are valid and reliable for comparison among school districts are not available on students' mental and physical wellness, core values and qualities of good character, or grounding in the arts.

[i] The study considers students to be career ready if they complete a "pathway," or sequence of three courses in a career and technical education (CTE) program area; earn an industry certificate in a CTE pathway; pass a state-approved

Finally, the per-pupil current expenditure data used in this report and commonly used to examine district spending do not capture all of district spending. It is possible that some districts may appear relatively higher or lower spending based on analysis of total per-per pupil expenditures. [j]

Major Conclusions

The study reached the major conclusions described below.

National Comparative Data

- Adjusted for inflation, per-pupil spending in Kentucky and the nation has increased over time; relative to the nation, Kentucky spending increased the most in the decade following the Kentucky Education Reform Act (KERA). Spending increases have been moderate since 2010, however, and Kentucky's per-pupil spending continues to lag the nation's.
- Student reading and mathematics outcomes on the National Assessment of Educational Progress (NAEP) increased steadily from 1990 through 2015, in both Kentucky and the nation. Until 2015, when Kentucky's average proficiency rates slightly exceeded the nation's, Kentucky's increases over time were relatively greater than the nation's. [k]
- Kentucky's spending and academic achievement in 2022, relative to other states, is approximately what would be predicted taking cost-of-living, student populations, and the state's relatively higher number of rural students compared with the nation into account. Kentucky appears to be neither much more nor much less effective and efficient than other states, on average.

assessment in a CTE pathway. The criteria for career readiness have changed several times in the last decade. The state's current definition of career readiness does not include pathway completion, though pathway completion was required previously. District impact for postsecondary enrollment and degree completion is calculated for graduates in the 2012-2014 school years.

[j] Current per-pupil expenditures do not include funds spent by districts on capital expenditures or interest on school debt. These types of expenditures include new construction, building renovation, and any depreciable supplies such as computers or busses. Current expenditures also do not include services provided to students who attend state-funded Area Technology Centers or community services such as those provided by Family Resource Youth Service Centers or adult education programs.

[k] In 1990, data were available in only a single grade and subject, 4th grade mathematics. Kentucky data in all four regularly tested subjects—4th and 8th grade reading and mathematics are available beginning with the 2003 NAEP.

District Per-Pupil Spending

- Highest spending Kentucky districts, on average, have greater percentages of economically disadvantaged students and students eligible for special education services; higher per-pupil state versus local funding; and higher local tax rates than do other districts.
- Highest-spending districts are more than twice as likely as all districts to be small districts with 1,000 or fewer students.[1] Almost all of the highest-spending, small districts are independent school districts (ISDs) whose boundaries are not defined by county lines. The higher operational costs of these districts are supported in part by higher local taxes that have been authorized over time by local communities.
- The state's two largest school districts—Jefferson County Public Schools (JCPS) and Fayette County Public Schools (FCPS)—are also among the state's highest-spending districts. In contrast to most highest-spending districts, these two districts have relatively lower percentages of students eligible for special education services and higher percentages of English language learners. JCPS and FCPS also receive greater local versus state per-pupil funding.

Factors Associated With Effectiveness

- District per-pupil expenditures are not associated with district effectiveness. After statistically adjusting for student and community characteristics, staff found very little relationship between district per-pupil current spending and districts' impact on reading and math outcomes among all districts.
- Small districts are 1.5 times as likely as other districts to be in lower-impact categories for reading and mathematics. The percentage of expenditures on instructional services for students are lower, on average, in small districts. National research has shown that, as district size decreases below certain thresholds, operational costs increase. Small districts experience challenges related to economies of scale that are beyond administrators' control and can negatively affect student achievement.
- Lower- versus higher-impact districts, on average, have less favorable working conditions as reported by Kentucky

[1] For analytic purposes, this report considers small districts to be those with 1,000 or fewer students. Many of Kentucky districts above that threshold would still be considered small by national standards.

teachers in areas such as school climate; feedback and coaching; and school leadership.

- Lower-impact districts have much higher teacher turnover rates, on average, than higher-impact districts. Teacher turnover is greatest, on average, among districts that pay relatively less competitive wages—especially those that exist in higher-cost labor markets.

Effectiveness And Efficiency In Kentucky

In a Kentucky context, the term "efficient" has implications for the quality, funding, and financial management of schools. Section 183 of the Kentucky constitution states that"[t]he General Assembly shall, by appropriate legislation, provide for an efficient system of common schools throughout the State Kentucky Supreme Court opined in in its *Rose v. Council for Better Education* (1989) decision that an efficient public education system must have as its goal to provide all students with free, substantially uniform opportunities to develop seven academic and nonacademic capacities, regardless of a student's residence or economic conditions. The decision also acknowledged the importance of more traditional, economic concepts of efficiency by stating that public schools should operate "free of waste, duplication, mismanagement, and political influence."[3]

The seven capacities identified by the court are included in the eight capacities listed as KRS 158.645 and are:

(1) Communication skills necessary to function in a complex and changing civilization;
(2) Knowledge to make economic, social, and political choices;
(3) Core values and qualities of good character to make moral and ethical decisions throughout his or her life;
(4) Understanding of governmental processes as they affect the community, the state, and the nation;
(5) Sufficient self-knowledge and knowledge of his mental and physical wellness;
(6) Sufficient grounding in the arts to enable each student to appreciate his or her cultural and historical heritage;
(7) Sufficient preparation to choose and pursue his life's work intelligently; and
(8) Skills to enable him to compete favorably with students in other states[m]

[m] The third capacity regarding moral character was added at a later date.

The statute also notes that public education involves shared responsibilities and that

> [s]tate government, local communities, parents, students and school employees must work together to create an efficient school system…The cooperation of all involved is necessary to assure that desired outcomes are achieved.

Review Of Research On The Relationships Between Educational Spending And Outcomes

Studies that examine the relationship between spending and outcomes fall into two broad categories,

- studies that analyze "efficiency" as measured by differences among districts in the amount they spend relative to their outcomes; and
- studies that look at the relationship between changes spending and outcomes over time.

Efficiency Studies

Methods Used To Determine District Efficiency. Most efficiency studies analyze efficiency in the traditional, economic sense, using various statistical techniques to identify educational organizations that appear to maximize educational outputs for funds spent. In addition to student outcomes and spending, these studies usually make adjustments for student populations and may also take into account factors such as cost of living, district size, district density, and measures of local competition. Efficiency studies do not evaluate districts relative to an external standard but in relation to each other. Each statistical approach that provides a single efficiency rating for individual districts has limitations.[n o 4].

Percent Of Districts Deemed Inefficient. Most studies identify a small minority of districts as inefficient, though percentages range widely among studies, from 6 percent of districts in North Carolina

[n] For example, by some methods an extraordinarily low-spending district might be identified as efficient even if it had low educational outcomes. In other methods, a district might be identified as inefficient if it spent relatively more than other districts on educational functions not directly related to reading and mathematics (such as career and technical education, the arts, or athletics). Finally, because districts are evaluated in comparison to each other, a district determined to be inefficient or efficient in one study might have a different designation if compared to districts in a different jurisdiction.

[o] These shortcomings are usually noted in individual models and are summarized by the Center for American Progress for the models used in their 2014 report. "Return On Investment."

to 10 percent in Illinois and 30 percent in Georgia.[5] These differences result primarily from the statistical model used to determine efficiency and do not necessarily reflect on the relative efficiency of schools in those states. Studies that examine school district efficiency on multiple outcome indicators or using multiple methods find much smaller numbers of districts that are inefficient on all metrics. For example, a 2014 study of all school districts in the nation using three different methods found only 3 percent of school districts that were inefficient by all methods. [6]

District Practices That Affect Efficiency. Once studies have identified particular districts as efficient or inefficient, they often use available large-scale data to explain differences among districts. Results of these types of analyses conflict among studies; however, on practices such as teacher versus administrator ratios or percentages of teachers with masters' degrees, leading one scholar to opine that "the net result of decades (research) is inconclusive."[7]

The inconsistency in findings about district practices in these large-scale efficiency studies may be explained by findings from district and school effectiveness literature. Findings from these studies generally highlight practices related to leadership, culture, and instructional management systems that are not evident in large scale data. [p8]

Contextual Factors That Affect Efficiency. Efficiency research has been consistent, however, in identifying a number of factors that are outside the control of administrators but reduce districts' efficiency; districts that face these contextual efficiency challenges typically spend more money to achieve the same outcomes as other districts with fewer challenges. Factors that reduce efficiency are:

- concentrations of student populations that have traditionally achieved lower academic outcomes, such as economically disadvantaged students or students with disabilities[q];

[p] Practices highlighted in literature on effective schools or districts include high expectations; stable, instructionally-focused leadership; systems of aligned expectations for curriculum and assessment; data-drive instruction; intentional human capital strategies that raise capacity of teachers and leaders (these include but are not limited to professional development and frequent teacher feedback); community investment and engagement; increased instructional time; cultures of collaboration; and targeted support for high-need schools or populations (examples include high-dose tutoring or additional assistance for high-need schools).

[q] Increased costs associated with economically disadvantaged or minority students are greater as concentrations of those students increase. In lower-poverty schools, the costs of educating economically disadvantaged students may be lower.

- low student membership, especially districts with 1,000 or fewer enrolled students; [r][9]
- geographic dispersion of students; [s] [10]
- and higher-cost labor markets.[11]

In addition, some studies have found that local competitive contexts or taxpayer scrutiny increases effectiveness.[t] [12]

As explained in detail in OEA's 2021 study on the SEEK funding formula, Kentucky provides additional funding for high-need student populations and some additional transportation funding for geographically dispersed districts. Unlike some states, Kentucky does not provide additional funding based on district size or labor markets. [13]

Association Of Spending And Outcomes Over Time

Numerous studies have examined the relationship between spending and outcomes by comparing outcomes of schools, districts, or states, before and after changes in school funding (often court-ordered). These studies are complicated by a variety of statistical and analytic challenges and have varied results.

As methods have become more sensitive to these statistical and analytical challenges, they have trended towards showing positive relationships between spending changes and student outcomes and have isolated some previously less understood relationships.[14] These include:

- While there are apparent advantages of increased investments on student achievement, these advantages are often not visible immediately but become apparent over time in long-term educational and labor market outcomes.
- As measured by reading and mathematics scores alone, increased investments appear to benefit students in districts

[r] Efficiency continues to decrease for districts with fewer than 500 students and, especially, districts with fewer than 200 students. While district efficiency increases as membership exceeds 1,000 students, the efficiency rewards diminish with size such that very large districts are not more efficient than moderately size districts.
[s] States define density in the number of students per square mile but differ in the thresholds set, from 4.5 in Michigan; to 10 in Wisconsin; and 25 in New York.
[t] Competitive contexts exist when numerous districts with higher achieving student are in close proximity to each other. Taxpayer scrutiny may be more likely when taxes come predominantly from local versus state or federal sources. On the other hand, those districts that have capacity to generate high levels of local funding may be less efficient.

with high percentages of economically disadvantaged students the most; spending-associated improvements in student outcomes may not always be apparent for students in less economically disadvantaged districts.[u]

- State funding increases that result from court-ordered reforms have tended to focus on closing gaps between property wealthy and less property wealthy districts; these strategies may not direct sufficient funds to the majority of economically disadvantaged students, who are enrolled in districts that fall between the two extremes.
- Differences among districts or changes in spending over time are often reflected in personnel-related data such as pupil teacher ratios or teacher salaries[v] [15]

The studies have not reached consensus, however, on cost-benefits questions such as the degree of improvement in student outcomes that justifies increased spending. [w] [16]

Consensus Findings

Overall, differences in the conclusions reached among researchers about the relationship between spending and outcomes reflect researchers' general orientation towards school spending. Researchers who represent a fiscally conservative perspective, like Erik Hanushek, take a skeptical view that funding increases are always necessary or beneficial. They note the tendency of courts to be more concerned about the potential consequences to students of underfunded schools than the potential consequence to taxpayers of schools that are funded without regard to effective or efficient use of resources.[x] [17] Researchers like Bruce Baker, who prioritize

[u] It is possible that these districts invest in educational opportunities such as the arts, foreign language, or career and technical education that are important for students but not related directly to reading and mathematics.

[v] C. Kirabo et.al. found that court-ordered spending increases were associated with reductions in pupil-to-teacher, pupil-to-counselor, and pupil-to-administrator ratios and increases in teachers' base salaries.

[w] Julien LaFortune , author of one influential long-term study demonstrating positive relationships between court-ordered state-funding increases and improvements in outcomes, especially for economically disadvantaged students noted, "It is important to note that our research design is poorly suited to identifying the optimal allocation of school resources across expenditure categories, or to testing whether actual allocations are close to optimal. It allows us only to say that the average finance reform, which we interpret to involve roughly unconstrained increases in resources, though in some cases the additional funds were earmarked for particular programs or tied to other reforms, led to productive (though perhaps not maximally productive) use of funds."

[x] Erik Hanushek has noted that "research does not indicate spending does not matter. Nor does it indicate that spending cannot matter. It does indicate that

equity and adequacy in school funding, are also in favor of program scrutiny but argue that sufficient evidence exists to support the need for increased funding, especially for economically disadvantaged students.[y] [18]

Despite different orientations researchers generally that:

- school districts need to be sufficiently funded;
- the relationship between spending and outcomes is complicated, not entirely understood, and often not observable in the short term;
- some districts face efficiency-related challenges that are outside administrators' control;
- individual programs and funding streams should be analyzed for effectiveness and efficiency; and
- salaries and benefits are the majority of expenditures in all districts and are an important focus of analysis.

Spending And Outcomes Over Time Kentucky And United States

Per-Pupil Spending 1970-2019

Figure 1.A shows current per-pupil spending in 2019 constant dollars in Kentucky and the US between 1970 and 2019. Education spending per pupil has increased substantially in both Kentucky and the nation. Per-Pupil spending in Kentucky has consistently lagged the nation, but the gap between Kentucky and the nation has narrowed over time. In 1970, Kentucky's spending was only 67 percent as much as spending in the US; by 2000, it had increased to 86 percent. With a slight dip in 2010, Kentucky spending relative to the nation has been steady since at least 2000. [z]

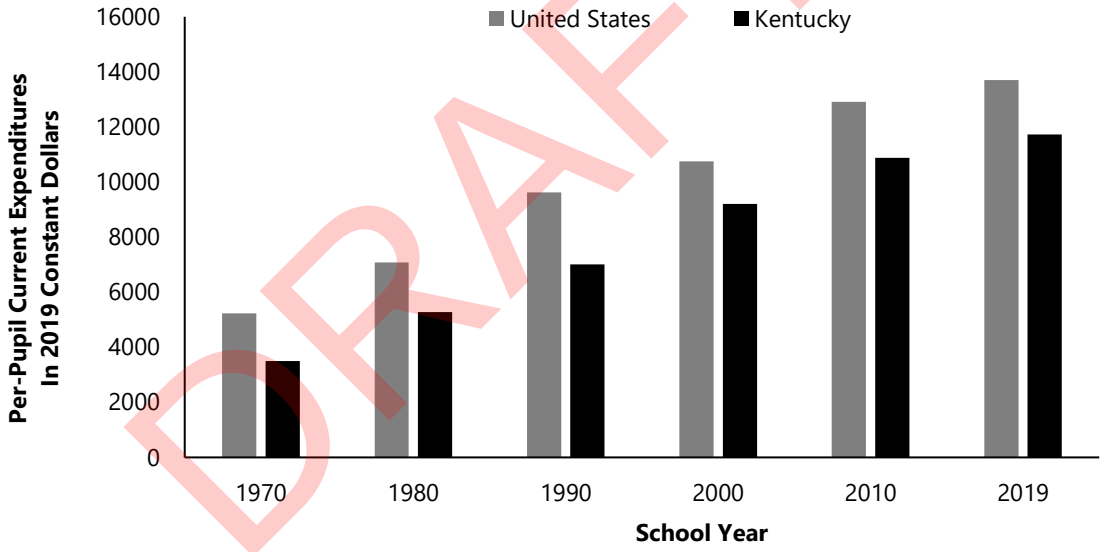
simply adding more resources without addressing how the resources will be used provides little assurance that student achievement will improve. Little progress has made in leveraging the results to uncover when more spending will have significant impact and when it will not."

[y] Baker and colleagues note, that "Virtually all potentially effective policies and approaches require investment, often substantial investment. And there is now widespread research, backed by research, that that we can't improve education outcomes without providing schools—particularly schools serving disadvantaged student populations—with the resources necessary for doing so. Put simply: We can't decide how best to spend money for schools unless schools have enough money to spend."

[z] Note that these percentages do not reflect regional cost-of-living adjustments. Later in the report, these adjustments are made for 2020 per-pupil spending data, bringing Kentucky relatively closer to the nation in per-pupil spending.

The sharpest increase in the percentage of Kentucky spending relative to the nation was from 1990 (73 percent) to 2000 (86 percent), an increase of 13 percentage points. This increase reflects additional spending in Kentucky which followed the 1990 Kentucky Education Reform Act.[aa] Relative to the nation, Kentucky spending also increased steeply, by 8 percentage points, from 1970 (67 percent) to 1980 (75 percent).

Figure 1.A
Per-Pupil Current Expenditures
Kentucky And US
In 2019 Constant Dollars
1970-2019



Source: Staff calculation using data from the United States Institute of Education Statistics

Not shown in this figure are the steep increases in spending in the 2020 and 2021 school years when the federal government provided districts with additional funding to assist with COVID-19-associated challenges.

Appendix C plots the relationship between district changes in per-pupil spending and ACT composite scores between 2009 and 2019. It shows very little relationship overall between changes in spending and changes in outcomes, especially when student demographic characteristics are taken into account.

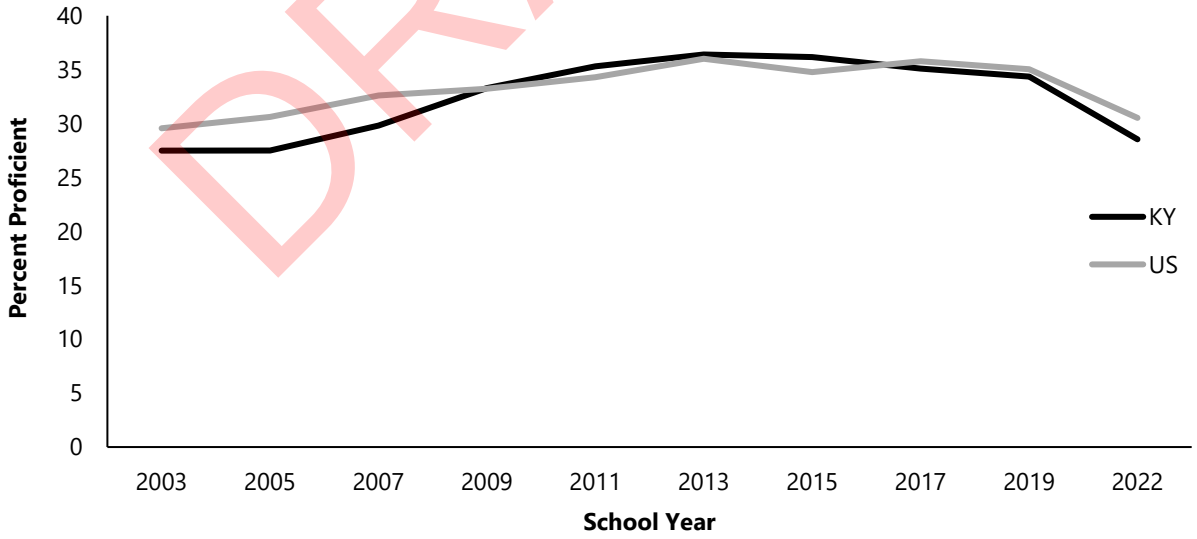
[aa] In the data available for this report, spending for individual years between decades were not available for years prior to 2009.

National Assessment Of Educational Progress 2003 To 2022

As shown in Appendix D, proficiency rates for Kentucky students and the nation as a whole rose steadily on the National Assessment of Educational Progress (NAEP) from 1990 through at least 2015.

Figure 1.B shows average proficiency rates for reading and mathematics in the 4th and 8th grades for Kentucky and the nation beginning in 2003—the first year all subjects and grades were tested in the same year. The figure shows the tail end of the increases from the previous decade that can be seen in individual subjects and grades in Appendix D. As shown in the appendix, the slight decline in scores that preceded the pandemic, both in Kentucky and the nation, were associated with reading. Due to COVID-19 associated school closures and other challenges, scores dropped steeply in 2022.

Figure 1.B
Average Percentage Of Students Proficient Or Above
NAEP 4th And 8th Grade Reading And Mathematics
School Years 2003 To 2022



Note: The data point for each year represents an average of proficiency rates in 4th- and 8th-grade reading and 4th- and 8th-grade mathematics.
Source: US. Department of Education. Institute Of Education Sciences. National Center For Education Statistics. National Assessment of Educational Progress (NAEP) Assessment. x

Recent Spending And Outcomes Kentucky And United States

Per-Pupil Spending

Table 1.1 compares Kentucky and national data on current per-pupil expenditures in 2020. Adjusted for regional cost of living differences, Kentucky's per-pupil expenditures come closer to the nation's. The state's unadjusted expenditures of $11,370 are 84 percent of the nation's whereas its regionally-adjusted expenditures of $12,700 are 94 percent of the nation's.

Table 1.1
Per-Pupil Current Expenditures And COLA-Adjusted Per-Pupil Expenditures Kentucky And US, 2020

Jurisdiction	Per-Pupil Current Expenditures 2020	COLA-Adjusted Current Expenditures 2020
Kentucky	$11,370	$12,700
United States	13,489	13,489

Source: US. Department of Education. Institute of Education Sciences. National Center For Education Statistics.

Percent Of Spending On Instruction. Appendix E shows that the percent of expenditures on instruction and student support in Kentucky is lower than the nation's. In 2020, Kentucky's regionally-adjusted per-pupil expenditures of $12,700 were 94 percent of the average of $13,489 spent in the US but its regionally-adjusted per-pupil expenditures of $7,424 on instruction were only 91 percent of the $8,158 spent on instruction in the US.

Kentucky's relatively lower spending on instruction compared with the nation likely reflects increased costs in the commonwealth associated with operating more rural and remote districts. Compared with the nation, Kentucky spends a greater percentage of expenditure on food and transportation, and, to a lesser extent, district and school administration. [bb] These differences, which are typical for more rural and remote schools, amount to over 4 percent of total expenses.

Rural Schools And Distant Or Remote Schools. As shown in Appendix F, Kentucky has almost twice the percentage of students in rural schools compared with the nation (37 percent versus 19 percent) and a higher percentage of students in schools that are in

[bb] The appendix also shows that Kentucky spends slightly more on district and school administration, but these differences amount to 0.6 percent of expenditures.

distant or remote towns (21 percent of Kentucky students versus 8 percent of US students). Due to lower economies of scale, costs related to transportation, food, and administration are generally higher in districts with these types of schools compared with districts located in cities or less geographically dispersed areas. [cc] [19]

2022 NAEP

Table 1.2 shows that, with the exception of 8th grade mathematics, the average percentage of Kentucky students that were proficient or above in all tested subjects in 2022 was similar to or slightly below the nation in most grades and subjects. Across all tested grades, the average percentage of students proficient in Kentucky (28.5) was two percentage points lower than the nation (30.5). Relative to the nation, Kentucky students scored much lower in 8th grade mathematics.

Table 1.2
Percent Proficient Or Above On NAEP
School Year 2022

	4th Grade		8th Grade		Average Proficiency 4th and 8th Grade
Jurisdiction	**Reading**	**Math**	**Reading**	**Math**	**Math and Reading**
Kentucky	31%	33%	29%	21%	28.5%
United States	32	35	29	26	30.5

Source: US. Department of Education. Institute of Education Sciences. National Center For Education Statistics. National Assessment Of Educational Progress. Data Tools: State And National Public Snapshots; US. Department of Education. Institute of Education Sciences. National Center For Education Statistics.

NAEP Performance By Student Group. Appendix G shows NAEP, 2022 proficiency rates and percent of tested students, by select subgroups. Kentucky NAEP performance by student group is, on average, similar to the nation for students eligible for free and reduced-price lunch (FRPL); higher for Hispanic students, and lower for black and white students.

Graduation Rates

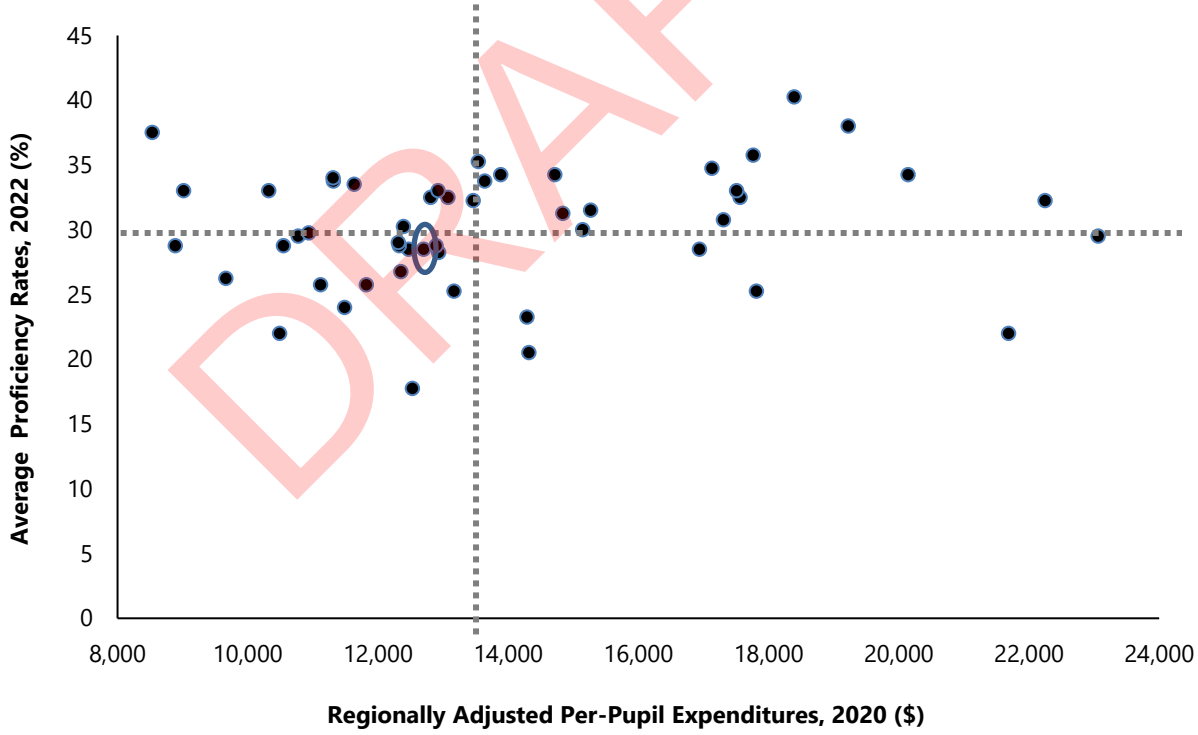
The percentage of Kentucky students who graduate from high school in 4 years is higher than the nation's—91 percent versus 86 percent in 2019.

[cc] Regardless of size, small districts must have superintendents and other district administrative staff and most small schools must have principals. In small districts and schools the ratio of administrators to pupils is thus higher, and the percentage those administrators comprise of total expenditures is greater. Likewise, the ratio of food and transportation personnel and related costs per pupil will increase when they are divided among a smaller number of students.

NAEP Proficiency Rates And Per-Pupil Spending By State

Figure 1.C plots average 2022 NAEP average proficiency rates by state against regionally-adjusted 2020 per-pupil expenditures by state. [dd]The horizontal dotted line represents the US average NAEP proficiency rates of 30.25 and the vertical dotted line represents the US average per-pupil expenditure of $13,489. Kentucky's placement as a state that both spends ($12,700 per pupil) and achieves (28.5 percent average proficiency) slightly below the national average is indicated by the oval.

Figure 1.C
NAEP Reading And Mathematics Average Proficiency Rates, 4th and 8th Grades, 2022
And Per-Pupil COLA-Adjusted Spending By State, 2020



Note: Average proficiency rates are calculated as the average percentage of students proficient or above on NAEP reading and mathematics tests on the 4th and 8th grades in 2022. Per-pupil expenditures are adjusted for cost-of-living, by state, based on 2020 per-pupil spending amounts. While the data are taken from different years, the difference among states in NAEP performance and per-pupil spending amounts is fairly consistent over time.

[dd] Average proficiency rates are calculated as the average percentage of students proficient or above on NAEP reading and mathematics tests on the 4th and 8th grades in 2022Comparative spending data are not yet available for 2022.

As the figure shows, there is not a strong relationship between spending and outcomes among states. This is not surprising given the many factors such as student populations; district/school size; and geographic dispersion that affect spending and outcomes and are not reflected in the figure. Research comparing performance and outcomes taking all of these factors into consideration has not been published. Were such research conducted, Kentucky's relative efficiency may improve somewhat to reflect its challenges as rural state. One analysis that compares state NAEP scores taking student populations into account has suggested that Kentucky's relative position may possibly decrease somewhat when scores are adjusted based on student characteristics. [20] Based on all the evidence available, however, it appears that Kentucky's outcomes are neither far more nor far less than what would be predicted given its spending, student populations, and geographic dispersion.

States Performing Above What Might Be Predicted

Figure 1.C shows a number of states that have per-pupil expenditures that are similar to or lower than Kentucky but have higher educational outcomes. As shown in Appendix H, most of these states are not comparable to Kentucky in that they have much lower percentages of children living in poverty. There are, however, several states whose spending relative to Kentucky's arouse interest in that they have student populations that are somewhat similar and appear to spend less than Kentucky while achieving similar outcomes.

[1] Grover Whitehurst et. al. "Do School Districts Matter?" Brown Center On Education Policy At Brookings Institute. March, 2013.
[2] See for example, Michael Casserly et. al. "How Well Do Large City Public Schools Overcome the Effects of Poverty and Other Barriers?". Council of the Great City Schools June, 2021. Web. ; Ulrich Boser. "Return on Educational Investment: 2014 A District-by-District Evaluation of U.S. Educational Productivity." Center For American Progress. July, 2014.
[3] *Rose v. Council for Better Educ., Inc.*, 790 S.W.2d 186, 198 (Ky. 1989).
[4] Ulrich Boser. "Return on Educational Investment: 2014 A District-by-District Evaluation of U.S. Educational Productivity." Center For American Progress. July, 2014.
[5] Jason Willis et al. "A Study Of Cost Adequacy, Distribution, And Alignment Of North Carolina's K-12 Public Education System." West Ed., 2019; Paul Melvin and Subhash Sharma. "Efficiency Analysis of K-12 Public Education in Illinois." Southern Illinois University, 2007; and Eric Houck et al. "Examining School District Efficiency in Georgia." *Journal Of Education Finance.* 25(4). Spring, 2010.
[6] Ulrich Boser. "Return on Educational Investment: 2014 A District-by-District Evaluation of U.S. Educational Productivity." Center For American Progress. July, 2014.

[7] R. Anthony Rolle. "Reconceptualizing Educational Productivity For New South Wales Public Schools: An Empirical Analysis." *Educational Considerations.* 43(2), 2016.
[8] Will Dobbie and Roland Fryer. "Getting Beneath the Veil Of Effective Schools: Evidence From New York City." *American Economic Journal; Applied Economics.* 5(4), Oct., 2013. ; Michael Casserly et. la. "Mirrors Or Windows: How Well Do Large City Public Schools Overcome The Effects Of Poverty And Other Barriers." Council Of Great City Schools. June, 2021, p. 6.; Organization For Economic Cooperation And Development. "OECD Review Of Policies to Improve Effectiveness Of Resource Use In Schools." Web. (Accessed July, 2023), p. 111.
[9] Lori Taylor et al. "A Study on Geographic Education Cost Variations and School District Transportation Costs" Texas A&M University. Jan., 2021, pp. 49-52 .
[10] Tammy Kolbe et. al. "Pupil Weighting Factors Report" Report to the House and Senate Committees on Education, the House Committee on Ways and Means. Updated, Jan, 2020, p. 11.
[11] Lori Taylor et al. "A Study on Geographic Education Cost Variations and School District Transportation Costs" Texas A&M University. Jan., 2021, pp. 5-6 .
[12] Tammy Kolbe et. al. "The Additional Cost Of Operating Rural Schools: Evidence From Vermont." *American Educational Research Association.* 7(1), 2021.; Bruce Baker. *Educational Inequality And School Finance: Why Money Matters for Americans Students"* Harvard Education Press, 2018, *p. 174.*
[13] Commonwealth of Kentucky Legislative Research Commission. Office of Education Accountability. "Funding Kentucky Public Education: An Analysis of Education Funding Through the SEEK Formula." October, 2021.
[14] Julien LaFortune et al. "School Finance Reform And The Distribution Of Student Achievement." *American Economic Journal: Applied Economics,* 10(2), 2018.
[15] C. Kirabo Jackson et al. "The Effects Of School Spending On Educational And Economic Outcomes: Evidence From School Finance Reforms." *The Quarterly Journal Of Economics,* 2016.
[16] Ibid, p 24.
[17] Danielle Handel and Eric Hanushek. "U.S. School Finance: Resources And Outcomes." National Bureau Of Economic Research Working Paper. December, 2022, p. 44.
[18] Bruce Baker et al. "The Adequacy And Fairness Of State School Finance Systems." Albert Shanker Institute, 2022, p.7.
[19] Tammy Kolbe et. al. "The Additional Cost Of Operating Rural Schools: Evidence From Vermont." *American Educational Research Association.* 7(1), 2021.
[20] Kristen Blag et. al. "America's Grade Book: How Does Your State Stack Up?" Urban Institute, March, 2020.

Chapter 2

Differences Among Kentucky Districts In Per-Pupil Spending

This chapter analyzes district spending in light of underlying factors—especially student demographic characteristics—that are important in understanding the relationship between spending and outcomes among Kentucky districts. The chapter shows broad differences among higher- versus lower-spending districts in major sources of revenue. These differences are explained largely by differences in student populations; property wealth; and local tax rates. [a] While the chapter groups districts into broad spending categories, individual districts within these categories vary. District-level data on many metrics discussed are shown in Appendix I.

Per-Pupil Current Spending

Figure 2A shows per-pupil current expenditures by district plotted against the percent of students considered to be economically disadvantaged in each district, as indicated by their eligibility for the federal free or reduced-priced lunch (FRPL) program.[b] The figure also shows the number of students in each district as represented by the size of each district's bubble.

The figure is divided horizontally, by the solid line, at the average percentage of FRPL-eligible students of all 171 districts (64 percent). [c] The dotted, vertical lines in the figure divide the districts into five per-pupil spending categories, from lowest (left) to highest (right): lowest; low, average; high; and highest. Appendix B describes the methods used to derive the categories and set thresholds.[d] The average per-pupil spending associated

[a] This chapter reports average data for districts in individual expenditure categories. These averages give the same weight to individual districts, regardless of size. In some cases, the average reported for districts may differ somewhat from state data reported elsewhere.
[b] Per-pupil expenditures current expenditures do not include capital expenditures or interest on school debt.
[c] Average is based on averaging percent FRPL-eligible students by district. The average percentage of students in the state who were FRPL-eligible during the same years was 61.
[d] As noted in Chapter 1, districts are not divided into categories based on ranking alone. Instead the categories take into account how far each district is from the state average. For this reason, there are fewer districts in the higher- versus lower-spending categories. Higher-spending districts are spread very far

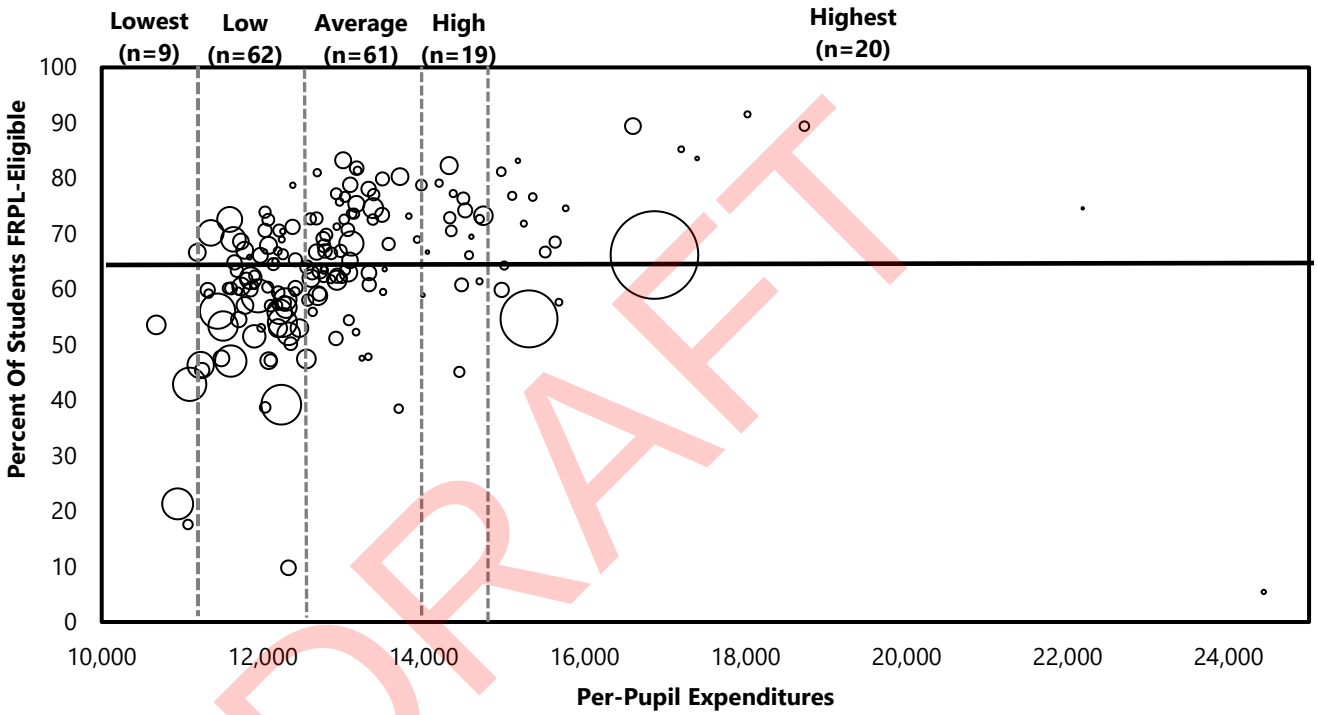
with each spending category is shown in Table 2.1, below the figure.

Figure 2.A shows a broad range of per-pupil expenditures, ranging from less than $11,000 (Meade County) to over $24,000 (Anchorage Independent). The overwhelming majority of districts (92 percent) fall in a narrower range between $11,000 and $15,000 per-pupil spending annually. The figure shows that most of the highest-spending districts have percentages of FRPL-eligible students that are above the state average and that many are small districts. It also shows that the state's two largest districts—JCPS and Fayette County Public Schools (FCPS)—are in the highest-spending category. The chapter shows data for JCPS and FCPS separately because they differ in several ways from most other higher-spending districts.

Following the figure, additional data illustrate trends in the distribution of districts related to per-pupil expenditures and major revenue-generating factors associated with spending.

from the state average whereas lower-spending districts are clustered relatively closely together.

Figure 2.A
Average Per-Pupil Expenditures,
Percent Of Students FRPL-Eligible,
And Student Membership
By District
2018, 2019, And 2022



Note: District membership is represented by the area of the bubble for each district whereas the actual data point for each district is at the center point of each district.
Source: Staff analysis of data from the Kentucky Department of Education.

Per-Pupil Expenditure Data For Individual Districts

This section shows broad differences among per-pupil spending categories based on average data for districts in each category.

Distribution Of Districts And Student Membership By Spending Categories

Table 2.1 shows the number of districts in each spending category and the percent of total state student membership in each of the categories. As explained in Appendix B, categories are determined by their relative distance from the average rather than by spending rank alone. Because so many districts are clustered together near and below the average for the state, there are many more districts in those spending categories. In contrast, relatively few districts

spend substantially above the average or substantially below the average; therefore, the ‘high”, “highest” and “lowest” categories contain a relatively low number of districts.

The table shows that most districts fall into either the average (61 districts) or low (62 districts) per-pupil expenditure categories. Of these, more students are enrolled in the relatively larger, low-spending districts; 40 percent of the state’s students are enrolled in these low-spending districts. Only 9 of the state’s 171 districts are in the lowest-spending category; 8 percent of the state’s students are enrolled in these districts. Conversely, the 20 highest-spending districts enroll 24 percent of the state’s students. As discussed above, most of these students are enrolled in JCPS or FCPS; only 3 percent of the state’s students are enrolled in the 18 other highest-spending districts.

Table 2.1
Average Per-Pupil Expenditures
Number Of Districts, And Percent Of State Membership
By Per-Pupil Expenditure Category
2018, 2019, And 2022

District Spending Level	Number Of Districts	Average Per-Pupil Expenditures	Total Membership	Percent Of State Membership
Highest (All)	20	$16,757	155,333	24%
JCPS	1	16,867	94,306	15
FCPS	1	15,309	40,475	6
All Other Highest	18	16,832	20,552	3
High	19	14,342	30,267	5
Average	61	13,013	145,386	23
Low	62	12,000	257,667	40
Lowest	9	11,122	53,033	8
Total	171	13,132	641,685	100

Note: JCPS= Jefferson County Public Schools; FCPS= Fayette County Public Schools. Within the highest er-pupil expenditure category, data for JCPS, FCPS, and all other high-spending districts are shown separately.
Source: Staff analysis of data from the Kentucky Department of Education

Factors That Affect Differences In Revenue By District

The per-pupil spending differences among districts shown in Figure 2.A reflect differences in the amount of revenue available to districts. While the SEEK funding formula, described below, is designed to provide an equal amount of base revenue for districts, a number of factors can increase district revenue beyond this amount. These include:

- the percentage of district students eligible for various SEEK add-ons;
- the amount of federal revenue received by the districts; districts with higher percentages of students living in poverty get disproportionately more federal funding than districts with lower percentages of students living in poverty; and
- differences in local tax rates, indicating the degree to which voters in each district have authorized various taxes beyond the minimum necessary to generate state efforts to equalize funding.

The sections that follow provide data showing general trends in higher- versus lower-spending districts in major sources of revenue.

Support Education Excellence In Kentucky (SEEK)

Districts' ability to financially support their schools with local revenue is a function of the property wealth of the district and the relative willingness of voters in the district to authorize additional taxes. Property-wealthy districts have far greater potential to generate local revenue than do property-poor districts.

The SEEK funding formula, which is the primary source of state funding for districts, is designed to balance revenue available to districts with greater and lower amounts of property wealth by providing relatively more state funding to districts with lower property wealth than to districts with higher property wealth.

The SEEK funding formula is generated from a base amount, which was an average of $3,994 in the 2018, 2019, and 2022 school years. The SEEK calculation includes additional add-ons for students who require various specialized services: at-risk students who qualify for federally-funded free lunch; students who have been identified as eligible for special education services due to a disability; and students who require instruction for limited English proficiency. For a complete description of funding weights and additional funding mechanisms (such as transportation) through the SEEK formula, see OEA's 2021 study, "Funding Kentucky Public Education: An Analysis of Education Funding Through the SEEK Formula."[1]

SEEK Add-On Student Populations

Table 2.2 shows the average percentage, by district per-pupil revenue category, of students who are FRPL-eligible; eligible for special education services; and eligible for limited English proficiency instruction. All of these student populations receive additional funding through the SEEK formula.[e] Of these categories, special education students generate the greatest amount of additional per-pupil funding through the SEEK calculation.[f]

[e] At-risk SEEK funding is received only for students who are eligible for free lunch, and not for students eligible for reduced-priced lunch. The overwhelming majority of FRPL students are eligible for free lunch.

[f] SEEK add-on weights are as follows: 0.15 for students eligible for free lunch; 0.096 for students eligible for Limited English Proficiency instruction; and weights for special education that increase depending on the perceived severity of the disability from 0.24 for "high incidence" speech-language disorders to 1.17 for "moderate incidence" such as specific learning disabilities (this includes dyslexia) or other health impairment (such as attention deficit disorder) and 2.35 for "low incidence" categories such as autism, emotional behavioral disorder; functional mental disability; and visual or hearing impairments.

Table 2.2 shows that higher-spending districts, on average, have higher percentages of students identified for special education and higher percentages of FRPL-eligible students than do lower-spending districts.

Within the higher-spending district category, JCPS and FCPS are different from other districts in that they have lower percentages of special education students and higher percentages of LEP students. FCPS has lower percentages of FRPL-eligible students than do the other districts in the highest-spending category (55 percent versus 72 percent). The percentage of FRPL-eligible students in JCPS (66 percent) is higher than the state average, but lower than most other higher-spending districts. [g]

[g] As a notable exception, Anchorage Independent is a small, higher-spending district that has the lowest percentage of FRPL-eligible students in the state (5 percent).

Table 2.2
Average Percentage Of Students Who Are FRPL-Eligible,
Eligible for Special Education Services,
Or Eligible For Limited English Proficiency Services
By Per-Pupil Expenditure Category
2018, 2019, And 2022

		Average Percentage Of Students		
District Spending Level	Number of Districts	FRPL-eligible	Special Education	LEP
Highest (All)	20	71%	17%	4%
JCPS	1	66	12	11
FCPS	1	55	11	13
All Other Very High	18	72	18	3
High	19	70	18	1
Average	61	67	17	2
Low	62	60	15	2
Lowest	9	46	14	2
District Totals*	171	64	16	2

Note: FRPL= eligible for free and reduced-price meals; LEP= Limited English Proficiency; JCPS= Jefferson County Public Schools; FCPS= Fayette County Public Schools. Each district receives the same weight in averages reported. State-reported data generally take district enrollment into account and may differ from district averages.
Source: Staff analysis of data from the Kentucky Department of Education

Revenue Associated With Exceptional Child Add-On. In 2023, the revenue generated through the SEEK exceptional child add-ons comprised about 13 percent of total SEEK allocations or about $464 million. Substantial funding is necessary to ensure that students with disabilities are identified and receive the services to which they are entitled. Special education programs are mandated and regulated at the state and federal level and monitored by KDE for compliance with state and federal guidelines.

Actions taken by individual states may affect special education costs and implementation. For example, rates at which students are identified for special education services vary among states and do not appear to be explained by differences in student populations generally.[h2] In 2022, rates of special education in Kentucky districts ranged from a low of 7 percent to a high of 31 percent; over one half of Kentucky's 171 districts identify students for special education at a rate above the 15 percent threshold that

[h] In 2021, the rates at which students ages 6-21 were identified for special education ranged from a low of 11 percent in Texas to 16 percent in Kentucky and a high of 20 percent in New York. These three states have similar rates of economically disadvantaged students. In 2021, the federally reported percent of FRPL-eligible students was 60 percent in Texas, 56 percent in Kentucky, and 56 percent in New York.

could trigger a child count audit under 707 KAR 1:380 Section 6(5)(e). KDE does not currently act under its authority to conduct these audits. Child count audits are permitted but not required. [3i]

Teacher licensure requirements also vary among states; special education teachers in Kentucky must earn special education degrees whereas some states offer licensure options that allow qualified, certified staff to teach special education students after earning endorsements or taking particular classes [j 4]

Pupil-Teacher Ratios.

Table 2.3 shows differences in pupil-teacher ratios among per-pupil spending categories. The table suggests that spending differences between lowest and highest spending districts are explained in part by the relatively fewer teachers per pupil in lowest- versus highest-spending districts. Lower per-pupil ratios in higher-spending districts are likely associated with the higher rates of special education in those districts. Students who receive special education services must be instructed by specifically certified teachers subject to caseload requirements. [k] Higher- versus lower-spending districts also serve higher percentages of economically disadvantaged students who may require additional academic assistance from certified teachers.

[i] A 2011 OEA report on special education cited an audit conducted by KDE in 2010 which found "widespread noncompliance in the collection and documentation of evidence" in the 600 student records examined. Fewer than half had the evidence required to document a particular disability.

[j] Kentucky and 10 other states require that teachers have a bachelor's or master's degree in special education. Other states permit qualified candidates to pass a single exceptional child course (16 states); obtain a special education endorsement (12 states) or obtain a dual bachelor's degree in general and special education (11 states). OEA's 2011 report on appropriate identification of students in special education noted the relatively low level of course content devoted to dyslexia in courses required for special education versus those that are required for reading specialists.

[k] Specified in 707 KAR 1:350.

Table 2.3
Average Pupil-Teacher Ratio
By Per-Pupil Spending Category
2018, 2019, And 2022

Per-Pupil Spending Category	Pupil Teacher Ratio
Highest	13
High	14
Average	15
Low	15
Lowest	17

Source: Staff analysis of data from the Kentucky Department of Education

Average Revenue Sources By District Spending Category

Table 2.4 shows broad differences among district per-pupil spending categories and the amount of per-pupil revenue that comes from state, local, and federal sources. The table also shows average per-pupil property assessments and levied equivalent rates. The levied equivalent rate, in simple terms, is a district's total tax revenue divided by its total assessment. The total assessment includes property and motor vehicles. [1 5] Levied equivalent rates give a sense of the degree to which voters in each district have, over time, approved additional taxes or higher tax rates to provide revenue for schools.

State Revenue. Table 2.4 shows that, on average, during school years 2018, 2019, and 2022, the amount of per-pupil revenue received from state sources increased from the very low to the high per-pupil expenditure categories (from an average of $7,810 to an average of $9,752 in state per-pupil revenue). This additional state revenue reflects, in part, the higher percentages of students who are eligible for SEEK add-on funds.

Highest-spending districts differ amongst each other in the degree to which they generate revenue primarily from state versus local sources; JCPS and FCPS receive less state per-pupil revenue than the state average and less than the average amount in any of the other per-pupil revenue category. These two districts are high property wealth districts that must generate the majority of their SEEK dollars from local sources. Most of the other high-spending districts receive more state-per pupil revenue than districts in other spending categories, on average. (these districts receive an average

[1] Because local school districts use and implement different types and amounts of taxes, KDE converts the districts' local tax efforts to a standardized tax rate called a levied equivalent rate.

of 9,205 per pupil compared with an average of $8,855 for all 171 districts).[m]

Federal Revenue. The table also shows the average per-pupil revenue generated through federal funds. On average, higher-spending districts receive far more per-pupil federal revenue than do lower-spending districts. This is explained largely by the fact that most higher-spending districts have higher percentages of economically disadvantaged students

Local Revenue. The amount of local per-pupil revenue is greatest, on average, in the highest spending districts. Otherwise lowest-spending districts receive more local revenue, on average, than do districts in the remaining categories.

Levied Equivalent Rates. Levied equivalent rates in most high-spending districts exceed the state average of 74; thus, these high-spending districts receive a greater amount of local revenue from the property they have than do other districts in the state, on average. In contrast, levied equivalent rates on the lower-spending districts are below the state average. While average property wealth in these districts is above the state average, that property is being taxed, on average, at rates lower than state averages.[n] As noted earlier, individual districts within each category diverge from that trend. [o]

[m] There are exceptions, most notably Anchorage Independent, which received an average of $7,595 in state per-pupil revenue and $17,652 in local per-pupil revenue in the 2018, 2019, and 2022 school years.

[n] The levied equivalent rate also reflects districts' collections from permissive tax (occupational, utility, and excise taxes). These taxes can generate substantially more revenue in some districts than others.

[o] About one fifth of the highest-spending districts have relatively low levied equivalent rates and about one fifth of lower-spending districts (the 71 low and very low together) have relatively higher levied equivalent rates.

Table 2.4
Average District Property Wealth, Levied Equivalent Rates, And Revenue Sources
By Per-Pupil Expenditure Category
2018, 2019, And 2022

		District Averages				
				Per-Pupil Revenue		
District Spending Level	Number Of Districts	Per-Pupil Property Assessment	Levied Equivalent Rate	Local	State	Federal
Highest (All)	20	$576,712	90	$6,159	$8,966	$3,478
JCPS	1	904,339	91	9,086	7,065	2,822
FCPS	1	889,727	92	8,890	6,567	1,775
All Others Very High	18	541,121	89	5,845	9,205	3,609
High	19	353,724	81	3,541	9,752	3,308
Average	61	391,097	71	3,331	9,183	2,589
Low	62	448,634	70	3,550	8,373	1,954
Lowest	9	489,336	71	4,024	7,810	1,432
District Totals	171	434,686	74	3,801	8,855	2,482

Note: JCPS= Jefferson County Public Schools; FCPS= Fayette County Public Schools. Each district receives the same weight in averages reported. State-reported data generally take district enrollment into account and may differ from district averages.
Source: Staff analysis of data from the Kentucky Department of Education.

Efficiency Challenges

Chapter 1 identified factors that increase district costs and are beyond administrators' control: high-need student populations, district size, expensive labor markets, and geographic dispersion. Differences among districts in student populations were reviewed earlier in this chapter. The remainder of this chapter shows the percentage of districts by spending category that face the other efficiency challenges.

District Size

Table 2.5 shows the number and percentage of districts by per-pupil spending category that have membership of 1,000 or fewer students. Research cited in Chapter 1 identified 1,000 students as the threshold under which districts experience the greatest efficiency challenges related to economies of scale. As district size goes below this threshold, efficiency challenges are even greater.

As shown in Table 2.5, 22 percent of school districts in the commonwealth are small. These small districts are disproportionately among the highest-spending districts; 50 percent of highest-spending districts are small. None of the state's nine lowest-spending districts is small.

Table 2.5
Number And Percent Of Small Districts
By Per-Pupil Spending Category
2018, 2019, 2022

	Lowest (n=9)	Low (n=62)	Average (n=61)	High (n=19)	Highest (n=20)	Total (n=171)
Number	0	9	11	8	10	38
Percent	0%	15%	18%	42%	50%	22%

Note: In this analysis, OEA considered small districts to be those with 1,000 students or fewer.
Source: Staff analysis of data from the Kentucky Department of Education

Independent Districts. The prevalence of small districts in the highest-spending category is explained, in part, by the high number of higher-spending districts that are independent districts (ISDs)—those whose district boundaries are not defined by county lines. [p] Though less than 30 percent of Kentucky districts are independent districts (51 out of 171), 65 percent of its highest-spending districts (13 out of 20) are independent districts.

Of Kentucky's 51 ISDs, 28 are small districts. On average, levied equivalent rates in independent districts are about 1.5 times the rates in county districts. This suggests that voters in independent districts have been willing over time to authorize additional taxes in order to support the relatively higher operating costs of the independent districts. For additional background on independent school districts, see OEA's "Kentucky's Independent School Districts: A Primer."[6]

Higher-Cost Labor Markets

NCES developed the Comparable Wage Index for Teachers (CWIFT) to facilitate comparisons of school spending among states and districts.[q] [7] The CWIFT compares regional variations in

[p] An independent school district is one whose geographic boundaries are defined not by the county lines that define most districts but by historic boundaries within counties. These historic boundaries are associated with districts that did not merge with county districts during the early 20th century, a period when Kentucky's many small ISDs were consolidating into county districts

[q] According to NCES, "The Comparable Wage Index for Teachers (CWIFT) is an experimental index created by the National Center for Education Statistics (NCES) to facilitate comparison of educational expenditures. The CWIFT is a measure of the systematic, regional variations in the wages and salaries of college graduates who are not PK-12 educators as determined by reported occupational category. It can be used by researchers to adjust school district-level finance data in order to make comparisons across geographic areas. The CWIFT is based on data from the American Community Survey (ACS), a continuous household survey conducted by the U.S. Census Bureau."

teacher labor markets based on wages of college graduates who are not teachers. The most recent CWIFT was developed in 2019. A CWIFT rating of "1" is equivalent to the national average. Higher CWIFT ratings indicate more expensive labor markets; salaries in districts with higher CWIFT ratings likely must pay higher salaries, on average, than districts with lower CWIFT ratings, in order to attract qualified workers.

CWIFT ratings in the commonwealth range from a low of 0.69 (about two thirds of national labor costs) to a high of 0.967 (almost equivalent to the nation). Appendix J maps the CWIFT calculated by NCES for Kentucky school districts in 2019. It also plots the relationship between districts' CWIFT and starting salary in 2019. As CWIFT increases so do salaries, on average. The Appendix shows variation among districts in salaries relative to CWIFT.

Table 2.6 shows average CWIFT by per-pupil spending category and the number and percentage of Kentucky school districts that are in higher-cost labor markets. [r] Districts with relatively higher-cost labor markets are distributed across the spending categories, but are disproportionately in the lowest and highest spending categories.

CWIFT ratings do not fully capture labor market challenges experienced by individual districts, however. For example, as noted in previous OEA reports, geographically remote schools or districts may have difficulty attracting qualified workers who prefer to live in larger towns or cities.[8] In addition, districts in competitive labor markets may have additional challenges staffing schools with higher percentages of economically disadvantaged and minority students.[s] National research shows that teachers consistently leave these schools in favor of schools with lower percentages of economically disadvantaged or minority students. [t9] Finally, districts that are in proximity to higher-cost labor markets may lose teachers to higher-paying school districts or other jobs.

[r] Thresholds used to determine these categories are reported in Appendix B.
[s] OEA's 2012 report on teacher shortages showed higher percentages of FRPL-eligible and minority students in JCPS and FCPS schools with higher- versus lower teacher turnover rates.
[t] Teachers report that working conditions in higher-poverty, higher-minority schools can make it difficult for teachers to teach and students to learn. Research also suggests that teachers are more likely to stay in these schools if they express satisfaction with school culture, leadership, and climate.

Table 2.6
Number And Percent Of Districts
In Higher-cost Labor Markets
And Average CWIFT
By Per-Pupil Spending Category
2018, 2019, 2022

Districts In Higher-Cost Labor Markets	Lowest (n=9)	Low (n=62)	Average (n=61)	High (n=19)	Highest (n=20)	Total (n=171)
Number	5	17	17	5	9	53
Percent	56%	27%	28%	26%	45%	31%
Average CWIFT	0.84	0.79	0.78	0.80	0.82	0.80

Source: Staff analysis of data from the Kentucky Department of Education

Dispersed Districts

Dispersed districts face higher transportation costs. In OEA's analysis, dispersed districts are considered to be those with 25 or fewer students per net square mile. [u]

Table 2.7 shows that the majority (64 percent) of Kentucky districts are dispersed. Highest-, high-, and lowest- spending districts are disproportionately less likely to be dispersed (30 percent, 47 percent and 44 percent, respectively) whereas average- and low- spending districts are more likely to be dispersed (79 percent and 68 percent, respectively).

Table 2.7
Number And Percent Of Dispersed Districts*
By Per-Pupil Spending Category
2018, 2019, And 2022

	Lowest (n=9)	Low (n=62)	Average (n=61)	High (n=19)	Highest (n=20)	Total (n=171)
Number	4	42	48	9	6	109
Percent	44%	68%	79%	47%	30%	64%

Source: Staff analysis of data from the Kentucky Department of Education

[u] OEA determined dispersion by dividing district membership by the adjusted square mile used by KDE in SEEK transportation calculations. It considered dispersed schools to be those with 25 students per adjusted square mile or less. This is the number used by New York State. New York has a relatively lower threshold for districts to be considered dispersed than do some states. KDE does not use membership in transportation funding calculations, however. Only those students who are eligible for transportation are included in the calculation.

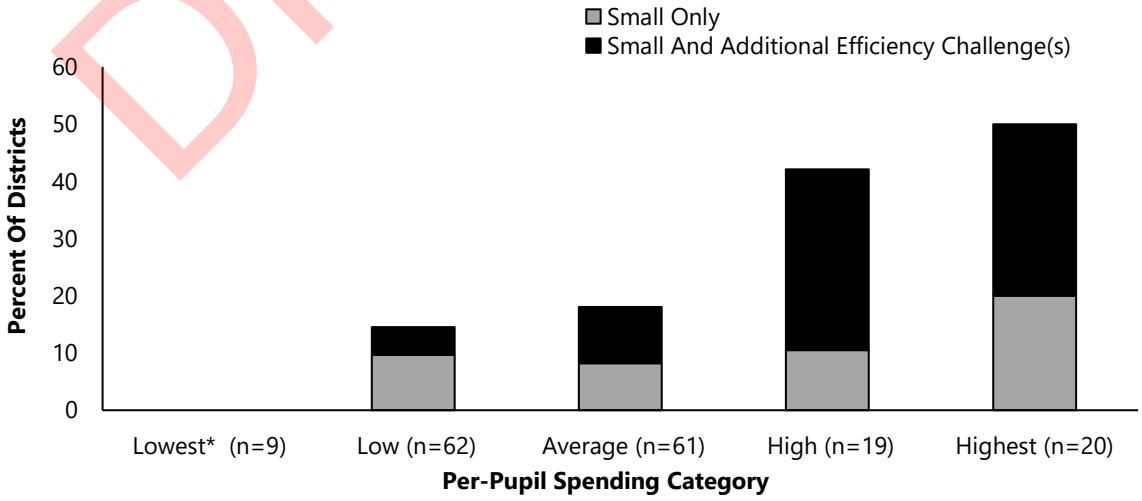
The SEEK transportation calculation takes into account district dispersion and the number of students transported and provides greater funding for more geographically dispersed areas. The formula uses a graduated measure, not a single category, to determine districts' relative dispersion.[10]

Multiple Efficiency Challenges

Data that will be presented in Chapter 3 shows that, on average, student reading and mathematics outcomes are lower in districts that face multiple efficiency challenges than they are in other districts. Figure 2. B shows the percentage of districts, by per-pupil spending category, that are small and the percentage that face additional efficiency challenges related to higher labor costs or geographic dispersion (or both).

The figure shows that both the percentage of small districts and the percentage of districts that are small and face additional challenges increase as per-pupil expenditures increase.

Figure 2.B
Percent Of Districts Facing Efficiency Challenges Due to Small Size And Additional Factors By Impact Category
2018, 2019, And 2022



*As shown in the figure and in Table 2.5, none of the 9 lowest-spending districts are small.
Source: Staff analysis of data from the Kentucky Department of Education and the National Center for Education Statistics.

[1] Kentucky. Legislative Research Commission. Office of Education Accountability. *Funding Kentucky Public Education: An Analysis of Education Funding Through the SEEK Formula.* Research Report No. 471. October, 2021.pp 5-16. Web.
[2] Kentucky. Legislative Research Commission. Office of Education Accountability. *District Data Profiles, 2022.* Research Report No.482. July 2023. Web.
[3] Kentucky. Legislative Research Commission. Office of Education Accountability. *Appropriate Identification and Service of Students With Disabilities: Special Education Eligibility, Funding, and Personnel Training*. Research Report No. 393. Nov., 2011, pp. 27-31. Web.
[4] Special Education Resource Project. "Teacher Licensing By State." Vanderbilt University. Web.
[5] Kentucky. Legislative Research Commission. Office of Education Accountability. *Understanding How Tax Provisions Interact With the SEEK Formula.* Research Report No. 354, Nov. 15, 2007. Web.
[6] Kentucky Legislative Research Commission. Office of Education Accountability. *Kentucky's Independent School Districts: A Primer*. Research Report No. 415. September, 2015. Web.
[7] Comparable Wage Index for Teachers (CWIFT). Web.
[8] Kentucky. Legislative Research Commission. Office of Education Accountability. *Tracking Teacher Shortages: Trends And Continuing Questions.* Research Report No. 395. Oct., 2012, p.72. Web*;* Kentucky. Legislative Research Commission. Office of Education Accountability. *Teacher Shortages And Supports For New Teachers.* Research Report No. 463. October, 2019, p.42. Web.
[9] Nicole Simon and Susan Moore Johnson. "Teacher Turnover In High-Poverty Schools: What We Know And Can Do." *Teachers College Record.* 117 (3). Web.
[10] US Department of Education. National Center For Education Statistics. Institute Of Education Sciences. Commonwealth of Kentucky Legislative Research Commission. Office of Education Accountability. "Funding Kentucky Public Education: An Analysis of Education Funding Through the SEEK Formula." October, 2021, p. 11.

Chapter 3

Relationships Among District Spending, Student Reading And Mathematics Outcomes, And District Characteristics

This chapter shows the relationships among district effectiveness in reading and mathematics, district per-pupil spending, and a variety of additional district characteristics. It relies primarily on district "impact" scores in reading and mathematics to determine effectiveness. Impact scores compare students' actual reading and mathematics scores with those of demographically similar students across the state.

District effectiveness in reading and mathematics is not associated with district spending; once student demographic characteristics are taken into account, there is little relationship among all districts between district per-pupil spending and student outcomes. Higher-spending districts, however, are more likely to be in lower reading and mathematics impact categories than are lower-spending districts.

District effectiveness in reading and mathematics associated with a variety of additional district characteristics. Small districts of 1,000 or fewer students are 1.5 times more likely than other districts to be in lower reading and mathematics impact categories. Lower- versus higher-impact districts, on average, have higher teacher turnover rates; less experienced teachers; relatively less competitive salaries; and less favorable working conditions as reported by teachers on KDE's working conditions survey.

The chapter relies primarily on impact data to identify factors associated with district effectiveness; as shown in Appendix K, however, all of the major findings reported in this chapter are also true when schools are grouped by actual scores.

Data reported at the end of the chapter serve as an important reminder that reading and mathematics data alone are incomplete measures of districts' overall effectiveness.

Reading And Mathematics Effectiveness Indicators: Actual And Impact

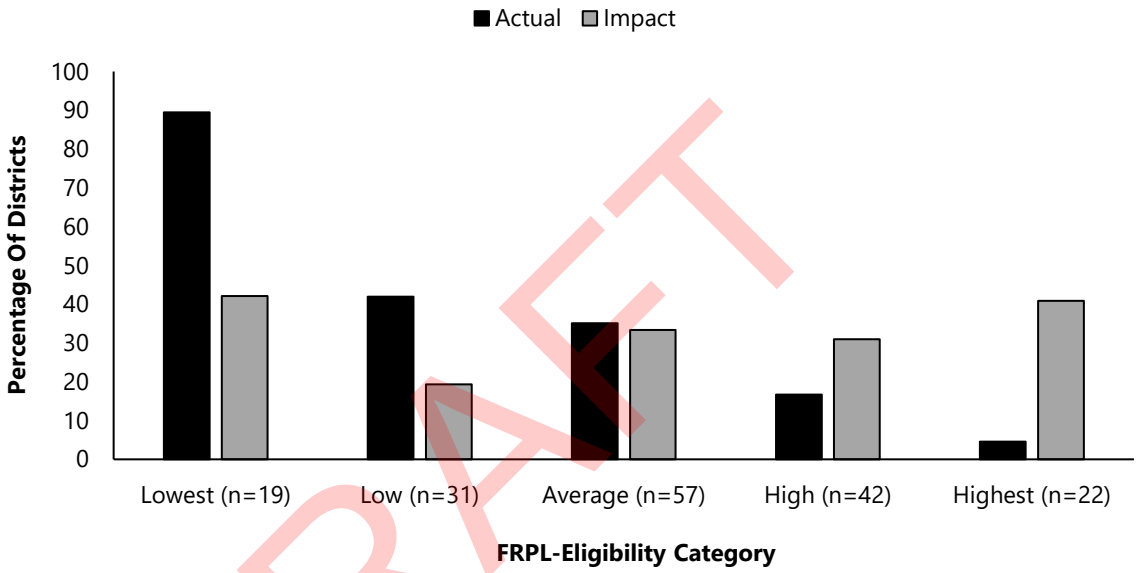
Figure 3.A shows the percent of districts with higher reading and mathematics performance as measured by actual and impact scores. [a] Districts are divided according to the percentage of district students that are economically disadvantaged as measured by FRPL-eligibility.

When district effectiveness in reading and mathematics is measured by actual scores alone, almost all (17 out of 19) of the lowest FRPL-eligibility districts appear effective compared with almost none (1 out of 22) of the highest FRPL-eligibility districts. [b] As district FRPL-eligibility increases, the percentage of districts in higher performance categories for actual scores decreases.

When district effectiveness is measured with impact scores, the percentage of districts that appear relatively more effective are distributed more evenly among district FRPL-eligibility categories.

[a] As noted in Chapter 1, reading and mathematics data in this report are converted into standard scores. Any district with a standard score above 0 is considered positive in this analysis.
[b] This highest-poverty higher-performing district is of note as the only district in this category to be in higher performance categories for actual scores.

Figure 3.A
Percent Of Districts
With Higher Actual And Impact Scores
By Student FRPL-Eligibility Category
2018, 2019, And 2022



Note: Higher actual or impact performance includes districts that fall in the high or highest category as determined by methods explained in Appendix B . FRPL= students eligible for free or reduced-price lunch. FRPL-eligibility categories are based on the percent of students that are eligible for the federal free or reduced-priced lunch program. Appendix B provides the thresholds and describes the method by which OEA determined category thresholds.
Source: Staff analysis of data from the Kentucky Department of Education

District Changes From Actual To Impact Scores

Most districts either remain in the same category or move up or down by no more than one category when actual versus impact data are used to determine district effectiveness categories. The majority of districts in higher-impact categories are also in higher categories of actual performance (40 out of 55 districts or 73 percent). The majority of districts in lower impact categories are also in lower categories of actual scores (51 out 64 districts or 80 percent). None of the lower impact districts are in higher performance categories of actual scores. Only three districts that are in lower categories of actual scores are in higher categories of impact scores.

Use Of Impact Scores To Analyze Relationships Between Effectiveness And Spending

Both actual scores and impact scores provide important information about district effectiveness. Because impact data takes into account efficiency challenges associated with higher-need student populations, the report uses it to analyze the relationships between spending and outcomes. Student demographic characteristics are used in effectiveness and efficiency studies as well as studies attempting to identify practices of higher-performing districts. For example, the Council of Great City Schools analyzes impact scores of school districts that elect to participate as separate jurisdictions in NAEP.[1]

District Impact In Reading And Mathematics Methodology

Impact scores take into account the performance of students in each district relative to students with similar demographic characteristics across the state. The student and community characteristics taken into account, along with their relative impact on the adjusted scores, are described in Appendix A. These include student economic disadvantage; eligibility for special education; LEP; and homeless programs; whether a student moved during the academic year; race or ethnicity; whether the student is enrolled in a highest-poverty school; and the percentage of adults in a students' community with a bachelor's degree or higher.

Impact scores are computed by subtracting the score that is statistically predicted for a district, based on the demographic characteristics of students tested in the district, from the districts' actual score. A district whose actual performance exceeds its predicted performance would be in a higher impact category whereas a district whose actual performance falls short of its predicted performance would be in a lower impact category. Both the actual and the impact analysis are computed from individual student-level scale scores that are transformed into standard scores valid for comparison across subjects, grades, and years. Both analyses also group districts into categories based on these scores. Appendix B describes the process by which OEA thresholds for these categories were established.

Relationship Between Per-Pupil Spending And Reading And Mathematics Outcomes

Table 3.1 shows the percentage of districts that fall in each category of reading and mathematics actual performance and per-pupil spending. The table shows that more than three quarters (77 percent) of lowest spending districts are in higher actual performance categories whereas almost all (85 percent) of highest-spending districts are in lowest actual performance categories. The percentage of districts in higher performance categories decreases as expenditures increase.

Table 3.1
Percent Of Districts By Actual Reading And Mathematics And Per-Pupil Spending Categories
2018, 2019, And 2022

Reading And Mathematics Actual Category	Per-Pupil Spending Category					All
	Lowest (n=9)	Low (n=62)	Average (n=61)	High (n=19)	Highest (n=20)	(n=171)
Highest (n=23)	44%	18%	10%	5%	5%	13%
High (n=35)	33	26	23	5	5	20
Average (n=46)	11	27	30	47	5	27
Low (n=45)	11	27	30	26	20	26
Lowest (n=22)	0	2	8	16	65	13

Source: Staff analysis of data from the Kentucky Department of Education.

Table 3.2 shows that districts are more evenly distributed among impact categories than actual performance categories; however, impact data for the lowest-spending districts remain relatively higher than other districts and impact data for highest-spending districts remains relatively lower. The percentage of districts in the lower two impact categories is 37 percent for all districts, 11 percent for the lowest-spending districts and 60 percent for highest-spending districts.

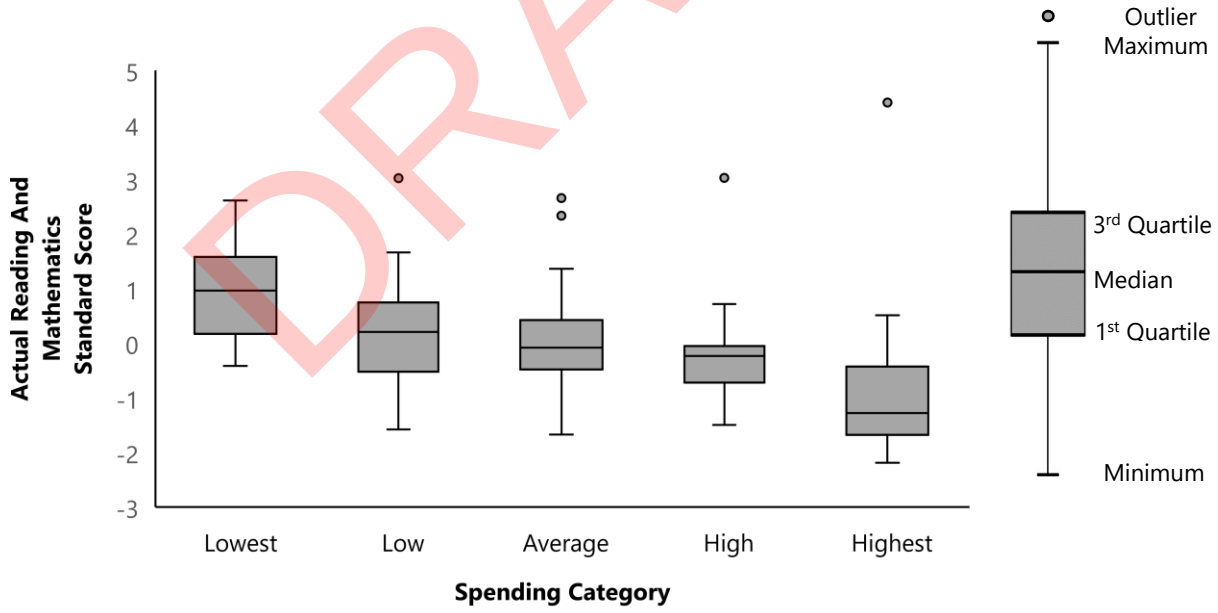
Table 3.2
Percent Of Districts By Reading And Mathematics Impact And Per-Pupil Spending Categories
2018, 2019, And 2022

Reading And Mathematics Impact Category	Per Pupil Spending Category					All
	Lowest (n=9)	Low (n=62)	Average (n=61)	High (n=19)	Highest (n=20)	(n=171)
Highest (n=24)	22%	13%	18%	11%	5%	14%
High (n=31)	11	21	21	21	0	18
Average (n=52)	56	26	28	37	35	30
Low (n=40)	0	24	23	21	35	23
Lowest (n=24)	11	16	10	11	25	14

Source: Staff analysis of data from the Kentucky Department of Education.

Relationship Between Per-Pupil Spending And Actual Reading And Math Scores. Figure 3.B shows the relationship between district per-pupil spending and actual reading and mathematics scores. The figure shows a generally negative association between per-pupil spending and actual scores; as per-pupil expenditure categories increase, average actual reading and mathematics scores generally decrease. This trend is explained, in part, by the demographic characteristics of students in each per-pupil spending category. As noted in Chapter 2, students in districts that are in higher- versus lower-spending categories are much more likely to be economically disadvantaged or eligible for special education services. Outcomes for these groups are lower than state averages in Kentucky and in every US state. The range in scores is greatest in the highest spending category. This category contains both the highest- and lowest-scoring districts.

Figure 3.B
District Reading And Mathematics Actual Scores
By Per-pupil Spending Category
2018, 2019, And 2022

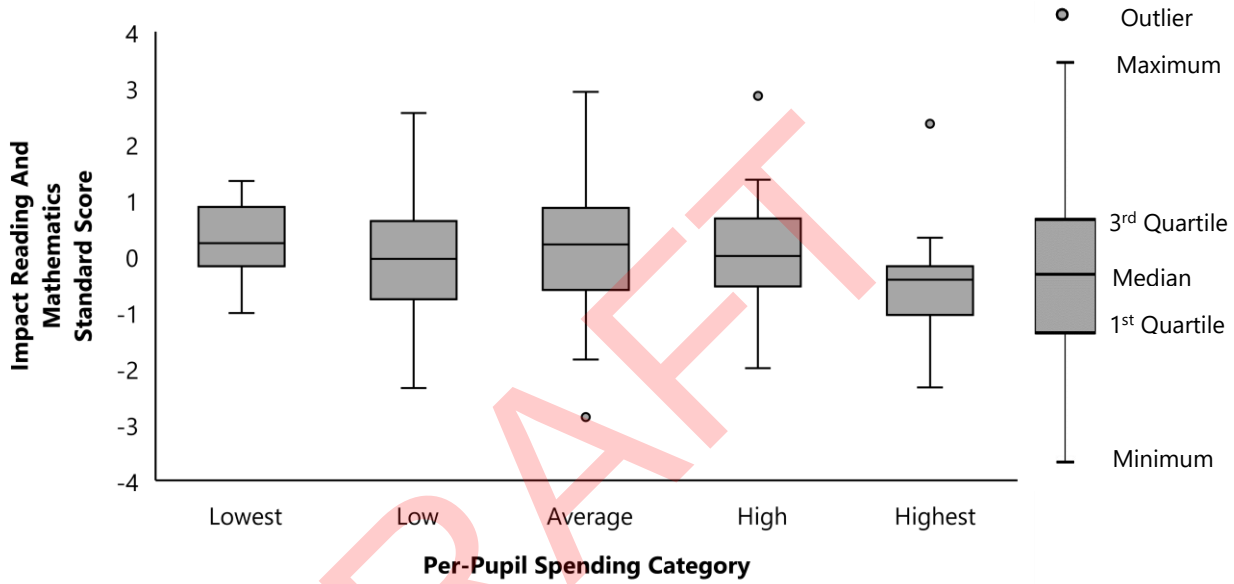


Note: Outliers are defined in this figure as beyond 1.5 times the interquartile range.
Source: Staff analysis of data from the Kentucky Department of Education.

Relationship Between Per-Pupil Spending And Reading And Mathematics Impact Scores. Figure 3.C shows the relationship between district per-pupil spending and reading and mathematics impact scores. While there is little relationship overall between per-pupil spending and district impact, highest-spending districts and low-spending districts have relatively lower impact than other

districts and lowest-spending districts have relatively higher impact than other districts.

Figure 3.C
District Reading And Mathematics Impact Scores
By Per-pupil Spending Category
2018, 2019, And 2022



Note: Outliers are defined in this figure as beyond 1.5 times the interquartile range.
Source: Staff analysis of data from the Kentucky Department of Education.

Of the efficiency factors known to affect the relationship between spending and outcomes, Figure 3.C takes only student populations into account. The figure shows that, even after adjusting for student populations, differences in district reading and mathematics performance remain unexplained by per-pupil spending.

The sections that follow show differences among higher- and lower-impact district in additional efficiency challenges and in practice-related variables among higher- and lower-impact districts. Unless otherwise noted, differences between higher- and lower-impact districts are similar, regardless of district per-pupil spending category.

Relationships Among District Impact And Size, Geographic Dispersion, And Higher-Cost Labor Markets

Research indicates that operational costs are greater for districts that are small; geographically dispersed; and in higher-cost labor markets.[c] Compared with other similarly-spending districts, those that face these efficiency challenges may have less purchasing power for services that directly impact instruction. Almost all Kentucky districts (89 percent) experience at least one of these challenges and just over one fifth (22 percent) experience two or more.

Table 3.3 shows that the percentage of districts in the lower two impact categories is greater for small districts (50 percent); districts in higher-cost labor markets (40 percent); and geographically dispersed districts (40 percent) than for all districts (37 percent). Unlike geographically dispersed districts, small districts and districts in higher-cost labor markets are also less likely than all districts to be in higher impact categories.

Table 3.3
Percent Of Districts
By Impact Category And
District Size, Geographic Dispersion, And
Higher-Cost Labor Markets,
2018, 2019, And 2022

Impact Category	All	Small (n=38)	Geographically Dispersed (n=109)	Higher-Cost Labor Markets (n=53)
Highest (n=24)	14%	11%	11%	9%
High (n=31)	18	13	22	13
Average (n=52)	30	26	28	38
Low (n=40)	23	32	27	17
Lowest (n=24)	14	18	13	23

Note: In the analyses conducted for this report, districts are considered small if they have 1,000 students are fewer; geographically dispersed if they have 25 students or fewer per net square mile; and in higher cost labor markets if they fall in the "highest" or "high" category on the CWIFT as determined by methods explained in Appendix B.
Source: Staff analysis of data from the Kentucky Department of Education and the National Center for Education Statistics.

The section that follows discusses efficiency challenges of small districts. Challenges of districts in higher-cost labor markets are addressed later in the chapter in the discussion of teacher turnover.

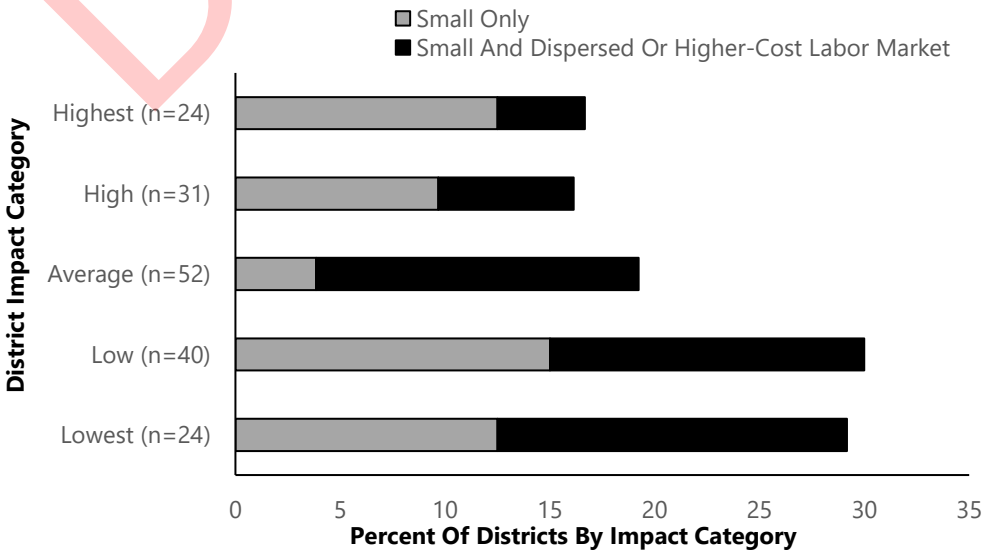
[c] Metrics used in the report to identify districts in these categories were discussed in Chapter 2.

Small Districts

Small districts are present in every impact category—they are among the state's highest- and lowest- impact districts. Small districts are, however, 1.5 times more likely than other districts to be in lower- versus higher-impact categories. Of the state's 38 small districts, 50 percent are in lower-impact categories compared with 34 percent of districts that are not small. Nine of 38 small districts (24 percent) are in higher-impact categories compared with 35 percent of other districts.

Small Districts With Additional Efficiency Challenges. Figure 3.D shows the percentages of districts, by impact category, that face efficiency challenges because they are small or small and also dispersed or in a higher-cost labor markets. The figure shows that challenges of small districts are present in all district impact categories but disproportionately affect lower-impact districts. Small districts in average and lower-impact and categories are also more likely than districts in higher-impact categories to face a combination of efficiency challenges beyond small size alone.

Figure 3.D
Percent Of Districts Facing Efficiency Challenges Due to Small Size And Additional Factors* By Impact Category
2018, 2019, And 2022



*Additional factors are higher-cost labor markets, geographic dispersion, or both.
Source: Staff analysis of data from the Kentucky Department of Education and the National Center for Education Statistics.

Geographic dispersion and higher-cost labor markets both increase the funds necessary to provide educational opportunities for students. Thus, these factors place additional challenges on those already experienced by small districts.

Spending Patterns Of Small And Dispersed Districts. Appendix L shows that, on average, the percentage of expenditures on district administration and business support is greater in small versus other districts. All districts are required to have certain district administrative staff such as superintendents, transportation directors, and special education directors. In smaller districts, these positions represent a larger percentage of staff than in larger districts.

The percentage of expenditures on instructional services is relatively less in small versus other districts. Instructional services expenditures are those that are provided directly to students in classrooms. They include teachers' salaries and benefits and other expenditures related directly to instructing students. Due to transportation costs, small districts that are also dispersed spend an even lower percentage on instructional services. On average, the percentage of expenditures on instructional services is 57 percent in small, dispersed districts compared with 61 percent in districts that are not small and not dispersed.

Higher-Spending, Lower-Impact Districts. Small districts are disproportionately in the higher per-pupil spending categories. Of the 18 districts that are in the higher (top two) spending categories and lower (bottom two) impact categories, 10 are small. Together, these small districts enroll less than one percent of the state's students, however. Of the 10 small, higher-spending, lower-impact districts, 9 are ISDs.

Independent Districts

Most—but not all—of ISDs are small. Of 51 ISDs, 28 have 1,000 students or fewer and 23 have more than 1,000 students. Five ISDs have more than 3,000 students and one has almost 5,000.

The majority (28 out of 38) of the state's small districts are, however, ISDs. Average impact scores of the 28 small districts that are ISDs are similar to average impact scores of the 10 small county districts, (-0.27 and -0.25, respectively), but small ISDs are slightly more likely to be in lower impact categories than are county districts (54 percent versus 40 percent). Of the 19 small, lower-impact districts, 15 are ISDs.

In contrast, average impact scores of the 23 ISDs that are not small exceed those of the 110 county districts that are not small (0.45 vs -0.01). Thirty percent of ISDs that are not small are in highest-impact categories compared with 11 percent of county districts that are not small.

Efficiency in ISDs may be positively affected by taxpayer scrutiny and locally competitive contexts. The relatively higher average levied equivalent rates in ISDs versus county districts (91 cents versus 66 cents) indicate that property assessments in ISDs are taxed at higher rates than in county districts. In addition, students enrolled in ISDs are more likely than students in county districts to be from families who have opted to have their students attend school in a district other than their district of residence. On average, about 20 percent of students enrolled in ISDs reside in other districts, compared to an average of about 2 percent in county districts. [d]

Efficiency challenges related to small district size offer only partial explanation for differences among districts in the relationship between per-pupil spending and district outcomes. Further, the minority of lowest-impact districts are small. The sections that follow report additional differences observed in higher- versus lower-impact districts.

Spending Patterns By District Impact Category

As a percentage of expenditures, highest-impact districts on average, spend about 3 percent more on instructional services than do lower-impact districts (69 percent versus 66 percent); percentages decrease as level of impact decreases.[e] Highest-impact districts, on average, spend slightly less than lower-impact districts on most other spending categories such as district and school administrative expenses or instructional support services. Instructional support services are those that benefit and support instruction but are not provided directly in the classroom.

[d] This calculation is weighted average that takes into account district membership. It excludes data from the four ISDs that provide education for students in grades kindergarten through eighth grade only: Anchorage Independent, East Bernstadt Independent, Science Hill Independent, and Southgate Independent.

[e] Percentages were calculated out of current expenditures not including those related to food and transportation. Food and transportation costs vary by district size and geographic dispersion in ways that are not entirely under administrators' control.

Examples of staff considered as instructional support services include school counselors, psychologists, and school nurses. Among small districts, higher- versus lower impact districts also spend a greater percentage on instructional services (66 percent versus 64 percent); as noted earlier,

Data available for this report do not reveal whether higher- versus lower- impact districts spend more on particular types of instructional services. For example, the relative number of teachers per student do not differ among impact categories; pupil teacher ratios are similar, about 15 students per teacher, in all categories.

Teacher Workforce

Higher- versus lower-impact districts, on average, are more likely to pay relatively competitive salaries; have lower turnover rates; have more experienced teachers; and have higher percentages of teachers reporting favorable working conditions.

Relatively Competitive Salaries

Table 3.4 shows that higher impact districts are more likely to pay relatively more competitive salaries than are lower impact districts.[f]

Table 3.4
Percent Of Districts With
Relatively Competitive Teacher Salaries
By District Reading And Mathematics Impact Category
2018, 2019, And 2022

Impact Category	Rank 3 0-year Salary (Starting Salary)	Rank 1 10-year Salary
Highest (n=24)	63%	71%
High (n=31)	55	55
Average (n=52)	54	40
Low (n=40)	33	40
Lowest (n=24)	38	38

Note: Competitive salary is determined by comparing starting salary to the starting salary that would be predicted based on a district's CWIFT. See Appendix J for an explanation of this calculation. Average 10-Year salary represents the salary schedule for teachers with Rank 1 and 10 years of experience.
Source: Staff analysis of data from the Kentucky Department of Education.

[f] Competitive salary is determined by comparing starting salary to the starting salary that would be predicted based on a district's CWIFT. See Appendix J for an explanation of this calculation. Higher- versus lower-impact districts also have higher average administrator salaries. The administrator salary differences might reflect differences in administrator experience, however. Administrator salary schedules were not obtained for this report.

Small districts are less likely than other districts to pay starting salaries beyond what would be predicted based on their labor markets (29 percent versus 53 percent). Salary disparities may especially affect small districts in higher cost labor markets.[g] Of districts in higher-cost labor markets, small districts are much less likely than others to pay competitive starting salaries (21 percent of small districts versus 59 percent of other districts).

Teacher Turnover And Experience

Table 3.5 shows that higher- versus lower-impact districts have, on average, lower rates of teacher turnover. The table also shows the percentage of districts within each impact category that have higher turnover rates of 15 percent or higher. [h] Over half of lowest-impact districts have higher teacher turnover rates, compared with none of the highest-impact districts. Appendix M maps teacher turnover among Kentucky districts.

Table 3.5
Teacher Turnover
By District Impact Category
2018, 2019, And 2022

Impact Category		Average District Teacher Turnover Rate	Percent Of Districts Higher Teacher Turnover Rates (15 Percent Or Greater)
Highest	(n=24)	11%	0
High	(n=31)	11	6
Average	(n=52)	13	27
Low	(n=40)	13	30
Lowest	(n=24)	17	54

Note: Higher teacher turnover rate categories were determined using methods explained in Appendix B. Teacher turnover rates show the percentage of teachers that leave a district each year. These rates do not reflect teacher turnover that happens within schools in each district. When teacher turnover is calculated based on the number of teachers that leave schools, turnover rates are higher in most districts, but especially larger districts. The difference between district and school teacher turnover rates is an average of 5 percentage points greater in larger districts versus 2 percentage points in small districts.
Source: Staff analysis of data from the Kentucky Department of Education.

As shown in Appendix M, districts located in higher cost labor markets that have relatively less competitive salaries have higher

[g] Higher cost labor markets are those that are “highest” or “high” based on thresholds explained in Appendix B. Competitive salary is determined by comparing starting salary to the starting salary that would be predicted based on a district’s Comparable Wage Index For Teachers (CWIFT).

[h] Higher teacher turnover rate categories were determined using methods explained in Appendix B.

teacher turnover rates, on average, than districts in those labor markets that pay relatively more competitive wages. Turnover rates by salary categories vary in the other labor markets.

Note that teacher turnover rates reported in Table 3.5 show the percentage of teachers that leave a district each year. These rates do not reflect teacher turnover that happens within schools in each district. When teacher turnover is calculated based on the number of teachers that leave schools, turnover rates are higher in most districts, but especially larger districts. The difference between district and school teacher turnover rates is an average of 5 percentage points greater in larger districts versus 2 percentage points in small districts. [i]

As shown in Table 3.6, differences among impact categories in teacher turnover rates are reflected by differences in average teacher experience and percentage of new teachers. On average, higher- versus lower-impact districts have higher average years of teacher experience and lower averages percentages of teachers with 5 or fewer years of experience.

Table 3.6
Teacher Experience
By District Impact Category
2018, 2019, And 2022

Impact Category		Average Years Teacher Experience	Percent Of Teachers 5 Or Fewer Years' Experience
Highest	(n=24)	13	25%
High	(n=31)	13	26
Average	(n=52)	12	29
Low	(n=40)	12	30
Lowest	(n=24)	11	35

Source: Staff analysis of data from the Kentucky Department of Education.

Teacher Working Conditions

Table 3.7 shows the average percentage of favorable responses to various categories of questions answered by Kentucky teachers on a 2020 KDE teacher survey. This survey is administered every other year to all certified educators; about three-quarters of teachers respond to the survey. Aggregate data by school and district are publicly available.

Table 3.7 shows substantial differences between teachers in higher-versus lower-impact schools in the percentages of favorable

[i] Based methods described in Appendix B, OEA identified largest districts to be the eight districts whose membership exceeded 6,500 students.

responses to questions in each category. Favorable responses were especially differentiated in the categories of school climate; feedback and coaching; and school leadership.

Table 3.7
Average Percentage Of Teachers
With Favorable Responses
Teacher Working Conditions Survey, 2020
By Impact Category, 2018, 2019, And 2022

Question Category	Highest (n=24)	High (n=31)	Average (n=52)	Low (n=40)	Lowest (n=24)	Difference Very High And Very Low
School Climate	72%	68%	64%	58%	55%	17%
Feedback and Coaching	64	60	56	52	49	15
School Leadership	74	69	67	61	59	15
Managing Student Behavior	75	71	67	63	61	14
Resources Available	56	49	47	42	44	12
Professional Learning	65	60	58	53	53	12
Staff-Leadership Relationships	82	78	77	73	73	10

Source: Staff analysis of data from the Kentucky Department of Education.

Staff placed districts in categories of relatively more or less favorable working conditions based on the average percentage of favorable responses in all question categories.[j] Figure 3.E shows differences in the percentages of districts in the relatively more and less favorable working conditions categories by reading and math impact categories. For example, 88 percent of highest-impact districts were in the relatively more favorable working conditions category compared with 17 percent of lowest-impact districts in the relatively more favorable working conditions category. While 58 percent of lowest-impact districts were in the relatively less favorable working conditions category, none of the highest-impact districts were in the relatively less favorable working conditions category.

[j] Average favorable responses by district ranged from a low of 40 percent to a high of 84.5 percent. Average favorable responses in districts with relatively more favorable responses was 71 percent versus an average of 55 percent in districts with less favorable working conditions .

Figure 3.E
Percent Of Districts By Impact And Working Conditions Categories
2018, 2019, And 2022

Note: OEA derived these relatively more or less favorable working conditions categories by averaging the percentage of favorable responses, by district, in the individual question categories. Districts with relatively more favorable working conditions are those in the top two quintiles and districts with relatively less favorable conditions are those in the bottom two quintiles.
Source: Staff analysis of data from the Kentucky Department of Education.

Relationship Between Impact On Reading And Mathematics And Impact On Graduation Rates And Career Readiness

As noted in Chapter 1 and earlier in this chapter—no single indicator can capture the degree to which an individual district or school is assisting students to achieve all of the capacities set as goals for Kentucky public schools.

In addition to reading and mathematics, staff calculated district impact data for district graduation rates and the percentages of graduates who met one of three career readiness indicators. [k] Methods used were similar to those used for the reading and mathematics impact data.

Table 3.8 shows the number of districts that were higher or lower in reading and mathematics impact and also higher or lower in the two other outcome measures. Just over half of the higher impact

[k] Graduates were considered career ready if they completed a sequence of three courses in an individual CTE pathway; earned an industry certificate; or passed a state-approved CTE assessment. Of these, pathway completion is no longer required as an indicator of career readiness, but it has been required in the past.

reading and mathematics districts were also higher impact for graduation rate. Approximately 21 percent of higher impact reading and mathematics districts were also higher impact in career readiness. Similarly, a minority of districts (approximately 28 percent) that were lower in reading and mathematics were also lower on the other outcome measures. Overall, there were eight districts that were higher and eight districts that were lower in all three outcome indicators.

Table 3.8
Number Of Districts
Higher- Or Lower- Impact In
Reading And Mathematics, Graduation Rate, And Career Readiness
2018, 2019, 2022

District Category	Reading And Mathematics	Reading And Mathematics And Graduation Rate	Reading And Mathematics And Career Readiness	Reading And Mathematics, Graduation Rate, And Career Readiness
Higher Impact	55	30	12	8
Lower Impact	64	25	18	8

Note: Districts that were in the highest or high group were considered "higher" and districts that were in the low or lowest group were considered "lower".
Source: Staff analysis conducted on data from KDE.

These data serve as an important reminder that reading and mathematics data presented in this chapter do not fully capture district effectiveness at ensuring that students develop the variety of capacities that are set as goals for Kentucky public schools.

Appendix N shows relatively higher relationships between district ACT impact and relatively higher long-term postsecondary education outcomes for district graduates. Of district graduates in higher-impact ACT districts in the 2012, 2013, and 2014 school years, 60 percent were also in higher impact categories for postsecondary enrollment and degree attainment through 2022.

Conclusion

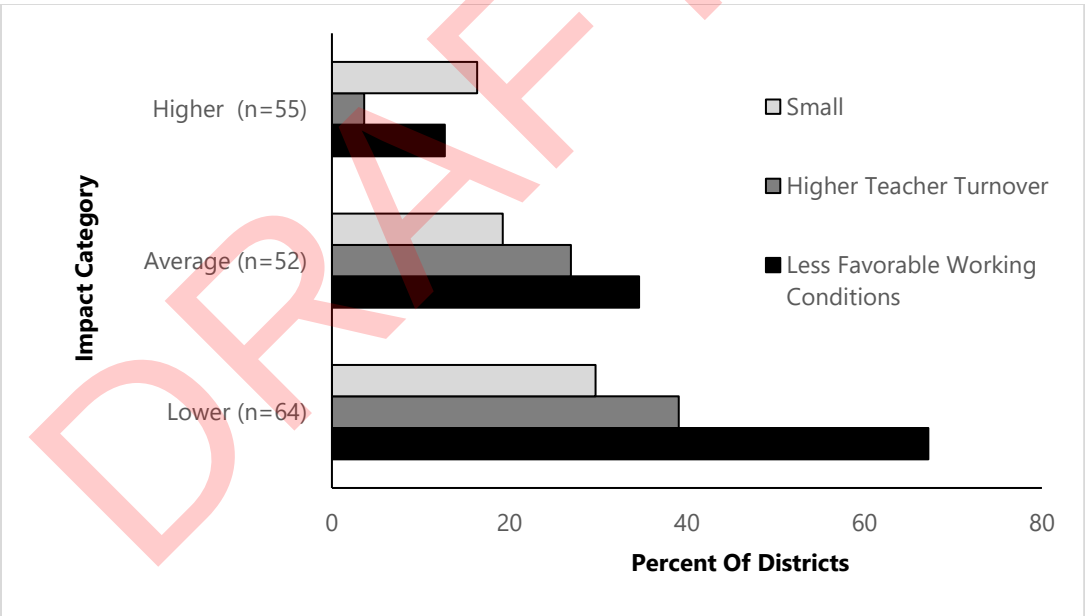
This chapter has identified three areas that merit attention from state and local leaders concerned about district effectiveness and efficiency:

- efficiency challenges of small districts;
- teacher turnover rates; and
- teacher working conditions.

Together, these area present clear challenges to districts across the state and barriers to effectiveness and efficiency. [1]

Figure 3.F summarizes data shown earlier in this chapter showing higher percentages of lower- versus higher impact districts that are small; have higher attrition rates; and relatively less favorable working conditions.

Figure 3. F
Percent Of Districts By Reading And Mathematics Impact Category That Are Small, Have Higher Teacher Turnover Rates, Or Relatively Less Favorable Working Conditions 2018, 2019, And 2022



Note: Higher impact districts include those that are highest or high and lower impact districts include those that are low or lowest.
Source: Staff analysis of data from the Kentucky Department of Education.

Challenges Faced By Small Districts

Because they lack economies of scale, smaller districts, on average, spend a lower percentage of available revenue on instructional services than do other districts. Depending on the revenue they receive, some small districts may have difficulty

[1] While data in this chapter focused on impact scores, Appendix K shows that these challenges also apply to districts that have higher- versus lower actual reading and mathematics scores.

affording instructional services and supports available to students in other districts. Small districts that face additional challenges such as geographic dispersion or higher labor market costs may be especially challenged.

Merger Options For Independent School Districts. The relatively higher operational costs in small ISDs have been borne in part by voters who have been willing over time to authorize additional taxes. Small ISDs that are struggling to generate revenue sufficient to support their costs have the option to request merger with the larger county district in which they are located. OEA's "Kentucky's Independent School Districts: A Primer" describes the process by which this may occur in detail.[2] Under current law, the ten small districts that are county districts do not have the option to request merger. Since 2005, five ISDs have merged with county districts.[m]

Small District Funding Weights. The General Assembly may wish to consider providing small districts—many of which are also geographically dispersed—with additional funding through the SEEK formula. Such a consideration might be informed by external research such as has been conducted recently for other legislatures in Texas and Vermont. An external study might recommend thresholds and associated funding weights for districts that are considered small or dispersed. [3]

Teacher Turnover

On average, lower- versus higher-impact districts have higher teacher turnover rates and less experienced teachers. Districts paying relatively less competitive wages—especially those districts located in higher-cost labor markets—experience greater turnover than other districts.

Data presented in this chapter suggest that actions taken by local boards and district leaders—especially those that target resources to support teacher working conditions or relatively competitive salaries—may have made some similarly-spending districts more successful than others at providing students with a stable, experienced teacher workforce.

[m] Harrodsburg with Mercer County in 2006; Providence with Webster County in 2007; Monticello with Wayne county in 2014; and Silver Grove with Campbell County in 2020; Westpoint with Hardin County in 2021.

Local leaders may ultimately be limited in their ability to retain teachers, however, if they lack sufficient revenue to ensure that teacher salaries keep pace with labor market demands. When considering budget allocations to support SEEK funding, the General Assembly should take into account, among other considerations, the degree to which increases in SEEK funding over time are sufficient to allow local districts to keep pace with changes labor markets generally.

Teacher Working Conditions

Districts in lower impact categories are over five times more likely than higher-impact districts to have relatively less favorable teacher working conditions as reported by teachers on KDE's biennial working conditions survey. None of the highest-impact districts have less favorably reported working conditions.

The KDE working conditions survey provides valuable data for state and local leaders. These data are important in guiding improvements at the local level through administrator evaluations, district improvement planning, or school improvement planning. Teacher working conditions data can also inform state policies or programs aimed at strengthening working conditions in areas such as school climate; teacher feedback and coaching; school leadership; and managing student behavior.

[1] Michael Casserly et. al. "How Well Do Large City Public Schools Overcome the Effects of Poverty and Other Barriers?". Council of the Great City Schools. June, 2021. Web.
[2] Kentucky. Legislative Research Commission. Office of Education Accountability. *Kentucky's Independent School Districts: A Primer*. Research Report No. 415. September, 2015. Web.
[3] Lori Taylor et al. "A Study on Geographic Education Cost Variations and School District Transportation Costs" Texas A&M University. Jan., 2021; Tammy Kolbe et. al. "Pupil Weighting Factors Report" Report to the House and Senate Committees on Education, the House Committee on Ways and Means. Updated, Jan, 2020, p. 11.

Appendix A

Statistical Methods Used To Determine District Effectiveness

This appendix describes the ordinary least squares linear regression model that staff used to calculate the impact scores reported in Chapter 3, in detail. The appendix later describes additional models that staff used to validate the findings reported in the chapter. While these additional models resulted in some small differences in districts identified in particular impact categories, they all validated the broader conclusions of the chapter.

Ordinary Least Squares Linear Regression Models Reading And Math Model

Ordinary Least Squares (OLS) regression modeling was used to quantify the relationship between student, community, and school characteristics with reading and math performance. The models were structured with the standard scores for reading and math by grade and year as the dependent variable.[a]

The students included in the OLS model were 3rd through 8th grade students with KPREP reading and math scores, and 11th grade students with ACT reading and math scores for school years 2018, 2019, and 2022. Scores for reading and math were treated as separate observations for all students in the data. There were 2,043,234 total observations in the OLS Model for this time period.

The model controlled for student-level subgroup categories for race and ethnicity, eligibility for free or reduced-price lunch, participation in an individualized education program (IEP), students with limited English proficiency (LEP), and whether a student was homeless. These student-level characteristics are represented in the equations for the model as (βDEMO).

The model also controlled for whether a student attended a school that had 75 percent or more of its population receiving free or reduced-price lunch as an indicator for attending a "high poverty" school (βSchoolPoverty).

The final student-level control used was whether a student moved schools during the school years 2018, 2019, or 2022 (βMoved).

The model also included a community characteristic control for the percentage of residents that had earned a bachelor's degree or more by zip code (βBachelorZip). The bachelor's degree data by zip code was obtained from the American Community Survey, and was matched up to the zip code of student residence for each observation.[b] The residual error term finishes the equation (ε).

[a] Standard scores were computed for each subject, grade, and year independently. For instance, standard scores for 3rd grade KPREP reading were computed at the student level for school years 2018, 2019, and 2022. The same was computed for 3rd grade KPREP mathematics, and then repeated for all grades, subjects, and years.
[b] In the event that a student-level zip code was not available, a district-level percentage of residents that earned a bachelor's degree or more was used.

$$\textit{Model 1: Standard Score} = \alpha + \beta DEMO + \varepsilon$$
$$\textit{Model 2: Standard Score} = \alpha + \beta DEMO + \beta SchoolPoverty + \varepsilon$$
$$\textit{Model 3: Standard Score} = \alpha + \beta DEMO + \beta SchoolPoverty + \beta Moved + \varepsilon$$
$$\textit{Model 4: Standard Score} = \alpha + \beta DEMO + \beta SchoolPoverty + \beta Moved + \beta BachelorZip + \varepsilon$$

Computed Beta Coefficients And Explained Variance

Table A.1 shows the beta coefficients and standard errors for each iteration of the Reading and Math model, with Model 4 representing the most comprehensive version.

All control variables in each version of the model have strong statistical significance, but most of the explained variance comes from student demographics.[c] This can be determined by examining the R-squared value for Model 4, which was approximately 18 percent, and the R-squared value from Model 1 that included only student demographics as control variables, which was approximately 16 percent.

Student demographics accounted for almost all the explained variance, but the other control variables that were added in Models 2 through 4 had strong statistical significance, they just did not contribute much to the total explained variance from Model 4, the primary model for this analysis.

Most of the control variables have negative coefficients, which means those factors according to the model were associated with lower reading and math scores relative to other students. FRPL status and IEP status were among the strongest negative predictors from the student demographic controls.

The percentage bachelor's degree by zip code and other race were associated with higher scores relative to other students according to the model. The beta coefficient for percentage bachelor's degree by zip code indicates that for every 1 percent increase in the percent of the population with bachelors' degrees, the expected scores for reading and math would increase by approximately 0.006 standard deviations. For example, if a particular zip code had 50 percent of its residents with bachelor's degrees, that would be associated with an expected increase in reading and math scores by nearly a third of one standard deviation.

The other control variables are categorical and not continuous like the percent bachelor's degree variable. Therefore, the coefficients are only applied to students that are in the populations of controlled variables in the model. For example, a student with FRPL status would have a negative beta coefficient of -0.3762, but a student not eligible for FRPL would not have this coefficient applied when computing the expected scores.

[c] Each of the control variables from Models 1 through 4 had t-statistics and p-values that indicate a confidence interval for the beta coefficients greater than 99 percent. This is also indicated in the small standard errors associated with each control variable.

Students can be in more than one control group, for instance a student could be eligible for FRPL and could have moved at least once during the observation period. In this instance the coefficients for each of those variables would be applied to that student observation during the computation of expected scores.

Table A.1
Regression Output For Reading And Math Scale Scores
Grades 3 Through 8 And 11
Models 1 Through 4
School Years 2018, 2019, And 2022

	OLS Regression - Reading and Math Performance - 2018, 2019, and 2022							
	Model 1		Model 2		Model 3		Model 4	
Controls	Beta Coefficient	Standard Error	Beta Coefficient	Standard Error	Beta Coefficient	Standard Error	Beta Coefficient	Standard Error
Black	**-0.3914**	0.0018	**-0.3821**	0.0018	**-0.3617**	0.0018	**-0.3831**	0.0018
Hispanic	**-0.0608**	0.0028	**-0.0606**	0.0028	**-0.0552**	0.0028	**-0.0757**	0.0028
Other race	**0.2911**	0.0040	**0.2905**	0.0039	**0.2826**	0.0039	**0.2432**	0.0039
FRPL	**-0.4456**	0.0014	**-0.4293**	0.0014	**-0.4092**	0.0014	**-0.3762**	0.0014
LEP	**-0.7335**	0.0044	**-0.7304**	0.0044	**-0.7052**	0.0044	**-0.7224**	0.0044
IEP	**-0.5622**	0.0020	**-0.5510**	0.0020	**-0.5464**	0.0020	**-0.5452**	0.0020
Homeless	**-0.1723**	0.0043	**-0.1293**	0.0043	**-0.1168**	0.0043	**-0.1084**	0.0043
Male	**-0.0469**	0.0013	**-0.0468**	0.0013	**-0.0465**	0.0013	**-0.0466**	0.0013
Moved Ever			**-0.3912**	0.0033	**-0.3814**	0.0033	**-0.3930**	0.0033
School FRPL population - 75 percent or more					**-0.1289**	0.0016	**-0.0956**	0.0017
Percent Bachelor's Or More By Zip Code							**0.0058**	0.0001
Intercept (α)	**0.4500**		**0.4597**		**0.4699**		**0.3131**	
R-Squared	0.1607		0.1692		0.1718		0.1774	
Number of observations	2,043,234		2,043,234		2,043,234		2,043,234	

Note: The intercept (α) represents the control group mean of 2018, 2019, and 2022 reading and math scale score for each of the models. Beta coefficients have been rounded to the nearest ten-thousandth. FRPL= free or reduced-price lunch; IEP = individualized education program; LEP = limited English proficiency. Each of the control variables from Models 1 through 4 had t-statistics and p-values that indicate a confidence interval for the beta coefficients greater than 99 percent.
Source: Staff Analysis of Data From the Kentucky Department of Education And The US Census Bureau.

OLS Models For Career Readiness and Graduation Rate

Models for career readiness and graduation rate were also conducted for the 2018 and 2019 school years. These models were used as alternative metrics of district performance to determine if there were districts that consistently performed above or below what the models projected.

Career Readiness Model

The career readiness model was a student-level model that included only high school graduates from the 2018 and 2019 school years. The control variables for this model were the same that were used in the reading and math model described earlier in this appendix. The strongest predictor from this model was whether a student moved schools. The models were structured with districts' career readiness rates by grade and year as the dependent variable.

When looking at the actual career readiness rates relative to the residuals produced by this model, there was very little district movement up or down when ranking districts relative to the other districts using standard scores.

Graduation Rate

The graduation rate model was a district-level model that included district data from 2018 and 2019. This model controlled for the percentages of students that were eligible for FRPL, percentage of students with and IEP, percentage of black students, percentage of students other race, percentage of students with LEP, percentage of homeless students, and the percentage of bachelor's degree within the district. The models were structured with districts' graduation rates by grade and year as the dependent variable. This model accounted for nearly 19 percent of the explained variance between the controls and the dependent variable. One of the strongest predictors for this model was the percentage of students eligible for FRPL.

Additional Methods That Validate Findings Of Chapter Three

Ordinary Least Squares Regression Model Without Controls For Race

The same OLS model was performed, but the controls for race and ethnicity were removed to examine if the model explained the same amount of variance without the controls for race and ethnicity. The OLS model without race/ethnicity controls had higher magnitude coefficients for free-reduced lunch and for students that attended a school with 75 percent or more of students being eligible for free-reduced price lunch. The OLS model without race/ethnicity controls accounted for approximately 2 percent less of the explained variance relative to the full OLS model described above.

Mixed-Effects Model

A mixed effects model was also performed on this data. Mixed-effects models account for both fixed and random effects and are typically used when using panel data, or when repeated

measurements are made on the same students over multiple years for instance. Mixed effects models are also used when units can be clustered together, for example students within schools.[1]

The clustering unit for this mixed-effects model was schools, and the model was performed using the same student level data for the 2018, 2019, and 2022 school years that was used for the OLS model described above.

The coefficients and computed residuals for the mixed effects output were slightly different than those from the OLS model, but the categorization of districts by impact was still computed using the standard score of the residual, in this case from the mixed effects model. There were 57 districts that were in a different impact category relative to the OLS model output, with 28 moving down one category and 28 moving up one category. There was one district that moved up from the Average category to the Very High category when using the mixed effects model output.

Overall, the results of the mixed effects model were nearly identical to those produced by the OLS model described at the beginning of this appendix.

Standard Score Comparison—IEP Students Relative To Other Students

As noted in Chapter 2, Kentucky districts range broadly in the percentage of students identified as eligible for special education. This variation may reflect naturally occurring differences among the student populations in each district. It may also reflect, in part, differences among districts in the standards or practices used to identify students for special education. Should these differences in identification practices exist, they could affect the scores of individual districts in the impact model.

Table A.2 compares the average actual standard scores for reading and math performance for IEP students relative to the rest of the student population. Districts are grouped by the percentage of IEP students. The third column is the difference in the average standard scores for these student groups. The table shows that the difference between the scores of IEP students and other students is the smallest for districts with the highest percentages of IEP students and increases as the percentage of IEP students decreases.

Table A.2
Average District Standard Scores For Reading And Math
Comparison Between IEP And Not IEP Students
School Years 2018, 2019, and 2022

IEP % Category	Standard Score – IEP students	Standard Score – Not IEP students	Difference
Highest	-0.35	0.02	-0.37
High	-0.61	-0.04	-0.56
Average	-0.61	0.06	-0.68
Low	-0.56	0.04	-0.60
Lowest	-0.47	0.27	-0.74
Total	-0.52	0.07	-0.59

Note: IEP= students eligible for individualized education programs.
Source: Staff analysis of data from the Kentucky Department of Education.

Table A.2 shows that actual, unadjusted scores of IEP students are highest among districts that identify students for special education at the highest rates and lowest among districts that identify students for special education at the lowest rates. These differences could potentially reflect differences the effectiveness of practices used to educate IEP students in those districts. Data reported in Table A.2 might also indicate differences among districts in the standards or practices used to identify students as eligible for special education.

Tables A.3 shows the district counts for impact category grouped by district IEP percentage category. Overall, 15 of the 27 districts in the highest IEP percentage category were in the highest impact categories.

Table A.3
District Count For R&M Model Impact Category
By District Exceptional Child Percentage
For School Years 2018, 2019, and 2022

	All Students Model Category						
IEP % Category	Highest	High	Average	Low	Lowest	Total	Avg. EC %
Highest	8	7	6	5	1	27	19
High	1	4	8	6	3	22	15
Average	6	11	20	14	6	57	13
Low	5	3	14	12	13	47	11
Lowest	4	6	4	3	1	18	9
Total	24	31	52	40	24	171	13

Note: IEP= students eligible for individualized education programs.
Source: Staff analysis of data from the Kentucky Department of Education.

Table A.4 also shows the district counts for impact category grouped by district IEP percentage category, but the impact model for this table excluded IEP students entirely. With IEP students removed from the model, only 11 of the 27 highest IEP percentage districts were in the highest impact category.

Table A.4
District Count For R&M Model Without IEP Students
Impact Category By District Exceptional Child Percentage
For School Years 2018, 2019, and 2022

	No IEP Students Model Category					
EC Category	**Highest**	**High**	**Average**	**Low**	**Lowest**	**Total**
Highest	6	5	6	10		27
High	1	3	9	7	2	22
Average	6	16	18	13	4	57
Low	5	8	10	11	13	47
Lowest	5	5	5	2	1	18
Total	23	37	48	43	20	171

Note: IEP= students eligible for individualized education programs.
Source: Staff analysis of data from the Kentucky Department of Education.

[1] UCLA Advanced Research Computing. "*Introduction to Linear Mixed Models.*" N.d. Web.

Appendix B
Standard Scores And Thresholds

Standard Scores. Because the report combines data from a variety of measures and years, it transforms each data point into a "standard score" that represent the data by units that can be compared across data sets. Standard scores take into account the difference of each data point from the mean, as well as the general distribution of data from the mean, as determined by the measure of standard deviation. Data that are more widely distributed have relatively higher standard deviations of units measured and data that are packed close together have lower standard deviations.A standard score of "0" is equal to the average and most measures fall between 0 and a standard score of positive or negative 1 standard score.

Categories

Following commonly used cut points, OEA considers data that are within 1/3 standard deviation of the mean as average, and data that are more than 1/3 standard deviation above or below the mean are considered high or low. [1]On occasion, the report further divides high and low categories into very high or very low; these categories are based on data that are 1 or more standard deviations above or below the mean. Because of differences in the way that different data sets are distributed in relation to the mean, different numbers of districts fall into each category, depending on the data set used.

Table B.1
Thresholds for Categories Used In The Report

Category Of Metric	Range of Metric	District FRPL Percent	Per-Pupil Expenditures	Reading And Math Standard Actual Score	Reading And Math Impact Residual
Highest	Low	76.9	$14,964	0.191	0.138
	High	91.4	$24,237	0.872	0.416
High	Low	68.3	$13,816	0.056	0.038
	High	76.3	$14,742	0.184	0.132
Average	Low	59.6	$12,561	-0.082	-0.06
	High	67.9	$13,706	0.051	0.037
Low	Low	50.4	$11,439	-0.215	-0.155
	High	59.0	$12,549	-0.087	-0.062
Lowest	Low	05.5	$10,678	-0.457	-0.431
	High	50.0	$11,355	-0.232	-0.159

Note: FRPL = Students eligible for free and reduced-price lunch; R&M= reading and math.
Source: Staff analysis of data from the Kentucky Department of Education.

Table B.2
Average Proficiency Rates For Reading And Math And Average ACT Composite For Districts Grouped By Actual Reading And Math Performance Categories 2018, 2019, And 2022

	Actual Performance Category					
Metric	**Highest**	**High**	**Average**	**Low**	**Lowest**	**Total**
Average of 11th Grade ACT Composite	20.6	18.9	18.5	18.0	17.3	18.6
Average of Elementary School Math Proficiency	62.1	49.9	44.1	38.5	28.5	44.2
Average of Elementary School Reading Proficiency	66.4	56.9	51.9	45.9	37.5	51.4
Average of Middle School Math Proficiency	58.8	51.0	42.0	36.4	28.9	43.0
Average of Middle School Reading Proficiency	68.0	58.7	55.6	49.9	43.1	54.8

Source: Staff analysis of data from the Kentucky Department of Education.

Table B.3
Average Proficiency Rates For Reading And Math And Average ACT Composite For Districts Grouped By Impact Reading And Math Performance Categories 2018, 2019, And 2022

	Impact Performance Category					
Metric	**Highest**	**High**	**Average**	**Low**	**Lowest**	**Total**
Average of 11th Grade ACT Composite	19.5	18.7	18.6	18.2	17.8	18.6
Average of Elementary School Math Proficiency	58.8	48.5	45.0	38.4	32.3	44.2
Average of Elementary School Reading Proficiency	64.0	56.3	52.0	46.5	39.7	51.4
Average of Middle School Math Proficiency	54.7	49.4	42.8	37.4	32.4	43.0
Average of Middle School Reading Proficiency	64.3	58.7	55.1	51.4	45.3	54.8

Source: Staff analysis of data from the Kentucky Department of Education.

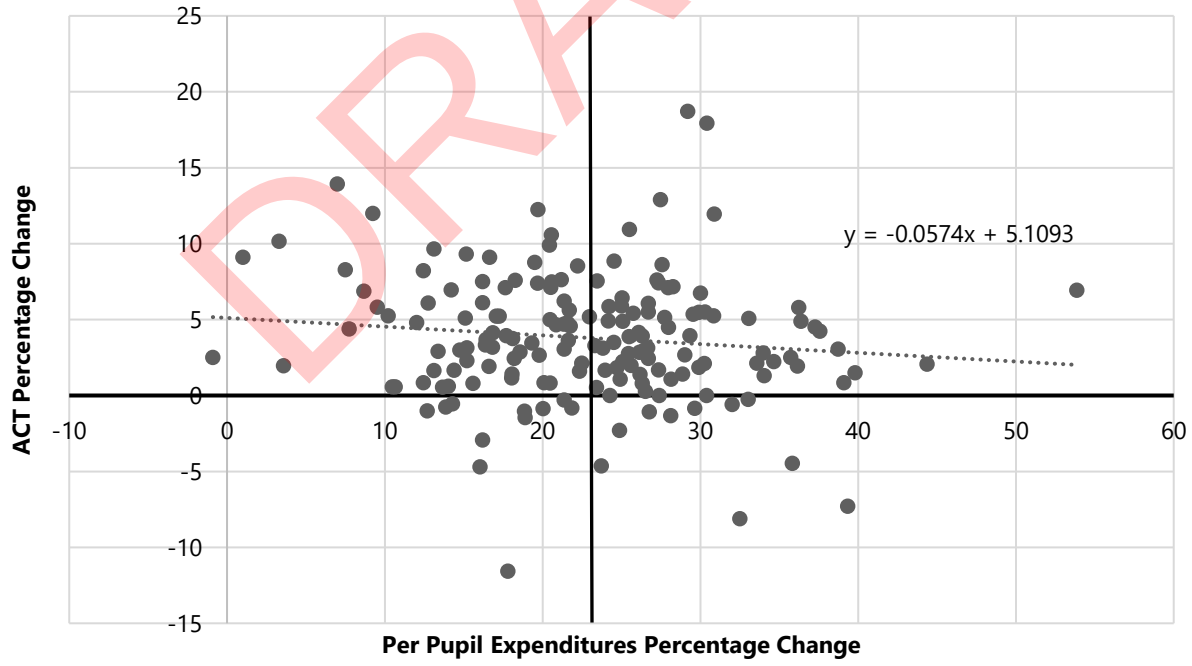
[1] Danielle Farrie and David Sciarra. “Making the Grade.: How Fair Is School Funding In Your State” Education Law Center, 2022 , p. 07.

Appendix C
Change In Per-Pupil Spending And ACT Composite Over Time

This analysis looks at the percentage change in ACT composite scores by district over 10 years. Data for the 2009 and 2010 school years was combined to form the beginning years of the analysis, and data for the 2018 and 2019 school years was combined to form the final years of the comparison between the two eras.

Figure C.A. shows a scatter-plot of districts with the percentage change in ACT composite scores on the vertical axis, and the percentage change in per pupil expenditures on the horizontal axis. When plotting these 2 metrics, without any statistical adjustments, there is a slight negative relationship between the 2 measures of change.

Figure C.A
Percentage Change In Per-pupil Spending
Relative To Percentage Change In ACT Scores
2009 and 2010 Averages Relative To Averages For 2018 and 2019



Source: Staff analysis of data from the Kentucky Department of Education.

Table C.1 shows the demographic changes that occurred during the 10 years for districts that were grouped by change in per pupil expenditures categories. Districts that were in the Very High per pupil expenditures change group had the largest percentage change in the percentage of students eligible for free or reduced-price lunch and percentage change in students with limited

English proficiency. Districts from the Very Low change in per pupil expenditures group had less FRPL students in 2018 and 2019 relative to the 2009 to 2010 timeframe.

Table C.1
Demographic Changes In Districts
Grouped By Percentage Change In Per-Pupil Spending
School Years 2010 To 2019

	Percentage Change Of Difference From School Year 2010 To 2019							
Change In Per-Pupil Expenditures Category	**Membership**	**FRPL**	**White**	**Black**	**Hispanic**	**Other Race**	**IEP**	**LEP**
Very High	-3.77	4.32	-7.56	-1.08	4.71	3.93	0.14	1.43
High	-2.67	1.94	-4.35	-0.37	2.59	2.14	0.40	0.82
Average	-2.39	2.20	-3.37	-0.86	2.29	1.95	0.31	0.51
Low	-0.80	1.20	-3.27	-1.23	2.49	2.01	-0.60	0.64
Very Low	-3.27	-2.77	-3.48	-0.19	2.21	1.47	0.42	0.72
Total Change	-2.42	1.44	-4.13	-0.75	2.70	2.19	0.13	0.76

Note: FRPL = eligible for free and reduced-price lunch; IEP= students with an individualized education program; LEP= students with limited English Proficiency.
Source: Staff analysis of data from the Kentucky Department of Education.

Table C.2 shows percentage of small districts, and the percentage of not small districts grouped by the percentage change in ACT composite scores category. The smaller districts were disproportionately in the Very High and Very Low categories for ACT score change.

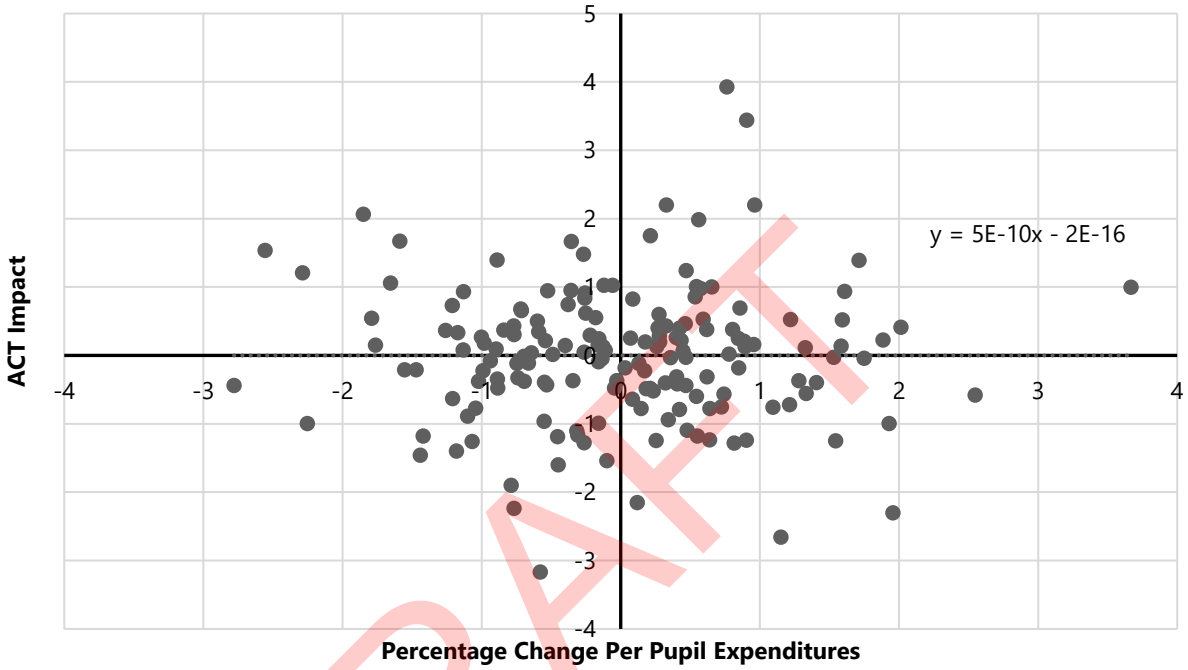
Table C.2
Percentage Of Districts Small Or Not
Grouped By Percentage Change In ACT Composite Scores
2009 and 2010 Averages Relative To 2018 And 2019 Averages

Percentage Change ACT Category	Percent Small Districts	Percent Other Districts	Total
Very High	33.33	66.67	100.00
High	20.00	80.00	100.00
Average	20.41	79.59	100.00
Low	16.28	83.72	100.00
Very Low	36.84	63.16	100.00
Total	22.75	77.25	100.00

Source: Staff analysis of data from the Kentucky Department of Education.

Figure C.B shows a scatter-plot of districts with the ACT district impact score on the vertical axis, and percentage change in per pupil expenditures on the horizontal axis. The ACT impact scores were computed with an ordinary least squares regression that had change in ACT composite scores as the dependent variable, and the percentage change in district demographics, percentage change in membership, and percentage change in per pupil expenditures as control variables. The scatter-plot indicates no apparent relationship between percentage change in ACT impact scores and the percentage change in per pupil expenditures after adjusting for the controls in the ACT percentage change model.

Figure C.B
Change In ACT Impact Score
Relative To Change In Per Pupil Expenditures
2009 and 2010 Averages Relative To 2018 And 2019 Averages

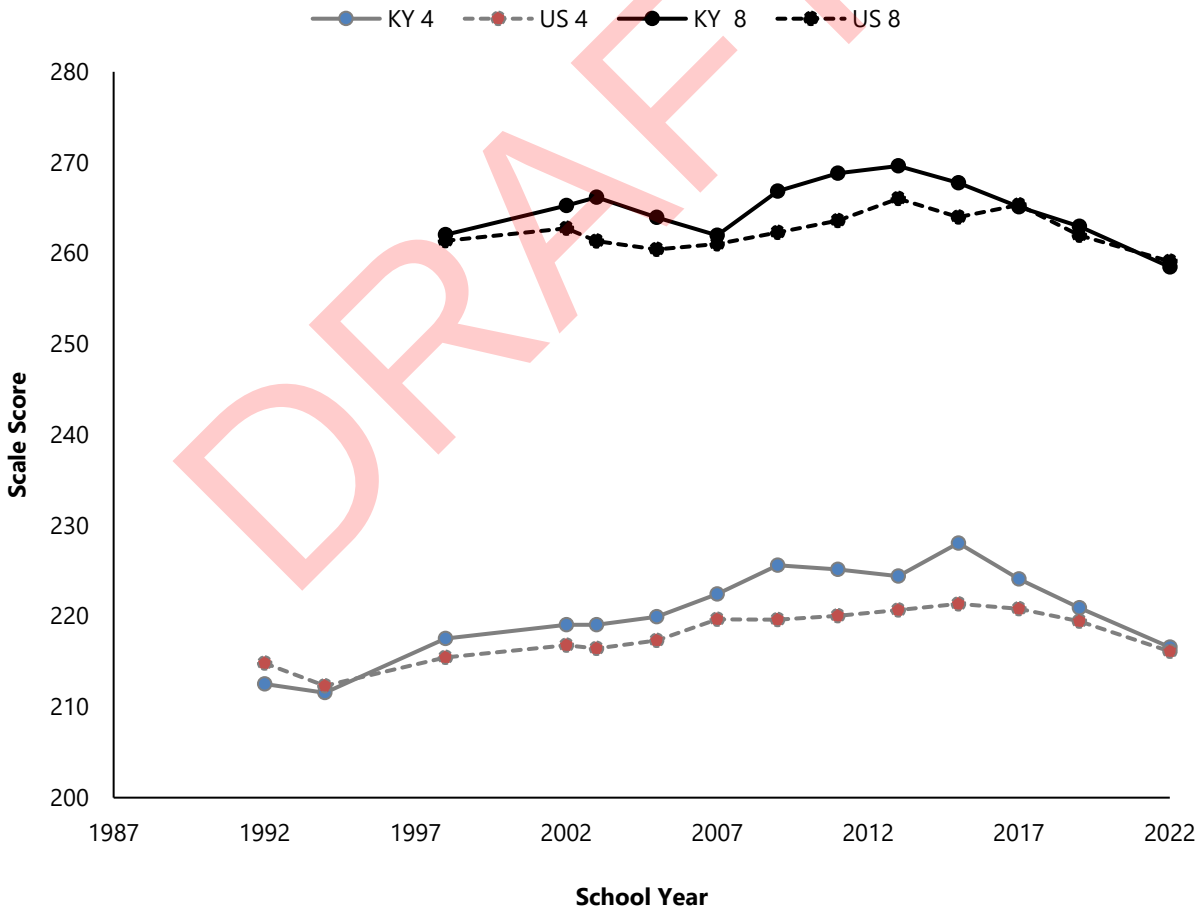


Source: Staff analysis of data from the Kentucky Department of Education.

Appendix D
NAEP Reading And Math Scores
Kentucky And Nation
1990-2022

Figure D.A shows NAEP 4th and 8th grade reading scale scores for Kentucky and the US between 1990 ad 2022 for all years available.

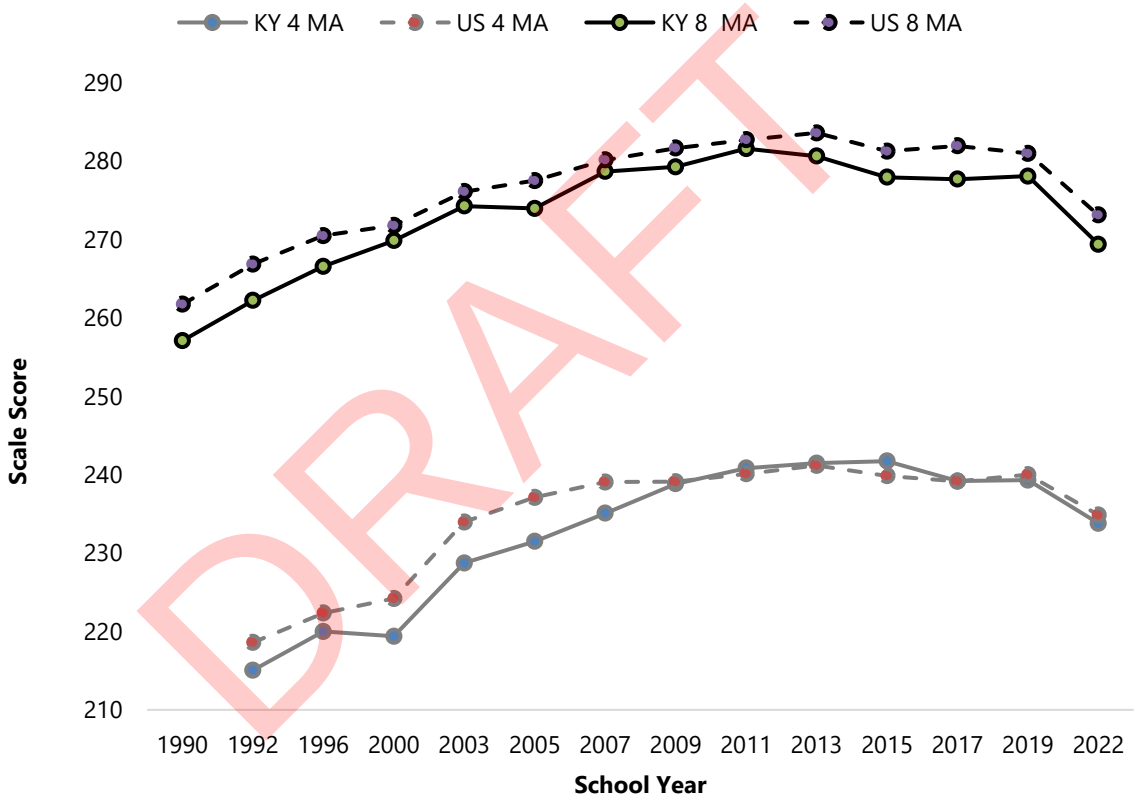
Figure D.A
NAEP Reading Scale Scores
4th And 8th Grades
Kentucky And US
1990-2022



Notes: Prior to 2000, testing accommodations were not permitted on NAEP.US reported from National Public data
Source: Staff compilation of data from the National Center of Education Statistics

Figure D.B shows NAEP 4th and 8th grade mathematics scale scores for Kentucky and the US between 1990 ad 2022 for all years avaialble.

Figure D.B
NAEP Mathematics Scale Score
4th And 8th Grades
Kentucky And US
1990-2022

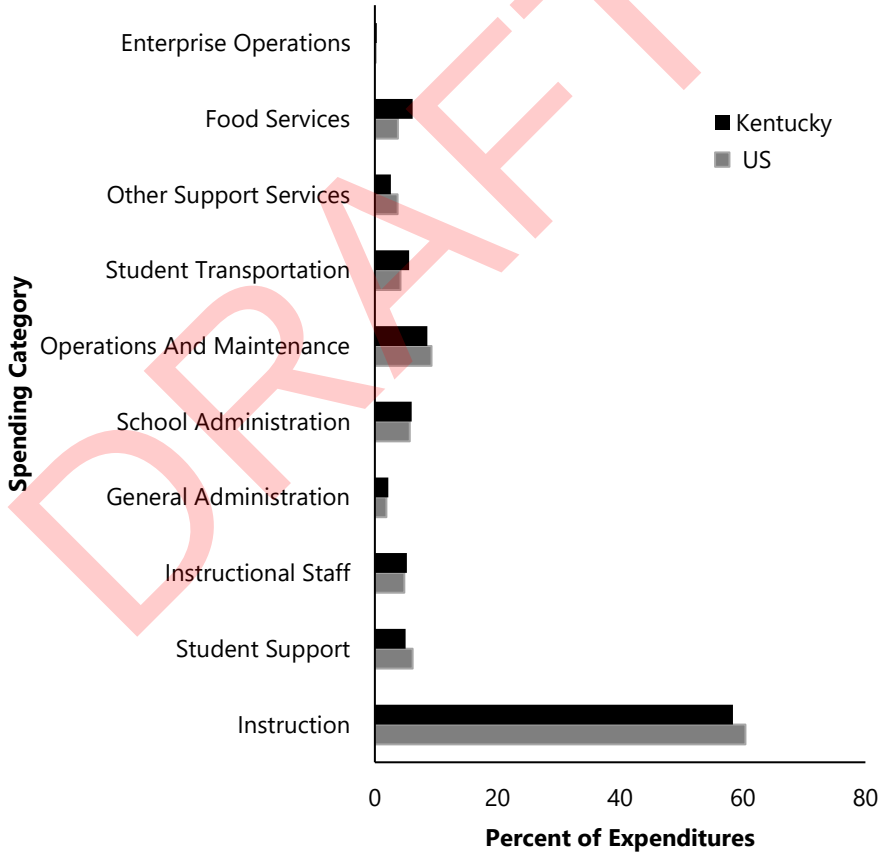


Notes: Prior to 2000, testing accommodations were not permitted on NAEP.US reported from National Public data
Source: Staff compilation of data from the National Center of Education Statistics

Appendix E
Education Spending By Category
Comparisons Kentucky and US, 2019

Figure E.A and Table E.1 show the percent of current expenditures by category for Kentucky and the US in 2019. Table E.1 also shows the ratio, by category of Kentucky expenditures to the US .

Figure E.A
Percent Of Current Expenditures By Category
Kentucky And US, 2019



Source: Staff compilation of data from the National Center For Education Statistics.

Table E.1
Percent Of Expenditures By Function
Kentucky And US, 2019

	US	Kentucky	Ratio Kentucky To US
Instruction	60.4%	58.4%	0.97
Student Support	6.1	5.0	0.81
Instructional Staff	4.8	5.2	1.08
General Administration	1.9	2.2	1.16
School Administration	5.7	6.0	1.06
Operations And Maintenance	9.2	8.5	0.93
Student Transportation	4.2	5.6	1.34
Other Support Services	3.7	2.6	0.70
Food Services	3.7	6.2	1.65
Enterprise Operations	0.2	0.3	1.64

Source: National Center For Education Statistics.

Appendix F
Geographic Location Of Students
Kentucky And US, 2019

Table F.1
Number And Percent Of Students
By Geographic Location
Kentucky And US, 2019

	Number of Students		Percent of Students	
	US	**Kentucky**	**US**	**Kentucky**
Total All Students	50,437,821	691,868		
City Total	15425261	151,869	31%	22%
City Large	8,508,016	125,062	17	18
City Midsize	3,2546,29	N/A	6	N/A
City Small	3,662,616	26,807	7	4
Suburban Total	19,727,941	117,620	39	17
Suburban Large	16,921,422	88,788	34	13
Suburban Midsize	1,822,788	13,836	4	2
Suburban Small	983,731	14,996	2	2
Town Total	5,469,164	163,583	11	24
Town Fringe	1,400,748	17,644	3	3
Town Distant	2,578,723	92,198	5	13
Town Remote	1,489,693	53,741	3	8
Rural Total	9,815,455	258,796	19	37
Rural Fringe	6,024,263	127,540	12	18
Rural Distant	2,798,354	90,817	6	13
Rural Remote	992,838	40,439	2	6

Note: N/A= Not Applicable.
Source: Staff compilation of data from the National Center for Education Statistics

Appendix G
NAEP Performance By Student Subgroups
Kentucky And US

Table G.1 shows NAEP, 2022 proficiency rates and percent of tested students, by select subgroups. Kentucky NAEP performance by student group is, on average, similar to the nation for students eligible for FRPL-eligible-students; higher for Hispanic students, and lower for black and white students.

Compared with the nation, a higher percentage of Kentucky students are FRPL-eligible (58 percent versus 51 percent) and white (73 percent versus 45 percent), and a lower percentage are Black students (10 percent versus 15 percent) or Hispanic students (9 percent versus 29 percent).

Table G.1
Average Percentage Of Students Proficient Or Above By Student Group And Average Percentage Of Student Group Of All Students Reading and Mathematics, 4th and 8th Grades Kentucky And US, 2022

		Student Subgroup				
	Jurisdiction	FRPL-Eligible	Not FRPL-Eligible	Black	Hispanic	White
Percent Proficient Or Above	Kentucky	18%	43%	11%	21%	32%
	United States	18	44	14	19	40
Percent Of Tested Students	Kentucky	58	42	10	9	73
	United States	51	48	15	29	45

Note: FRPL= students eligible for free and reduced-price lunch.
Source: US. Department of Education. Institute of Education Sciences. National Center For Education Statistics. National Assessment Of Educational Progress. Data Tools: State And National Public Snapshots.

Appendix H
NAEP Scores Kentucky and US, 2022

Table H.1
Average Percentage Of Students Proficient Or Above NAEP Reading and Mathematics, 4th and 8th Grades, 2022 COLA-Adjusted Per-pupil Spending, 2020, And Percent Of Children Living In Poverty, 2021 Kentucky And US

State	COLA-Adjusted PP Expenditures, 2020	Percent Child Poverty 2021	Per-Pupil Expenditure Category	Child Poverty Category	Average NAEP Proficiency, 2022
Utah	$8,532	8%	Lowest	Lowest	37.50
Arizona	8,886	17	Lowest	Average	28.75
Idaho	9,015	13	Lowest	Low	33.00
Nevada	9,661	19	Lowest	High	26.25
Florida	10,321	18	Lowest	High	33.00
Oklahoma	10,489	21	Lowest	Highest	22.00
Texas	10,549	20	Low	High	28.75
North Carolina	10,775	18	Low	High	29.50
Tennessee	10,935	18	Low	High	29.75
Mississippi	11,116	28	Low	Highest	25.75
Colorado	11,309	12	Low	Low	34.00
South Dakota	11,313	15	Low	Average	33.75
Alabama	11,485	22	Low	Highest	24.00
Indiana	11,633	16	Low	Average	33.50
Arkansas	11,820	22	Low	Highest	25.75
Missouri	12,312	16	Low	Average	29.00
South Carolina	12,325	20	Low	High	28.75
Oregon	12,353	14	Low	Low	26.75
Georgia	12,391	20	Low	High	30.25
California	12,471	16	Low	Average	28.50
New Mexico	12,526	24	Low	Highest	17.75
Kentucky	**12,700**	**22**	**Low**	**Highest**	**28.50**
Montana	12,808	14	Low	Low	32.50
Kansas	12,892	13	Average	Low	28.75
Virginia	12,922	13	Average	Low	33.00
Michigan	12,932	18	Average	High	28.25
Iowa	13,072	13	Average	Low	32.50
Louisiana	13,166	27	Average	Highest	25.25
Washington	13,461	12	Average	Low	32.25
Wisconsin	13,539	13	Average	Low	35.25
Minnesota	13,639	11	Average	Lowest	33.75
Nebraska	13,887	13	Average	Low	34.25
Delaware	14,288	17	Average	Average	23.25
West Virginia	14,319	21	Average	Highest	20.50
Ohio	14,718	19	Average	High	34.25
Hawaii	14,838	14	Average	Low	31.25
Maryland	15,144	14	High	Low	30.00

North Dakota	15,265	10	High	Lowest	31.50
Maine	16,938	15	High	Average	28.50
New Hampshire	17,130	9	High	Lowest	34.75
Rhode Island	17,308	15	High	Average	30.75
Pennsylvania	17,508	17	Highest	Average	33.00
Illinois	17,562	16	Highest	Average	32.50
Wyoming	17,762	13	Highest	Low	35.75
Alaska	17,811	12	Highest	Low	25.25
Massachusetts	18,392	13	Highest	Low	40.25
New Jersey	19,224	14	Highest	Low	38.00
Connecticut	20,140	13	Highest	Low	34.25
District of Columbia	21,684	24	Highest	Highest	22.00
Vermont	22,245	10	Highest	Lowest	32.25
New York	23,063	19	Highest	High	29.50

Note: PP= Per-Pupil. Per-pupil expenditure and child poverty categories were derived based on methods described in Appendix B.
Sources: Staff analysis of NAEP data and per-pupil expenditures from The National Center for Education Statistics, and child poverty data from the Annie. E. Casey Foundation Kids Data Center.

Appendix I
District Data

Table 1.1 shows categories by district of select measures mentioned in Chapters 2 and 3 of the report .

Table I.1
Select Financial And Teacher Workforce Data
By District
2018, 2019, And 2022

District	FRPL	Per-Pupil Expenditures	Levied Equivalent Rate	Dispersed	Small	Labor Market Costs	Teacher Turnover Rate	Teacher Starting Salary	Difference From CWIFT-Predicted Salary
Adair County	High	Low	Low	Yes		Lowest	Low	$36,000	$272
Allen County	Average	Low	Lowest	Yes		Average	Low	37,605	395
Anchorage Independent	Lowest	Highest	Highest		Yes	Highest	Average	41,494	2,574
Anderson County	Lowest	Low	Low	Yes		Low	Low	36,560	-366
Ashland Independent	Average	Average	High			Low	Average	36,048	-593
Augusta Independent	Average	High	Highest		Yes	Average	Average	37,798	588
Ballard County	Average	Average	Low	Yes		Average	High	35,979	-1,331
Barbourville Independent	Average	Low	High		Yes	Average	Low	34,644	-2,396
Bardstown Independent	Average	High	High			Low	Lowest	41,029	4,104
Barren County	Low	Average	Average	Yes		Average	Low	37,361	151
Bath County	High	Low	Low	Yes		Average	Average	35,394	-1,817
Beechwood Independent	Lowest	Lowest	Highest			Highest	Low	40,643	1,964
Bell County	Highest	Average	Average	Yes		Average	Low	32,753	-4,286
Bellevue Independent	High	Highest	Highest		Yes	Highest	Highest	39,346	924
Berea Independent	Average	High	Highest			Average	Average	37,923	456
Boone County	Lowest	Low	Average			Highest	Low	40,097	1,761
Bourbon County	Average	Average	Low	Yes		Low	High	36,125	-629
Bowling Green Independent	Average	Average	Highest			Average	Average	38,231	764
Boyd County	Average	Highest	Average	Yes		Low	Average	35,860	-781
Boyle County	Low	Average	Average	Yes		Average	Average	39,197	2,143
Bracken County	Low	Lowest	Lowest	Yes		Average	High	35,825	-1,386

District	FRPL	Per-Pupil Expenditures	Levied Equivalent Rate	Dispersed	Small	Labor Market Costs	Teacher Turnover Rate	Teacher Starting Salary	Difference From CWIFT-Predicted Salary
Breathitt County	Highest	High	Low	Yes		Average	Average	37,422	41
Breckinridge County	Average	Average	Low	Yes		High	Average	38,701	907
Bullitt County	Lowest	Low	Average			Low	Average	39,780	2,855
Burgin Independent	Lowest	Average	Average	Yes	Yes	High	Average	35,626	-2,155
Butler County	Average	Low	Lowest	Yes		Average	Average	35,839	-1,428
Caldwell County	Average	Low	Low	Yes		Lowest	Average	36,569	228
Calloway County	Average	Low	Lowest	Yes		Average	Low	36,563	-776
Campbell County	Lowest	Average	Average			Highest	Average	39,742	1,321
Campbellsville Independent	High	High	Average			Lowest	Average	37,526	1,798
Carlisle County	Low	Average	Low	Yes	Yes	High	Average	35,730	-2,136
Carroll County	High	Highest	Highest	Yes		High	Highest	39,428	1,591
Carter County	Average	Low	Low	Yes		Lowest	Low	36,277	-207
Casey County	High	Average	Low	Yes		Lowest	Average	36,105	377
Caverna Independent	Highest	Highest	Average		Yes	Average	Highest	38,976	1,752
Christian County	High	Low	Lowest	Yes		Average	Highest	37,610	171
Clark County	Average	Average	Average	Yes		High	High	37,500	-280
Clay County	Highest	Average	High	Yes		Average	Lowest	35,871	-1,169
Clinton County	High	Average	Low	Yes		Lowest	Lowest	35,530	-198
Cloverport Independent	Average	Low	High		Yes	High	Highest	35,409	-2,386
Corbin Independent	Average	Lowest	Average			Lowest	Lowest	38,316	1,932
Covington Independent	Highest	Highest	Highest			Highest	Highest	39,145	467
Crittenden County	Average	Low	Lowest	Yes		Lowest	Average	37,017	675
Cumberland County	Highest	High	Low	Yes	Yes	Lowest	High	35,438	-290
Danville Independent	Average	Highest	Highest			Average	High	39,894	2,840
Daviess County	Low	Low	Average	Yes		High	Low	39,706	2,139
Dawson Springs Independent	High	Low	High		Yes	Lowest	Average	34,004	-2,337
Dayton Independent	Highest	High	Highest		Yes	Highest	Highest	38,315	-107

District	FRPL	Per-Pupil Expenditures	Levied Equivalent Rate	Dispersed	Small	Labor Market Costs	Teacher Turnover Rate	Teacher Starting Salary	Difference From CWIFT-Predicted Salary
East Bernstadt Independent	Average	Low	Average		Yes	Lowest	Average	38,003	1,676
Edmonson County	Average	Low	Lowest	Yes		Average	Low	35,256	-2,011
Elizabethtown Independent	Lowest	Low	Highest			Highest	Low	39,168	874
Elliott County	High	Average	Lowest	Yes	Yes	Lowest	Low	33,717	-2,767
Eminence Independent	Average	Low	Highest		Yes	High	Highest	36,668	-1,169
Erlanger-Elsmere Independent	High	Average	Highest			Highest	Highest	38,507	-171
Estill County	High	Low	Low	Yes		Average	Average	37,699	318
Fairview Independent	High	Low	Highest		Yes	Low	Highest	36,403	-237
Fayette County	Low	Highest	Highest			Highest	Low	42,262	3,911
Fleming County	Average	Low	Lowest	Yes		Average	Average	35,702	-1,508
Floyd County	High	Average	Low	Yes		Lowest	Average	38,279	2,322
Fort Thomas Independent	Lowest	Low	Highest			Highest	Lowest	40,780	2,358
Frankfort Independent	Low	Highest	Highest		Yes	Average	Average	37,310	-29
Franklin County	Low	Low	Average			Average	Average	38,734	1,395
Fulton County	High	High	Low	Yes	Yes	High	Highest	35,834	-2,032
Fulton Independent	Highest	Highest	Highest		Yes	High	Highest	35,686	-2,180
Gallatin County	High	Average	High	Yes		High	Highest	36,755	-1,083
Garrard County	Average	Low	Average	Yes		Average	Average	36,974	-407
Glasgow Independent	Average	Average	High			Average	Low	37,748	537
Grant County	High	Low	Low	Yes		High	Highest	36,107	-1,730
Graves County	Low	Low	Lowest	Yes		High	Average	37,290	-576
Grayson County	Average	Low	Low	Yes		High	Low	36,979	-816
Green County	Average	Average	Low	Yes		Average	Low	36,216	-1,051
Greenup County	Average	Average	High	Yes		Average	Average	35,531	-1,680
Hancock County	Low	Average	Average	Yes		High	Average	38,729	934
Hardin County	Low	Low	Average	Yes		Highest	Average	39,003	710
Harlan County	Highest	Average	Low	Yes		Low	Low	34,748	-1,821

District	FRPL	Per-Pupil Expenditures	Levied Equivalent Rate	Dispersed	Small	Labor Market Costs	Teacher Turnover Rate	Teacher Starting Salary	Difference From CWIFT-Predicted Salary
Harlan Independent	Average	Average	Average		Yes	Low	Average	34,561	-2,009
Harrison County	Average	Low	Low	Yes		Average	Low	36,098	-1,113
Hart County	Average	Average	Average	Yes		Average	Average	35,706	-1,561
Hazard Independent	Average	Average	Average		Yes	Low	Average	37,867	1,298
Henderson County	Low	Low	Average	Yes		Average	Average	36,603	-721
Henry County	Low	Low	Average	Yes		High	High	36,187	-1,651
Hickman County	Average	High	Low	Yes	Yes	High	Average	35,757	-2,109
Hopkins County	Average	Low	Low	Yes		Lowest	Average	36,549	208
Jackson County	High	High	Average	Yes		Average	Lowest	36,101	-1,280
Jackson Independent	Low	High	High		Yes	Average	Highest	34,358	-3,023
Jefferson County	Average	Highest	Highest			Highest	Low	42,914	3,994
Jenkins Independent	Highest	Highest	Highest	Yes	Yes	Lowest	Highest	37,842	1,885
Jessamine County	Low	Low	Average			Average	Average	38,299	1,117
Johnson County	Average	Average	Low	Yes		Lowest	Low	37,344	1,388
Kenton County	Lowest	Lowest	Average			Highest	Average	42,492	3,814
Knott County	High	High	Low	Yes		Lowest	Average	38,082	2,126
Knox County	Highest	High	Low	Yes		Average	Average	34,880	-2,160
LaRue County	Low	Low	Low	Yes		Average	Lowest	38,986	1,719
Laurel County	High	Low	Low	Yes		Lowest	Low	38,055	1,728
Lawrence County	Average	Average	Low	Yes		Lowest	Average	35,754	-729
Lee County	Highest	Average	Lowest	Yes	Yes	High	Low	36,393	-1,387
Leslie County	High	Average	Low	Yes		Average	Low	35,602	-1,438
Letcher County	High	Average	Average	Yes		Lowest	Average	38,068	2,112
Lewis County	High	Low	Lowest	Yes		Average	Low	36,293	-918
Lincoln County	Average	Average	Low	Yes		Average	High	36,403	-978
Livingston County	Average	Highest	Lowest	Yes		Lowest	Low	38,005	1,663
Logan County	Low	Low	Lowest	Yes		Low	Average	36,698	-270
Ludlow Independent	High	High	Highest		Yes	Highest	Low	40,268	1,590
Lyon County	Average	Low	Lowest	Yes	Yes	Lowest	Average	37,991	1,649
Madison County	Low	Low	Average			Average	Low	38,114	647

District	FRPL	Per-Pupil Expenditures	Levied Equivalent Rate	Dispersed	Small	Labor Market Costs	Teacher Turnover Rate	Teacher Starting Salary	Difference From CWIFT-Predicted Salary
Magoffin County	Highest	Average	Average	Yes		Lowest	Lowest	36,134	178
Marion County	Average	Average	Average	Yes		Average	Low	38,972	1,705
Marshall County	Low	Low	Low	Yes		High	Low	39,887	2,021
Martin County	High	Average	Low	Yes		High	Low	36,654	-1,055
Mason County	Average	Average	Low	Yes		Average	Low	38,043	833
Mayfield Independent	Highest	Average	Highest			High	Low	37,970	104
McCracken County	Low	Low	Lowest			Average	Lowest	39,068	1,758
McCreary County	Highest	Average	Lowest	Yes		Low	Average	36,745	-209
McLean County	Low	Low	Low	Yes		Low	Average	35,359	-1,609
Meade County	Low	Lowest	Low	Yes		High	Lowest	38,016	221
Menifee County	Highest	Average	Low	Yes	Yes	Average	Highest	35,368	-2,014
Mercer County	Low	Average	Average	Yes		High	Average	37,718	-62
Metcalfe County	High	Average	Average	Yes		Lowest	Low	35,328	-400
Middlesboro Independent	High	Highest	Low			Average	High	35,920	-1,120
Monroe County	High	High	Average	Yes		Average	Lowest	35,144	-2,067
Montgomery County	Average	Low	Low	Yes		Low	High	36,976	221
Morgan County	High	Average	Average	Yes		Lowest	Average	36,390	-94
Muhlenberg County	Average	Average	Lowest	Yes		Low	Low	37,481	513
Murray Independent	Lowest	High	Average			Average	Average	38,101	762
Nelson County	Low	Low	High	Yes		Low	Highest	38,909	1,983
Newport Independent	Highest	Highest	Highest			Highest	Highest	38,837	416
Nicholas County	Average	Low	Lowest	Yes		Average	Low	35,350	-1,861
Ohio County	Average	Lowest	Low	Yes		Average	Average	38,763	1,495
Oldham County	Lowest	Lowest	High			Highest	High	37,295	-1,013
Owen County	Average	Low	Average	Yes		High	Highest	35,448	-2,389

District	FRPL	Per-Pupil Expenditures	Levied Equivalent Rate	Dispersed	Small	Labor Market Costs	Teacher Turnover Rate	Teacher Starting Salary	Difference From CWIFT-Predicted Salary
Owensboro Independent	High	High	Highest			High	Low	40,315	2,748
Owsley County	Highest	Highest	Low	Yes	Yes	Average	Low	33,791	-3,590
Paducah Independent	High	High	High			Average	Average	40,255	2,945
Paintsville Independent	Lowest	Average	Highest		Yes	Lowest	Lowest	37,326	1,370
Paris Independent	High	Highest	High		Yes	Low	Highest	35,980	-774
Pendleton County	Average	Low	Average	Yes		High	High	35,413	-2,424
Perry County	High	Average	Low	Yes		Low	Average	36,482	-87
Pike County	High	Average	Highest	Yes		High	Lowest	38,503	794
Pikeville Independent	Lowest	Average	High			High	Lowest	41,392	3,682
Pineville Independent	Highest	Low	High		Yes	Average	High	34,013	-3,026
Powell County	High	Average	Lowest	Yes		High	Average	34,682	-3,098
Pulaski County	High	Low	Low	Yes		Low	Low	36,750	-204
Raceland-Worthington Independent	Low	Low	Highest		Yes	Average	Lowest	36,171	-1,040
Robertson County	High	High	Average	Yes	Yes	Average	Average	35,708	-1,503
Rockcastle County	High	Average	Lowest	Yes		Average	Lowest	37,207	-174
Rowan County	Average	Low	Average	Yes		Lowest	Low	35,961	-522
Russell County	High	Low	Low	Yes		Low	Low	35,952	-1,002
Russell Independent	Lowest	Low	High			Average	Lowest	38,753	1,542
Russellville Independent	High	Highest	Highest		Yes	Low	Highest	36,672	-297
Science Hill Independent	Average	Average	Average		Yes	Low	Lowest	37,811	857
Scott County	Lowest	Lowest	Average			Highest	Average	38,768	-908
Shelby County	Low	Low	Average	Yes		High	Highest	37,614	-224
Simpson County	Average	Average	Low	Yes		Low	Low	38,951	1,982
Somerset Independent	Average	Low	High			Low	Low	38,699	1,745
Southgate Independent	High	Highest	Highest		Yes	Highest	High	37,186	-1,235
Spencer County	Lowest	Lowest	Low	Yes		Low	Low	39,882	2,957

District	FRPL	Per-Pupil Expenditures	Levied Equivalent Rate	Dispersed	Small	Labor Market Costs	Teacher Turnover Rate	Teacher Starting Salary	Difference From CWIFT-Predicted Salary
Taylor County	Low	Low	Average	Yes		Lowest	Average	36,750	1,022
Todd County	Average	Average	Lowest	Yes		Low	Highest	34,974	-1,995
Trigg County	Low	Average	Low	Yes		Lowest	Low	38,136	1,795
Trimble County	Low	Average	Average	Yes		High	Average	36,180	-1,657
Union County	Average	Average	Average	Yes		Lowest	Average	35,742	-599
Walton-Verona Independent	Lowest	Low	Highest			Highest	Lowest	38,934	598
Warren County	Low	Low	Low			Average	Average	37,848	381
Washington County	Average	Average	Average	Yes		Low	Average	37,613	688
Wayne County	Highest	Average	Low	Yes		Low	Low	35,965	-989
Webster County	Average	Low	Low	Yes		Lowest	High	35,032	-1,309
Whitley County	Highest	Average	Low	Yes		Lowest	Lowest	36,457	130
Williamsburg Independent	High	Average	Low		Yes	Lowest	Low	34,386	-1,941
Williamstown Independent	Low	Average	Highest		Yes	High	Highest	35,372	-2,465
Wolfe County	Highest	Highest	Lowest	Yes		Average	Lowest	36,576	-805
Woodford County	Lowest	Low	Average	Yes		High	High	38,538	758

Note: FRPL= eligible for free and reduced-price lunch; CWIFT= comparable wage index for teachers. CWIFT is a measure developed by the National Center for Education Statistics that allows researchers to compares regional variations in teacher labor markets based on wages of college graduates who are not teachers. Difference from CWIFT-predicted salary was calculated as described in Appendix K.
Source: Staff analysis of data from the Kentucky Department of Education And National Center for Education Statistics

Appendix J

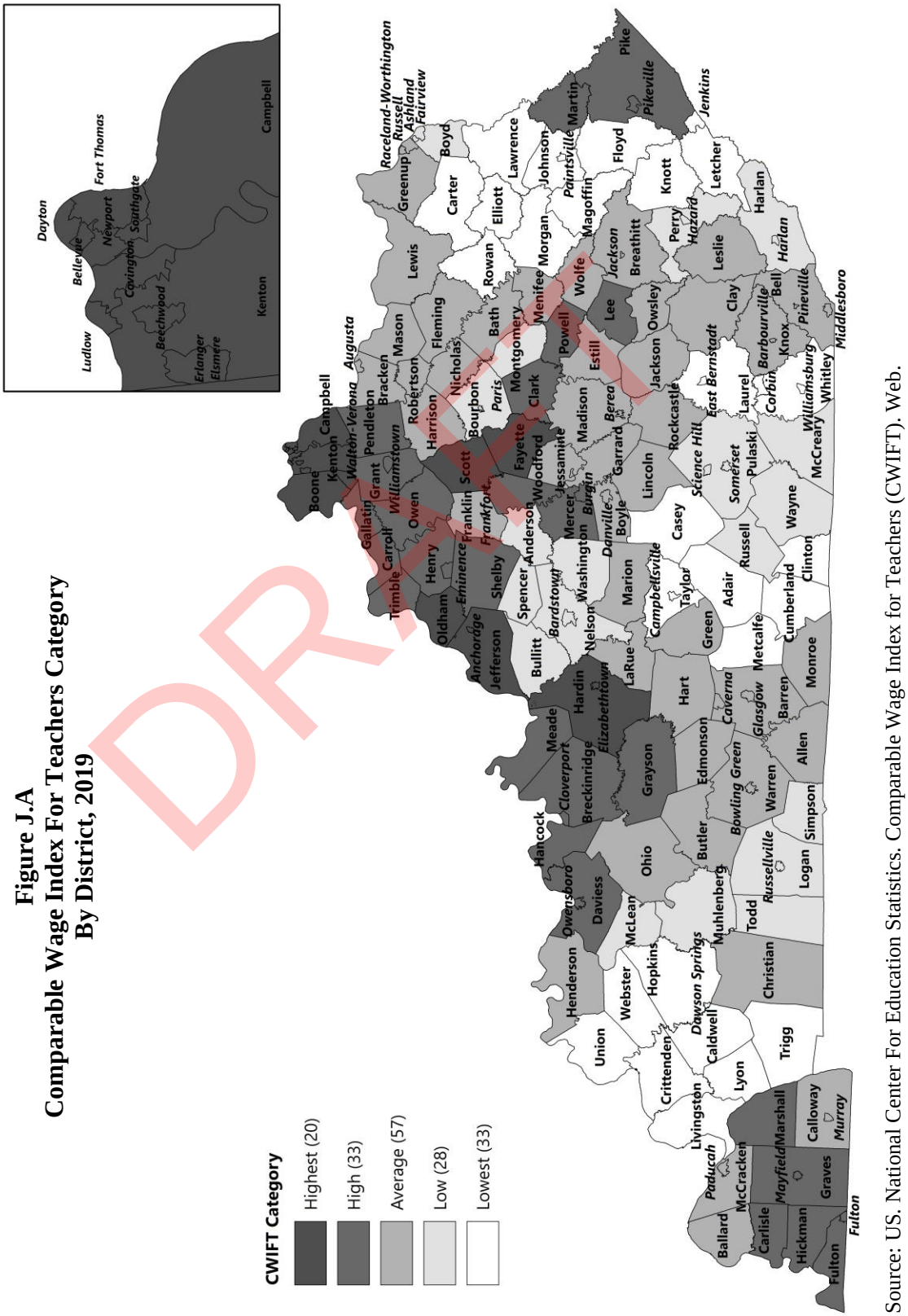
Comparable Wage Index For Teachers

NCES developed the Comparable Wage Index for Teachers (CWIFT) to facilitate comparisons of school spending among states and districts.[a] [1] The CWIFT compares regional variations in teacher labor markets based on wages of college graduates who are not teachers. The most recent CWIFT was developed in 2019. A CWIFT rating of "1" is equivalent to the national average; higher CWIFT ratings indicate more expensive labor markets. CWIFT ratings in the commonwealth range from a low of 0.69 (about two thirds of national labor costs) to a high of 0.967 (almost equivalent to the nation) .

Figure J.A displays the CWIFT calculated by NCES for Kentucky school districts in 2019.

[a] According to NCES, "The Comparable Wage Index for Teachers (CWIFT) is an experimental index created by the National Center for Education Statistics (NCES) to facilitate comparison of educational expenditures. The CWIFT is a measure of the systematic, regional variations in the wages and salaries of college graduates who are not PK-12 educators as determined by reported occupational category. It can be used by researchers to adjust school district-level finance data in order to make comparisons across geographic areas. The CWIFT is based on data from the American Community Survey (ACS), a continuous household survey conducted by the U.S. Census Bureau."

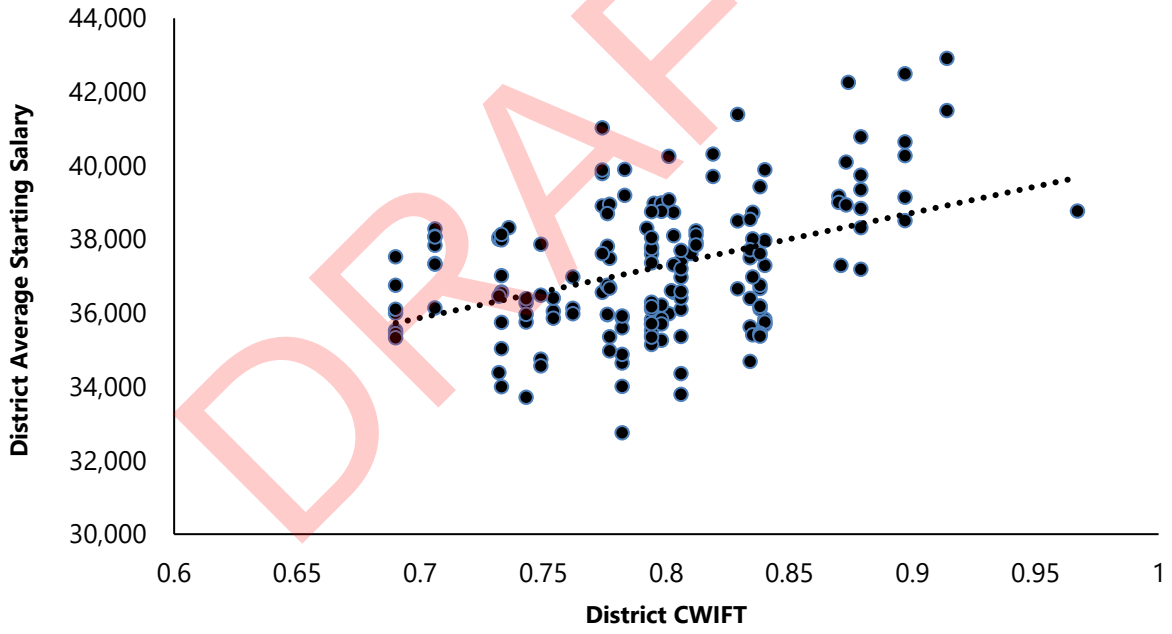
Figure J.A
Comparable Wage Index For Teachers Category
By District, 2019



Source: US. National Center For Education Statistics. Comparable Wage Index for Teachers (CWIFT). Web.

Figure J.B plots the relationship between districts' CWIFT and starting salary in 2019. As districtd CWIFTs increase so do starting salaries, on average. The dotted line in the figure represents the statistically predicted relationship between CWIFT and starting salary. Districts that fall above the line have starting salaries above what would be predicted whereas those that fall below the line have salaries above what would be predicted.

Figure J.B
2019 CWIFT And Average Starting Salary
2018, 2019, And 2022



Note: The dotted line in the figure shows the statistical relationship between CWIFT and average starting salary.
Source: Staff calculation using data from the Kentucky Department of Education And National Center for Education Statistics.

[1] US. National Center For Education Statistics. Comparable Wage Index for Teachers (CWIFT). Web.

Appendix K
District Characteristics Related To Effectiveness As Measured By Actual, Unadjusted Scores

Table K.1 shows while 39 percent of all districts are in the two lowest-performance categories, 56 percent of small districts and 47 percent of districts in higher-cost labor markets are in those categories.

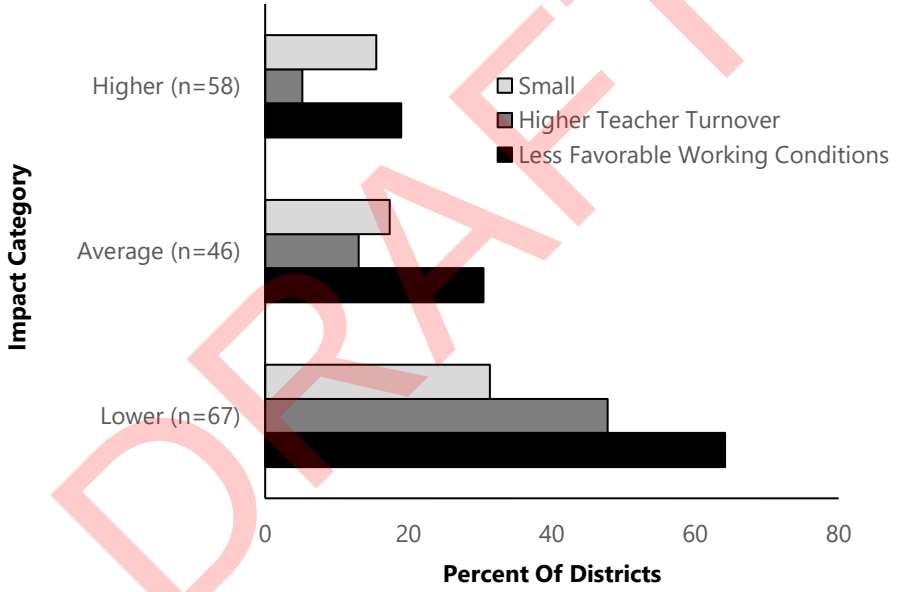
Table K.1
Percent Of Districts
By Performance Category And
District Size, Geographic Dispersion, And Higher-cost Labor Market

Actual Performance Category		All (N=171)	Small (N=38)	Dispersed (N=109)	Higher-Cost Labor Markets (N=53)
Highest	(n=23)	13%	11%	7%	19%
High	(n=35)	20	13	22	23
Average	(n=46)	27	21	32	11
Low	(n=45)	26	24	30	28
Lowest	(n=22)	13	32	8	19

Note: In this analysis, districts are considered small if they have 1,000 students are fewer; geographically dispersed if they have 25 students or fewer per net square mile; and in higher cost labor markets if they fall in the "highest" or "high" category on the CWIFT as determined by methods explained in Appendix B.
Source: Staff analysis of data from the Kentucky Department of Education and the National Center for Education Statistics.

Figure K.A shows that, as with impact categories, the percentage of districts that are small, have higher teacher turnover rates of 15 percent or greater, and less favorable working conditions is greater for lower versus higher performance categories. Compared with impact scores, the differences among categories are greatest in teacher turnover relative to less favorable working conditions. The percentage of lower-performing districts with higher teacher turnover rates is over nine times greater than the percentage of higher-performing districts with higher turnover rates (48 percent versus 5 percent).

Figure K.A
Percent Of Districts By Reading And Mathematics Performance Category Of Actual, Unadjusted Scores That Are Small, Have Higher Attrition Rates, Or Relatively Less Favorable Working Conditions 2018, 2019, And 2022



Note: Higher impact districts include those that are highest or high and lower impact districts include those that are low or lowest.
Source: Staff analysis of data from the Kentucky Department of Education.

Appendix L
Expenditures By District Dispersion And Size

Table L.1 shows that, compared with other districts, total per-pupil spending is greater, on average, in small districts. As a percentage of all spending, spending in small districts versus other districts is greater on district administration and business supplies and is relatively less on instruction services. On average, small, dispersed districts spend less on instruction services than all other types of districts. In addition to higher district administration and business supply costs, small, dispersed districts also have higher transportation costs than non dispersed districts.

Table L.1
Per-pupil Expenditures And Expenditure As A Percent Of Total Current Expenses
By Expenditure Category
And District Status As Small Or Dispersed
2018, 2019, And 2022

	Average Per-Pupil Spending				Average Percent Of Expenditures			
	Small		Other		Small		Other	
	Dispersed	Not Dispersed	Dispersed	Not Dispersed	Dispersed	Not Dispersed	Dispersed	Not Dispersed
Instructional Services	$8,048	$8,376	$7,418	$8,021	57%	58%	59%	61%
Instructional Support	1,151	1,333	1,106	1,310	8	9	9	10
District Administration	730	898	372	413	5	6	3	3
School Administration	644	762	685	755	5	5	5	6
Business Support	505	538	298	330	4	4	2	2
Plant Operations	1,201	1,234	1,114	1,139	9	9	9	9
Transportation	726	324	799	511	5	2	6	4
Food_ Service	1,005	951	860	772	7	7	7	6
Total	14,008	14,416	12,651	13,250	100	100	100	100

Note: In this report, small districts are considered to be those with 1,000 or fewer students. Dispersed districts are considered to be those with 25 or fewer students per square mile.
Source: Staff analysis of data from the Kentucky Department of Education.

Appendix M
Teacher Turnover

Figure M.A shows the average percentage of teachers that left each district in the 2018, 2019, and 2022 school years.

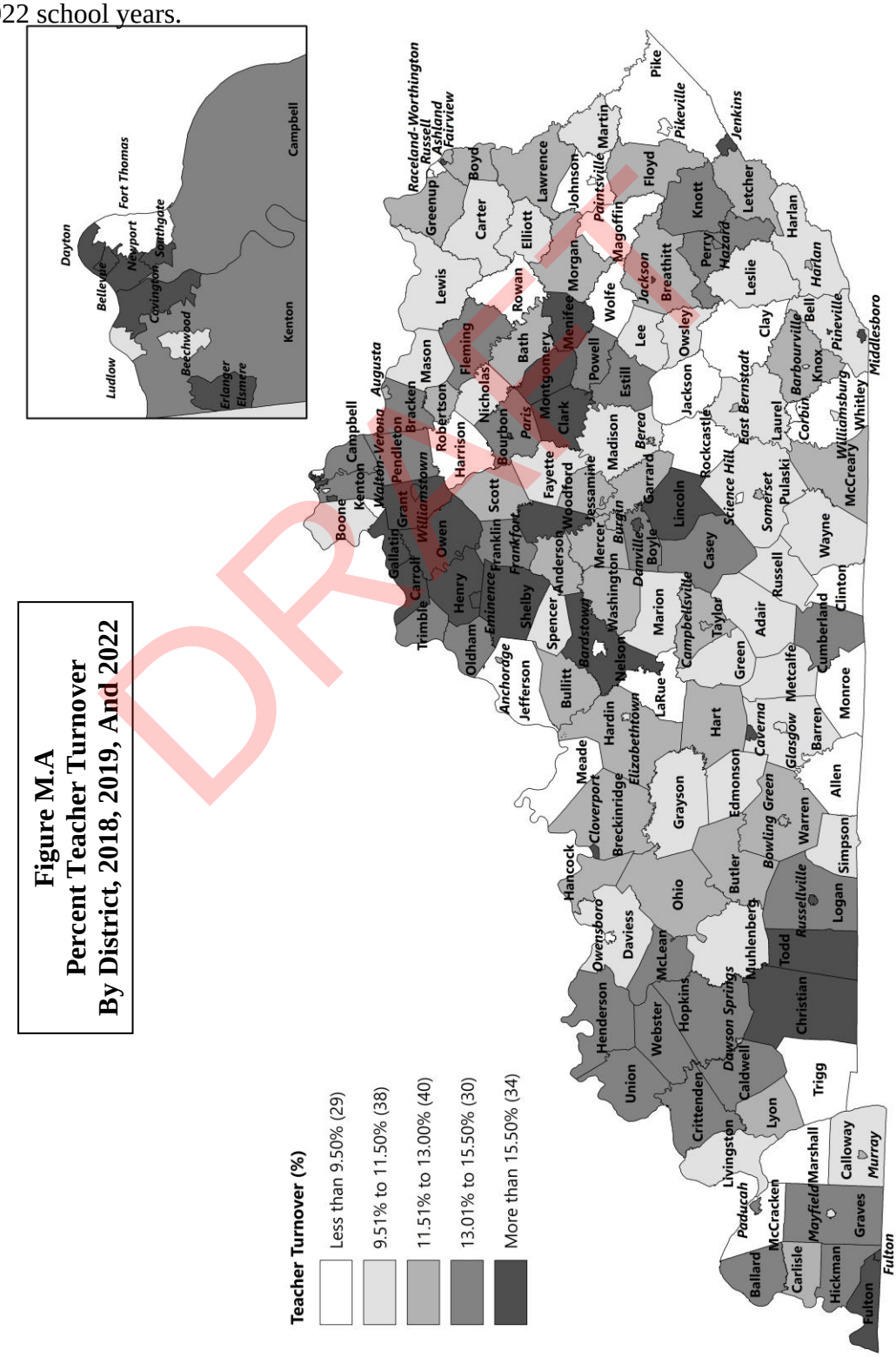


Table M.1 shows the average turnover rate of districts by categories of competitive salary or labor market, relative to other districts. Staff determined competitive salary categories based on the difference between districts' starting teacher salary and what was statistically predicted based on its CWIFT. Based on that difference, districts were placed in categories using methods described in Appendix B. Competitive labor market categories were determined using methods described in Appendix B, but based on districts' CWIFT.

The table shows that, on average, teacher turnover rates are lowest overall in higher competitive salary categories (12 percent) compared with districts in categories of average or below (about 14 percent).

Table M.1
Average Teacher Turnover Rate
By Competitive Teacher Starting Salary
And Labor Market Categories
2018, 2019, And 2022

	Competitive Labor Market					
Competitive Salary Category	Highest (n=20)	High (n=33)	Average (n=57)	Low (n=28)	Lowest (n=33)	All Districts
Highest (n=34)	11%	9%	13%	13%	13%	12%
High (n=28)	13	13	12	11	11	12
Average (n=41)	22	13	12	15	11	14
Low (n=38)	15	15	12	14	14	13
Lowest (n=30)		17	13	13	11	14
All Districts	14	15	12	14	12	13

Note: Relatively competitive labor market is based on district' 2019 CWIFT and relatively competitive salary is determined by whether district starting salary falls above or below what would be predicted based on its CWIFT category. See Appendix J for a description of the CWIFT and competitive salary.
Source: Staff analysis of data from the Kentucky Department of Education and National Center for Education Statistics.

Relative salary may affect teacher turnover rates in higher-cost labor markets compared with others. Average attrition rates of districts with competitive salaries of average or below were 16.4 percent for districts in higher cost labor markets (those in the higher and high category) compared with an average of 12.5 percent for districts with average or below salaries in other labor markets (those in average, low, and lowest).

Table M.2 shows the average difference of actual and predicted starting salary by relatively competitive starting salary and labor markets.

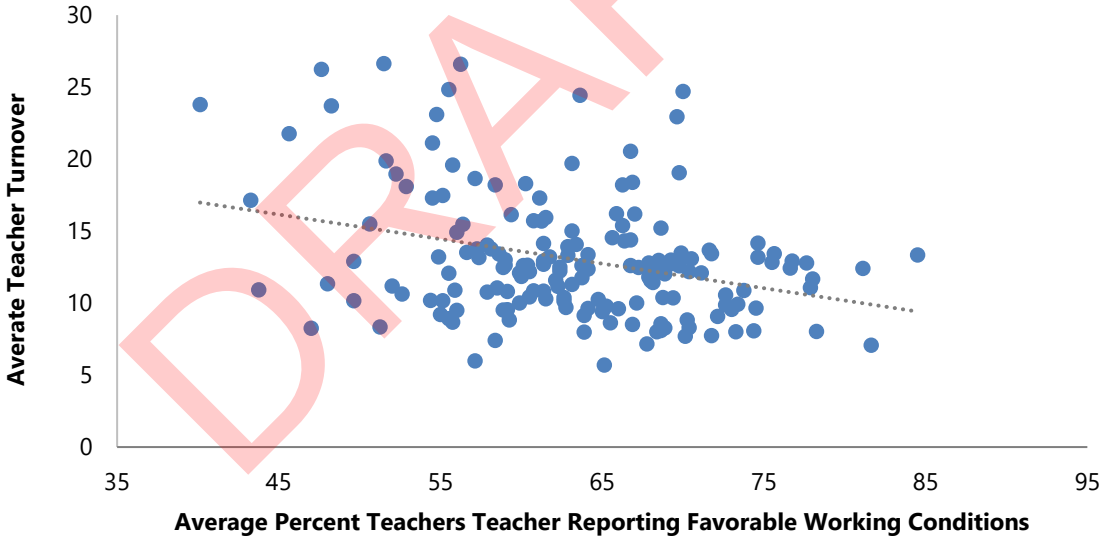
Table M.2
Average Difference Actual And Predicted Starting Salary
Relatively Competitive Teacher Starting Salary
And Relatively Competitive Labor Market
2018, 2019, And 2022

	Relatively Competitive Labor Market					
Relatively Competitive Salary Category	Highest (n=20)	High (n=33)	Average (n=57)	Low (n=28)	Lowest (n=33)	All Districts
Highest (n=34)	$2,911	$2,648	$2,123	$2,604	$1,904	$2,367
High (n=28)	1,003	997	1,016	947	,221	1,039
Average (n=41)	151	-48	167	104	-27	23
Low (n=38)	-1,052	-1,105	-1,174	911	-879	-1,080
Lowest (n=30)		2,230	-2,494	941	,348	-2,319
All Districts	1,192	-581	-442	190	459	0

Note: Relatively competitive labor market is based on district' 2019 CWIFT and relatively competitive salary is determined by whether district starting salary falls above or below what would be predicted based on its CWIFT category..See Appendix J for a description of the CWIFT and competitive salary.
Source: Staff analysis of data from the Kentucky Department of Education and National Center for Education Statistics.

Figure M.2 shows the relationship between the average percentage of teachers reporting favorable working conditions in 2020 and the average percentage of teacher turnover in 2018, 2019, and 2022. As noted in Chapter 3, each variable was associated with district effectiveness. This figure can be used to understand the relationship between these two variables as used in the report. The data reported in Figure M.2 are not appropriate for drawing general conclusions about the relationship between teacher working conditions and teacher turnover because district turnover rates in larger districts do not reflect teacher turnover of schools within each district. In addition, teacher turnover may be more highly associated with specific elements captured in the working conditions survey than with the average across all survey elements that was calculated by OEA. Finally, teacher turnover in the years most closely associated with the survey may be different from the average teacher turnover of 2018, 2019, and 2022 used in the report.

Figure M.2
Average Percentage Teachers Reporting Favorable Working Conditions, 2020 And Average Teacher Turnover, 2018, 2019, And 2022 By District



Source: Staff analysis of data from the Kentucky Department of Education.

Appendix N

This Appendix shows results of OEA's analysis of long-term postsecondary education outcomes.

Staff also reviewed data for long-term workforce outcomes of graduates from individual districts. These data are not included in the report due to concerns about the effect of out-of-state workers on data calculated for districts that border other states. Graduates of border districts were disproportionately underrepresented in workforce data.

Early Cohort Persistence Across Metrics

This analysis was conducted using student-level data for high school graduates from the 2012, 2013, and 2014 school years. Statistical models were used to determine the impact coefficients for student demographics and school characteristics on ACT scores and whether those students enrolled in postsecondary education or earned a bachelor's degree or higher.[a]

The residuals for districts from each model were ranked in categories using the methodology described in Appendix B. The presentation of this data is grouped in separate tables that are described below.[b]

Table N.1 shows the number of districts that were in the higher (high/highest) and lower (low/lowest) impact categories for ACT performance, postsecondary enrollment rate, and degree attainment. Of the 58 districts that were higher-impact on the ACT, approximately 60 percent were also in the higher impact categories for postsecondary enrollment and bachelor's degree attainment (33 and 34 districts, respectively). Of the 58 districts with higher impact on ACT, 27 (approximately 47 percent) were higher in both postsecondary enrollment rate and bachelor's degree attainment.

Of the 63 districts that were lower-impact for ACT performance, 28 (approximately 44 percent) were also lower-impact for postsecondary going rate. Of those 63 districts, 38 (more than 60 percent) were also lower-impact for degree attainment.

[a] A district-level model from the High School Feedback Report from the Kentucky Center for Statistics was used in for a statistical model on the postsecondary going rate for these students.
[b] The district impact scores for each of the Early Cohort models showed a slightly positive relationship with per pupil expenditures for the 2012 through 2014 school years.

Table N.1
Number Of Higher And Lower Impact Districts
For ACT Performance, Postsecondary Enrollment,
and Bachelor's Degree Attainment
For High School Graduates
2012, 2013, and 2014

Impact Category	ACT	ACT And Postsecondary Enrollment	ACT and Degree Attainment	ACT, CGR, and Degree
Higher	58	33	34	27
Lower	63	28	38	23

Source: Staff analysis of data from the Kentucky Center for Statistics.

Table N.2 shows district counts for higher and lower impact categories for career readiness, postsecondary enrollment, and degree attainment. Career readiness did not have the same relationship as ACT performance with the postsecondary going rate and bachelor's degree attainment metrics. A little more than one third of districts that were in the higher category for career readiness were also in the higher categories for postsecondary going rate, and less than one quarter of those districts were in the high categories for degree attainment.

Table N.2
Counts Of High And Low Performing Districts
For ACT Performance, Postsecondary Enrollment,
And Bachelor's Degree Attainment
For High School Graduates
2012, 2013, And 2014

Impact Category	CR	CR and CGR	CR and Degree Attainment	CR, CGR, and Degree
Higher	60	21	14	10
Lower	65	14	20	9

Source: Staff analysis of data from the Kentucky Center for Statistics.

Of the 65 districts that were lower impact in career readiness, 14 (approximately 30 percent) were also in the lower categories for degree attainment. A brief description of each of the models used for this analysis concludes this appendix.

ACT Model

The ACT performance model for high school graduates from school years 2012, 2013, and 2014 used the computed standard scores for each cohort as the dependent variable. For instance, the standard scores for 2012 high school graduates were computed using the 2011 ACT composite scores for those students.

Student demographic controls included: free-reduced price lunch status, IEP status, LEP status, race and ethnicity controls, gender, whether a student moved schools, and whether a student attended a school with 75 percent or more of the population being eligible for free-reduced price lunch.

The ACT model included more than 119,000 student observations for those graduating cohorts, and the model accounted for nearly 24 percent of the explained variance between the dependent variable and the controls.

The residuals from the ACT performance model for the early cohort had a slightly positive relationship with per pupil expenditures for those years.

Bachelor's Degree or Higher Model

The OLS model for attainment of a bachelor's degree or higher included the same control variables as the ACT model described above. This model was also a student-level model with more than 130,000 observations for those graduating cohorts, and the model accounted for approximately 16 percent of the explained variance between the dependent variable and the control variables.

Postsecondary Going Rate Model

The model for postsecondary going rate used district level data from the High School Feedback Report from KY Stats. This model used data that was also provided by KY Stats to control for the percentage of: Black students, Hispanic students, students labeled other race, students eligible for free-reduced price lunch, percentage of students with an IEP, percentage of students with limited English proficiency, and the percentage of homeless students in the district for school years 2012, 2013, and 2014. This model accounted for approximately 20 percent of the explained variance between the dependent variable and the control variables.