

# CONNECTICUT SCHOOL FINANCE PROJECT



## A REVIEW OF THE RESEARCH ON DISTRICT & SCHOOL CONSOLIDATION

An examination of the research regarding the fiscal and academic costs and benefits of district and school consolidation

February 2019

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## Introduction

There exists substantial academic research regarding the costs and benefits of what can be roughly grouped into two bodies of work: school district consolidation and school consolidation. However, these works are often classified as relating to district size, school size, or more broadly as relating to regionalization. These titles are ambiguous, leading to confusion by both readers and among other researchers. The purpose of this literature review is to disambiguate between several meaningful terms that appear in the academic research, and to provide a summary of the findings related to:

1. School district consolidation and economic efficiency,
2. School district consolidation and measures of student outcomes,
3. School consolidation and economic efficiency, and
4. School consolidation and measures of student outcomes.

## Methodology

The academic works reviewed in this report were published between the years of 2007 and 2018, and, with few exceptions, were published in peer-reviewed academic journals. Because of the ever-changing national policy landscape relating to the incentivizing and disincentivizing of school and district consolidation, in some cases it was appropriate to include policy papers, white papers, and working papers that analyze recent trends in policy or state-specific circumstances regarding the outcomes of different regionalization strategies.

The search terms used to collect the articles included in this review were “school consolidation,” “district consolidation” “school district consolidation,” and “school district regionalization,” which were entered into major academic journal databases, including Articles+, EBSCO, Google Scholar, JSTOR, Nexis Uni, Proquest, and Wiley.

These search terms resulted in the review of 72 articles, with 51 articles being coded as primarily related to school district consolidation or other types of interdistrict regionalization, 20 articles being coded as primarily related to school consolidation or school size, and one article relating to both topics equally. These articles included two previously done literature reviews, with one related primarily to school size and the other related to primarily to school size effects with a discussion on district size and consolidation.

With the exception of the literature reviews, the articles were then screened for the rigor of research methods. However, this literature review errs on the side of inclusivity, and only articles that contained no original research were excluded. Articles that are merely descriptive of trends and articles that employed only qualitative research methods were included in this literature review. Two articles were excluded from the group of articles on school size and consolidation, as they did not include original research, and 11 articles were excluded from the research on school district consolidation as they were either not peer-reviewed or did not include original research.

Thus, included in this review are 40 articles related to school district size, consolidation, and other types of school district regionalization, and 18 articles related to school consolidation, school size, and school closure.



## Disambiguation of Terms

### **“School District Consolidation” & “School Consolidation”**

There is significant conflation of the terms “school district consolidation” and “school consolidation,” even among researchers. Most articles that were reviewed for this literature review did not define either term, which adds to confusion regarding what it means to consolidate districts or schools. Authors who have defined these two terms often use conflicting or overlapping definitions. Schlitz and DeWitte (2017) acknowledge that school district consolidation and school consolidation are different activities and therefore have different economic impacts, but do not explicitly define either term,<sup>1</sup> while Jakubowski and Kulka (2016) do not attempt to disambiguate the terms, which they use throughout their work.<sup>2</sup>

Hall and McHenry-Sorber (2017) include a broad number of regionalization initiatives under their implicit definition of school district consolidation but do not explicitly define the term.<sup>3</sup> Hicks and Faulk (2014) state the consolidation of school corporations “primarily involves the merger of administrative functions.”<sup>4</sup> Rogers, Glesner, and Meyers (2014) use the term “merger” to refer to school district consolidation, in order to disambiguate from school consolidation.<sup>5</sup> Rooney and Augenblick (2009) define school district consolidation as “the process of combining or merging multiple school districts to form a single school district” and school consolidation as involving “closing one or more schools and shifting its student population to another school or schools.”<sup>6</sup> The Pennsylvania School Boards Association (2009) defines a merger as the combining of two or three school districts, and consolidation as the wholesale reduction of the number of school districts or the closure of school buildings.<sup>7</sup>

Adding to the confusion, some works, primarily within those studying sparse, rural school districts, are written with an unstated presumption that school district consolidation necessarily leads to school consolidation. Although this could be incidentally true in areas that were examined for specific research, it is not uniformly true across geographically dissimilar areas.<sup>8</sup> Specifically, in relatively small, Northeastern states, there are numerous objectively small school districts, which if consolidated, would not necessarily lead to school consolidation or closure.<sup>9,10</sup>

Therefore, for the purposes of this literature review, the term “school consolidation” will be used to refer to the merging of two or more schools, resulting in the closure of at least one school. The term “district consolidation” will be used to refer to the combination of two or more previously independent school districts into one new and larger school district, resulting a single district oversight board and administration. The term “regionalization” is a general term referring to the consolidation of attendance zones and/or educational services, which may or may not lead to a district consolidation. For example, in Connecticut, regional school districts are often formed while leaving in-place the original elementary schools of the districts forming the regional school district. Sometimes, these schools are part of the new, regional school

district and overseen by the regional school board, while in many cases these elementary and middle schools continue to be managed by their local boards of education and operate as districts independent from the regional school district.

### **“Economies of Scale” & “Diseconomies of Scale”**

Other terms that appear to cause confusion among various authors concern the economic concepts of “economies of scale” and “diseconomies of scale.” In economic research on school size and district size, economic regressions allow researchers to define a cost function.<sup>11</sup> Cost functions contain both a measure of input, such as per pupil expenditures or average costs, and an output measure of student outcomes. The purpose of this modeling is to determine the school district efficiency. Economic efficiency is achieved when the marginal cost is equal to the marginal benefit.<sup>12</sup> Therefore, in terms of school districts, efficiency is reached when the same student outcomes can be achieved for the least cost.

Cost functions appear on a graph as a parabolic curve<sup>13</sup> with the x-axis representing the number of students and the y-axis representing costs. Depending on how the cost function is constructed, the curve is “U-shaped”<sup>14</sup> or shaped like a check mark.<sup>15</sup> Check-marked shaped cost functions indicate a logarithmic relationship between inputs (dollars) and outputs (outcomes),<sup>16</sup> while U-shaped cost functions indicate a quadratic relationship.<sup>17</sup> Cost curves have what is known as an “optimal point” to minimize expenditures per pupil, wherein the most cost-efficient outcome has been reached,<sup>18</sup> which is the lowest point on the curve. Points before and beyond the optimization point on the curve will have lower cost-efficiency and therefore higher costs per pupil. As enrollment increases toward the optimization point and per-pupil costs decrease, the school district experiences economies of scale.

Savings on a cost curve tend to accrue up to the optimization point and then decrease as enrollment increases past the optimization point, even though cost savings are still positive compared to having multiple smaller school districts. Importantly, this means cost savings can still be found through district consolidation beyond the optimization point of the cost function. The trend of acceleration to the optimal cost point is often referred to as a movement toward an economy of scale, as it represents increasing returns to scale. In economics, an economy of scale is generally understood to be the situation in which an output can be doubled for less than a doubling of cost.<sup>19</sup> Essentially this means as schools and districts increase in size, their cost per student decreases rapidly to the optimal cost minimization point, after which per-pupil costs begin to increase again. At the point, in which student populations are so high that the cost of an additional student exceeds the average cost per student, the function indicates a diseconomy of scale. Increases in enrollment beyond the optimization point mean the school district has moved into diseconomies of scale. In economics, a diseconomy of scale arises when, for example, a doubling of output requires more than twice the cost.<sup>20</sup> While economic models define specific cost optimization points, cost

savings can be found in a wider range of school and district sizes than is sometimes suggested in educational research.

When determining an optimal school or school district size for the purposes of cost efficiencies, an economic analysis technique called a two-stage least squares (2SLS) regression is often employed,<sup>21,22,23,24</sup> which allows for multiple dependent variable types to be modeled.<sup>25</sup> 2SLS regressions are often used when controlled experiments are not possible and are specifically designed to account for endogenous variables.<sup>26,27</sup> In addition, ordinary-least squares (OLS),<sup>28</sup> Fourier cost functions,<sup>29</sup> and stochastic cost frontier<sup>30</sup> methods have more-recently been applied to model the economic efficiency of school districts. Although the results of these types of regressions can be different than 2SLS regressions, and can result in irregularly-shaped cost functions,<sup>31</sup> the technical definitions for economies and diseconomies of scale still apply.



## Methodological Challenges in the Research

There is a large body of academic research regarding school size, especially as it relates to student outcomes, but also relating to fiscal efficiency. Of this body of work, two literature reviews have been completed in the past 10 years, each of which notes a number of methodological challenges that complicate the existing literature.

Academic works relating to school or district size often refer to “small” schools as compared to “large” schools, however, there is no consistent definition among researchers for what is considered a small school or a large school. Instead, most articles use location-specific parameters to comparatively define small and large schools. In a literature review of school size research, Ares Abalde (2014) found definitions of large schools ranged from schools with student populations of 800 to 3,200 students.<sup>32</sup> Ares Abalde discusses the challenges raised to comparability of results between studies and encourages future researchers to refer to specific quantities of students rather than using vague terms such as small, medium, or large schools.<sup>33</sup>

Morrison (2014) attempted to study small and large high schools in Florida but found only eight schools in the state qualified as small under Cremin’s (1970) definition of having an enrollment of fewer than 500 students.<sup>34</sup> Green (2015) defines small schools as those with 450 students or less, and large schools as those with 1,000 or more students.<sup>35</sup> Cullen (2010) defines a small high school in Connecticut as having under 750 students.<sup>36</sup>

In their 2009 literature review about school size effects, Leithwood and Jantzi conclude that “‘smaller’ does not usually mean ‘really small,’ and that within academic research ‘smaller is a relative term . . . [and] can mean as many as 1,500 students,’ depending on the overall size of the school district where the school is located.”<sup>37</sup> Ares Abalde cites Slate and Jones (2005) as concluding that researchers should refer to specific enrollment sizes, rather than general nomenclature of small or large, as researchers use these titles to describe very different entities.<sup>38</sup>

Similar confusion is found in the literature regarding school district size, with Baker and Geller (2015) providing an extended discussion of the literature on school district economies of scale and noting the differences between school districts in geographically dissimilar states. Baker and Geller remark that “in many states a school district enrolling 2,000 pupils or a high school with fewer than 900 pupils is small. In Vermont, however, these would be among the largest in the state.”<sup>39</sup> Boser (2013) defines small school districts as those with fewer than 1,000 students and which are not classified as “rural remote” or “town remote” by the U.S. Census Bureau.<sup>40</sup> Rooney and Augenblick cite Yan (2006) as noting that “the research on school district size is limited in-part because it makes no distinction between school size and district size.”<sup>41</sup>

Another commonly cited methodological limitation is related to the complexity of variables that contribute to student outcomes, and the inherent endogeneity<sup>A</sup> of these characteristics. Karakaplan and Kutlu (2016) cite endogeneity in economic cost models as causing incorrect estimates of efficiencies created by school district consolidation and suggest that policy recommendations based on simple cost functions may not be reliable.<sup>42</sup>

Ares Abalde states that “in general terms, schools that are smaller than average will likely share some features that separate them from larger schools, and many of these characteristics will not be included in the specified models, either because they are unobservable or because no measures of them are available.”<sup>43</sup> Because the preferred methodology of random selection is difficult to implement when studying school size effects, it is not possible to control for all variables related to school or student characteristics.<sup>44</sup> Because randomly assigned studies are not available, Ares Abalde states the causal mechanisms of the effects of school size on quality or cost of education are a “black box.”<sup>45</sup>

Ares Abalde also cites the lack of a comprehensive theoretical model that “indicates and elaborates on the relationship between different factors explaining school effectiveness or efficiency,” as causing a lack of comparability of results through the “omission of relevant explanatory variables” that could “increase the significance of other explanatory variables.”<sup>46</sup> Ares Abalde uses the example of the mission and purpose of different types of schools as having an impact on their cost structures.<sup>47</sup> Similarly, Ares Abalde cites interaction effects as another methodological challenge of existing research into school size, stating “researchers have tended to overlook the interaction of school size with other variables,” and argues that production and cost functions in many research papers should include more interactions between student and parental characteristics and school size.<sup>48</sup>

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<sup>A</sup> Endogeneity describes a situation when a variable, which is not included in a statistical model, is related to a variable that is included in the model, thereby limiting the ability to determine causality of one variable to another. Endogenous variables in social science research are frequent, especially when random assignment is not possible, and can be unobserved among data sets.

Pinzón, E. (2016, October 20). *Dealing with and Understanding Endogeneity* [PowerPoint slides]. College Station, TX: StataCorp LP. Retrieved from <https://www.stata.com/meeting/spain16/slides/pinzon-spain16.pdf>.

## Previous Reviews of Literature on School & District Size

Ares Abalde's (2014) work is the most comprehensive of the existing literature reviews, and relates primarily to school size, but also incorporates a number of articles regarding school district size and economies of scale and school and district consolidation. However, the paper has a broad, global focus that complicates the author's findings, as different countries have varied policies and practices that influence their educational systems.

Ares Abalde acknowledges that "school size policies are strongly context-dependent [and] this is a crucial limitation to the transferability of these results to other local or regional contexts."<sup>49</sup> Leithwood and Jantzi's (2009) literature review attempts to limit its scope to school size effects but also includes research related to school district size and consolidation. Leithwood and Jantzi draw the conclusion from their review of relevant research that "smaller schools are generally better for most purposes," but they qualify this statement by acknowledging there is no one working definition for the term "smaller,"<sup>50</sup> which weakens the conclusion. The authors do not specifically address the impact of school district size, even though certain articles reviewed expressly relate to this topic. In addition, Leithwood and Jantzi's work does not include the most recent research regarding school or district consolidation.<sup>51</sup>

## Review of Research Regarding School District Consolidation & Fiscal Impact

Because of the methodological concerns regarding the research on school size, as well as the ambiguity of terminology associated with this body of work, a careful review of the most recent relevant literature is warranted. This paper provides a review of the literature in four domains: school district consolidation and fiscal impact, school district consolidation and student impact, school consolidation and fiscal impact, and school consolidation and student impact. Papers with strong, quantitative methodologies are highlighted.

On review of the literature related to school district consolidation and fiscal impact, it is clear economies of scale are likely to occur when smaller districts combine to form a single, larger school district. However, the optimal school district size for cost-efficiency, as modeled in economic research, is heavily dependent on geography, and ranges from approximately 1,900 students in Indiana<sup>52</sup> to approximately 47,000 students in Texas.<sup>53</sup> Recent additions to the literature also critique the larger body of work that relies on economic regressions to create cost functions and suggest that endogenous effects<sup>54</sup> and lack of market competition<sup>55</sup> may reduce the actual economic gains experienced by school districts, post-consolidation. In addition, political<sup>56, 57, 58, 59, 60, 61</sup> and geographic realities<sup>62, 63, 64, 65</sup> may reduce the feasibility of districts consolidating to reach the economies of scale predicted in economic regression.

### ***Economic Research on School District Consolidation Since 2007***

There is substantial evidence that cost efficiency is expected to increase through school district consolidation. Each study of economic impact and school district size or school district consolidation found that larger school districts were likely to be more efficient than smaller school districts, with econometric studies most often finding evidence of a U-shaped cost function, wherein an optimal district size for economic efficiency is identified, and beyond this point, economic benefits decrease, and diseconomies of scale are reached. These results vary widely by geography, with optimal district size for cost efficiency ranging from approximately 1,900 students to approximately 47,000 students. More recent economic models have shown weaknesses in simple cost functions, with some research indicating that economies of scale can be overestimated due to issues of endogeneity and production, while others have shown a wave-shaped function with more than one point at which costs decrease, and then again increase. In addition, two studies of the actual results of school district consolidations in Nebraska and Iowa indicate the realized economic benefits of district consolidation may be lower than projected cost savings in economic models.

Schiltz and DeWitte (2017) find an optimal school district size of approximately 6,500 students in the Flanders region of Belgium, with regard to fiscal efficiency.<sup>66</sup> Although the school districts sampled are located outside of the United States, and therefore the results may not be generalizable to school districts in the United States, this article was

included in this literature review because it employs a Fourier cost function and provides an important critique of previous economic cost models. The Fourier cost function allows for a periodic function with multiple optima, by including higher-degree polynomials.<sup>67</sup> This methodology indicates that, although optimal district sizes exist, there may also exist both increasing and decreasing costs as district size increases, leading to a function that appears more wave-shaped than U-shaped. Schiltz and DeWitte also find that “the inclusion of school and class size variables . . . emphasise the robustness of district size effects, once school and class size effects are accounted for.”<sup>68</sup> However, the authors also caution that the more commonly used quadratic cost functions may overestimate scale economies.

Karakaplan and Kutlu (2017) find a U-shaped cost function with a minimum cost at a district size of approximately 5,868 students in California. The authors use a stochastic frontier methodology to better manage endogeneity in the economic model.<sup>69</sup> Stochastic frontier models explicitly account for inefficiencies within organizations,<sup>70</sup> implying that school districts may not actually behave in ways that will minimize costs. Karakaplan and Kutlu control for variables such as student achievement and market concentration when estimating cost efficiencies. They find that, when controlling for endogenous inefficiency, the effect of education market concentration on cost inefficiency is greater, which could impact overall savings from district consolidation. The authors argue their stochastic methodology better predicts outcomes of consolidation by acknowledging district consolidations will inherently change the education market structure.<sup>71</sup>

Gronberg, Jansen, Karakaplan, and Taylos (2015) find economies of scale exist for school districts up to enrollments of 47,124 students, after which diseconomies of scale appear., by simulating the consolidation of school districts to the county-level in Texas.<sup>72</sup> The authors also employed a stochastic frontier analysis to model the theory that reduced market competition will limit the economic benefits of school district consolidation through increased inefficiency. The authors found that “expenditures would be 16% higher under monopoly than under perfect competition, all other things being equal,” which translated to approximately \$2 billion in lost efficiency.<sup>73</sup>

Nguyen-Hoang and Yinger (2014) performed a broad analysis of the Massachusetts school finance system. As a part of this work, the authors performed a cost function analysis of the efficiency of school districts in the state. The authors found a significant U-shaped relationship between per-pupil spending and student enrollment, with diseconomies of scale only arising at an enrollment of 36,315, for school districts in Massachusetts.<sup>74</sup> The authors surmise from these results that “almost all of the school districts in Massachusetts would be able to save if they merged with one or more of their neighboring school districts.”<sup>75</sup> John Yinger shared his cost function results with the Connecticut School Finance Project via direct communication in 2018. These results show the highest rate of cost savings, at 24.8 percent, with enrollments between 100 and 3,000 students, and a sharp decrease in the rate of savings with enrollments

between 3,000 and 5,000 students.<sup>76</sup> This indicates that cost efficiency in Massachusetts can be achieved somewhere near 3,000 students. Nguyen-Hoang and Yinger also found that increases in voter income resulted in higher demand for school quality paired with a reduction in monitoring, which they argued makes school districts less efficient.<sup>77</sup>

Dority and Thompson (2013) find a U-shaped relationship between per-pupil spending and the average daily membership of school districts in Nebraska, with an optimal district size for cost efficiency at approximately 8,000 students. However, the authors also performed a time series analysis of per-pupil spending before and after district consolidation, over a period of 10 years, and did not find consistent evidence that consolidation actually lowered per-pupil spending over time. Instead, the authors found rural districts only experienced a reduction in expenditures after multiple consolidations, and that non-rural districts' per-pupil spending was not statistically different post-consolidation when compared to pre-consolidation. The authors argue these results indicate that savings realized, if any, "may be small despite the observed U-shaped pattern between school district membership and per-pupil spending."<sup>78</sup>

Duncombe, Yinger, and Zhang (2014) examined whether school district consolidation had a negative impact on property values in upstate New York. They found district consolidation appears to have a negative impact on home values in the short-term but this effect reverses over time. The authors argue this pattern suggests it takes time for the economic advantages of school district consolidation to be realized. The authors also found school district consolidations have positive impacts on home values in low-income communities, but negative impacts on home values in higher-income communities, where the authors suggest "parents may have a relatively large willingness to retain the non-budgetary advantages of small districts."<sup>79</sup>

Hanushek and Yilmaz (2013) analyze the interaction of location and schools, hypothesizing that, under a general equilibrium framework, families seek an optimal place of residence based on factors including commuting costs, wages, and school quality, and then vote on local taxes, the variation of which can influence school quality across geographies. The authors model the possible impacts of two school funding policies designed to increase school funding equity by reducing reliance on local property taxes, "district power equalization" and "district consolidation and full state funding,"<sup>80</sup> to determine which policy increases student achievement and individual household welfare. The authors use a combination of Tiebout choice and urban location theory to develop a general equilibrium model that they argue has "sufficient richness to capture the basic reality of urban spatial structure and the key elements of governmental policy interventions."<sup>81</sup> The authors found the district power equalization method of school finance, wherein the state equalizes the per-pupil revenue of low-wealth districts through per-pupil grants, reduces school quality for all schools, including schools in high-wealth districts. The authors also find that full state funding eliminates the ability of families to choose a residence based on preferred tax



policy, thereby increasing the weight of workplace accessibility in the model. Both models project reduced expenditures and lower student outcomes, which the authors argue results from the impact of the policies being “‘as if’ all districts have a majority of low-valuation households voting a low tax rate,” thereby lowering the quality of schools for all groups.<sup>82</sup>

Heffley and Bekaroglu (2010) performed a regression on academic efficiency scores, as measured by number of inputs (teachers, administrators, and computers) per 100 students to quality of output – differences in performance (relative to average performance) in SAT and Connecticut Mastery Test (CMT) scores, and district size in Connecticut. Controlling for District Reference Groups (DRGs), the authors found the ideal district size for output efficiency was 2,789 students and the ideal district size for input efficiency was 2,782 students.<sup>83</sup>

Zimmer, DeBoer, and Hirth (2009) found a concave, parabolic cost curve, with an optimal enrollment for cost efficiency of 1,942 students per district, in Indiana. The authors examined a number of different types of costs, including transportation and salary costs and found transportation did not lend to significant economies of scale, while salaries increased with consolidation with district enrollments up to approximately 4,000 students. The authors argue this indicates that as districts consolidate, labor unions force districts to offer the wage rates of the most generous of the consolidating districts, but districts over a certain critical size can exert market power in the wage market.<sup>84</sup> The authors also found administrators' salaries may be the source of diseconomies of scale in districts over 3,000 students.<sup>85</sup>

Hu and Yinger (2008) found school district consolidation increased home values and rents by about 25 percent in very small school districts, but that the impact declines with district enrollment, and that district consolidation has no impact on housing values in districts with enrollments over 1,700 students. The authors also find school district consolidation has a positive impact on home values in low-income Census tracts, and a large negative impact in high-income tracts, which is consistent with later research by Duncombe, Yinger, and Zhang (2014).<sup>86</sup>

Duncombe and Yinger (2007) found that, in New York, consolidating districts from 300 students to 600 students would yield cost savings of 56.04 percent, from 900 students to 1,800 students would yield cost savings of 48.6 percent, and from 1,500 students to 3,000 students would yield savings of 45.07 percent. The authors also found that consolidation leads to increased capital spending, which can lead to some mitigation of cost savings. The authors argue that state aid to incentivize consolidation not be applied to capital projects, so as to maximize economic efficiency through school district consolidation.<sup>87</sup>

### **Other Research on School District Consolidation & Fiscal Impact**

In addition to economic research, authors in other disciplines have also examined the fiscal impact of school district size through statistical methodologies, case studies,

qualitative research, and GIS mapping. The results of these studies are summarized below. However, because the research methods are varied in approach and rigor, it is difficult to draw any overarching conclusions about the findings of this research. Also included in the review for this section is a policy paper released by a governmental entity, which has not been published in a peer-reviewed journal but provides insight into a specific geography.

Hall (2017) performed research regarding noncongruence of school district and municipal borders, to test the hypothesis that noncongruence “severs the link between costs and benefits of the median voter. . . which could result in excessive residential development and fiscal externalities that lower property values,”<sup>88</sup> meaning that in circumstances where municipal borders differ from school district borders, municipal voters may make decisions that negatively impact property values in the school district, because municipal decision-making may not correspond to the needs of the school district. The author uses a hedonic regression to estimate the impact of these types of externalities on housing values, and GIS mapping to measure district congruence with municipal borders. In Ohio, there are no school districts that draw from a single municipality without being congruent,<sup>89</sup> meaning that all noncongruent school districts in the state draw students from multiple municipalities, and municipalities may send students to multiple school districts. In addition, all school districts in Ohio are fiscally independent,<sup>90</sup> so property values have a direct fiscal impact on the district.<sup>B</sup> Hall found that, for most observed levels, noncongruence has a negative impact on property values. However, the author also finds that for school districts shared more equally between municipalities, as determined by the Herfindahl-Hirschman Index, which measures the percentage of land area from each municipality in the district, the impact on property values was negligible or positive.<sup>91</sup>

DeLuca (2015) compared the per-pupil spending in states with county-level school districts and states with multiple school districts per county and found that current operating expenditures are significantly lower in districts organized by county than in districts in multi-district counties, at about \$742 less per pupil. DeLuca finds that countywide school districts spend less per pupil on instructional services than do districts in multi-district counties, which could indicate savings are not redirected toward instruction, which the author notes is a common argument in favor of school district consolidation. However, DeLuca’s findings also show that single-district counties allocate a higher proportion of current operating expenditures to instruction than do districts in multi-district counties, and that for each additional district in multi-district counties, the allocation of current operating expenditures to instruction decreases. The author recommends additional study to examine the causes of these discrepancies.<sup>92</sup>

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<sup>B</sup> Noncongruent school districts in Ohio differ from regional school districts in Connecticut because towns that send students to noncongruent school districts may not send all students to a single, noncongruent school district. This is possible in Ohio because school districts are fiscally independent and operate as entirely separate governmental agencies from municipalities and levy their own taxes from property-owners within the district. Therefore, the impact of municipal decision-making on school district property values has a direct fiscal impact on the school district’s ability to raise funds.  
U.S. Census Bureau. (2013). *2012 Census of Governments – Individual State Descriptions: 2012*. Retrieved from <https://www2.census.gov/govs/cog/2012isd.pdf>.

Hall (2015) used OLS regression to show that noncongruent school districts in Ohio generated less revenue from local sources than did school districts with borders that are congruent with municipalities, and that these effects appear to increase with the degree of noncongruence. The author hypothesizes that his observations are caused by moral hazard where the median municipal voter may reap all of the benefits of residential development and zoning, but only incur a fraction of the cost of educating the students in that development. Hall argues that voters respond by voting for lower school spending at the district-level, including against school construction.<sup>93</sup>

In a policy paper released by the Vermont Agency of Education, Baker and Geller (2015) wrote a response to a report by graduate students from Pennsylvania State University, which Baker and Geller argue conflated school consolidation and school district consolidation in Vermont. Baker and Geller contend that school district consolidation in Vermont would not necessarily lead to school consolidation, due to the geography and demography of the state, where the vast majority of school districts have enrollments less than 1,000 students, and schools tend to be remote. The authors use data from the Vermont Agency of Education to show that when weighted for enrollment, smaller school elementary school districts in the state spend an average of approximately \$1,000 per pupil more than their peer districts and have higher homestead tax rates. The authors provide analysis that indicates that in certain areas of the state, district consolidation would be feasible and advisable, due to a high level of fragmentation among school districts whose centers are less than 10 miles apart and are near major transportation routes.<sup>94</sup>

DeLuca (2013) explores the potential of cost savings through the consolidation of non-instructional services from local school districts to regional Education Service Agencies (ESAs) in Michigan. This practice is cited as being a less politically-challenging alternative to school district consolidation. Using fixed-effect regressions, DeLuca found that non-instructional service sharing agreements had no significant impact on per-pupil non-instructional spending, while the consolidation of business office services had a positive, statistically significant impact on per-pupil instructional spending. However, other factors such as district size, were shown to have a much stronger impact on instructional spending. The author concludes there is no evidence that districts in Michigan have reduced costs through non-instructional service consolidation, nor have they transferred presumed savings to instructional expenditures.<sup>95</sup>

Howley, et. al. (2012) performed a case study on an anonymized 4-district collaborative that "shared services for more than 15 years in an effort to retain rural schools and thereby preserve community identity." Participating districts had experienced declining enrollment, previous district consolidation, and were under threat of further consolidation. The districts collaborated by sharing resources including administrators, the relocation of teachers, itinerant teachers, and distance learning. This study did not include quantitative analyses, but rather used survey data in a qualitative study. From the case study, the authors concluded that under certain circumstances, the sharing of

administrative and instructional services between districts “function[s] as a workable compromise between complete district autonomy and extensive consolidation.”<sup>96</sup>

Cox and Cox (2010) compared student outcome and district expenditure data in the Hamilton County Department of Education in Tennessee. In 1997, Chattanooga City schools merged with the surrounding county school system, creating the Hamilton County district. The authors compare point-in-time data from the 1997-98 school year and the 2006-07 school year. However, the comparison methodology for expenditure data is flawed, as the authors failed to control for inflationary increases,<sup>97</sup> which limits the usefulness of the comparison, and calls any conclusions drawn from the data into question.

Cullen (2010) compared student outcomes between regional high schools and community (local) high schools in Connecticut, the results of which are discussed in the later section on student outcomes. The author also found that regional high schools spend approximately \$600 more dollars per-pupil than the comparison group of community high schools, but this finding was not statistically significant. However, the author fails to account for the regional district per-pupil bonus in the state funding formula for public schools, known as the Education Cost Sharing grant, which provides additional per-pupil funding (the amount of which depends on the number grades that have been regionalized) to towns that are members of regional school districts,<sup>98</sup> which include regional high schools.

Gordon and Knight (2008) analyzed school district consolidations that occurred in Iowa in the 1990s. These school district consolidations were achieved with sizable state incentives, which translated to an average of an inflation-adjusted \$5,100 per pupil over the 5-year period, as a reduction to the foundation tax rate. In addition, districts were allowed to continue applying weights for whole grade sharing for five years post-consolidation, which increased district revenue by an average of \$200 per person.<sup>99</sup> The authors found the increase in state revenue was not offset by a corresponding decrease in local revenues, and therefore, district revenues increased rather than decreased in the 5-year period post-consolidation, when compared to the five-year period pre-consolidation.<sup>100</sup> This research provides caution to policymakers who may rely on economic models that predict school district consolidation will result in economies of scale, when in both Nebraska<sup>101</sup> and Iowa the economic benefit predicted may not have been fully realized.<sup>102</sup> However, it is important to note this 5-year, post-consolidation period was also the period of state subsidy,<sup>103</sup> and therefore does not include information about whether long-term efficiencies were realized after the state subsidy ended.

## Review of Research Regarding School District Consolidation & Student Outcomes

There exist fewer studies on school district size and school district consolidation and student outcomes than studies related to school district size and fiscal outcomes, but those available are reviewed in this section. However, many of the economic studies discussed in the previous section also include measures of student outcomes as components of production functions, results of which are also discussed below. In addition, there is a growing body of academic research that relates to school district fragmentation and segregation of students, including one policy paper that was not published in a peer-reviewed journal but provides summary data regarding national trends. A selective review of this literature on district fragmentation is also included in this section.

There is no conclusive evidence that school district consolidation positively impacts students' academic performance, although arguments can be made that access to educational opportunities such as Advance Placement courses, elective courses, and athletics is improved by consolidating very small school districts. Likewise, there is no conclusive evidence that school district consolidation negatively impacts student performance. In studies where student outcomes are shown to be negatively correlated with school district size, other variables, such as student income and student-teacher ratios have much stronger effects on student achievement than does the size of school districts. There is more literature, and more substantive research regarding school size and academic achievement, which is further discussed in a later section.

### **Research on School District Consolidation & Academic Outcomes**

Karakaplan and Kutlu's (2017) model for optimal district size of 5,868 students includes both measures of fiscal efficiency and academic outcomes. The authors use the Academic Performance Index (API), which is an aggregated measure of test scores, created by the California Department of Education, and is based on standardized assessment results in math, reading, writing, science, and history in grades two through 12. Their model shows that at district sizes greater than 5,868 students, holding all other variables constant, "a higher level of district achievement would require a higher level of expenditure per pupil." The authors also found that a one percentage point increase in the special education student identification rate results in a 2.28 percent increase in cost to achieve the same student outcomes. They found that an average-sized district in California would need to increase its per-pupil expenditure by 4.1 percent in order to achieve a 10 percent increase in API. However, when controlling for endogenous inefficiencies using stochastic frontier methodology, the authors find that in order to gain the same 10 percent increase in API, the average California district would need to increase its per-pupil expenditure by 54.19 percent. In addition, in order to account for any concerns regarding the validity of the API metric in measuring student achievement, the authors also ran regressions using the Adequate Yearly Progress (AYP) metric, which includes additional outcome information such as graduation rates and



academic proficiency rates, which yielded similar results when controlling or not controlling for endogenous inefficiency.<sup>104</sup>

Hall and McHenry-Sorber (2017) performed a case study which examined the time and role allocations of a superintendent in a multi-district supervisory union in Vermont. These types of regional structures protect the autonomy of participating districts by retaining local boards of education, while associating the districts under one central administrator. The authors found that the just over half of the superintendent's time and associated responsibilities were spent on activities the authors categorized as "political," which related to governance and autonomy.<sup>105</sup> The authors indicate this reduces the amount of time the superintendent was able to spend on managerial and instructional leadership, with 24.6 percent of the superintendent's time spent engaged in tasks related to student instruction. The authors suggest all stakeholders considering entering into a supervisory union relationship must understand the distinction between the role of a supervisory union superintendent and a local school district superintendent.<sup>106</sup>

In their stochastic frontier analysis of the efficiency of Texas school districts, Gronberg, et. al. (2015), include the change in pass rate on the Texas Assessment of Knowledge and Skills (TAKS) in a matched cohort of students over two years as an output variable, and the percentage of students completing an advanced course in high school, in addition to the log of current operating expenditures per pupil (excluding food and student transportation expenditures). This is done to ensure the projected cost-efficiency includes student performance as an outcome. Thus, their optimal size for district efficiency of 47,124 students includes measures of student achievement.<sup>107</sup>

Baker and Geller (2015) note that, in Vermont, there is a positive correlation between school size and the number of Advanced Placement classes offered and argue that educational program breadth and depth may be compromised in Vermont's very small high schools, as "data appear similar for athletics opportunities."<sup>108</sup>

Nguyen-Hoang and Yinger (2014) examined Massachusetts' school finance system. As a part of this larger analysis, an economic analysis of the efficiency of school districts in the state was performed. The authors treat student performance, as measured by the Composite Performance Index that was developed by the Massachusetts Department of Elementary and Secondary Education, as endogenous in their cost function. The authors find that the coefficient of student performance in relation to expenditures is highly significant, indicating that "money does matter in raising student performance in Massachusetts, as in other states."<sup>109</sup> The authors found school districts must increase spending by 2.7 percent in order to obtain a one percent increase in student achievement, and that a one-percentage point increase in low-income students requires a 1.1 percent increase in spending to maintain student performance.<sup>110</sup>



Donis-Keller, O'Hara-Miklavic, and Fairman (2013) performed a qualitative study on the impacts of Maine's school district consolidation, which occurred after statewide legislation passed in 2007 with the goal of increasing equitable access to educational opportunity for students. They focused their investigation on the equity of educational opportunities in 24 newly-formed regional school districts. Of the districts surveyed, 22 reported changes to some aspect of the delivery or content of their programs of education, which included "expanded technology; increased gifted and talented programs; expanded prekindergarten or kindergarten programming; alignment of special education services; perceived improvements in education programming in certain subject areas; and improved professional development for teachers."<sup>111</sup> However, the authors also note these expanded services did not occur with uniformity, and "about a third of the districts. . . described only modest changes."<sup>112</sup> However, in terms of equity as defined by a redistribution of resources among partnering districts, two-thirds of responding districts noted "improved or increased equity of educational opportunity in some aspect of their programming," although these changes also varied in breadth and scope.<sup>113</sup> The authors found that "in consolidations that had size imbalances between partners, larger systems could point to fewer education equity benefits accrued to them in the process," and cited difficulty in measuring the impacts of equity.<sup>114</sup>

Dority and Thompson (2013) use student outcome measures of average ACT scores and high school graduation rates as control variables in their cost model for Nebraska school districts. Their model indicates that student outcome measures are negatively correlated with per-pupil spending, however, the coefficient on ACT scores is not statistically significant, and the coefficient on cohort graduation rate is weakly significant. The authors note a possible interpretation of this result is that "a higher cohort graduation rate implies more students are completing their high school degree in 4 years—thus not requiring additional funds to be spent on them beyond 12 years."<sup>115</sup>

Fairman and Donis-Keller (2012) completed qualitative research regarding 15 school districts in Maine that consolidated after 2007. The authors found three areas of self-interest that worked to facilitate or impede reorganization: financial interests, governance interests, and educational interests. District leaders and planning committees explored whether neighboring districts had similar educational programs and priorities, their academic performance, and high school choice policies when selecting potential partners for consolidation. The authors note that many districts saw "advantages in sharing or expanding programs regionally through consolidation, such as pre-K, art and music, foreign language, career and technical education, technology, and advanced placement courses."<sup>116</sup> Three of the 15 regional planning groups found no potential educational benefits to consolidation, and "overwhelmingly voted down their reorganization plans."<sup>117</sup>

Cox and Cox (2010) found increases in math, reading, and ACT scores when comparing school districts in Hamilton County, Tennessee before and after

consolidation. However, the authors provide no statistical analysis of these results, therefore their significance cannot be determined.<sup>118</sup>

Cullen (2010) compares academic performance in regional high schools to community high schools in Connecticut, within District Reference Groups (DRGs), which group like-districts based on socioeconomic characteristics. The author found that regional high schools outperformed their community high school counterparts in 15 of 16 pairs, using SAT I outcomes as the performance metric. Of these, four pairs compared were statistically significant.<sup>119</sup>

Heffley and Bekaroglu (2010) used a value-added measure of student performance on the Connecticut Mastery Test (CMT) and the SAT Reasoning Test in math, reading, and writing as output variables, and the number of teachers, administrators, and computers per 100 students in 119 Connecticut school districts, in order to measure district efficiency. The authors used a data envelopment analysis (DEA), which “compares each district’s observed mix of inputs and outputs with those of other districts and determines whether the same. . . output bundle might be produced by adopting some combination of the input-output mixes seen in other districts.”<sup>120</sup> The authors find that the average output-efficiency score is 0.97, and that 21 of 119 districts are “fully efficient” on both inputs and outputs. The authors note the districts of Meriden, Windham, and New Britain are “fully efficient,” even though their performance is lower than average, because the value-added metric, which takes into account growth in student achievement, combined with “conservative use of inputs” result in efficiency scores. The authors also note that 8 of 17 regional school districts show “very strong results.”<sup>121</sup> The authors found an ideal district size in Connecticut for both input and output efficiency was approximately 2,780 students.<sup>122</sup>

Zimmer, et. al. (2009) included student performance as endogenous to their cost model and found a positive and significant relationship exists between student performance and per-pupil costs. In addition, the authors found the relationship between student attendance, used as a proxy for family engagement, is quadratic and concave, with attendance rates increasing with district enrollments up to 847 students, and decreasing from that point. The authors contend that school district consolidation may lead to lower levels of family engagement, as measured by student attendance.<sup>123</sup>

Haddad and Alsbury (2008) performed spatial analyses to determine whether district size or district location had a larger impact on student performance in Iowa and Illinois by detecting the levels of spatial autocorrelation and spatial heterogeneity and the interaction of these effects on student achievement. Spatial autocorrelation would indicate that the “value,” student test scores, in a location is correlated with the test scores of its geographic neighbors, rather than with another value, such as school district enrollment. Spatial heterogeneity occurs when student outcomes are correlated with geographic patterns, such as between rural and urban school districts, which shows that “the spatial distribution of student proficiency is not stable across space.”<sup>124</sup>

The authors found that generally high-performing and generally low-performing districts, as measured by state-level standardized assessments, tend to be clustered in certain parts of each state, controlling for variables such as teacher experience, class size, graduation rates, and poverty rates. However, the models do not control for school district size, as measured by enrollment. The authors also identified clusters of districts that both underperformed and outperformed model predictions of student outcomes. Because of these results, the authors recommend the use of spatial data in the deployment of statewide professional development programs for educators or in creating education policy on a regional basis, and warned against the use of national, "one-size-fits-all" reform efforts, such as No Child Left Behind's accountability measures.<sup>125</sup>

Gordon and Knight (2008) examined the impact of whole-grade sharing and administrative consolidations of school districts in Iowa and found no effects of either regionalization strategy on student-teacher ratios, school district enrollment, or dropout rates. The authors note that they lack detailed student outcome data, but state that their preliminary results do not indicate any efficiency gains or increases in school quality, post consolidation.<sup>126</sup>

Berry and West (2008) estimated the impact of changing school and district size on student outcomes during the national, large-scale district consolidation that occurred between 1930 and 1970 in the United States, as over 100,000 school districts were eliminated through consolidation. The authors use data from the Public-Use Micro Sample (PUMS) of the 1980 U.S. Census to analyze changes in school size, district size, state education funding, students' labor market outcomes, and educational attainment. The authors found that students born in states where the average school district size increased were associated with somewhat higher returns to education and increased educational attainment. However, the authors also found these trends were reversed in states where the average school size increased, and that the economic and educational losses associated with increased school size outweighed the gains found through increased school district size.<sup>127</sup>

Jones, Toma, and Zimmer (2008) found school district size (as measured by schools per district), school size, and class size were all inversely related to average daily attendance among schools and districts in Texas. Of these metrics, student-teacher ratios showed a stronger correlation than did schools per district or school enrollment. The authors acknowledge that although their results indicate student attendance is negatively impacted by the size of schools and districts, there may be unmeasured, endogenous characteristics of schools and districts impacting the results.<sup>128</sup>

Duncombe and Yinger (2007) used the percent of students achieving minimum competency on New York's statewide standardized assessments for elementary reading and math, and the percent of students receiving a Regents diploma as measures of student performance, and these are treated as endogenous variables in

their cost functions.<sup>129</sup> This means student performance is considered in their cost efficiency results, which indicated an optimal school district size of approximately 3,000 students.<sup>130</sup>

## School District Fragmentation & Segregation

Although the majority of research uncovered using the search terms “school district consolidation” and “district consolidation” studied the effectiveness of merging two or more school districts on economic and student learning outcomes, there also exists a growing body of academic research regarding the impacts of school district fragmentation. While the majority of research on school district consolidation relies on statistical and economic modeling of potential costs and benefits of district consolidation, the bulk of studies related to school district fragmentation are careful analyses of the aftermath of school districts that previously served a wide, diverse student population and geography, where all or certain communities have seceded from the larger school district in order to form smaller, local school districts, serving a less diverse community of students. Most of these analyses relate to socio-political issues of local control and racial segregation. However, the trend is also documented in school districts that are more racially homogeneous.

There exists sufficient evidence to suspect that school district fragmentation leads to greater racial and wealth inequalities among student groups. The discussion below does not constitute a complete literature review on the topic of school district fragmentation and segregation, as a discussion of this body of work could constitute its own, separate analysis. However, the selection of works below include the most recent writings on the topic.

The selected literature on school district fragmentation is in concurrence that fragmentation leads to higher levels of between-district segregation but is not conclusive as to whether school district fragmentation increases segregation at the school level. However, in considering school district consolidation, policies that support school-level integration appear to be important factors in whether integration will increase post-merger. In addition to the research on economic efficiency and academic outcomes, the possibility school district consolidation could support further economic and racial integration of schools could be perceived as a benefit that is not fully considered in existing literature regarding school district consolidation.

Siegel-Hawley, Diem, and Frankenberg (2018) performed a 2-year qualitative case study exploring the political dynamics that led to the secession of six municipalities in Shelby County, Tennessee from the Memphis-Shelby County school district, and the impact these changes have had on racial segregation. In 2013, the Memphis-area public schools in Shelby County underwent the largest city-suburban school district merger in recent United States history, creating a school district with a combined enrollment of 150,000 students. The following year, 30,000 students left the district to form six new, smaller school districts. Through the case study, authors identified three overlapping themes: “the prevalence of colorblind attitudes and law, despite deepening racial and economic inequality, the historical exercise of local control to avoid desegregation, and the shift toward seeing the benefits of education primarily in terms of the individual student rather than collective society.”<sup>131</sup> The authors document

the historic use of the term “local control” as emerging after the U.S. Supreme Court ruling in *Brown v. Board of Education*, which outlawed segregation in schools, and argue the term has continued to be used with racially-tinged connotations in the service of preserving segregation. The authors also document a history of “race-neutral” Supreme Court decisions, such as *Milliken v. Bradley*, which allowed suburban schools in Detroit to retain autonomy, and argue these cases have led to increased segregation in schools and school districts. The case study shows the new school districts that formed in 2014 were “largely unavailable to low-income residents of color [and their] choices were constricted in large part because wealth accumulation and racial segregation are deeply related.”<sup>132</sup>

Frankenberg, Siegel-Hawley, and Diem (2017) also performed a quantitative analysis of the rates of segregation in the Memphis-area Shelby County public schools, as measured by an “exposure index,” which included several measures of school-level segregation, including Black and White students’ rates of exposure to each other and the multigroup information theory index, which indicates the level of randomness of group distribution of schools across the county. The authors compared these measures pre, during, and post-merger. The authors note that because policy dictated students’ school assignments be frozen for three years post-merger, little overall change in segregation was documented during the one year of the merger. However, incremental increases in Black/White exposure were observed, which reversed post-fragmentation. The authors found the highest contribution to between-district segregation was the eight districts that formed post-fragmentation, accounting for 60 percent of total segregation. Similar results were found regarding exposure between high and low-income students. Post-fragmentation Shelby County Schools hosted 87 percent of all Black and low-income students in the county, although district enrollment was only 75 percent of the total enrollment in the county. Although these results are preliminary, the authors expect the trend toward further segregation to continue, because Black and low-income families have lower ability to move between districts than do higher-income and White families, and because the elimination of the merged district eliminates possible future desegregation efforts through the redistribution of students within the district.<sup>133</sup>

Brasington and Parent (2017) used a partial observability spatial bivariate probit approach to determine factors that influence whether school districts choose to consolidate services and found the probability of consolidation increases when neighboring districts have already undergone consolidation. Brasington and Parent use data from urban areas in Ohio and Texas, and found municipal size, and heterogeneity of the population of each town has a significant impact on decisions to cooperate or consolidate on the provision of educational services. Determinants such as property value, racial composition, educational attainment, family composition, and the percentage of renters in a community were all shown to have a significant impact on contiguous municipalities’ willingness to consolidate.<sup>134</sup>



EdBuild (2017) released a policy paper regarding school district fragmentation and student segregation. The authors found the average student poverty rate in the newly-formed suburban districts of Shelby County was approximately 11 percent, while 33 percent of students in the Shelby County district lived below the poverty line. EdBuild also noted that in the year post-fragmentation, the Shelby County district's budget declined by 20 percent. EdBuild also examined other school districts that have seceded from larger, more diverse school districts, such as those in East Baton Rouge Parish, Louisiana, where three communities have successfully left the larger district to form local school districts. In the case of the students remaining in the East Baton Rouge Parish district, 10 percent were White, while the suburban districts had an average of 42 percent White students. The authors note that in East Baton Rouge attempts to secede by suburban communities continue. The authors emphasize the fiscal impact this would have on the larger, urban school district, because as wealthier districts exit, it weakens the overall tax base of the East Baton Rouge district. The authors also note the splitting of school districts in Yuma County, Colorado, where two districts were consolidated from 26 in the 1950s. In 2001, the two districts split into four districts, which the authors attribute to a state funding policy that increases state aid to small school districts. However, the split led to variations in the enrollment levels in each district, which has had the impact of depressing per-pupil expenditures in the districts with the highest enrollment, with the two new districts receiving nearly double the state aid as the districts from which they seceded. The authors also briefly discuss similar fragmentations in Mobile, Alabama, Jefferson County, Alabama, and a proposed split between Santa Monica and Malibu schools in California.<sup>135</sup>

Rury (2015) examined the history of the wealthy Shawnee Mission District in Johnson County, Kansas and its fight to remain independent of school district consolidation efforts from the early 1920s through the early 1980s. The author discusses this case through the lens of suburbanization and localism, and notes that, in this case, race was not a critical factor, and therefore posits that race "was not a necessary component of localist perspectives on schooling in the suburbs." The author discusses how this case foreshadowed widening social and economic inequalities in schools across the country.<sup>136</sup>

Ayscue and Orfield (2015) define school district fragmentation as the degree to which a metropolitan area is split into many separate school districts, which include school districts that have fragmented post-consolidation and those that are fragmented without having faced any threat of consolidation. The authors examine the relationship between school district fragmentation and segregation, using the measures of student exposure to students of other races, racial concentration across state and metropolitan-level data in North Carolina and Virginia, which are less fragmented, and New Jersey and New York, which are more fragmented. The authors found that, although the states had relatively similar overall percentages of White and non-White students, White students in New York and New Jersey are exposed to fewer Black peers (and vice versa) than students in North Carolina and Virginia. Similarly, low-income

students in New York and New Jersey are more isolated from wealthier peers than in North Carolina and Virginia. The trends continue when the authors examined multiracial unevenness, with students in New Jersey and New York being unevenly distributed than in the other two states. The authors also call New York's racial unevenness "severe."<sup>137</sup> In addition, 91 percent of segregation in New Jersey and 69 percent in New York is due to between-district segregation (rather than in-district segregation) as compared to 55 percent in North Carolina and 68 percent in Virginia. The authors also found that "the shares of intensely segregated and apartheid schools are substantially larger" in the states with fragmented school systems.<sup>138</sup>

Siegel-Hawley (2014) examined school district boundary lines and desegregation policy in Louisville-Jefferson County, Kentucky, Charlotte-Mecklenburg County, North Carolina, Chattanooga-Hamilton County, Tennessee, and Richmond-Henrico-Chesterfield, Virginia. The author uses GIS spatial mapping, and measures of concentration and dissimilarity to determine levels of segregation in the four metropolitan areas. Siegel-Hawley found evidence that the distribution of students by race and income was "clearly linked" to both whether a city-suburban school district consolidation had occurred,<sup>139</sup> and whether the consolidated district had a comprehensive desegregation policy, the data also suggests desegregation policies post-merger may have had a larger impact on segregation levels than did school district consolidations.<sup>140</sup>

Frankenberg (2009) studied the process of school district fragmentation to better understand the impacts of establishing new school districts on school segregation in Jefferson County, Alabama. The author found school segregation in the area remained high throughout the period of 1960-2005. However, over time between-district segregation has replaced in-district segregation and overall racial and income segregation has increased.<sup>141</sup>

Bischoff (2008) defines fragmentation as "the proliferation of autonomous jurisdictions," which is seen across the United States.<sup>142</sup> The author uses sorting theory and the Tiebout model of residential selection, which uses a market structure model to show people move to towns that most closely match their ideal government services, within their ability to pay, to examine political fragmentation and its impacts on school segregation. The author finds a significant, negative correlation between fragmentation of school districts, and both within-district and between-district segregation. She also finds municipal fragmentation has a statistically insignificant impact on school district and school segregation.<sup>143</sup>

## Review of Research Regarding School Consolidation

There exists a large body of academic research related to the estimation of the ideal school size, and whether smaller or larger schools improve student outcomes. This is a topic that continues to be of scholarly debate, and although related to school consolidation, is a separate area of investigation. Therefore, constraints were applied to narrow the scope of this literature review. The review herein is limited to research that specifically contemplates school consolidation to ensure this review contains a full disambiguation of recent academic research on school consolidation and school district consolidation, as these terms (and the associated concepts) are so often conflated.

The articles reviewed were found using the search term “school consolidation” and were published between the years of 2007 and 2018. Like the review on school district consolidation, only scholarly works related to school consolidation in the United States were included, as school systems vary widely by geography, so international results may not be descriptive of trends in United States schools. All peer-reviewed articles were included but works with robust quantitative analysis are highlighted. In addition, certain policy papers and doctoral dissertations that describe the outcomes of school consolidation in specific geographies were included, despite not undergoing peer review. The articles are organized similarly to the review of school district consolidation, into two sections: those related to school consolidation and fiscal impact and those related to school consolidation and student outcomes.

Importantly, the majority of the research on school size effects, which is well-documented in previous literature reviews by Ares Abalde (2014) and Leithwood and Jantzi (2009), was published before the 10-year time frame of this review, and therefore, is not discussed herein. In this section, more recent academic and policy papers are reviewed, and because of their limited nature should be taken in context with previous academic research. Conclusions should not be drawn solely from the content of this section.

### ***Research on the Fiscal Impact of School Consolidation***

There is significantly less research that focuses on economic efficiency at the school level than at the school district level. This is not surprising, as endogeneity becomes a larger methodological challenge the smaller the unit of measurement. As schools use fundamentally different education modalities, it is very difficult to control for these variables in an economic model. Governance, curriculum, theme, demographics, geography, and culture all contribute to student outcomes at the school level, in addition to school size and school funding.<sup>144</sup> These variables make it very difficult to measure efficiency as it relates to costs and student outcomes, and the smaller unit of measurement make results less generalizable than at the district level. However, several articles were identified that discuss the fiscal impacts of school consolidation.

The Pew Charitable Trusts (2011) studied the outcomes of public school consolidations in Chicago, Detroit, Kansas City, Milwaukee, Pittsburgh, and Washington, DC, and found the money saved through school consolidation was “relatively small in the context of big-city school-district budgets,” with the largest savings being realized when school consolidations were paired with large-scale teacher layoffs. The authors also caution that the selling or leasing of empty school buildings, which they note are often located in “declining neighborhoods,” is very difficult, and that at least 200 school properties were vacant across the six cities studied. The authors argue these buildings can become blighted if not occupied for several years, and if not leased, some of the projected savings are not realized.<sup>145</sup>

Berry and West (2010) analyzed census data to compare changes in school size and district size to students’ labor market outcomes as adults. The study involved students born between 1920 and 1949, and who were attending school during the school consolidation movement when over 60,000 school districts were consolidated. The authors model a region effect and a cohort effect on the return to education, and found an increase in school size of 145 students is associated with a nine percent decrease in earnings for high school graduates, and that a 10 percent increase in the share of state funding for education was associated with a 2.2 percent decrease in earnings, despite increases in wages due to school district consolidation. The authors argue that modest increases in labor market outcomes due to district consolidation are outweighed by larger decreases in labor market outcomes due to school consolidations.<sup>146</sup>

Berry (2007) investigated whether school consolidation influenced the variation in student outcomes in addition to having a negative impact on the average student outcomes, as measured by adult wages, and found there was little evidence in support of the hypothesis that the school consolidation movement from 1930 to 1970 impacted variations in labor market outcomes for impacted students.<sup>147</sup>

### **Research on School Consolidation & Student Outcomes**

A literature review of research on school consolidation and student outcomes yielded more results, and both quantitative and qualitative research on the impacts of school consolidation on student outcomes. These original works, in addition to literature reviews by Ares Abalde (2014) and Leithwood and Jantzi (2009), indicate that despite the challenges raised by a lack of consistency in definitions of “small” and “large” schools, there is evidence school consolidation can negatively impact student outcomes, as measured by standardized assessments, student attendance, graduation rates, and labor market outcomes,<sup>148,149</sup> although some researchers have documented conflicting findings.<sup>150,151</sup> However, there is also evidence that the consolidation of schools that are so small they struggle to provide robust curricular options has a positive impact on student outcomes, and evidence that negative effects of larger school sizes are not seen among higher-income student groups.<sup>152,153</sup> Below is a review of recent literature that specifically considers school consolidation, or in some cases the converse of

breaking up larger schools to form smaller schools. This review should be considered as complementary to more comprehensive accountings of school size effects.

Green (2015) used nonparametric tests to study the outcomes of the New York City small school initiative, and defined small high schools as those with student enrollments of 450 students or less and large high schools as those with 1,000 students or more. The author found student outcomes, as measured by scores on standardized assessments, were higher at large schools, and that the difference was statistically significant. The author also found large schools were better at preparing students for college and careers, as measured by the New York City Department of Education's college and career readiness grade, which is part of the district's school-level accountability system. However, the author suggests a likely reason for these results is the district targeted struggling schools, with larger populations of low-income students, to be broken up into smaller schools or small learning communities within schools. The author argues this led to high concentrations of poverty in the new, smaller high schools.<sup>154</sup>

Baker and Geller (2015) present evidence that very small high schools in Vermont do not provide equal access to Advance Placement courses and athletic programming as in larger high schools in the state. The authors note most of the largest high schools in Vermont would qualify as small high schools under most scholarly definitions,<sup>155</sup> indicating the relative scale of small and large schools within a geographic context impacts whether school consolidation could provide a benefit to students.

Morrison (2014) studied high school size configuration in Florida by comparing the outcomes of students attending large (1,000 or more students), traditional high schools, and those attending small learning communities within larger high schools. The author found that, controlling for socioeconomic status and race, students attending large, traditional high schools had superior outcomes on standardized assessments administered by the State of Florida, especially in mathematics. The author found no correlation between school configuration and the outcomes of students with low socioeconomic status or for minority students, which the author notes contradicts earlier research. The author also performed qualitative research by surveying school administrators, and a large majority of respondents indicated they believed the small learning communities would increase student outcomes, although the quantitative analysis did not yield these results.<sup>156</sup>

Hyndman, Cleveland, and Huffman (2010) discuss the history of small, rural school consolidation in Southeastern Kentucky and document the challenges to community identity that consolidation poses. The authors argue small, rural schools have the advantages of lower travel time, support for the community, support for students, and accessible extracurricular activities, while consolidated, regional schools provide a comprehensive curriculum, diverse social experiences, better facilities, better trained and prepared teachers, and a broader array of extracurricular activities. The authors argue that, with the advent of new learning technologies, school consolidations might

be avoided, in order to preserve the benefits of community schools, while still providing students with the academic advantages of regional schools.<sup>157</sup>

Similarly, Warner, and Lindle (2009) document the difficulty educational leaders face in coming to a decision regarding whether or not to consolidate schools when faced with limited resources through a case study of a school district struggling with the decision to consolidate schools. The authors note the case illustrates the ethical tension in balancing students' educational needs and community identity in the inherently political process of decision-making related to school consolidation and the drawing of attendance zones.<sup>158</sup>

Nitta, Holley, and Wrobel (2008) performed a phenomenological study of school consolidation to investigate how these types of reorganizations impact school culture and educational choices, and to assess the costs and benefits of school consolidation. The authors found educators and students agreed consolidation in the four districts studied increased academic opportunities for students and that students had access to more extracurricular activities. However, the authors also found that lack of transportation reduced participation in these activities, as well as in parent-teacher groups and conferences. The authors did not note any significant improvement in facilities or technology and documented larger class sizes. The authors found students and teachers who had to move schools felt their social support networks were weakened, while students and teachers at receiving schools saw only temporary changes. The authors also note adults had much more difficulty forming new social and academic relationships, while students adapted more quickly.<sup>159</sup>

Jones, Toma, and Zimmer (2008) performed statistical regressions to examine the impact of class, school, and district size on average daily attendance rates in Texas. The authors found the size of high schools, class size, and the size of school districts are all inversely related to student attendance rates, and the relationships are statistically significant. Class size clearly had the largest effect of the three variables. In addition, the percentage of low-income students also was negatively correlated with student attendance.<sup>160</sup>

### **Research on School Consolidation & Segregation**

Recent research presents evidence that school consolidation within districts disproportionately impacts higher-need students,<sup>161,162</sup> and that the redrawing of attendance zones post school closures can lead to increased racial and economic segregation.<sup>163</sup>

Lee and Lubienski (2017) used spatial mapping and cartograms to investigate the impact of 54 school closures in Chicago in 2013 on different student demographic groups, and found evidence the school closures caused disparate impact on certain subgroups. The authors note that although district leaders attempted to use a logical framework that considered school utilization rates when deciding what schools to close,



the impact of the consolidations was not even across student groups. The authors demonstrated these results by using a two-step floating catchment area model, which estimates the level of accessibility of students to their new schools as the ratio of schools to student density within a centered location. The authors used ArcGIS mapping to create cartograms that illustrate the relationship between this accessibility metric and sociogeographical attributes of catchment areas. The authors found accessibility decreased substantially for African American students who resided in northern Chicago but less so for African American students in southern Chicago. However, Latino American students across the city were disparately impacted by school consolidations, which indicates that even in the case of achievement-neutral school closure policies based on enrollment capacity, Latino American students would bear most of the burden in terms of geographic accessibility. The authors summarize that school closures in Chicago increased inequality in predominately disadvantaged neighborhoods and student groups, which exacerbated segregation and inequity of access to educational opportunities.<sup>164</sup>

Ramussen (2017) documents how the racially integrated New Brunswick High School was resegregated after residents of the suburb of North Brunswick succeeded in building a new high school, which was quickly populated with White students who formerly attended New Brunswick High School. This historical case study documents that residents of North Brunswick used the argument of local control to overcome integration policies set forth by the New Jersey Department of Education, through political and legal interventions. New Brunswick High School today enrolls almost exclusively Black and Latino students.<sup>165</sup>

Siegel-Hawley, Bridges, and Shields (2017) document school closures and resultant rezoning policies in Richmond, Virginia. The authors use qualitative methods to examine the political context of the school consolidation and rezoning, and quantitative methods to examine the impact on racial segregation pre- and post-implementation. The authors found the primary political pressure that resulted in the closing of a school was related to budgetary concerns as newly elected leaders attempted to demonstrate fiscal constraint. The authors found the process for selecting the school that was to be closed was "swift, chaotic, and nontransparent,"<sup>166</sup> and argue it intersected with the interests of White families that were pushing for new attendance zones or to create new enclave schools. The authors found the contentious school closure and rezoning led to "clear and consistent increases" in racial segregation within schools and attendance zones.<sup>167</sup>

England and Hamann (2013) describe how school district consolidation in Dawson County, Nebraska led to increased racial segregation and inequality. These outcomes were seen despite the stated goal of the district consolidation policy being to increase equal access to education. The authors show how demographic changes in Dawson County, largely caused by the location of a meatpacking plant in the town of Lexington, resulted in the highest population of Latino students in the state, which

coincided with a statewide effort to consolidate school districts. Between 2000 and 2010, the number of school districts in Dawson County were reduced from 18 to five. The district of Lexington has retained the majority of Latino students, has had the largest enrollment increase, and the highest number of students with limited English proficiency, but has also seen the smallest per-pupil funding increase in Dawson County, despite state grant support for students who are acquiring English language skills. An analysis of racial dissimilarity shows that from 2000 to 2010, segregation in Dawson County more than doubled between census tracts, which the author argues resulted from White families moving away from the Lexington school district as the Latino population of Lexington increased.<sup>168</sup>

Daugherty Schmidt and Welsh (2012) document school consolidations in Warren, Ohio between 1978-2011. The authors find policymakers used voluntary desegregation policies to justify the closure of schools because of fiscal constraints brought on by decreasing student enrollment. However, the authors argue the results of school consolidations had a negative impact on Black students, with most school closures occurring in majority Black and low-income neighborhoods.<sup>169</sup>

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