The Effects of State and Federal Funding on K-12 Small School Consolidation: A Quantitative Analysis and Qualitative Comparison

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THE EFFECTS OF STATE AND FEDERAL FUNDING ON SOUTH DAKOTA K-12 SMALL SCHOOL CONSOLIDATION: A QUANTITATIVE ANALYSIS AND QUALITATIVE COMPARISON

by

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ABSTRACT

“The Effects of State and Federal Funding on K-12 Small School Consolidation: A Quantitative Analysis and Qualitative Comparison”

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Since 2000, the number of South Dakota K-12 school districts has decreased from 176 to 151, the most pronounced decline since the early 1970s. Meanwhile, at the forefront of South Dakota education is an ongoing discussion of adequate education funding, noted by the recent case Davis, Davis et. al v. South Dakota (2011). Given the decline in school districts and funding concerns, this work considers the extent to which state and federal funding mechanisms are significant factors in small school (K-12) consolidation with particular emphasis on the South Dakota K-12 funding formula.

This paper uses interdisciplinary approaches to develop a holistic view of school finance as it relates to school consolidation, reorganization, or dissolution decisions in the state of South Dakota. Linear probability models (LPMs) are used along with difference-in-means tests to analyze school district data between FY2000 and FY2012, determining which financial and non-financial factors may best explain a district’s decision to consolidate. This quantitative analysis is used in conjunction with interviews of school administrators with prior consolidation experience, creating an unprecedented overview of small school consolidation that bridges statistical inference with practical realities facing South Dakota school districts.

Keywords: K-12, school consolidation
# TABLE OF CONTENTS

Acknowledgements ........................................................................................................................................... v

I. Introduction .................................................................................................................................................. 1

II. Literature Review

   II. I Introduction ........................................................................................................................................... 8
   II.II State-Funding Mechanisms and Funding Adequacy ............................................................................. 10
   II.III Economies of Scale, Outcomes, and Decision Estimation ............................................................... 19
   II.IV Consolidation Narratives .................................................................................................................... 34
   II.V Conclusion ............................................................................................................................................ 39

III. Background: South Dakota Funding Policy

   III.I Foundation Program and Policies Regarding Small School Districts .................................................. 41
   III.II Funding Adequacy in South Dakota .................................................................................................... 47

IV. Quantitative Analysis

   IV.I Introduction ........................................................................................................................................... 51
   IV.II Dependent and Independent Variables ............................................................................................ 52
   IV.III Assumptions ...................................................................................................................................... 57
   IV.IV Linear Probability Models (LPMs) ..................................................................................................... 59
   IV.V Difference-in-Means Testing ............................................................................................................... 66
   IV.VI Potential Biases .................................................................................................................................. 69
   IV.VII Discussion ......................................................................................................................................... 70

V. Qualitative Comparison

   V.I Overview ............................................................................................................................................... 74
   V.II Conclusions .......................................................................................................................................... 78

VI. Conclusion ................................................................................................................................................ 82

Appendix A: Interview Questions .................................................................................................................. 85

Appendix B: County-Level Census Data ....................................................................................................... 87

Appendix C: Tables – Correlation of Collected Variables ............................................................................... 89

Bibliography ..................................................................................................................................................... 90

iv
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CHAPTER ONE

Introduction

Small school consolidation is not an uncommon phenomenon in South Dakota. Data from the South Dakota Department of Education (2013) suggests that schools in the state were forced to close their doors as early as 1950. The landscape of South Dakota school districts has changed significantly since the earliest school closure, and the reasons for that change are as numerous as the schools that have consolidated. The way education is funded has also changed in that time, resulting in South Dakota’s current K-12 funding formula.

On January 1, 1997, the State of South Dakota enacted a new apportionment scheme for K-12 education funding. The funding formula is based on a “foundation program” approach, by which the operation of public K-12 schools is supported through a fixed per pupil funding level “historically intended to pay for a basic[…] education program” (Verstegen, 2011, p. 4). Using this formula, the financial need of a local district is calculated by multiplying its K-12 enrollment by a per-student funding figure. From there, the State of South Dakota calculates the district’s maximum property tax base and the subsequent state aid that will meet local need after these local tax contributions (South Dakota Department of Education, 2013).

The basic premise of this formula is similar to nearly every other foundation program in the country. Each state gives a specified guarantee for each district based on enrollment counts multiplied by the PSA figure. A uniform tax rate is applied to each district, typically on local property taxes, and these tax levies contribute to the generated
amount. What is left following local contribution is awarded to a district as state aid. Based on this logic, poorer districts that are not able to contribute to the formula through property levies will receive greater state funding, and tax-wealthy districts will receive less.

The formula goes well beyond this simple premise, however. Recent changes to the South Dakota funding formula have also added in factors such as a small school adjustment (SSA) figure for districts of enrollment less than or equal to 600 in addition to the per-student figure, as well as providing additional funding for districts that meet requirements as a ‘sparse’ school district and counting students with limited English proficiency (LEP). In addition, districts are required to take enrollment counts in the fall when enrollment is typically higher, and in response to declining enrollments, the State of South Dakota allows districts to use either a two-year average or the current year’s count for enrollment, whichever is greater. These additional factors account for “economies of scale,” according to the South Dakota Department of Education (2012, p. 2), as it tends to cost more to educate students in low-enrollment school districts that serve widespread, rural populations. This is the case for many South Dakota school districts.

This blend of policy solutions was a reversal of the previous, expenditure-based approach used for K-12 education funding (Davis, Davis, et al v. South Dakota, 2011). The foundation program used by the state is allocated into a school district’s General Fund, through which daily operating expenses and instructional salaries are paid while also being used to balance annual budgets and smooth general short-term and long-term expenditures over time (Associated School Boards of South Dakota, 2011). The General Fund constitutes, on average, around 66% of a school district’s annual budget, of which
82% may be used for unrestricted spending. Monies received from the State’s K-12 funding formula do not contribute to a school district’s Capital Outlay, Pension, Special Education, or Impact Aid funds, each of which have restrictive purposes under State Codified Law or, in the case of Impact Aid, Federal Law.

The passage of this funding formula heralded a new era of equitable funding for South Dakota K-12 schools. The premise of a foundation program ensures equal funding on a per-student basis, hence a standardized formula that assumes all districts cover the same cost per student. In addition, a foundation formula provides assistance to districts that have an inability to raise funds through local property taxes, which would provide a solution to district wealth inequality. Unfortunately, the South Dakota formula has received serious criticism from parents and school districts for inadequacy. This is not unlike many other states around the country, whose conversations on education funding are beginning to shift from financial equity to financial adequacy (Shober, 2012).

These criticisms came to a head in 2011, the same year which the State of South Dakota cut the PSA figure by 8.6% (South Dakota Department of Education, 2013). Reaction to the cut was as severe as the subsequent impact it had on districts around the state. Even before state funding received serious cuts, a lawsuit was filed by a coalition of parents and school boards from all over South Dakota against the State for funding inadequacies—Davis, Davis et al v. South Dakota (2011). Districts and parents did not believe that school districts could provide an adequate education based on the current funding mechanism, citing the South Dakota Constitution’s clause requiring “adequate education” (Davis, Davis et al v. South Dakota, 2011, p. 73). The South Dakota Supreme Court ruled in favor of the State, stating that there was not enough evidence to prove
inadequacy of education while simultaneously expressing the opinion that this issue is meant for the legislative, not judicial branch of state governance. This problem is common for many states who have dealt with similar lawsuits, since no clear answer exists for what defines an adequate education (Shober, 2012).

While the ruling allowed the formula to continue, concerns remain over the adequacy of the state’s foundation program. Statistics provided by the Associated School Boards of South Dakota (ASBSD, 2011) show that school districts have lost nearly 15% of their General fund balances as a portion of total General fund expenditures from 1997 to 2012, suggesting that districts have been systematically losing their ability to fund day-to-day expenses. In addition, as the ASBSD (2011) argues, taxpayers continue to take on a heavier burden, as noted by shifts in Capital Outlay and Pension fund usage and the increased usage of ‘opt-outs,’ a move taken by a local school board to increase property levies above statewide limits in order to secure additional funds. Taxpayers are not the only group taking on the burden; the ASBSD (2012) also reports that 465 positions were cut statewide in FY2012. These measures would suggest that the burden of funding districts has shifted away from the state and onto localities, despite the formula’s assumptions of district wealth inequality.

Meanwhile, a growing number of small school districts are being forced to close, reorganize, or consolidate. It is difficult to fully attribute these decisions by school districts to one particular factor, as there are a multitude of potential reasons. One cause could be the consistent population decline in rural areas of South Dakota, with some counties seeing consistent “rural flight” over the past 100 years (Copeland, 2011). Other factors that could be forcing consolidation include open enrollment opportunities and a
law, SDCL § 13-6-97, which requires a plan for closure or consolidation if a district’s K-12 enrollment falls below 100 unless noted as a ‘sparse’ school district. No matter what may cause consolidation, closure, or dissolution of small South Dakota school districts, the fact that South Dakota is experiencing the most pronounced decline in the number of school districts since the 1970s is going relatively unnoticed. This may not be surprising, if one considers that the state has the highest number of school districts per capita in the country and consolidation is not uncommon in a rural environment (South Dakota Department of Education, 2013).

Independent of one another, the publicly argued shortfalls of South Dakota’s current K-12 education funding formula and the growing number of small school consolidations are large issues. The simultaneous nature of these discussions, however, provides the context for my research question: Does the current K-12 funding formula have a significant effect on small school consolidation in the state of South Dakota? I do not assume that the funding formula itself would be a primary cause of small school consolidation. However, considering all other demographic factors and enrollment-based policies in place, there is utility in investigating the potential for a connection between the State’s funding mechanism and small school consolidation, reorganization, and dissolution.

Extensive literature exists to describe the funding mechanisms of other states and the conflict funding discussions can bring, and an even more extensive pool of economic literature brings the methodological approach necessary to answer the research question. Using a multidisciplinary approach, the number one goal of this paper is to take a more holistic approach to the study of school finance effects on the consolidation decision,
especially as it relates to this particular trend in small school districts. In order to accomplish this goal, the study will take both quantitative and qualitative approaches.

From a quantitative perspective, regression models are developed to explain the effect of state funding mechanisms on consolidation. Linear probability models (LPMs) will be used to estimate the likelihood of a consolidation, reorganization, or dissolution based upon the foundation program’s key factors, enrollment and fiscal condition. Data is collected from FY2000 to FY2012 to account for measurable factors not directly related to the funding formula, such as a district’s five fund balances (General, Capital Outlay, Special Education, Pension, and Impact Aid), population and land area, open enrollees, instructional expenditures, and presence of an athletic cooperative. In addition to these regressions, difference-in-means tests are performed, separating districts that consolidated during the specified time period from those that did not and comparing the statistical means for each variable of interest to understand what sets consolidated school districts apart.

Unlike most economic papers on the subject of consolidation, this thesis brings a qualitative balance to this discussion, analyzing common factors that lead to consolidation in the form of interviews with school administrators. These individuals can frame the various forms of consolidations, reorganizations, and dissolutions, but also discuss the unique circumstances that each district faces in South Dakota. Conversations such as these provide constructive discourse on the topics of school finance and consolidation decisions, necessary to a holistic view of funding effects on consolidation in the state of South Dakota.
The multidisciplinary approach to the research design is meant to create a clearer view of how the state’s funding formula and small school consolidations may relate to each other. It is important to note in this approach, however, that this paper will neither pass normative policy prescriptions on the state’s education funding policy nor fully address the South Dakota foundation program’s adequacy in providing funding for K-12 education. The discussion of adequacy certainly contributes to the overall discussion, but this paper is only intended to explain the significant factors that contribute to the consolidation decision for a small, rural school district in South Dakota. It may never be possible to fully explain what causes a school’s consolidation, reorganization, or dissolution, as is found through in the quantitative and qualitative research of this thesis. However, this thesis develops a better understanding of what factors consistently contribute to the consolidation decision for small schools in South Dakota.
II.1 Introduction

Statistical analysis is used to understand the relationships that may exist between the South Dakota K-12 funding formula and small school consolidation. In this case, quantitative analysis is used to study the marginal effect of varying factors (e.g., state funding) on a binary, dichotomous outcome (i.e., consolidation) within a set of assumptions that most closely matches the operating environment of South Dakota’s small school districts.

Unlike most economic literature regarding the subject of consolidation, statistical methodology is not the only way to answer the research question. Understanding the policy environments in which these relationships occur also requires that this paper delve into academic studies of funding formulae and the discussions that lead to their implementation. Furthermore, any thorough answer to the research question would require surveying or interview methods that analyze the shared, unquantifiable experiences of those leaders making the decision to consolidate. This way, the accuracy of statistical significance can be compared with what is practically significant.

The general direction of the methodology is very clear, but because of its uniqueness in the academic study of school consolidation, its implementation can be tricky. No research found has explored any relationship between a state’s education funding formula and the local decision to consolidate school districts, let alone attempt to
study this relationship in a sample of districts with almost only rural demographics. Thus, understanding how to implement a quantitative and qualitative analysis of this relationship requires a three-part, multidisciplinary review of previous literature.

First, I investigate the ways in which states fund K-12 education nationwide and regionally, as well as how the works of academics and litigants have altered these policies over time. Research is limited to overviews of state policy approaches and how critics of these policies have gradually changed arguments over time, but nonetheless, it is useful for better understanding how South Dakota’s funding formula and the arguments for or against it relate to a national and regional context. Literature in this field also attempts to answer questions of what is equitable or adequate regarding the funding of K-12 education.

Second, a review of traditional economic studies regarding consolidation is conducted. This portion of the overall literature review focuses heavily on the economies of scale to be gained from consolidation, as well as what outcomes may occur from consolidation. A vast amount of previous studies exist on these two foci, but there are no economic studies on the relationship between a funding policy and consolidation. However, a few studies stand out in this field of literature that build a foundation for applying statistical approaches to the study of marginal effects on small school consolidation.

Finally, I explore the field of consolidation narratives to determine a methodology for comparing practical significance with the results of quantitative analysis. This literature ranges from popular, non-fiction books depicting the culture of education in rural communities, to consolidation briefs intended to educate (and sway) policymakers,
and even to simple survey-based studies attempting to understand how students, teachers, and administrators felt as they went through a consolidation.

Each section of the literature review includes a general overview of the entire set of studies to provide understanding as to why experts in each field use the methodology that they do, and then an explanation of the literature relevant to building this paper’s methodology is given.

II.II State-Funding Mechanisms and Funding Adequacy

In the academic study of state education funding programs, the leading expert in the field, by far, is D. A. Verstegen. Her work over time has included multiple updated overviews of state finance policies (2008; 2009a; 2011) but also analyses of equitable and adequate funding (1998; 2007; 2009b) and policy-influencing literature that articulates funding needs for the nation’s rural school districts (1991; 1992). Of course, many others have researched the effects of individual school spending on student outcomes and achieving educational successes, but there are few academic studies of state funding formulae besides Verstegen’s (2011) work.

Verstegen’s (2011) most recent study might be the defining work of this section of the literature review, which gathered information on each state’s finance policies for public education. It was intended to provide “a compendium of finance and policy options that are used across the states,” giving a resource to interested policymakers and educational leaders around the United States (Verstegen, 2011, p. 3). Previous studies from Verstegen (2008; 2009a) provided similar results and discussion of the states’ funding mechanisms, but her 2011 study is both the most recent picture of state funding formulae and the most complete history of how the funding of public education in the
United States has evolved in this century. Thus, it provides an understanding of how South Dakota funding policy fits into national and regional trends.

Verstegen’s 2011 study begins by stating that finance policies for public education have changed little since their inception in the 1920s and 1930s. Prior to then, local taxation was the accepted method funding public education. In the mid-to-late 1800s, the burden of school funding began to shift away from localities, as education reformer Ellwood Cubberley exposed problems with the local financing of public education (Verstegen, 2011). Cubberley questioned whether localities had “sufficient revenue,” and through his examination, he found that three-fourths of the states’ school finance structures were in need of reform (as quoted by Verstegen, 2011, p. 4). For rural areas, he proposed funding based on the number of teachers needed rather than total students enrolled while also including incentives to allow localities to increase levies beyond a state’s statutory requirements.

His contributions to current education finance theory are unquestioned, but modern school finance was given its “origin” in the work of George Strayer and Robert Haig (as quoted by Verstegen, 2011, p. 4). These were the minds behind the “foundation” program concept, used today by 38 states including South Dakota (Verstegen, 2011, p. 4). This program’s signature feature is the use of a per-student funding allocation needed to meet basic education requirements as determined the state. To contribute to a district’s overall “need” calculation, a uniform tax rate for localities is applied for revenue generation (Verstegen 2011, p. 4). Other funding programs were proposed around the time Strayer and Haig developed the foundation program concept, such as Henry Morrison’s fully funded state finance plan from the 1900s, and Harlan
Updegraff’s “district power equalizing” theory (Verstegen, 2011, p. 5). No concept received as much attention as the foundation program, although district power equalization is the only other funding program that has been used multiple states. That program made its way into two-tiered funding programs after the landmark Serrano v. Priest (1971) case in California (Verstegen, 2011).

Verstegen (2011) then shifts away from the theorists who developed commonly accepted funding formulae like the foundation program and focuses on the public force that changed K-12 funding mechanisms, the courtroom. Citing cases such as Serrano, which deemed the then-California foundation system unconstitutional on the basis of inequitable funding across districts, Verstegen (2011) discusses the rise of litigation regarding school finance programs. The flurry of litigation began in the early 1970s, questioning the equity of school funding around the country. This “first wave,” which focused on the Federal Constitution’s Equal Protection Clause, resulted in seven state finance systems deemed unconstitutional and fifteen systems upheld (Heise, 1995, p. 1153; Verstegen, 2011). According to Heise (1995, p. 1151), distribution of education funds among school districts by state and local governments has since become a “frequent subject of litigation” because of this movement in the 1970s. A second wave of litigation began in 1973, focusing on state education clauses in addition to equal protection but still carrying the general rationale of inequitable funding.

Litigation of school funding schemes quieted following the 1983 report from the National Commission on Excellence in Education entitled *A Nation at Risk*. It warned of a “rising tide of mediocrity in our nation’s schools that threatens our very future as a Nation and as a people” (as quoted by Verstegen, 2011, p. 6). From that report,
education finance research (and as discussed later, economic studies of consolidation) turned to relationships between funding resources and student outcomes. This shift completely halted the work of state finance policy theorists, but it also changed the grounds for funding litigation from inequity to inadequacy.

By the end of the 1980s, five more state Supreme Court decisions burst on the scene. Between 1989 and 1995, litigants had filed more than sixty lawsuits in forty-one states, with many more filed in the following years (Heise, 1995). This includes the most recent litigation against the South Dakota funding formula—Davis, Davis, et al v. South Dakota (2011). This “third wave” of school finance litigation is based on the rationale that more funding is necessary to ensure all districts meet minimum levels mandated by state education clauses (Heise, 1995, p. 1152). Widespread adequacy-based litigation still remains at large and because of these three waves of litigation, changes made to funding programs have been limited to what can ensure constitutionality (Verstegen, 2011; Heise, 1995).

Today, states provide funding to public school districts using one of the four formulae advanced by theorists in the early 1900s: foundation programs, district power equalization systems, full state funding, and flat grants (Verstegen, 2011). Several states have also combined formulae into a two- or three-tiered system. When considering the states who combine a foundation program approach with other schemes, the total number of states who use a foundation formula rises to 45 of the 50 states, making the foundation program easily the most widely used formula in the country.

That is not to say that the foundation program is the only accepted formula for use. Updegraff’s district power equalizing (DPE) system is used by three states as their
mechanism for providing education funding. The system provides equal funding for districts with similar tax rates across the state, focusing on taxpayer equity rather than the per student equity rationale behind the foundation program. According to Verstegen (2011), DPE is quickly becoming obsolete, but the reasons why are unclear. In general, DPE is generally adopted by more states in conjunction with a foundation program to create two- or three-tiered finance programs.

Verstegen (2011) ends her comprehensive study by discussing the cross-cutting themes found in current state foundation programs. Foundation formulae follow the basic premise that was originally developed by Strayer and Haig (Verstegen, 2011), but states have learned over time how to adjust the formula to account for the needs of individual districts as a response to equity and adequacy cases in their respective court systems. Many states use weighting within their formulas to adjust for the costs of special education programs and students with limited English proficiency. Some use their foundation programs to contribute towards debt servicing, capital outlay, and transportation costs of a district, and some do not. There is even a wide variance in per student funding figures and sufficiency of funds to teach to state standards. In general, foundation programs are commonly used but look very different from state to state.

One form of adjustment not covered in Verstegen’s (2011) general overview is the approach to fund education in states with rural demographics. As described by Bass and Verstegen (1992), the conceptual shift from large to small schools and districts as a basis for achieving greater efficiency during the 1980s encouraged a number of states to include sparsity and/or geographical isolation adjustments in their foundation programs. Why? Funding elements being equal, small and rural school districts are generally less
able to provide an equal educational opportunity for their students due to the higher costs associated with lower student-teacher ratios (Goodlad, 1984). Further, Monk asserts that small schools must “either spend greater amounts of available revenues to provide the resources necessary to offer a basic educational program…or they must be satisfied with more limited educational offerings” (as quoted by Bass & Verstegen, 1992, p. 17). While these statements do not indicate whether or not a small school district is cost-effective, research does show that small schools produce equal or superior student achievement in general (Cotton, 1996). Thus, there are many research justifications that create the rationale for sparsity and geographical isolation adjustments.

According to Bass and Verstegen (1992), each state foundation program treats small school districts in three different ways: neutrality, intolerance, or positive. The implementation of each policy approach varies from state to state and may be used in combination. Under a policy of neutrality, a state treats all school districts in the same manner, regardless of size or location. States which use a policy of intolerance attempt to eliminate small school districts through consolidation, whether through financial incentives included its foundation program or through other statutes. Otherwise, states may take a positive policy stance towards small schools by including adjustments in its foundation program for sparsity or geographical isolation. A sparsity adjustment would provide additional support to all small schools, and an adjustment for geographical isolation only provides additional support to those districts for which there is no feasible consolidation partner available (Bass & Verstegen, 1992).

In this field of literature, Verstegen (2011) and Bass and Verstegen (1992) provide the most objective, comprehensive view of how a rural state might approach
funding policy and how litigation over time has encouraged states to adjust for
differences in individual district needs. Neither paper delves into specifics, however, as
to why the question of funding adequacy remains unresolved in litigation attempts around
the country. States seem to almost agree unanimously with Strayer and Haig’s
(Verstegen, 2011) view of education funding by choosing their foundation program, and
yet there are an increasing number of adequacy cases being litigated with no clear
definition of adequacy available. Regardless of how any case may turn out, widespread
litigation would suggest that a problem exists with the amount of funds given to school
districts throughout the United States. If so many individuals question the adequacy of
state education funding using legal proceedings, an answer should be sought. The vast
majority of adequacy cases pass the burden of answering the question to a state’s
legislative branch (Davis, Davis et al v. South Dakota, 2011), but would a recently
overturned formula provide any end to the discussion?

One of the few pieces of literature available on a successfully overturned funding
system is found in a 2005 legislative study prepared by Odden, et al (2005) for the
recalibration of the Wyoming funding formula. This recalibration in Wyoming was a
direct result Campbell County School District v. State (1995), which ruled that the state’s
previous foundation program was unconstitutional on the grounds of state-created
funding disparities between school districts. Wyoming now develops their funding
recommendations for districts based on a funding model that determines reasonable costs
for districts. This model uses data envelopment analysis (DEA) for elementary, middle,
and high schools with specified enrollment counts, recognizing that the costs of education
would likely differ according to student needs, curriculum, school circumstances, and
district circumstances. The funding model also makes cost adjustments small schools and districts, vocational education programs, and regional cost differences (Odden, et al, 2005). With the results, the State of Wyoming then awards block grants to school districts, a more evidence-based take on funding that resembles a flat-grant program rather than a foundation program.

While this is a great piece of literature regarding a successfully rehabilitated school funding system, Wyoming’s foundation program was not overruled on a basis of adequacy, but equity. This is common; Heise (1995) notes that successful challenges to state funding programs have relied on equal protection clauses, not state constitutional clauses regarding an adequate education. The majority ruling in Campbell County School District v. State (1995, p. 56) does encourage the Wyoming legislature to “account for disparities representing actual cost differentials from district to district” when creating a new formula. It does not necessarily define what an adequate education is, but it does suggest some steps towards finding that definition.

Still, the problem remains; why do so many individuals question the adequacy of state education funding, and is there an answer? For this, I return to the academic study of funding formulas. Verstegen and Driscoll (2008c) trace one source of the adequacy conversation to states shirking on their share of education. Using Illinois as an example, a state may be placing greater financial burden on local school districts despite constitutional clauses requiring the state to be the primary source of education funding. This may not imply inadequacy, however, unless the state is statutorily required to fund specifically greater amounts in proportion to localities.
Bass and Verstegen (1992) find a more reasonable source of adequacy conversations by investigating challenges to funding programs. The authors state that “the equity of a state financing program must begin with an evaluation of the adequacy of the foundation guarantee” (p. 24). Verstegen (2011, p. 23) adds that adequacy should be defined in terms of “high student outcomes.” It seems to hold more traction in the literature that the best approach to the question of funding adequacy is to attempt to align state and locally desired student outcomes with funding standards, based upon these assertions. Examples such as the Wyoming recalibration suggest that it is possible for a state to look more closely at the financial need of an individual district. Until an adequate education is properly defined, however, the current wave of adequacy litigation will not end.

In a literature set where no clear definition on funding adequacy exists, let alone agreement on methodological approaches to resolving questions of funding adequacy (Verstegen & Driscoll, 2008c; Mullin & Brown, 2009; Verstegen & Driscoll, 2009), there are a few things that are clear. First, lower student-pupil ratios have been linked to higher student achievement in both mathematics and reading, and minority students tend to benefit from a smaller class environment (Verstegen & King, 1998). Smaller classroom sizes may mean less efficiency in cost, but this approach to quality lends to the evidence that money matters in producing educational outcomes (Verstegen & King, 1998). Second, small schools tend to incur higher per student costs, thus requiring additional support through enrollment loss provisions or sparsity and geographical isolation adjustment (Bass & Verstegen, 1992). Finally, no inherently new theoretical approaches to finance K-12 education have been implemented by any state for multiple decades (Verstegen, 2011). Instead, as was discussed by Verstegen (2011) and Bass and
Verstegen (1992), states have simply adjusted their existing programs to meet a greater number of individual needs.

Today, the lone state experimenting with funding adequacy is Maine, as the state reported the use of a new adequacy-based formula in Verstegen’s 2011 study. This approach makes them the first state to attempt to answer the seemingly never-ending question of inadequate state education funding. No studies were found to describe the results of the new program. Until those results come forward, the funding of K-12 education nationwide remains relatively stagnant. Nonetheless, this portion of the literature review provides a clear picture of how states fund K-12 education and what kinds of legal and policy discussion are occurring around funding policy. These studies create the context for understanding how the South Dakota funding formula operates today and what has shaped it over time, as discussed in Chapter Three.

II.III Economies of Scale, Outcomes, and Decision Estimation

Of this three-part literature review, the most extensive research available on the topic of consolidation is found in the discipline of economics. Economists have approached consolidation in many different ways, mostly studying the economies of scale in school enrollment, but also the effects of school size and consolidation on student-based outcomes, such as daily attendance (Jones, Toma, & Zimmer, 2008), school quality linked to housing values (Brasington, 1997), and student performance on standardized testing (Jacques, Brorsen, & Richter, 2000; Driscoll, Halcoussis, & Svorny, 2003).

The majority of studies are not necessarily focused on the decision to consolidate or funding policies, let alone consolidation in the decades following the 1970s. As a result, these studies do not provide much help for developing quantitative methodologies
to answer the research question, nor provide background for developing hypotheses on what affects the consolidation decision in South Dakota. However, five articles stand out for utilizing a statistical model that estimates the marginal effects of consolidation factors (Streifel, Foldesy, & Holman, 1991; Brasington, 1999; Brasington, 2003) or for analyzing school fiscal condition in a state with similar demographics to South Dakota (Ratcliffe, Riddle, & Yinger 1990; Tholkes, 1991). These studies build the framework for the quantitative analysis that is explained in Chapter Four. To understand these five studies, one must take a similar approach to funding policy literature and begin with an understanding how these methodologies came to be.

Modern economic analyses of consolidation began with the work of W. Hirsch, who set forth basic issues related to economies of scale in the provision of education (Driscoll, Halcoussis, & Svorny, 2003). Hirsch (as quoted by Tholkes & Sederberg, 1990, p. 11) suggested that “administrative top-heaviness” and “unionization of public servants…can produce disceconomies.” Prior to Hirsch’s work, previous studies had uniformly agreed that economies of scale were present in education, but his work in 1959 initiated a “redirection and resurgence in research on the application of economies of scale in elementary-secondary education” (as quoted by Tholkes & Sederberg, 1990, p. 11). Hirsch’s use of cross-sectional data and inferential statistics changed the direction of methodology in the field for studying economies of scale (Tholkes & Sederberg, 1990). Although he stated that “conditions that help private industry to benefit from scale economies…do not apply to schools” (as quoted by Tholkes & Sederberg, 1990, p. 11), his dissension with previous thought regarding economies of scale in education served as the foundation for years of new research.
White and Tweeten (1973) were among the first to explore the optimal school size of rural school districts following Hirsch’s work (Tholkes & Sederberg, 1990), specifically estimating costs of K-12 education in the state of Oklahoma. The sample was divided into subpopulations according to geographic location and size of school district, selecting 5% of districts in each stratum independently and randomly. Cross-sectional data was taken from the 1969-1970 school year and focused on instructional costs (including support staff and books/supplies), attendant costs (plant, equipment, and overhead for administration), facilities (buildings and construction costs), and transportation costs. From this, the authors developed a long-run average cost (LRAC) curve.

White and Tweeten (1973) found significant economies of scale up to 800 students K-12, but found that districts could operate between 400 and 1,100 students without significant differences in per-unit costs. For rural districts, they found a positive relationship between student density and optimal school district size, meaning that optimal district size is smaller for more sparsely populated areas. In addition, they note that rural districts face substantially higher per-unit costs, and transportation costs were more relevant for districts in more sparsely populated areas. The demographics of the sample in White and Tweeten’s (1973) study are arguably different than the sample of small school districts in South Dakota. However, the ideas concerning student density as related to optimal district size and higher per-unit and transportation costs are contextually relevant to this study. Some of South Dakota’s rural small school districts may be uncontrollably smaller due to population realities, and transportation costs may also be a relevant cost factor because of geographical isolation.
Three other studies reviewed (Lewis & Chakraborty, 1996; Dodson and Garrett, 2004; Zimmer, DeBoer, & Hirth, 2009) take similar approaches to determining economies of scale. Lewis & Chakraborty (1996) also use a cost function for estimation of scale economies in 40 Utah school districts. Their dependent variable is operating expenditure per student, studying the marginal effects of school size with control variables such as per capita income, average instructional salary, and proportion of population with advanced degrees. Their findings show that consolidation of school districts to reduce per unit costs may not be successful unless school size is also increased at the same time. However, these findings are based on a statistical sample that is among the most urbanized in the United States. Therefore, the demographic differences of school enrollment and district population between Lewis and Chakraborty’s (1996) sample set and the sample of South Dakota districts may alter conclusions.

Dodson and Garrett (2004) explored scale economies for Arkansas school districts, estimating cost elasticity using ordinary least squares (OLS) methods on cross-sectional data from the 1999-2000 school year. Along with simulating the consolidation of several neighboring rural, low-enrollment districts into a single district, the authors suggest that rural districts would experience measurable cost savings from consolidation, regardless of geographical difficulties. In addition, Dodson and Garrett (2004) find that consolidation scenarios across Arkansas could save merging districts an average of 34% of average variable cost and 30.6% on salary per student costs, as well as reduce costs for the State of Arkansas by nearly $40 million. Contradictions exist in interpretation of the results, however. Dodson and Garrett (2004, p. 276) initially state that the results are “purely economic” and only applicable to Arkansas districts, but then conclude that the
findings have significant policy implications not just in Arkansas, but throughout the United States. Nevertheless, the assertion that state and local officials must have solid evidence of potential cost savings and all explicit and implicit costs of consolidation before making decisions on consolidation is logically sound.

Zimmer, DeBoer, and Hirth (2009) apply the same cost function as White and Tweeten (1973) to three years of Indiana school district data arranged in a panel set. The panel set is analyzed using a two-stage least squares (2SLS) random effects regression, optimizing enrollment and cost per student. This approach found optimal enrollment being 1,942 students and optimal cost per student being $9,413.93. Enrollment within 5% of their cost optimization ranged from 547 to 6,889 students in a district. The bottom of this enrollment range may be more relevant to the size of most South Dakota districts than the study’s determined optimal enrollment. This may be due to the significantly large school districts in the urban centers of Indiana (e.g., Indianapolis) included in the sample set. While the authors (2009) stated that transportation does, in fact, hold diseconomies above a certain enrollment, their assertion that transportation is not a cost liability for small school consolidation does not take into account the land area within a district’s borders.

The study did find a positive relationship between school size and teacher salaries, as well as a significant and negative relationship between attendance and per student cost. This may suggest that a premium may be paid for teaching in larger schools with assumed higher teacher-student ratios, as well as lowered costs as a result of higher attendance or higher level of parent-student involvement. This would concur with prior
research from Jones, Toma, and Zimmer (2008), who found that student attendance decreased as enrollment rose in the state of Texas.

Studies such as Jones, Toma, and Zimmer (2008) are among those in the literature who attempt to bridge the gap between school size or consolidation and student outcomes. Jacques, Brorsen and Richter (2000) used a hierarchal linear model to find that consolidation is the answer when cost-savings are the object of state incentives for school consolidation. On the contrary, their findings also suggest that consolidation may decrease statewide average achievement test scores in Oklahoma. Driscoll, Halcoussis, and Svorny (2003) use an empirical-based production function to determine relationships between school size and test scores in California, stating that a failure to control for population density leads to overestimation of district size effects on school-level standardized test scores. Brasington (1997) takes the discussion of consolidation’s effect on student performance further, finding it is possible to attest the negative relationship between housing values and school consolidation to two factors. These factors include decreased student performance and the loss of a partner community’s control over the educational agenda.

Many more studies could be added to this expansive list. A multitude of scholars have focused their research on school size and consolidation on economies of scale, as well as on student outcomes. To summarize the findings of this vast literature set, Berry and West (2010) state that researchers, in general have found that students educated in states with smaller schools tend to obtain higher returns to education. This finding is coupled with the knowledge that economies of scale do exist in education, but the level at which economies exist varies widely from state to state and study to study.
It is necessary to discuss where the economic literature surrounding consolidation has been and appears to be going. It is also important to acknowledge that the vast majority of literature in this field is not congruent with the methodology needed to answer this research question. The quantitative analysis requires an approach that measures the impact of a set of inputs on a dichotomous, decision-based variable while also limiting the sample to the population of South Dakota small school districts.

That is where the studies of Streifel, Foldesy, and Holman (1991), Tholkes (1991), Brasington (1998, 2003), and Ratcliffe, Riddle, and Yinger (1990) enter the picture. These studies build the proper quantitative methodology by exploring financial and non-financial effects on the consolidation decision. In addition, these studies recognize the sparsity and geographic isolation principles outlined by Bass and Verstegen (1992), which are shown to be at work in the South Dakota funding formula.

Streifel, Foldesy, and Holman (1991) were the first authors found to have diverged from traditional economic studies of consolidation. Their study collected data on schools from all fifty states which consolidated between 1980-81 and 1983-84, analyzing the revenues and expenses for the three year periods prior to and following the consolidation. Using the non-parametric Wilcoxon matched-pairs, signed-ranks test, the authors determined any financial advantages or disadvantages of their decision.

The authors (1991) assumed a non-normal distribution due to sample size variances across multiple states, thus ensuring that false significance would not be generated. The study indicated only administrative costs were significantly decreased as a result of consolidation. However, there was not enough consistency in the study to suggest that consolidation would have a significant effect on other costs. The study also
did not control for potential non-financial factors in the consolidation decision and the variations across state funding policies. Nonetheless, this was the first study in the vast economic literature to analyze pre- and post-consolidation financial data. It is also among the few studies that suggest that major financial advantages are not a necessary outcome of school district consolidation.

Next enters the work of R. Tholkes (1991), who applied economies of scale theory in rural school consolidation to the creation of the Lac Qui Parle Valley School District in Minnesota. Tholkes (1991) used this case study to develop a predictive cost model, which explained many variations in the results of cross-sectional studies previously conducted on school economies of scale. Seven scale effects and four non-scale effects were in operation as he studied the simulated costs of the consolidation. These findings indicated that multiple factors were at work in determining scale effects in consolidation, and scale effects are not responsible for all expenditure changes post-consolidation. Further, it upheld previous literature that identified student-teacher ratio as a chief source of economies of scale, while also recognizing the difficulty of applying theory to schools that is traditionally left for manufacturing. For example, job redesign, which produces the specialization effect in manufacturing, seems confined to administrative positions in school consolidation and changes in course availability.

While Tholkes (1991) contributes further to the already large pool of literature studying economies of scale in consolidation, it does provide two unique and practical perspectives. First, it provides a more evidence-based approach to determining scale effects than that of previous cross-sectional studies, considering it follows the actual reorganization of the Appleton, Madison, Marietta-Nassau, and Milan school districts in
Minnesota. Many authors acknowledge that consolidation is an individual decision requiring informed decisions in their conclusions (White & Tweeten, 1973; Jacques, Brorsen, & Richter, 2000; Dodson & Garrett, 2004; Zimmer, DeBoer, & Hirth, 2009; Berry & West, 2010), but this was the first study to put these thoughts into practice when studying the economies of scale found in school consolidation.

Second, as other studies merely suggest scenarios for the reorganization of multiple rural districts into one (Dodson & Garrett, 2004), this study acknowledges the realities of a joint powers agreement (maintenance of separate elementary facilities and construction of a $12 million central, six-year secondary facility), a specialized form of consolidation. These realities include the ranges in enrollment and population between the communities, distance traveled throughout the district to its center point, as well as the environment of declining enrollment and aging school facilities throughout the surrounding region. Tholkes’ (1991) study is a prime example of how to apply economic theory to the study of consolidation in an operating environment much similar to the one in which South Dakota districts face.

Of the economic literature available on the topic of consolidation, D. Brasington (1999; 2003) may have the most unique and relevant approach—statistical analysis predicting individual consolidation decisions. Brasington (1999) was the first statistical author found that studied consolidation of schools by comparing neighboring districts and examining the set of consolidation opportunities they faced. His study focused almost entirely on the decision to consolidate, including the relationships between consolidation and cost savings or consolidation on school quality (and, by extension, housing prices) as independent variables.
Brasington (1999), like Tholkes (1991), found that it was necessary to research consolidation at an individual level. Brasington (1999, p. 374) stated that too many studies focus at the state, metropolitan, or national level, and thus “data is too aggregated to extrapolate decisions facing neighboring political jurisdictions with much confidence.” This does not mean that aggregated studies do not explain factors that may affect the number of consolidations that occur, but he does explain that generalized effects do not necessarily impact the individual consolidation decision. Brasington (1999) also asserts the need to consider inter-state differences in consolidation incentives and funding formulae, thus suggesting that empirical studies of consolidation decisions should be performed in a uniform policy environment—within each state.

Brasington (1999) builds upon Miceli’s (1993) model of joint school provision as a tradeoff between scale economies and tastes for education. By using a Poirier bivariate probit model, he estimates the likelihood of merging for each partner in a two-district consolidation. The sample of merger partners is limited to metropolitan areas in Ohio, assuming that the entities of each school district are internally homogeneous and cases of communities with no school building or are contracted out for educational services are omitted from the analysis. Independent variables include but are not limited to racial composition, property valuation per student, median income, and a school quality variable. The school quality variable is measured by the percentage of students passing all four sections of the 1990 Ohio ninth grade proficiency exam as a function of enrollment (Brasington, 1999).

What Brasington (1999) found is highly relevant to the model developed in this paper. First, enrollment was found to be negatively correlated with the likelihood of
consolidation, but a squared enrollment term was positive and significant. For Brasington (1999), this means districts are willing to relinquish to a great deal of control over its educational system to reap benefits, while extremely large districts are not in danger of losing control and will consolidate to reap additional scale economies. Medium-sized districts are large enough that additional cost savings or benefits do not outweigh the implicit cost of losing some degree of control over the educational agenda.

Second, the differential between each partners’ enrollment had a strong, positive effect on consolidation probability. This may suggest that large and small communities may be more likely to consolidate with each other, but similar-sized communities tend to stay independent. This may also explain why the number of potential students captured by consolidation of districts was positively related to a merger and why valuation per student was found to be negatively correlated with consolidation. The benefits of consolidation may be greater for larger districts desiring to earn greater economies of scale in education cost. In addition, the cost of merging outweighs the benefits for similarly sized districts.

Finally, and perhaps most surprising, Brasington (1999) found that income, racial composition, and hypothetical school quality levels (and differences in all three) were all statistically insignificant. These findings would suggest that population and property valuation matter in the consolidation decision, but socio-demographic factors are not a significant influence in the decision to jointly provide the service of public education. This does not seem practical, considering previous research on racial heterogeneity and fractionalization of school districts (Martinez-Vasquez, et al, 1997). Thus, Brasington (1999) accepts that differences in attitudes or values may still be detrimental to merging.
Brasington (2003) built upon this work by studying the relationship between size differences and its effects on the consolidation decision. For this newer study, he utilized a median voter model, which explored plausible conditions under which large cities would want to consolidate with small cities and vice versa. Brasington (2003) then disentangled the issue of size differences between school districts wishing to consolidate. The variables, the empirical model, and the sample set are much the same as in the 1999 study, with two exceptions. No school quality variable is used, and the model is assumed to generally apply to large and small cities in urban environments (Brasington, 2003). That does not mean this study does not have application in South Dakota rural school district studies, but it is important to acknowledge the urban assumptions.

In his 2003 study, Brasington first runs a regression with variables only related to the size of a city. He then adds property value variables, and then adds all demographic variables used in his 1999 model. His findings are similar, in many regards. Surprisingly, however, Brasington (2003) found that larger districts and smaller districts may not necessarily be more likely to consolidate, especially as the large districts get larger and the smaller districts get smaller. The larger the potential merger partner, as Brasington (2003) stated, the more likely the small district is to resist consolidation.

Brasington’s (1999; 2003) use of a Poirier bivariate probit model to estimate consolidation probability is crucial to this paper’s quantitative methodology. This type of model studies the effects of a set of independent variables on a variable that has a binary outcome, also known as a dichotomous variable. A regression of this type, also called a binary-response model (BRM), fits the needs of this paper as it provides a way to study the marginal effects of varying factors on consolidation. The Poirier bivariate probit
model is not the exact approach that will be used, as probit models are a more accurate estimator of binary outcomes than the marginal effects of independent variables in the regression. However, Brasington’s (1999; 2003) studies clarify that a regression in the family of BRMs would be the best quantitative approach to the research question. In addition, his studies (1999; 2003) suggest that highly influential determinants in the consolidation decision are size and property valuation, both of which will be studied in this paper.

The final study within this section of the literature review explores the fiscal condition of school districts in a rural state. Ratcliffe, Riddle, and Yinger (1990, p. 82) apply a methodology to 865 Nebraska school districts that had been previously used on municipalities (Ladd & Yinger, 1989), defining “fiscal condition” as the ability of a district to provide reasonable quality services at a reasonable tax burden on its residents. Much like Tholkes (1991), this study (Ratcliffe, Riddle, & Yinger, 1990) provides another example of consolidation research in an operating environment much similar to South Dakota.

The model for this study is entirely different from anything else found in the rest of the literature set. The authors seek to estimate each Nebraska school district’s revenue-raising capacity, or the money levied per student at average statewide tax burden. They also calculate each district’s expenditure need, or the expenditure per student required to provide an “average-quality” education in line with Nebraska state educational standards (Ratcliffe, Riddle, & Yinger, 1990, p. 85). Much similar to the South Dakota funding formula’s approach to calculating local effort (South Dakota Department of Education, 2013), this study calculates local revenue-raising capacity at
the same assumed tax burden statewide. However, Ratcliffe, Riddle, and Yinger (1990) also account for overlaps of districts and therefore, collection of taxes, by only attributing revenues raised by a district to the students it actually educates. Using these calculations, the authors express revenue-raising capacity as an index (100 being the average) based on the ratio of total property taxes collected to aggregate income of a school district. Overall, Ratcliffe, Riddle, and Yinger (1990) found a positive relationship between revenue-raising capacity per student and enrollment for districts with student counts greater than twenty (20).

As for expenditure-need, the authors’ (Ratcliffe, Riddle, & Yinger, 1990) apply research methods to solve the difficulty of estimating the relationship between community characteristics and public service costs. Therefore, they (Ratcliffe, Riddle, & Yinger, 1990, p. 83) recognize that school spending is determined by the level of school outputs multiplied by the cost per unit of said output, an approach that can be “readily extended to aspects of school costs other than economies of scale.” Expenditure-need is expressed through a combination five cost factors into a single cost index, and the results show that districts with 100 to 499 students have the highest average expenditure need of all Nebraska districts in the sample set (Ratcliffe, Riddle, & Yinger, 1990).

Using these calculations, Ratcliffe, Riddle, and Yinger (1990) then determine the need-capacity gap, or the difference between revenue-raising capacity and expenditure-need. The results are not a far cry from those found in the expenditure-need portion of the study. Districts with the highest need-capacity gaps are those with enrollments between 100 and 500 (Ratcliffe, Riddle, & Yinger, 1990). Although the authors did not apply much of their study toward theories on consolidation, they did perform a simple
experiment in which all districts in Nebraska were consolidated into county school
districts, with the exception school districts in the cities of Lincoln and Omaha (Ratcliffe, Riddle, & Yinger, 1990). The results were staggering; the standard deviation in need-capacity gap was cut in half, showing that consolidation would greatly lower the unfair fiscal advantages shown in the study. The authors do recognize that this cannot be interpreted as cost savings and in fact, dramatizes the need for consolidation in the state (Ratcliffe, Riddle, & Yinger, 1990).

Ratcliffe, Riddle, and Yinger (1990) provide an excellent understanding of the needs and revenue-raising capacities of school districts similar in size to the small South Dakota districts. Another important contribution of the authors to the realm of economic study on rural school districts is their recognition of the effects of a state funding formula on the fiscal condition of school districts. Nebraska operated a foundation program at the time of study, which used both additional district power equalizing and incentive elements. Unlike most foundation programs, their per-student allocation was focused on the higher costs of educating students in higher grade levels, not on the variance in tax bases across the state of Nebraska. Thus, Ratcliffe, Riddle, and Yinger (1990, p. 98) concluded that the Nebraska formula at the time of study did not identify and compensate districts who, “through no fault of their own, are in poor fiscal condition.”

Though the pool of economic studies on consolidation is extremely vast, it is only through Streifel, Foldesy, and Holman (1991), Tholkes (1991), Brasington (1999; 2003), and Ratcliffe, Riddle, and Yinger (1990) that the quantitative approach necessary to answer this paper’s research question can be developed. These studies recognize the operating environment of school districts in a state such as South Dakota, analyze
consolidation decisions using an estimation model with a dichotomous dependent variable, and develop an understanding of the relationship between district size and fiscal condition.

Like the studies used to build the quantitative methodology, this paper will take a different statistical approach to the study of consolidation. Instead of focusing solely on economies of scale, educational outcomes, or the decision to consolidate, this paper’s quantitative analysis will study the marginal effect of a force generally left for assumptions in other economic studies—a state’s education funding formula—on the consolidation decision. In addition, this paper will add to the literature set by using two sample $t$-tests to describe what sets a merging district apart from a non-consolidating district. This form of quantitative analysis is not seen in any reviewed study, but it does provide another way to answer the research question. Thus, the blended quantitative methods used in this paper add to previous economic studies of consolidation in a meaningful way.

II.IV Consolidation Narratives

D. Stone (2012, p. 176) states in her book, *The Policy Paradox*, that “narrative stories are the principal means for defining and contesting policy problems.” In pure economic analyses of the decision to consolidate, however, numbers tend to provide the primary means of discussion. As is found in most quantitative arguments, one can find both a sense of enhanced legitimacy but also the unfortunate potential for manipulation (Stone, 2012). This may the reason why there is such a vast field of economic literature on the subject of consolidation and unusual to find qualitative consolidation studies. It is
fair to wonder why including consolidation narratives would be included in a paper focused mainly on statistical arguments.

A qualitative analysis is necessary for answering the research question, however, because I am not simply studying a revenue source for school districts. Instead, this paper explores how an educational policy dictates the environment in which school districts operate and affects individuals and communities in ways that go beyond statistical analysis. This policy is a force created by political actors without the direct control of school districts, and because it is the most crucial aspect of the research question, a qualitative methodology is needed where quantitative study fails.

Another purpose for including consolidation narratives in this research is that economic study of consolidation tends to ignore that consolidation is a decision made by community units. Consolidation is not simply an outcome controlled by an invisible force or a source of greater economies of scale, better educational outcomes, and so forth. A consolidation requires the political will of the individual communities involved in order to succeed, presenting factors and situations that cannot be replicated through statistical analysis. Although these assumptions are rarely factored into economic studies of consolidation, economists have acknowledged that district patrons can act as a variable of resistance to consolidation (Jacques, Brorsen, & Richter, 2000; Brasington, 2003).

Thus, consolidation is a process that must take into account factors much greater than economies of scale, tax revenue, or the fiscal condition of school district. Especially in a state with sparsely populated regions such as South Dakota, the study of consolidation requires an understanding of how administrators, teachers, taxpayers, and the students of two (or more) schools can work together to build a new identity as a new
school district. As such, there are inputs into consolidation and externalities that result from the decision that cannot necessarily be quantified. With this knowledge, it is important to compare the results of quantitative studies of consolidation with practical reality.

As logical as it seems to compare quantitative results with qualitative reasoning, the body of consolidation narratives is very limited as a whole to papers and briefs educating policymakers about the benefits and drawbacks of consolidation. Furthermore, many of these briefs are either authored by researchers heavily involved in the economic study of consolidation (Duncombe & Yinger, 2010; Cotton, 1996; DeYoung & Howley, 1990) or by educational agencies seeking quantitative legitimacy, such as the National Education Policy Center. Thus, the qualitative nature of their work is also limited.

Only one study was found that takes a true phenomenological approach to consolidation studies (Nitta, Holley, & Wrobel, 2010), interviewing 23 high school students, educators, and school administrators who moved to a new high school as a result of consolidation, as well as those individuals in those capacities from the host district. Otherwise, other literature in this section includes popular non-fiction books describing the plights and culture of rural education in the United States. What can be synergized from this limited field of literature to ensure that this paper’s research question is answered from a qualitative point of view?

First, it is clear that policy briefs are not a valid methodological approach for this paper. Instead, policy briefs simply speak to the high level of disagreement regarding whether or not consolidation is a good or bad decision for a school district. On one end of the spectrum, consider the work of Duncombe and Yinger (2010). They describe the
overall potential for cost savings and the mixed signals that may have resulted from economic study of small school consolidation, especially the net impact of consolidation on education costs per student. Citing empirical evidence from economic study on consolidation’s overall effects on housing prices and property values as well as on the enhanced economies of scale, Duncombe and Yinger (2010) overwhelmingly support consolidation. In fact, they encourage state policymakers to consider state aid bonuses for consolidation if found desirable on equity grounds or to limit sparsity aid bonuses to districts for which consolidation is possible (Duncombe & Yinger, 2010).

On the other end of the spectrum, authors such as Cotton (1996), Strang (1987), and DeYoung and Howley (1990) point out academic contradictions in the notion that larger schools are less expensive to operate or have higher-quality curricula than small schools. For example, Cotton (1996) outlines the positive effects that smaller school size has on academic achievement, student attitudes, social behavior, levels of extracurricular participation, and sense of belonging. Strang (1987) and DeYoung and Howley (1990) focus more on the social, political, and economic attitudes that led to the massive amounts of consolidation leading into the 1970s and beyond, exposing attitudes that are biased towards viewing education as a place in need of greater efficiency. Each of these studies overwhelmingly opposed the claims of authors such as Duncombe and Yinger (2010).

In the middle ground, Salmon (1990) takes a similar approach to the work of Verstegen (2011) and outlines the varying types of funding mechanisms that states use to fund K-12 education and provides conclusions useful to policymakers as to how these funding programs affect rural schools. Likewise, Tholkes (1991) provides a review of
economies of scale literature as it relates to rural school district reorganization, citing the need to provide administrators and policymakers with an unbiased overview of economies of scale literature in order to aid their decisions at both the state and local level. In partnership with the National Education Policy Center, Howley, Johnson, and Petrie (2011) compile previous consolidation and deconsolidation studies to provide a balanced overview of factors that may deter or support the decision to consolidate or deconsolidate from an administrative point of view. Their suggestion, due to the lack of consistency in literature either supporting or opposing consolidation, is that the consolidation decision should be decided on a case-by-case basis, similar to studies in other sections of the literature review (2011).

Second, popular, non-fiction narratives such as Reynolds (1999) and Carr and Kefalas (2010) that portray the culture of rural education only go so far in providing context as to how rural school districts operate as it relates to this study. Certainly, these books may be relatively accurate in describing the culture of rural education in states similar to South Dakota. However, they do not fully study the impact of how the process of consolidation affects individual decision-making, let alone delve into the topic of consolidation. Instead, their stories focus on generalized trends of population decline and a sort of self-defeating culture that plagues not just the school district, but also the community it serves (Carr & Kefalas, 2010).

Finally, it is clear that the phenomenological approach taken by Nitta, Holley, and Wrobel (2010) is the lone consolidation narrative that uses a methodology applicable to this paper. By interviewing students, teachers, and administrators who experienced the consolidation process, the authors were able to determine commonalities between
subjects’ answers and produce a clear explanation of how consolidation may affect individuals from nearly every perspective. This type of approach has practical usage for school districts desiring to understand how consolidation affects each member of the community throughout the process. In addition, this approach may explain why the decision to consolidate may or may not be successful outside of statistical factors. Thus, it makes sense to include this qualitative method to understand what factors may affect small school consolidation in South Dakota beyond the scope of the quantitative analysis, as well as determine the true significance of the statistical relationships studied.

From this section of the literature review, it is determined that interviews will conducted with school administrators and school board members responsible for carrying out the decision to consolidate. This way, the anecdotal commonalities that encourage or discourage a consolidation decision can be studied and compared to the quantitative analysis to determine if statistically significant factors are practically significant, as well as determine the existence of factors beyond the scope of the quantitative analysis. By using a phenomenological approach to study the research question, this paper will be able to more accurately explain what leads to small school consolidation in South Dakota.

II.V Conclusion

A three-pronged, multidisciplinary literature review brings forward the proper methodology to answer the research question in the desired quantitative and qualitative manner. While the research on funding formulae and funding adequacy contributes little to this paper in terms of methodology, it does add to the economics and narratives of consolidation by providing context for Chapter Three of this thesis, which describes the way in which the South Dakota funding formula and related funding policies operate as
well as discuss how questions of adequacy have reached the South Dakota State Supreme Court.

Using the work of Brasington (1998) and Ratcliffe, Riddle, and Yinger (1990) as a foundation, the quantitative methods that will be applied to analyze the relationship between South Dakota’s funding formula and small school consolidation are linear probability models (LPMs) and two sample t-tests. This way, a better understanding of how independent variables can affect the binary outcome (i.e., consolidation) can be found, as well as seeking a descriptive view of consolidated districts to understand what sets them apart from the set of unmerged districts. As for the qualitative methods used, the narrative portion of the literature review encourages the replication of the Nitta, Holley, and Wrobel (2010) study, and thus, interviews of administrators and school board members with consolidation experience will be conducted. Using this approach, commonalities found in the interviews can be compared with the quantitative results to take the desired holistic view of the research question.

This paper is an atypical economic study of consolidation, but the literature review emphasizes that a multidisciplinary approach is the best way to research the subject of consolidation. While this thesis is not expected to provide groundbreaking insights, it may be an example for how to better approach the economic study of consolidation in the future.
CHAPTER THREE

Background: South Dakota Funding Policy

III.I Foundation Program and Policies Regarding Small School Districts

Verstegen (2011) notes that South Dakota is like each of its neighboring states (ND, MN, IA, NE, WY, MT) in using a foundation program for education funding, with the exception of Montana which uses a multi-tiered system. The systems of these seven states are similar in their foundation structure, but as is common around the nation, each state implements their foundation program differently. Differences include the means for dispersing local need, funding low-income students or special education, controlling for debt servicing, and funding transportation.

South Dakota’s foundation formula does not contribute to capital outlay, debt servicing, special education, or pension funds. The funding mechanism only contributes to the General fund, the largest and most discretionary portion of a district’s budget which includes all instructional expenditures and transportation costs (Associated School Boards of South Dakota, 2011). Each district still receives funds for capital outlay projects, special education programs, and pension funds. However, because these funds receive revenues in a different manner than the General fund, only the balances are relevant to this thesis. This relevance is explained further in Chapter Four.

In a manner similar to the Strayer-Haig foundation program, the South Dakota formula relies on a ‘local need’ calculation, through which K-12 enrollment is multiplied by a per-student allocation (PSA) figure. Local need is not a measure of a district’s actual need, but simply a means for the State to determine how much state aid is given to
each district. Enrollment is counted using the current year’s fall average daily membership (ADM) or the average of the fall ADM for the past two years, using the higher value of the two counts to “soften the blow of declining enrollment” (South Dakota Department of Education, 2013, p. 2). The PSA figure was set in 1997 at $3,350 and is set by law to grow at the rate of inflation (as measured by the Consumer Price Index) or 3%, whichever is less. Figure 3.1 shows the PSA figure determined by the State of South Dakota over the past five years.

**Figure 3.1: Per-Student Allocation Figures (2009-2014)**  
*Source: South Dakota Department of Education*

<table>
<thead>
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<th>School Year</th>
<th>PSA</th>
<th>% change in PSA</th>
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<tr>
<td>2009-2010</td>
<td>$4,805</td>
<td>3.0%</td>
</tr>
<tr>
<td>2010-2011</td>
<td>$4,805</td>
<td>0.0%</td>
</tr>
<tr>
<td>2011-2012</td>
<td>$4,390</td>
<td>-8.6%</td>
</tr>
<tr>
<td>2012-2013</td>
<td>$4,491</td>
<td>2.3%</td>
</tr>
<tr>
<td>2013-2014</td>
<td>$4,626</td>
<td>3.0%</td>
</tr>
</tbody>
</table>

In addition to the PSA figure, South Dakota approaches the calculation of local need with policies of sparsity and geographical isolation, as well as recognition of limited English proficiency (Bass & Verstegen, 1992; Verstegen, 2011). Sparsity is added within the local need calculation in the form of the Small School Adjustment (SSA). This adjustment allocates an additional $847.54 per student for districts with ADM of 200 students or less, and $0 per student to districts with 600 students or more. The SSA utilizes a sliding scale of $0-$847.54 to award additional funding to districts with 201-600 students.

Prior to 2007, this adjustment was called the ‘Small School Factor.’ Instead of adding a per student dollar amount to the PSA figure, additional funds were awarded based
upon adjusted ADM counts in the local need calculation. The Small School Factor still operated on a sliding scale rule for districts ADM between 201 and 600, while districts with less than 200 students saw their ADM counts multiplied by 1.2 when local need was calculated. Figure 3.2 displays the way in which South Dakota has applied Bass-Verstegen sparsity policies within the timeframe of this study (FY 2000-2012).

**Figure 3.2: Bass-Verstegen Sparsity Policies in South Dakota (2000-2012)**

<table>
<thead>
<tr>
<th>Fall ADM (x_i)</th>
<th>Small School Factor (Prior to 2007)*</th>
<th>Small School Adjustment (2007-Present)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>(x_i &lt; 200)</td>
<td>1.2(x_i)</td>
<td>PSA + $847.54</td>
</tr>
<tr>
<td>201 &lt; (x_i &lt; 600)</td>
<td>2.98(x_i^{.8293})</td>
<td>PSA + 4,237.72(-0.0005(x_i) + 0.3)</td>
</tr>
<tr>
<td>(x_i \geq 600)</td>
<td>(x_i)</td>
<td>PSA + $0</td>
</tr>
</tbody>
</table>

*The results of these products were then multiplied by PSA to determine local need.  
**The results of these mathematical operations are then multiplied by Fall ADM \(x_i\) to determine local need.

Geographical isolation is rewarded through state-defined ‘sparse’ school funding, based on multiple criteria including enrollment less than 500, fall enrollment per square mile of 0.5 or less, district area of 400 square miles or more, distance of 15 miles to the nearest secondary attendance center, and operation of a high school while levying the maximum property tax in its districts. If a district meets these criteria, their enrollment count is adjusted based upon the provisions of SDCL § 13-13-78 and multiplied by 75% of the PSA to determine the amount of ‘sparse’ funds allocated (SDCL § 13-13-79). No more than $110,000 may be allocated to one school district, and this funding mechanism is separate from the state foundation program.

Like nearly every state in the Union, South Dakota also offers additional funding to districts with students who do not speak English as a first language or who come from bilingual or multicultural backgrounds. To this end, the state allocates funds for students
who have limited English proficiency (LEP) by multiplying the PSA figure by 0.25. This adjusted PSA figure is then multiplied by the number of students in the prior year that scored less than 4.0 on the language proficiency assessment given by the state. Note that these students are not removed from the ADM count used in the local need calculation.

With these elements in mind, the current calculation for local need in South Dakota is derived from the following equation:

\[
\text{Local Need (\$)} = \text{Fall ADM} \times (\text{PSA} + \text{SSA}) + \text{LEP Enrollment} \times (0.25 \times \text{PSA})
\]

While this formula does not determine how much a district is allowed to spend per student, it does place a ceiling on how much state aid a school district can receive. Contributions towards a district’s local need come from two sources: local property taxes (‘local effort’) and state aid. To determine the level of state aid a school district will receive, the following formula is applied:

\[
\text{Local Need (\$)} = \text{Local Effort (\$)} + \text{State Aid (\$)}, \text{ or }
\]

\[
\text{State Aid (\$)} = \text{Local Need (\$)} - \text{Local Effort (\$)}
\]

This calculation relies on two major assumptions. First, local effort calculation is based upon the district levying the state-determined maximum local tax rates for agricultural, owner-occupied, and non-agricultural property for all land within its jurisdiction. Second, although local need does not necessarily place a limit on local effort as a revenue source, it does for state aid. That is, if a district’s local effort satisfies its local need, no state aid may be given, but local effort may be greater than local need and the funds from tax revenue retained without penalty. Districts wishing to tax beyond the maximum levels and receive tax revenue beyond the formula calculation may do so, as well, and this will not affect calculations of local effort or state aid. However, an opt-out
of the state’s property tax freeze requires a two-thirds vote of the district’s school board and may be referred to a public vote if 5% of the district’s electorate signs a petition against the opt-out (South Dakota Department of Education, 2013).

Districts in South Dakota may also receive other sources of revenue not limited to federal grants such as Impact Aid, gross receipts, bank franchise taxes, rental income, investment income, and fines. Not all districts will receive support from these funding sources, nor will each fund source contribute towards a district’s general fund.

A general overview of the funding formula clearly indicates that South Dakota uses funding adjustments through the foundation program and ‘sparsity’ funding to encourage the survival of its small school districts. While the State takes these policy approaches to small schools, it has also approved statutes that would be considered intolerant by Bass and Verstegen (1992) due to incentives created for consolidation. Synthesizing South Dakota Department of Education (2013) data, a ‘consolidation’ is defined as a merger of two school districts into a single, new entity. A ‘reorganization’ involves the creation of one or more new school district(s) from more than two school districts. A “dissolution and attachment” is the complete disbanding of a school district, after which the land ‘attaches’ to one or more neighboring school districts. While policy does not distinguish between these processes, it is important to understand that ‘consolidation’ does not have a uniform definition at the state level. Each process is distinct, and thus, consolidation incentives created by policy may impact a ‘consolidation,’ ‘reorganization,’ and ‘dissolution and attachment’ differently.

The prime example of consolidation incentive policy was the 2007 passage of a minimum enrollment law, SDCL § 13-6-97. This law mandates that districts with K-12
enrollment of 100 students or less either consolidate, reorganize, or dissolve within two years or receive a state-mandated plan for one of those three options. Any district receiving additional ‘sparsity’ funds is not subject to the law, as it would be assumed that consolidation is not geographically feasible.

Other incentives have been awarded to consolidating school districts within the timeframe of this study. Prior to 2007, these incentives came in the form of additional Small School Factor funds in years one through four of the consolidation and options for different state aid and local need calculations in years five through eight of the consolidation pursuant SDCL § 13-13-1.4 through 13-13-1.7. In 2007, however, the state legislature passed SDCL § 13-13-1.9, which only allowed these provisions for districts which consolidated prior to July 1, 2007. Thus, no consolidations following that date receive special financial incentives.

A third example of contradiction exists through penalties for excess General fund balances. These penalties were first assessed was in 2002, five years following the original implementation of the foundation program (Woodmansey, 2014). The original purpose of the penalty was to ensure that school district fund balances did not exceed one year’s budgeted General fund expenditures. Thus, the state wanted local school districts to spend more on instructional expenditures instead of leaving its state aid in reserves. Regardless of the original intent, data received from the South Dakota Department of Education reveals that most districts have not been penalized within the timeframe of this study.

Despite the contradictions that have occurred in funding policy, the current foundation program has been implemented for over fifteen years, with the majority of
adjustments to the formula and related elements occurring in the 2007 legislative session. Since then, South Dakota funding policy has not changed significantly with the exception of the LEP addition in 2012 (South Dakota Department of Education, 2012).

III. II Funding Adequacy in South Dakota

The only regional source of judicial contrast to the ruling in Davis, Davis, et al v. South Dakota (2011) is found in Campbell County School District v. State (1995) described in Chapter Two. While the Wyoming funding formula was overturned, the challenge of the South Dakota formula was unsuccessful. The South Dakota Supreme Court ruled against the plaintiffs’ complaints that the state’s funding formula was unconstitutional on the basis of adequate education clauses. For South Dakota, this decision proved to be similar to those made around the country—inequacy could not be found. Following precedent around the country (Verstegen & Driscoll, 2008c), South Dakota’s judicial branch echoed the sentiment that issues surrounding funding adequacy “are to be brought before the people’s popularly elected Legislature,” calling it the “appropriate forum for resolution of such issues” (Davis, Davis, et al v. South Dakota, 2011, p. 73). Thus, the 1997 funding formula is still in effect, and the question of what determines adequate funding remains.

South Dakota is no stranger to heated discussions over the success of its education funding system. When the state’s foundation program was unveiled in 1997, it was heralded as a measure that would improve funding equity and relieve the state of the issues that were created from the previous expenditure-driven formula (Davis, Davis et al v. South Dakota, 2011). While the formula is intended to improve the fortunes of districts reliant on state funds due to lack of property tax base, today’s discussions of
funding adequacy can be traced to the very source of funding equity conversations—the state share of general funding (Figure 3.3).

**Figure 3.3: South Dakota State Share of General Funding, 2009-2014**
*Source: South Dakota Department of Education*

<table>
<thead>
<tr>
<th>School Year</th>
<th>State Aid</th>
<th>Local Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-2010</td>
<td>56.1%</td>
<td>43.9%</td>
</tr>
<tr>
<td>2010-2011</td>
<td>56.1%</td>
<td>43.9%</td>
</tr>
<tr>
<td>2011-2012</td>
<td>52.6%</td>
<td>47.4%</td>
</tr>
<tr>
<td>2012-2013</td>
<td>53.2%</td>
<td>46.8%</td>
</tr>
<tr>
<td>2013-2014</td>
<td>53.8%</td>
<td>46.2%</td>
</tr>
</tbody>
</table>

The Associated School Boards of South Dakota (ASBSD) are perhaps the most vocal in advocating the plights of the current funding situation. ASBSD (2011) statistics show that school districts have lost nearly 15% of their general fund balances as a portion of total general fund expenditures from 1997 to 2012, and the prevalence of ‘opt-outs’ has increased in that same time frame. Additionally, ASBSD (2011) asserts that widespread cuts have been forced onto school districts due to state funding decreases in 2011, resulting in the loss of 465 jobs statewide in FY2012. On face value, the burden of funding has shifted away from the state to the local districts, in spite of the funding formula’s intent to improve district wealth inequality. Furthermore, local share of school funding has not yet shifted back to pre-2011 levels, and at the current rate of change, it would not shift back to those levels until 2018 at the earliest (Figure 3.3).

Does this suggest that the funding formula in South Dakota is inadequate? That is difficult to say. Citing Verstegen and Driscoll (2008c), the change in financial burden could suggest that the state is shirking its responsibility to fund education and would
further fuel the argument that the state needs to return education funding to the level it would be if cuts were not made in 2011. However, increasing local share of education funding could also be caused by other phenomenon, such as a change in the way property taxes are assessed. That is not to mention that Verstegen and Driscoll’s (2008c) argument may not be applicable in conversations regarding funding adequacy unless specific proportions of funding are defined in the state constitution. In this case, there are no definitions.

While there are certainly merits to argue that funding is adequate or inadequate in South Dakota, the discussion of adequacy today is at a relative standstill in comparison to 2011. This is not much different than what is seen nationally—no one appears willing to seek the definition of an adequate education, including the State Supreme Court (Davis, Davis et al v. South Dakota, 2011). However, a lull in the conversation does not necessarily mean that the issue does not exist. Until the question of “What is a basic (or adequate) education for South Dakota students?” is answered, there will remain a general sense of skepticism surrounding the funding of school districts.

South Dakota has taken strides to improve equitable outcomes in K-12 education by implementing a foundation funding formula and granting adjustments to small and geographically isolated districts. And yet, the current status of education funding today is defined by themes of contradiction and skepticism. Despite the ruling of Davis, Davis et al v. South Dakota (2011), there is growing evidence that current state funding may not be enough to support schools. At the same time, questions regarding the funding formula’s adequacy have quieted since the ruling. This lull may be attributed to increases in state education funding since 2011, or it may be an acceptance of unchangeable
political and legal circumstances. The case for adequate education funding has not gained much traction nationally, let alone in South Dakota. How the recent funding environment has affected small school consolidation is studied in Chapters Four and Five, but one thing seems clear from this chapter—South Dakota fits into national funding trends and does not appear to be diverging in the foreseeable future.
CHAPTER FOUR
Quantitative Analysis

IV.1 Introduction

Estimating the effects of the South Dakota K-12 education funding formula on small school consolidation requires models that simultaneously recognize a binary outcome (Brasington, 1999; Brasington, 2003) but allow for accurate interpretation of parameters and their individual effects. As such, the bivariate probit model used by Brasington (1999; 2003) is not applicable, as the priority of this analysis is not the likelihood of consolidation. Instead, this study intends to explain the contributing factors to the decision to consolidate, reorganize, or dissolve and attach to another district, with the main focus being on the state funding formula. Thus, the estimation methods of choice are linear probability models (LPMs) and independent, two-sample t-tests (difference-in-means test).

For the purpose of explaining a dichotomous outcome, the regressions utilized take the form of a binary response model (BRM). There are three main types of BRMs—linear probability models (LPMs), probit models, or logistical models. The LPM regressions are the most useful for explaining the relationship between elements of the K-12 funding formula and consolidation. This means that the dependent variable can only take on two values: 0 or 1. Two regressions are developed to explain the marginal effect of enrollment on consolidation with controlling factors, as well as how inflows, balances, and outflows from a district’s General fund can impact the decision to consolidate.
The simple $t$-test approach is then used to explore the difference between means of selected variables in groups of consolidated and non-consolidated districts. While it does not study the marginal effects of consolidation factors, it does provide another method of understanding what factors may be contributing to the consolidation decision. By utilizing these two approaches, one can gain a better understanding of how funding formula elements and control factors impact consolidation, as well as what variables are relevant when looking at potential consolidation candidates.

IV.II Dependent and Independent Variables

Variables were chosen based upon what was needed to develop the LPM regressions, not the performance of $T$-tests. Although some variables are removed from the LPM analysis due to multicollinearity and all are analyzed by $T$-tests, it is important to recognize the purpose behind variable selection for the quantitative analysis.

The dependent variable for each regression, ‘CONSOL,’ is dichotomous, describing the decision to consolidate. A value of ‘0’ signifies no consolidation, and a value of ‘1’ signifies a consolidated district within the dataset. CONSOL is created as a leading variable, meaning that CONSOL=1 during the final year in which a district’s ADM is positive. Thus, CONSOL recognizes a district’s consolidation, reorganization, or dissolution within the dataset in the year prior to its closure. In this regard, the LPM models used in this analysis are similar to what would be found in a duration analysis. ‘Non-existent’ school districts hold values for group variables FY and SchoolID, but all independent variables that would suggest the reality of a district’s operation are missing data. Because each non-existent school district is missing data instead of zero-values,
independent variables are not skewed and their marginal effects on CONSOL can be captured prior to a district’s ‘death.’

With a clearly-defined dependent variable and group variables determined, the real question is this: Which independent variables are used to understand the effects of the funding formula on small school consolidation? The answer lies in local need calculation and revenue contributions toward the local need amount. That is, LPM regressions, and therefore variable choices, must focus on two specific concepts: enrollment as the basis for local need calculation and the inflows, balances, and outflows of the General fund.

As can be recalled from the previous chapter, local need for South Dakota school districts is calculated based upon fall enrollment count (FALLADM), the per-student allocation (PSA), and the small school adjustment (SSA). English language proficiency is excluded from the regressions as the policy was not implemented until 2013 (South Dakota Department of Education, 2012). After local need amount has been calculated, local effort is determined by the state. Once maximum property levies have been evaluated, state aid is then distributed to the district’s General fund to cover any remaining local need.

While it is important to study factors such as the SSA, the funding formula is driven almost entirely by a school’s enrollment count. Every calculation in the formula outside of the PSA and SSA is augmented by enrollment, making it the single most important factor when considering the formula’s effect on small school consolidation.

The first regression is focused on the marginal effect of FALLADM as an independent variable and CONSOL as the dependent variable. Additional independent
variables are needed to control for factors that affect enrollment, so data is collected for
district land area, population served, population density, and the number of students who
have open enrolled into the district. In addition, two variables are added to the regression
to control for ‘joint program provision’—i.e., a district that shares programs or staff or
has already consolidated with another district. These variables are PREVCONSOL, a
dummy variable measuring whether a district has already consolidated within the
timeframe of the data set, and COOP, a dummy variable indicating an the presence of an
athletic cooperative. PREVCONSOL functions in nearly the same manner as CONSOL,
but instead is lagged to indicate when a new district enters the dataset. COOP measures
the presence of shared athletic programs, but it is also considered a proxy for presence of
program- and staff-sharing between districts.

If a regression solely focuses on the marginal effect of enrollment without funding
factors included, it ignores the effect that enrollment has on district funding. Thus, a
second regression is developed to measure how inflows, balances, and outflows of a
General fund may impact a district’s decision to consolidate—an application of the ‘fiscal
condition’ principle used by Ratcliffe, Riddle, and Yinger (1990). The regression takes
into consideration three major sources of revenue (state aid, total local tax revenue, and
‘sparse’ school funding) to ensure that the analysis includes all General fund inflows. In
addition, a district’s fund balances are included in the regression. Fund balances include
the General fund, but also Special Education, Pension, Capital Outlay, and Impact Aid.
This way, a full financial picture is captured on a year-to-year basis and accounts for any
fund transfers from Capital Outlay or Federal Impact Aid funds to the General fund.
Finally, instructional expenditures and average teacher salary are included as cash outflows, which cover nearly all General fund expenditures.

The goal of data collection was to gather as much information available on the selected variables since the inception of the model in 1997. Sample size was limited to the small school districts of South Dakota. A ‘small school district’ is defined by the SSA—K-12 enrollment of less than 600 (South Dakota Department of Education, 2013). Data was available beginning in the fiscal year (FY) 2000 and not yet complete for FY 2013; thus, data was gathered on 151 school districts between FY 2000 and FY 2012. Data is arranged in a panel set with 1,963 cross-sections, resulting in no more than 13 observations per school district. As mentioned, these cross-sections include missing data variables due to non-existent school districts which reduces the overall N to 1,583.

School district data was obtained from the South Dakota Department of Education, the Rural Life and Census Data Center at South Dakota State University, and the South Dakota High School Activities Association.

All variables were gathered as secondary data. However, certain variables were calculated using the existing data, such as population served by a school district and population density (along with previously explained CONSOL and PREVCONSOL). Combining the 2000 and 2010 school district populations gathered from the Rural Life and Census Data Center at South Dakota State University along with county population data from 2000 and 2010 census, annualized growth rates were determined. These growth rates were then used to extrapolate population data between 2000 and 2010 and beyond 2010 to mimic expected growth or decline in population to the present day.
While this may not depict exact population numbers for districts in a county with a high population growth rate (e.g., Wolsey-Wessington School District in Beadle County), it does reflect the general sense of growth or decline in the population served by a particular school district. These statistics can be found in Appendix B, as the table

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>MEAN</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALLADM</td>
<td>Fall enrollment count</td>
<td># of students</td>
<td>281.93</td>
<td>17.00</td>
<td>769.48</td>
</tr>
<tr>
<td>SSA</td>
<td>Small School Adjustment</td>
<td>$/student</td>
<td>584.33</td>
<td>0.00</td>
<td>873.67</td>
</tr>
<tr>
<td>LCLNEED</td>
<td>Total Financial need calculated by State</td>
<td>in $1000s</td>
<td>1311.84</td>
<td>79.34</td>
<td>3281.54</td>
</tr>
<tr>
<td>LCLEFFORT</td>
<td>Maximum property tax valuation</td>
<td>in $1000s</td>
<td>515.92</td>
<td>7.93</td>
<td>2841.58</td>
</tr>
<tr>
<td>GENREV</td>
<td>Total non-state generated general fund revenues</td>
<td>in $1000s</td>
<td>746.95</td>
<td>0.00</td>
<td>3121.89</td>
</tr>
<tr>
<td>STATEAID</td>
<td>Total state aid received</td>
<td>in $1000s</td>
<td>811.00</td>
<td>0.00</td>
<td>2433.88</td>
</tr>
<tr>
<td>SPARVAL</td>
<td>Total “sparse” school funding received</td>
<td>in $1000s</td>
<td>7.03</td>
<td>0.00</td>
<td>200.24</td>
</tr>
<tr>
<td>PREVCONSOL</td>
<td>Dummy variable, 1=consolidated with other district within dataset</td>
<td>0 or 1</td>
<td>0.07</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>LAND</td>
<td>Total land area in district</td>
<td>Square Miles</td>
<td>465.50</td>
<td>40.06</td>
<td>2684.10</td>
</tr>
<tr>
<td>COOP</td>
<td>Dummy variable, 1=shared athletic program with another district</td>
<td>0 or 1</td>
<td>0.41</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>OPTOUT</td>
<td>Total tax revenue received above maximum property tax levels</td>
<td>in $1000s</td>
<td>8.92</td>
<td>0.00</td>
<td>500.00</td>
</tr>
<tr>
<td>GENFUNDBAL</td>
<td>Total year-end General Fund balance</td>
<td>in $1000s</td>
<td>587.77</td>
<td>-478.39</td>
<td>2584.40</td>
</tr>
<tr>
<td>CAPOUTBAL</td>
<td>Total year-end Capital Outlay fund balance</td>
<td>in $1000s</td>
<td>337.25</td>
<td>-271.44</td>
<td>9325.38</td>
</tr>
<tr>
<td>SPEDBAL</td>
<td>Total year-end Special Education fund balance</td>
<td>in $1000s</td>
<td>112.56</td>
<td>-98.03</td>
<td>1747.59</td>
</tr>
<tr>
<td>PENBAL</td>
<td>Total year-end Pension fund balance</td>
<td>in $1000s</td>
<td>43.97</td>
<td>-31.13</td>
<td>628.20</td>
</tr>
<tr>
<td>IMPACTAID</td>
<td>Total year-end Federal Impact Aid balance</td>
<td>in $1000s</td>
<td>259.34</td>
<td>0.00</td>
<td>8965.42</td>
</tr>
<tr>
<td>OPENENROLL</td>
<td>Total number of students open enrolling into district</td>
<td># of students</td>
<td>20.85</td>
<td>0.00</td>
<td>316.00</td>
</tr>
<tr>
<td>POP</td>
<td>Population served by district</td>
<td># of patrons</td>
<td>1630.59</td>
<td>352.13</td>
<td>4831.00</td>
</tr>
<tr>
<td>INSTRUCTEXP</td>
<td>Total instructional expenditures</td>
<td>in $1000s</td>
<td>1095.42</td>
<td>170.50</td>
<td>3778.98</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Population/land area served by district</td>
<td>Persons/sq. mile</td>
<td>6.21</td>
<td>0.46</td>
<td>99.98</td>
</tr>
<tr>
<td>SALARY</td>
<td>Average teacher salary</td>
<td>$</td>
<td>30618.01</td>
<td>19865.69</td>
<td>42793.01</td>
</tr>
</tbody>
</table>

While this may not depict exact population numbers for districts in a county with a high population growth rate (e.g., Wolsey-Wessington School District in Beadle County), it does reflect the general sense of growth or decline in the population served by a particular school district. These statistics can be found in Appendix B, as the table
displays calculations for annualized growth rates on a county basis as well as the school district ID number assigned to each county (County – District). Appendix B does not include annualized growth rates for school districts whose census data was complete and did not consolidate, reorganize, or dissolve.

Panel data was arranged using FY as the time-sensitive variable, along with school identification numbers (SchoolID) as the group identifier in the data. SchoolID is based on the state’s numerical classification system (e.g., 21-2). The first number indicates the county by alphabetical order, and the second number indicates the individual district within that county in alphabetical order, unless consolidated following the original numbering of districts. All variables are fully described in Figure 4.1.

IV.III Assumptions

By using the LPM to study the marginal effects of the state’s funding formula on consolidation, multiple assumptions are precluded. First, districts without secondary attendance centers (i.e., facilities holding grades 7-12) are not included in the data. This assumption is highly important to consider, as many of these districts have been part of multiple reorganizations within the time frame of this data set. However, because many of these districts would contribute incomplete enrollment or funding data or had already contracted out their students, it was best to remove them from the data set. Along with the state’s minimum enrollment policy, this may have been one of the most crucial factors to exclude from the analysis to ensure the LPM was as unbiased as possible.

Second, the LPM models assume that no penalties for excess General fund balances and added incentives are included in the fund balances or revenues tested in the model. Because of difficulties securing the policy that assessed the excess General fund balances and inability to determine revenues received from incentives, neither of these
potential add-ins to the data are included in this model. Nonetheless, it is important to consider their importance anecdotally.

Third, the model assumes socioeconomic homogeneity within a community, but heterogeneity between communities. In other words, each community may have different values resulting from factors such as income, race, ethnicity, etc. but these values are the same within the community. These are similar assumptions used by Brasington (1999, 2003) in his modeling of the consolidation decision. The LPMs do not include these as independent variables because the necessary data is not available to describe the patron demographics at a district level. The only variables that may have some connection may include GENREV or OPTOUT, as these may express the value of education in a community as demonstrated by its willingness to pay through tax revenue.

Fourth, these models assume no differentiation between the consolidation, reorganization, or dissolution and attachment of a school district as indicated by CONSOL in the data set, nor does CONSOL denote any connection between merging partners. To make distinctions within the dataset instead of using CONSOL alone would be moot for many reasons, not to mention attempting to link merging districts together within the dataset. Though it may be helpful for understanding the dynamics of each ‘type’ of consolidation, it would require even more extensive data collection to describe the nature of a district’s nearest neighbors. Thus, the focus of study would shift away from marginal effects to accurate consolidation estimation.

Along with these assumptions, it is important to state that the LPM models are expected to be only a small explanatory factor as to why consolidations occur in South Dakota. Hence, additional difference-in-means and phenomenological analyses are used.
Variables were chosen based on previous literature and the nature of the state’s funding formula and were subject to data availability. However, it is recognized that the consolidation decision is also affected by factors that may not be quantifiable. Thus, CONSOL is not expected to be fully explained by the independent variables in either regression, resulting in very small $R^2$ values. A different approach is taken to find goodness of fit—number and percent of consolidations correctly predicted by each model. The focus of the study is to gain a better understanding of marginal effects on the consolidation decision, not to determine the most accurate estimation of consolidation probability.

IV.IV Linear Probability Models (LPMs)

The first statistical method used in the quantitative analysis is the LPM. The LPM assumes that the response probability, or the probability of success, is a linear function of independent variables $x_j$ explained by beta coefficients $B_j$. This model is selected because it simultaneously provides the necessary binary outcome to represent consolidation, but it allows for simpler interpretation of marginal effects for each $x_j$ (Wooldrige, 2013). Thus, LPMs are the most effective type of BRM that can be applied, since the point of emphasis is the relationship that may or may not exist between the elements of the funding formula and CONSOL. Probit and logistical models, on the other hand, would be preferred if the goal of the quantitative analysis was to accurately estimate the probability of CONSOL, but that is not the case.

Prior to regression analysis, all variables were tested for correlation. Previous tests of LPM models\footnote{Initial results of working paper previously presented at Missouri Valley Economics Association Annual Conference: October 12, 2013 in Kansas City, MO} found little to no significance in the results, suggesting the
presence of multicollinearity within the data set. There is no true solution to multicollinearity, nor is it necessarily an issue. Statistical significance may just be understated, unless more data is collected or variables are removed. After running the correlation tests (Appendix C), the variables SSA, POP, LCLNEED, and SALARY were found to be highly correlated with FALLADM, while SALARY was found to be highly correlated with FY. Including these variables within the regression may not harm the results, but if there is significant correlation occurring between variables, it is unwise to include multiple versions of a similar variable within the regression. In addition, SALARY may be prone to serial correlation, as its level over time may affect its future value.

For the sake of developing the most accurate picture of marginal effects, these variables are removed from each regression since more data could not be collected. Although it is not a factor contributing to multicollinearity, LCLEFFORT is not included in any LPM regressions as GENREV simply replaces the variable in the “fiscal condition” regression. Each variable is studied in the difference-in-means portion of the quantitative analysis. All values with correlation greater than |0.70| are in bold in the table, which was the criteria for potential removal.

The enrollment regression is explained by the following equation:

\[
CONSOL_t = \beta_0 + \beta_1 FALLADM_t + \beta_2 OPENENROLL_t + \beta_3 LAND
+ \beta_4 DENSITY_t + \beta_5 PREVCONSL_t + \beta_6 COOP_t
+ \beta_7 FALLADM^2_t + u_t
\]

where \(t\) denotes fiscal year (FY), \(\beta_0\) is the constant, and \(u_t\) denotes the error term of the equation. This regression estimates the probability of \(CONSL\) on an assumed scale of 0
transformation of FALLADM, FALLADM^2, is created to visualize any diminishing marginal effects that FALLADM may have on CONSOL as enrollment increases. As enrollment increases to a certain level, there may be a possibility that a large district within the data set attracts a smaller district for consolidation, as previously found by Brasington (2003). Thus, the first regression focuses on the enrollment aspect of the state’s funding formula as a factor in small school consolidation.

The fiscal condition regression can be expressed by the following equation:

\[ CONSOL_{tB} = \beta_0 + \beta_1GENREV_t + \beta_2STATEAID_t + \beta_3SPARVAL_t \]
\[ + \beta_4OPTOUT_t + \beta_5GENFUNDBAL_t + \beta_6CAPOUTBAL_t \]
\[ + \beta_7SPEDBAL_t + \beta_8PENBAL_t + \beta_9IMPACTAID_t \]
\[ + \beta_{10}INSTRUCTEXP_t + u_t \]

where \( t \) denotes fiscal year (FY), \( \beta_0 \) is the constant, and \( u_t \) denotes the error term of the equation. Like the first regression, the regression is run to estimate the probability of CONSOL on an assumed scale of 0 to 1, with 1 expected to be the highest probability of consolidation.

As the data used is a panel set, the regressions account for unobserved, time-invariant characteristics, and fixed effects. In addition, clustered robust standard errors are used with SchoolID as the cluster variable to ensure that the regression is not subject to heteroskedasticity based upon the grouping of the panel data.

The main parameters of interest are FALLADM, GENREV, and STATEAID, as each has the most direct connection to South Dakota’s funding formula within the regressions. FALLADM is expected to have a negative, but decreasing relationship with
CONSOL as would be noted by a positive relationship between FALLADM^2 and CONSOL. Similarly, GENREV and STATEAID are expected to have a negative relationship with CONSOL as additional dollars of revenue should decrease the probability of consolidation.

Within the enrollment regression, OPENENROLL, LAND, and PREVCONSOL are all expected to have a negative relationship with CONSOL, while COOP would be expected to have a positive relationship with CONSOL. The presence of program sharing would be more of a precursor to consolidation than would be a previous consolidation within the scope of this data set, thus setting apart the two dummy variables used to indicate joint provision of services or programs. DENSITY is the only enigma; on one hand, higher population density may suggest higher population levels in the district, but on the other, also may signal a smaller land area. As a result, the district may have more options for consolidation than a more geographically isolated locale. It would seem more likely that a small value for DENSITY would suggest smaller district population rather than larger land area, and thus, DENSITY is expected to have a negative relationship with CONSOL.

Within the fiscal condition regression, SPARVAL is expected to have a significant negative relationship with CONSOL, as districts receiving sparse school funding are not subject to the state’s minimum enrollment laws. Geographic isolation may not preclude a district from consolidation, but consolidation would not be expected. Each fund balance variable is expected to have a negative relationship with CONSOL. It would seem counterintuitive that a district would be less likely to consolidate if it spent more, but
INSTRUCTEXP seems to be closely linked to enrollment. Thus, INSTRUCTEXP is expected to have a negative relationship with CONSOL.

### Figure 4.2: Enrollment Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Std. Err.)</th>
<th>Coefficient (Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALLADM</td>
<td>-0.0021*** (0.0006)</td>
<td>GENREV</td>
</tr>
<tr>
<td>FALLADM^2</td>
<td>0.0000*** (0.0000)</td>
<td>STATEAID</td>
</tr>
<tr>
<td>OPENENROLL</td>
<td>0.0005* (0.0003)</td>
<td>SPARVAL</td>
</tr>
<tr>
<td>LAND</td>
<td>0.0002* (0.0001)</td>
<td>OPTOUT</td>
</tr>
<tr>
<td>DENSITY</td>
<td>-0.0039*** (0.0007)</td>
<td>GENFUNDBAL</td>
</tr>
<tr>
<td>COOP</td>
<td>-0.0062 (0.0154)</td>
<td>CAPOUTBAL</td>
</tr>
<tr>
<td>PREVCONSOL</td>
<td>-0.0176*** (0.0057)</td>
<td>SPEDBAL</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>0.3198*** (0.0953)</td>
<td>PENBAL</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.1460$

N=1,583

F(6,150)= N/A

*Note: standard errors are in parentheses.***Significant at 99% confidence level **Significant at 95% confidence level *Significant at 90% confidence level

### Figure 4.3: Fiscal Condition Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Std. Err.)</th>
<th>Coefficient (Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENREV</td>
<td>0.0001** (0.0000)</td>
<td>GENFUNDBAL</td>
</tr>
<tr>
<td>STATEAID</td>
<td>0.0000 (0.0000)</td>
<td>CAPOUTBAL</td>
</tr>
<tr>
<td>SPARVAL</td>
<td>0.0001 (0.0001)</td>
<td>SPEDBAL</td>
</tr>
<tr>
<td>OPTOUT</td>
<td>-0.0004*** (0.0001)</td>
<td>PENBAL</td>
</tr>
<tr>
<td>GENFUNDBAL</td>
<td>-0.0001*** (0.0000)</td>
<td>IMPACT AID</td>
</tr>
<tr>
<td>CAPOUTBAL</td>
<td>-0.0000 (0.0000)</td>
<td>INSTRUCTEXP</td>
</tr>
<tr>
<td>SPEDBAL</td>
<td>0.0000 (0.0001)</td>
<td>CONSTANT</td>
</tr>
<tr>
<td>PENBAL</td>
<td>0.0002* (0.0001)</td>
<td>-0.00001</td>
</tr>
<tr>
<td>IMPACT AID</td>
<td>-0.0000 (0.0000)</td>
<td>-0.0281</td>
</tr>
</tbody>
</table>

$R^2$ (within) = 0.0243

N=1,583

F(10,150)=2.50

*Note: standard errors are in parentheses.***Significant at 99% confidence level **Significant at 95% confidence level *Significant at 90% confidence level
### Figure 4.4: Percentage Correctly Estimated, Enrollment Regression

<table>
<thead>
<tr>
<th>Enrollment Regression (mean +/- std. dev.)</th>
<th>Predicted &quot;0&quot;</th>
<th>Predicted &quot;1&quot;</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual &quot;0&quot;</td>
<td>219</td>
<td>228</td>
<td>466</td>
</tr>
<tr>
<td>Actual &quot;1&quot;</td>
<td>1</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>246</td>
<td>485</td>
</tr>
</tbody>
</table>

"Consolhat"  
Mean = 0.0246368  
Std. Dev. = 0.1417704  
Min. = -0.547796  
Max. = 0.6283467  
Total consolidations correctly predicted (% of actual total = 39) = 46.15%

### Figure 4.5: Percentage Correctly Estimated, Fiscal Condition Regression

<table>
<thead>
<tr>
<th>Fiscal Condition Regression (mean +/- std. dev.)</th>
<th>Predicted &quot;0&quot;</th>
<th>Predicted &quot;1&quot;</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual &quot;0&quot;</td>
<td>162</td>
<td>220</td>
<td>382</td>
</tr>
<tr>
<td>Actual &quot;1&quot;</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>165</td>
<td>225</td>
<td>390</td>
</tr>
</tbody>
</table>

"Consolhat"  
Mean = 0.0247148  
Std. Dev. = 0.0342029  
Min. = -0.1678689  
Max. = 0.1712877  
Total consolidations correctly predicted (% of actual total = 39) = 12.82%

Results of the enrollment and fiscal condition regressions are shown in Figures 4.2 and 4.3, respectively, along with their respective tables for percentage correctly estimated in Figures 4.4 and 4.5. To determine the percentage of observed consolidations estimated correctly, predicted values for CONSOL, or ‘consolhat,’ are compared with the actual values for CONSOL for each regression. Values for ‘consolhat’ do not necessarily align with the 0 or 1 outcomes of CONSOL, and thus, criteria for comparison must be established. Any value of ‘consolhat’ that is one standard deviation above the mean or greater is considered a predicted consolidation (i.e., CONSOL expected to = 1). Meanwhile, any value of ‘consolhat’ that is one standard deviation below the mean or less is considered a predicted non-consolidation (i.e., CONSOL expected to = 0).
number of predicted consolidations in each regression is then compared with the number of actual consolidations, and the percentage of correctly estimated consolidations is calculated.

The results of the enrollment regression are as expected. FALLADM has a large negative, significant relationship with CONSOL, but its effect diminishes as it reaches a certain level. This is known because of the positive, significant relationship between FALLADMM^2 and CONSOL. PREVCONSOL is negatively related to CONSOL, as expected, and DENSITY emerges as another variable that has a strong, inverse relationship with CONSOL. Contrary to prior expectations, OPENENROLL and LAND each have a positive, significant relationship with CONSOL, and COOP shows a weak positive correlation with CONSOL.

In the fiscal condition regression, the results show very few significant variables, but those variables which appear to have strong relationships with CONSOL are also not surprising. OPTOUT and GENFUNDBAL are both negatively related to CONSOL, suggesting that additional funds received through opt-outs and higher fund balances reduce the likelihood of consolidation. Interestingly, the results show that GENREV has a significant positive relationship, as does PENBAL. It would be difficult to grasp why PENBAL would have a significant relationship with CONSOL, but GENREV may be easier to explain—a larger tax base may preclude a district from receiving greater amounts of state aid, and thus place greater burden on taxpayers to keep the school doors open.

Based upon the methods used to determine percentage of consolidations correctly estimated, the enrollment regression would be considered a more accurate estimator of
consolidation. The calculation of ‘consolhat’ by the enrollment regression correctly estimated 46.15% of consolidations, while the fiscal condition regression correctly estimated 12.82%. The range of ‘consolhat’ in the enrollment regression was much wider than the fiscal condition regression, ranging from -0.5478 to 0.6283 and from -0.1679 to 0.1713, respectively. The fiscal condition range shows a much tighter distribution, perhaps suggesting less variance in funding availability than in the enrollment counts that are used to augment the majority of revenue sources. Nevertheless, it is not the perfect ‘0’ to ‘1’ distribution that would be expected in a theoretical linear probability model, nor is joint significance a focus on these regressions. These ranges show how well the regression fits this particular set of data.

IV.V Difference-in-Means Testing

The second statistical approach taken in this paper is the utilization of difference-in-means tests. That is, the dataset is approached in the manner of a two-sample \( t \)-test, which determines the statistical significance of differences between the mean values of a particular variable when grouped by another variable or in comparison with another variable. In this analysis, the grouping variable is CONSOL. Thus, the analysis describes the statistical differences that may be found between consolidated and non-consolidated school districts within the data set.

For all two-sample \( t \)-tests, the tentative assumption is that means are the same for each sample, thus the null hypothesis and alternative hypothesis are written as follows with the mean of each sample denoted by \( \mu \):

\[
H_0: \mu_1 - \mu_2 = 0
\]

\[
H_a: \mu_1 - \mu_2 \neq 0
\]
The $t$-statistic is computed by comparison of the means of the sample, as well as the use of each sample’s standard deviations and total number of observations, $n$. With a $t$-statistic calculated, statistical significance can be be determined at the 99%, 95%, and 90% confidence levels using degrees of freedom (d.f.) of $N-2$. $N$ is the total number of observations between both samples being tested. The standard deviation of each sample is denoted by $s$, and $n$ denotes the sample size. The equation for $t$ is noted as follows:

$$ t = \frac{(\bar{x}_1 - \bar{x}_2) - D_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} $$

All independent variables are tested for difference-in-means grouped by CONSOL, assuming unequal sample size but equal variance. The results of difference-in-means tests can be found in Figure 4.6.

The results are not dissimilar to those found in the LPM portion of the quantitative analysis, and the variables not tested in the enrollment and fiscal condition regressions provide some background not seen in that portion of the analysis. FALLADM, COOP, LCLNEED, GENFUNDBAL, INSTRUCTEXP, and POP each show strongly significant difference-in-means between consolidated and non-consolidated districts. In general, however, it can be noted that regardless of statistical significance, districts that consolidate show differences from districts that do not consolidate in nearly every measured variable gathered for this paper.

Additional difference-in-means tests could be performed on the changes in policy that occurred within the time frame of this study (e.g., changes in the calculation of SSA) to see further statistical difference between consolidated and non-consolidated districts.
However, the results of this portion of quantitative analysis provide enough discussion to leave room for future investigation.

Figure 4.6: Results of Difference-in-Means Tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>All Districts in Sample (Std. Dev.)</th>
<th>Unmerged Districts (Std. Dev.)</th>
<th>Merged Districts (Std. Dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALLADM***</td>
<td>281.93 (138.09)</td>
<td>283.54 (136.87)</td>
<td>218.23 (21.23)</td>
</tr>
<tr>
<td>SSA</td>
<td>584.33 (257.02)</td>
<td>582.88 (6.53)</td>
<td>641.36 (43.16)</td>
</tr>
<tr>
<td>LCLNEED***</td>
<td>1311.84 (570.18)</td>
<td>1318.93 (14.34)</td>
<td>1031.18 (119.20)</td>
</tr>
<tr>
<td>LCLEFFORT</td>
<td>515.92 (330.38)</td>
<td>517.46 (8.40)</td>
<td>454.81 (54.28)</td>
</tr>
<tr>
<td>GENREV</td>
<td>746.05 (394.80)</td>
<td>747.35 (10.06)</td>
<td>694.63 (57.73)</td>
</tr>
<tr>
<td>STATEAID***</td>
<td>811.00 (424.76)</td>
<td>815.92 (10.76)</td>
<td>616.44 (73.94)</td>
</tr>
<tr>
<td>SPARVAL</td>
<td>7.03 (28.52)</td>
<td>7.14 (0.73)</td>
<td>2.63 (1.61)</td>
</tr>
<tr>
<td>PREVCONSOL</td>
<td>0.07 (0.25)</td>
<td>0.07 (0.00)</td>
<td>0.05 (0.04)</td>
</tr>
<tr>
<td>LAND</td>
<td>465.50 (445.71)</td>
<td>466.31 (11.39)</td>
<td>432.34 (56.16)</td>
</tr>
<tr>
<td>COOP***</td>
<td>0.41 (0.49)</td>
<td>0.40 (0.01)</td>
<td>0.64 (0.08)</td>
</tr>
<tr>
<td>OPTOUT</td>
<td>8.92 (42.24)</td>
<td>8.96 (1.08)</td>
<td>7.49 (4.28)</td>
</tr>
<tr>
<td>GENFUNDBAL***</td>
<td>587.77 (417.15)</td>
<td>592.49 (10.60)</td>
<td>400.94 (65.51)</td>
</tr>
<tr>
<td>CAPOUTBAL</td>
<td>337.25 (419.39)</td>
<td>339.26 (10.76)</td>
<td>257.62 (39.81)</td>
</tr>
<tr>
<td>SPEDBAL</td>
<td>112.56 (172.65)</td>
<td>112.35 (4.40)</td>
<td>121.11 (27.18)</td>
</tr>
<tr>
<td>PENBAL</td>
<td>43.97 (76.95)</td>
<td>44.23 (1.97)</td>
<td>33.70 (8.48)</td>
</tr>
<tr>
<td>IMPACTAID</td>
<td>259.34 (924.69)</td>
<td>264.40 (23.81)</td>
<td>59.02 (25.36)</td>
</tr>
<tr>
<td>OPENENROLL</td>
<td>20.85 (26.65)</td>
<td>20.98 (0.68)</td>
<td>15.59 (3.13)</td>
</tr>
<tr>
<td>POP*</td>
<td>1630.59 (901.90)</td>
<td>1636.92 (22.90)</td>
<td>1365.64 (155.80)</td>
</tr>
<tr>
<td>INSTRUCTEXP**</td>
<td>1095.42 (524.47)</td>
<td>1100.22 (13.35)</td>
<td>905.30 (77.51)</td>
</tr>
<tr>
<td>DENSITY</td>
<td>6.21 (7.16)</td>
<td>6.24 (0.18)</td>
<td>4.95 (1.39)</td>
</tr>
<tr>
<td>SALARY</td>
<td>30618.01 (3904.47)</td>
<td>30602.38 (99.54)</td>
<td>31236.81 (579.80)</td>
</tr>
<tr>
<td>SAMPLE SIZE</td>
<td>1,583</td>
<td>1,544</td>
<td>39</td>
</tr>
</tbody>
</table>

Note: standard deviations are in parentheses.

*Null hypothesis is rejected at the two-tail 0.10 Type 1 error level.
** Null hypothesis is rejected at the two-tail 0.05 Type 1 error level.
*** Null hypothesis is rejected at the two-tail 0.01 Type 1 error level.
IV.VI Potential Biases

Before diving into an analysis of the results from both the linear probability models and the difference-in-means tests, it is important to acknowledge the potential biases that exist in the statistical approaches used.

First, a linear probability model (LPM) is widely known to have serious drawbacks as a decision estimation model, as the dependent variable is treated in a linear manner and thus, has the potential to view probability in manner that would practically be read as “a level of X variable, ceteris paribus, means the probability of phenomenon Y is less than 0%.” Clearly, this is a flaw in the practical application of the LPM. However, it has been noted throughout this chapter that the LPM was not chosen for its perfect estimation of the consolidation outcome. Instead, it was selected for combining a binary dependent variable while simultaneously allowing for the study of marginal effects on that outcome.

Second, the regressions, although corrected for heteroskedasticity and multicollinearity, do not have a strong joint significance and are not strong estimators of consolidation probability (as measured by the R^2 value) on their own accord. Smaller regressions were chosen to better understand relationships between selected variables and the decision to consolidate. As stated in the assumptions for the LPMs, these models cannot begin to cover every variable that may lead to consolidation, especially as many factors that lead to consolidation cannot be quantified (e.g., political will).

Finally, there is a potential for omitted variable bias in the regressions. As mentioned in the assumptions, important demographic variables (e.g., race, ethnicity, etc.) are left out of the regressions and thus, differences in culture or value of education between communities are not measured in the regression. Their lack of presence in the
LPMs may alter the outcomes, but it would be believed that the sign of each variable would not change—simply the magnitude of the marginal effects.

Based upon these potential biases, it is safe to say that the difference-in-means tests are safer way to approach this research question. For this paper, however, the LPM approach is provides appropriate analysis of marginal effects on small school consolidation in South Dakota.

IV.VII Discussion

Looking first at the results of the difference-in-means tests, one can find a pretty clear picture of what a merging school district may look like. Districts that consolidate are more likely to have a lower enrollment, have a lower local need calculation, receive less state aid, be part of an athletic cooperative, have fewer funds available in the General fund balance, serve a smaller patron base, and spend less on instructional expenditures than districts that do not consolidate. Interestingly enough, these are just the statistically significant variables. There are differences in the mean values for nearly every variable measured, many of which are near statistical significance at a 90% level, which would speak to the vast amount of differences that exist between consolidated and non-consolidated districts in the data set.

What else is interesting about this quantitative analysis are the amount of differences that exist between the results of the LPM regressions and the difference-in-means testing. Little clear significance can be found regarding specific monetary aspects of the funding formula, as variables such as LCLNEED and STATEAID are found to have statistically different means in the two-sample t-tests but are not statistically significant in the fiscal condition LPM. Revenue generators outside of the state’s funding
formula, GENREV and OPTOUT, as well as other parameters not necessarily crucial to the study (e.g., PREVCONSOL) have similarly different results in each quantitative method used. Many of these variables are statistically significant in the LPM regressions but not in the difference-in-means tests and vice versa. This does not mean that they are not significant factors in the decision to consolidate, but it does reflect the differences in methodology used to answer the research question. LPM regressions require that some elements are the same in each group in order to parse out the effect of one or more variables of interest. Meanwhile, a difference-in-means test is intended to determine whether the average value of a specific factor is affected by a grouping of the dataset (e.g., CONSOL). Thus, the differences seen in the results may be attributed to the types of methodology applied.

In the results, two variables stand out for their consistency—FALLADM and GENFUNDBAL. Both variables exhibit strong statistical significance on the decision to consolidate, and the means of each variable show strong statistical difference between consolidated and non-consolidate districts. What does this practically say about the state’s funding formula and its impact on small school consolidation?

First, it is clear that enrollment, based upon the quantitative analysis, is perhaps the greatest force behind the decision to consolidate. This should come as no surprise, considering that a school cannot operate without students. Regardless of any funding circumstance, a district with very few students is far more likely to shut down than a school with a large number of students.

Second, seeing as enrollment is such a strong driving force behind consolidation, it should also come as no surprise that enrollment also could have a significant impact on
the overall effect of the state’s funding formula through the local need calculation. Enrollment is multiplied by the PSA when determining local need, but it also is used to determine the SSA figure, which is added to the PSA figure when determining a district’s local need. Thus, enrollment not only directly affects the local need calculation; it also determines the value of other variables used to calculate local need. With local need calculated, the amount of state aid allocated can be determined. The amount of state aid received may then affect General fund balance levels and even how much a district can spend on instructional expenditures. The impact of enrollment on the state funding formula may explain why GENFUNDBAL is statistically significant in both the fiscal condition LPM and the difference-in-means test.

Finally, it could be drawn from the statistical significance of POP and DENSITY in the difference-in-means tests and enrollment LPM, respectively, that population has a significant impact on the decision to consolidate. The impact of population on consolidation may be traced to the correlation between POP and FALLADM (Appendix C). Population served by a community likely influences a district’s enrollment, which may suggest that greater forces are at play when funding is allocated to a small school district. This is why multiple methodologies are used to study the marginal effects of consolidation factors and why many consolidation factors remain unexplained.

Practical significance does not apply only to the strong impact enrollment plays on consolidation. The results suggest that PREVCONSOL and OPTOUT are statistically significant factors, and they make practical sense, as well. A district that has previously consolidated is likely at an enrollment level that discourages consolidation in the foreseeable future, not to mention that the land area created by mergers would most likely
discourage additional consolidation for the sake of creating unrealistically land-heavy districts. OPTOUT’s significance should come as no surprise either. If a district is struggling to maintain a healthy General fund balance or needs assistance with other fund balances to take heat off its General funds, then an opt-out would be necessary. The presence of an opt-out, then, would most likely suggest that a district has low revenue available from the state due to its enrollment count, among other potential reasons.

Other variables, such as PENBAL, are statistically significant but do not make much practical sense. It would seem implausible that Pension fund balances are a significant factor in the decision to consolidate, although the entire portfolio of fund balances would have an effect on General fund budgeting and balances on a year-to-year basis. However, examples like PENBAL are among the minority in this study—practical significance would argue in favor of other statistically significant factors.

While Figures 4.4 and 4.5 suggest that LPM models are not the most successful joint estimators of effects on the consolidation decision, the blended approach of the LPM models and difference-in-means tests clarify why school districts consolidate in South Dakota, as well as why the funding formula may be viewed as a significant factor in the decision to consolidate.
CHAPTER FIVE
Qualitative Comparison

V.I Overview
Following in the steps of Nitta, Holley, and Wrobel (2010), this thesis takes a step into the world of consolidation narratives by conducting interviews of individuals who have been involved in the consolidation process. For the purposes of this study, five administrators from South Dakota were interviewed because of their involvement with a consolidation, reorganization, dissolution and attachment, or even a failed consolidation attempt. Unfortunately, no interviews with administrators to discuss the situations faced by districts receiving sparse school funding could be secured. Before discussing the conclusions of the interviews as a whole, a brief overview of each administrator is given.

Linda Whitney currently serves in her main role as the Superintendent of Sanborn Central School District but also wears the hats of elementary principal and part-time school counselor. Though Whitney has not been involved in a consolidation as an administrator, she has experience with consolidation attempts and a shift toward a new identity as a school district in 2004. The change in the district’s name from Artesian-Letcher to Sanborn Central happened to coincide with a second failed attempt to consolidate with the Woonsocket School District and the opening of Sanborn Central’s new, K-12 school building on Highway 34 in Forestburg, SD.

Whitney had already experienced the consolidation of the Artesian and Letcher School Districts in 1991 as a teacher. As she moved up through the ranks to top administrator of the school district, two later consolidation attempts with the Woonsocket School District failed. She is no stranger to the efforts taken to bring a consolidation plan
forward, but she is also no stranger to the patron-base at Sanborn Central, which highly engaged and motivated by a sense of community—symbolized by the new K-12 school building in Forestburg. Despite significant funding and program cuts, Whitney says that Sanborn Central is not yet ready for a full on consolidation, although she believes it is looming in the not so distant future (Whitney, 2013).

The next interview was conducted with Mike Ruth, the superintendent of the Miller School District. Miller has experienced two reorganization plans within the time frame of the data set studied—one reorganization involving Wolsey and Wessington School Districts in 2004 and another involving Polo and Faulkton School Districts in 2008. Ruth was not employed by the Miller School District during the reorganization in 2004, but he was the superintendent during the 2008 reorganization.

Miller is a sizeable district within the dataset—430 students were enrolled K-12 in the 2012 school year—but the districts surrounding it are not large (South Dakota Department of Education, 2012). Polo was one of many districts removed from the data set because it lacked a secondary attendance center, and as Ruth stated, Polo had no students left, and the students who were from Polo had already been open enrolling to either Faulkton or Miller schools. With consolidation incentive monies available, it only made sense for the lands held in the Polo School District to be distributed between the Faulkton and Miller School Districts. Through a very smooth process, Miller received 65.15% of the Polo School District lands, assets, and liabilities while Faulkton received the remaining portion. Because of this reorganization and the previous reorganization involving Wolsey and Wessington in 2004, Miller remains a standalone school district with much greater land coverage and no signs of consolidation in sight (Ruth, 2013).
The third interviewee, Laura Morrow, is the current elementary principal at Jefferson Elementary School in Watertown, SD, but her consolidation experiences came as the Superintendent of the Waverly and South Shore School Districts. During her time as Superintendent, South Shore had begun to “see the writing on the wall” with a dwindling enrollment and aging facilities (Morrow, 2013). Few options were left besides a consolidation with Waverly.

Waverly had been a great neighbor to South Shore for several years. The districts already shared athletic, program, and teacher resources, and perhaps more importantly, Waverly had long-term prospects thanks to newer school facilities and close proximity to one of South Dakota’s micropolitan centers, Watertown. As the superintendent for both school districts, Morrow took a thorough approach to South Shore’s dissolution with both school boards and communities. The payoff was successful for the dissolution of the South Shore School District and subsequent attachment to Waverly School District, cited by Morrow as one of the smoothest consolidation plans that the ASBSD has assisted in executing.

Jason Bailey, the superintendent for the Bridgewater-Emery (B-E) School District, provides a unique contrast to the rest of the interview group, noting the conflict that was present in the Bridgewater and Emery consolidation in 2010. Proponents of the consolidation attempt were highly focused on the positive outcomes that could be achieved through the merger and many logical reasons for consolidating two extremely close neighbors. Unfortunately, as is often heard anecdotally (Jacques, Brorsen, & Richter, 2000; Brasington, 2003), there were also plenty of opponents to consolidation,
citing the rivalry held by the communities in athletics and a previously failed consolidation between the districts back in the 1970s.

The consolidation bid was successful, however. Today, the district is experiencing prosperity it has not seen in years (Bailey, 2013). New programs and coursework are now available for B-E students, and enrollment has even seen a slight uptick since the schools consolidated in 2010. Going forward, B-E is now taking its consolidation to a new level, considering plans for a new building between the communities and using existing structures in both towns for rural economic development purposes.

The final interviewee, Don Kraemer, currently serves as the Elementary Principal for the Faith School District in northwestern South Dakota with his consolidation experience coming as the former superintendent of the dissolved Isabel School District. Isabel was among the many districts that are more geographically isolated than its counterparts east of the Missouri River, and unfortunately, because of enrollment counts significantly below the state’s minimum enrollment law, closure was only a matter of time.

Because of Isabel’s location on the Cheyenne River Indian Reservation, the district received significant amounts of Impact Aid funding from the Federal government in lieu of property taxes, as did its closest neighbors. Because of Federal law requiring a three-year waiting period for Impact Aid-receiving districts that consolidate together, the Isabel School District was dissolved and attached in part to the Timber Lake, McIntosh, and Dupree School Districts, and today, Isabel students can attend one of those three schools depending upon which district they may be closest to. While enrollment was
certainly the motivator for the dissolution, funding availability determined the way in which the dissolution was implemented (Kraemer, 2013).

V.II Conclusions

Questions used in the interviews are available in Appendix A. The goal of the interviews was to find commonalities in which factors led to consolidation, what reasons were given that may have mitigated consolidation, and what made consolidation attempts successful.

What common factors lead to consolidation? Across nearly every front, enrollment was the number one factor facing each district considering consolidation. That ideal looks a little different in the situation of Miller High School, which was not seeing any issues with its enrollment, nor was it necessarily the case leading Sanborn Central to a new school building in Forestburg. However, low enrollment was a major reason why Polo was forced to merge into the Miller School District, and enrollment at Sanborn Central is actually too high on a class-by-class level to merit consolidation with Woonsocket at the present time (Whitney, 2013). Enrollment is the most important commonality found in the interviews as well as the quantitative portion of this thesis.

Besides enrollment, what other factors are common between school districts? Financial incentives are a big factor. Another factor includes district patrons wanting better educational opportunities for their children. State and federal consolidation incentives were readily apparent in the cases of Isabel and Miller, although both districts were on the opposite sides of the fence regarding financial incentives. For Bridgewater and Emery, as well as Waverly and South Shore, the move to consolidate simply meant that financial resources were better utilized or that one school simply had better financial
options, and thus, a consolidation was the best move for the partner (Bailey, 2013; Morrow, 2013).

In nearly every case, the moves toward a consolidation were led by patrons wanting better educational opportunities for their children—and they received them. Bridgewater-Emery was able to provide FACS and agriculture classes to students from both schools, as well as expand electives (Bailey, 2013). Waverly now offers a similar expansive program for students with South Shore now in their district (Morrow, 2013). Higher quality teachers can be hired, and, as was the case for Sanborn Central, the potential for brand new, community-led facilities projects can be taken on as well (Whitney, 2013).

It is very clear that good things have happened because of these moves, but how did they come to be successful? The commentary with administrators reveals very similar stories: patron engagement is crucial, and cooperation with the State and with key education agencies (e.g., ASBSD) will ensure success for any reorganization, consolidation, or dissolve and attach plan. As is found in the interviews, making the effort to inform constituents and make them feel a part of the plan can go a long way in not only making the process of consolidation smooth, but also in building a foundation for a future together as one school district.

There remain significant inhibitors to the passage of a consolidation attempt, however. As is evident in the interviews, political will is important. Whitney (2013), who has experienced two failed consolidation attempts, cites the very opposite of what encouraged consolidation as what denied both consolidation attempts: false information sharing and an outpouring of pride in remaining a singular community. Bailey (2013)
observes similar ideologies in the opponents to the Bridgewater-Emery consolidation, noting that attitudes of previous athletic rivalries were a key part of the justification as to why the schools should not join.

The politics of small town life may appear as parochial reasoning for choosing not to consolidate, but there are also legitimate reasons why two districts may not merge. Enrollment was cited by Whitney (2013) as one reason why Sanborn Central does not yet consolidate, as class sizes in a merger would rise above 30 students. This would leave the new school district with needs for a brand new building, not long after new facilities were built in Forestburg.

More consistently, the size of a merged district and resulting transportation costs may discourage consolidation. In nearly every interview, consolidation in the near future was not necessarily in the cards, except for Sanborn Central. Schools did not foresee any consolidation in the near future because the school building of the nearest neighboring district was a significant distance away. In addition, a potential merger would create a district so large that patrons on the most outlying parts of the district would be more likely to annex their land to a neighboring district and travel a shorter distance to that district’s attendance site. Schools do not necessarily have to be geographically isolated for this to be a reality. Most of these schools do not receive any sparse school funding from the state, meaning that the state government does not formally recognize them geographically isolated districts.

In summary, there are very clear factors that encourage consolidation, many of which are congruent with the quantitative results of this paper (e.g., enrollment). Most interesting, though, was the succinct statement given by Jason Bailey (2013):
“consolidation should really be taken on a case-by-case basis.” What he means is that with all of these significant factors present, the way they may be presented in the case of specific school districts or consolidation scenarios is unique every time. No two consolidations, reorganizations, or dissolutions are the same, as these interviews prove. Thus, it is important not to develop generalizations about whether or not consolidation is good, bad, or otherwise. Consolidation is an individual decision and should be treated as such.
CHAPTER SIX

Conclusion

In the Introduction of this thesis, a research question is posed: does the current K-12 funding formula have a significant effect on small school consolidation in the state of South Dakota? Based upon the quantitative and qualitative analyses, the study does not find overwhelming evidence that the state’s funding formula is a significant factor in consolidation. However, funding remains a crucial element for school district survival and does not preclude the funding formula from having an effect on consolidation.

A far more powerful force in the decision to consolidate is enrollment, something deemed highly significant both statistically and practically. Each school administrator agreed that enrollment as the driving force behind each consolidation attempt they have experienced. Other important factors that may persuade districts to consolidate include financial incentives and more desirable curriculum and program offerings. These incentives include state-awarded consolidation incentives or increased fund availability due to cost-cutting. The most common dissuading factor is the high burden of travel for students on the outlying edges of the district. This may suggest that the resulting, merged district may be too large to justify a consolidation.

What can be gained from this study on consolidation? First, it is apparent that a full understanding of available state resources and collaborative tools is useful for a successful consolidation attempt. This understanding is helpful not just for school administrators seeking to lead their districts through the consolidation process, but also
for policymakers seeking a better understanding of how schools operate before and after consolidation.

Second, intangible factors produce a multitude of marginal effects on consolidation that cannot be measured by statistical approaches. The scope of outside effects on the decision to consolidate is far beyond what this paper can study. Effects can be felt from tax policies, Federal education policies, rural economic climates, in-group politics, political will, individual community values regarding education, and so on. While it is indeed frustrating that quantitative analysis can only go so far in studying the factors leading to consolidation, the large scope of intangible effects only emphasize further the rationale for the phenomenological approach used in this paper.

Third, consolidation should not be labeled as something inherently good or bad. The decision to consolidate in the state of South Dakota and around the country is something that must be viewed on a case-by-case basis. It is important to understand what common factors play into consolidation scenarios around South Dakota while also knowing that each consolidation, reorganization, or dissolution is unique for each community.

In closing, this quantitative and qualitative analysis shows that the state’s foundation program for K-12 education is not a primary factor in the decision to consolidate. However, enrollment, the basis on which the formula is augmented, is the most significant factor that leads to discussions of consolidation, reorganization, or dissolution. Although no normative policy prescriptions are given in this paper, both quantitative and qualitative analyses suggest that a funding formula using enrollment as the key factor in need calculations may encourage consolidation of small school districts.
over time. This is especially true if sparsity policies such as the Small School Adjustment are insufficient to adjust for economies of scale in rural education. Most importantly, however, it is necessary that a ‘one-size fits all’ approach to consolidation is never applied, and that time is taken to understand the unique demographics of individual districts and consolidation scenarios. This way, a true quantitative and qualitative approach to consolidation may come to life and improve decision making for all parties involved.
APPENDIX A

Sample of Consolidation/Reorganization/Dissolution Interview Questions

- Please explain which school districts were involved in the merger, reorganization, or dissolution plan?
- When did your districts consolidate?
  o Check or verify enrollment before and after, for all districts
- What were the main factors that led to these school districts to the decision to consolidate/reorganize/dissolve?
  o Did these factors present themselves in any tangible way?
- Where did the pressure come from to consolidate?
  o What was the most pervasive pressure?
  o Did your district opt-out (verify from list of opt-outs) before the consolidation?
- Were there active proponents? Opponents? What was the logic of their arguments? Alternatively, what were the key components of the campaign for the consolidation? Against?
  o Were there any publications or documents used to support the consolidation? If so, can I get access to them? Who was behind this effort?
  o Opposition?
- What process did the districts have to go through in order to reach the end goal of consolidation/reorganization/dissolution?
  o Follow-up: Did the process itself have any significant effects on the districts involved?
- What were these effects have any bearing on how the decision was made and implemented? In other words, were these effects significant enough to change any part of the decision or process?
- What was your role throughout this entire process?
- In your view, what was the most significant factor in leading to consolidation/reorganization/dissolution?
- What have been the results of consolidation?
  o Any effects on enrollment other than those assigned/designated to your district?
  o Have there been any effects on standardized test scores?
  o Have graduate rates changed? (number of grade 9 enrollees who were graduated four years later)
  o Standardized test scores sometimes tell a part of the entire picture – what other effects are there?
    ▪ Curriculum changes made as a result?
    ▪ Busing changes
    ▪ Increased or decreased expenditures, changes in efficiency, etc.
  o Participation in school board elections – different new districts have higher/lower turnout, opt out elections, decreasing support for opt-outs, etc.
  o Changes in hiring policies, financial stability, athletics, program offerings, etc.
  o Changes in school/community pride or identity
- Looking at the numbers, (explain significant effects and what the data on their particular school district means). The regressions run on our data tell us that (these factors) are significant contributors to consolidation. Do you find this accurate?
- Did the numbers shown on your school district (predicted value for y-hat, statistically significant variables) match up with the main factors leading to your consolidation/reorganization/dissolution?
Sample of Sparse School District Interview Questions

- What is the distance between you and the nearest neighboring high school? Nearest school district?
- How much land area does your district cover?
- Please explain any benefits or difficulties for your students and their families that comes with your designation as a “sparse” school district. (e.g., travel)
- How have the factors that play into being a “sparse school district” (e.g., distance from nearest district, size of district, etc.) affected your ability to operate?
  o How has the bussing policy changed for such a large district?
  o How does your physical location affect ability to maintain programs, attract teachers, etc.?
- The state’s “sparsity factor” has only been around since 2007. How did this recognition of your district’s sparse local with cash inflow aid your district’s ability to operate?
  o To what extent does this additional funding meet all of the costs that can be attributed with operating a sparse school district?
- To what extent has your location limited the school district from implementing a program, curriculum, schedule, etc.?
  o Follow-up: How does your location affect your hiring decisions, test scores, athletics, well-being of students?
- Looking at the numbers, (explain significant effects and what the data on their particular school district means). The regressions run on our data tell us that (these factors) are significant contributors to consolidation. Would you agree or disagree on the significance of these contributing factors? Please explain.
### APPENDIX B

County-Level Census Data

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Source: US Census Bureau (July, 2013)
APPENDIX C

Tables - Correlation of Variables Collected

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