SPECIAL EDUCATION FINANCE IN MICHIGAN: IMPLICATIONS FOR EQUITY

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ABSTRACT

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In this dissertation, I seek to understand encroachment within school finance, wherein school districts must divert unrestricted, general education revenues to compensate for unfunded, mandated special education costs. I claim that encroachment in itself is not an issue – special education students should be funded, and it is fair for local school districts to contribute to that funding – but rather that inequities in encroachment lead to significant disparities in the financial burdens school districts face. As encroachment requires districts to divert dollars that would otherwise be spent on general education services, inequities in encroachment affect not only special education students, but general education students as well.

Research on encroachment is limited, and this dissertation adds to the literature by (1) measuring encroachment within Michigan public school districts and describing trends over a seven-year time span; (2) tying policy and district characteristics to encroachment; (3) investigating funding approaches as potential encroachment equalizers; and (4) looking for trends in districts' expenditure responses to encroachment.

To make the first contribution, I create a novel panel dataset which brings together federal, state, and newly gathered local special education revenues. I then run standard OLS regressions of the novel encroachment measure on a range of policy and district characteristics to identify potential predictors. To look at potential funding policy solutions, I simulate flows of special education revenues to local districts under varying assumptions and calculate a measure of equity for the resulting encroachment. Lastly, I identify and estimate a two-way fixed effects

regression model to determine if there are systematic patterns in how districts reorganize expenditures to make up for unfunded, mandated special education costs.

I show that encroachment has remained relatively constant at the state level over time, with statewide encroachment fluctuating around $700 million annually from 2013 to 2019. I note, however, that encroachment varies substantially between districts, with many districts having more than enough special education revenues to cover costs. Simultaneously, dozens of school districts must necessarily divert over $1,500 per general education student to compensate for insufficient special education revenues. Of note, Michigan's charter schools experience, on average, less than half of the encroachment faced by traditional public schools.

The ability of an intermediate school district (ISD) to generate local revenues is significantly tied to the encroachment faced by its constituent local districts. I find that ISDs with higher allowable special education millage (tax) rates, higher willingness to pay those taxes, and higher property values on which to levy those taxes have lower levels of encroachment, on average. I also highlight notable differences between encroachment's contributing factors within traditional public schools and charter schools.

I show that, in general, ISDs would improve equity in the encroachment faced by their constituent local districts by distributing their available revenues based on each local district's share of special education costs within the ISD.

Lastly, I attempt to find systematic patterns in district's reorganization of expenditures when faced with encroachment. I find no such patterns, which suggests districts consider current budgeting needs when diverting resources to meet special education funding requirements. With this finding, along with the others, I develop a foundation on which state and local policymakers can draft equity-enhancing financial policy.

For Hammu, always by my side.

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For years I have looked forward to writing this section – to having a relatively grand opportunity to give credit to all those who have gotten me here. Now that I have the opportunity, I struggle to know where to begin. Though my name is on the front of this dissertation, it is truly the cumulative effort of so many people – family, friends, colleagues, teachers, advisors, and others – all of whom have shaped me into the scholar I am today. I owe so much to so many, and I hope here to take steps forward in doing so.

I often look for opportunities to promote the fact that teachers are the most important in-school factor for a child's success. While we read about this throughout our coursework in the education policy program, it is one of the few things I already knew because I had lived it. Were it not for Mrs. Nasson in Ludington High School – Amber, as I'm now "supposed" to call her – I would not have the passion for learning that I do today. She introduced me to economics and policy, but more importantly pushed me to learn and to keep learning. Whether it was the Greek alphabet, the definition of *gerund*, or international currencies, she taught me to be excited to things I may otherwise push to the side. I carry that excitement – and most of the tidbits – with me today, and I will be forever grateful.

I have been blessed numerous mentors and advisors who kept me on track during my nine years at Michigan State. In my undergraduate studies, Laurie Thorp showed the importance of caring for the world around you, giving grace to all, and, of course, to think outside of the box. When I needed guidance, whether that be in coursework, life, or entering the real-world after graduation, Sandi Hewitt Dean was there to offer it. To Scott Imberman, you not only pulled me into the world of education studies, but you taught me to love research and recognize its ability

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At the end of my third year in the education policy program, I made a difficult decision to switch the focus of my research. I loved what I was studying, but a nagging voice in my head kept directing me back to a project I had contributed to a year prior in David Arsen's school finance course. Two years later, I am submitting a dissertation on special education finance. Over those two years, David pushed me to think about policy in the real world, have more confidence in my abilities and my research, and, to my chagrin, be less chatty. While the following 100-plus pages may be chattier than you'd like, I have made incredible strides in my thinking and my confidence, and from the bottom of my heart, I thank you.

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I am not hesitant to share that this past year and a half has been grueling. Writing this dissertation is one of the most stressful—though most rewarding—experiences I have had. Through it all, I have been fortunate to have by my side (sometimes virtually) Kailey Chema, who has given me love and support each and every day. Even when I was at my grumpiest, she would listen and assure me I would get through it. She has put up with a lot, and I am forever grateful. Kailey, thank you for truly being my partner—my one true bb.

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Chapter 1: Introduction

With the passage of the Education for all Handicapped Children Act in 1975—later reauthorized and renamed the Individuals with Disabilities Education Act (IDEA)—the federal government enshrined the right to an education for all children with special education needs. The purpose of IDEA is "to ensure that all children with disabilities have available to them a free appropriate public education that emphasizes special education and related services designed to meet their unique needs and prepare them for further education, employment, and independent living" (20 U.S.C. § 1400(d)(1)(A)). The law also requires that these services be provided regardless of cost, simultaneously providing a goal for Congress to fund up to 40 percent of special education needs. However, the federal government has never authorized funding at that level, typically only funding between 10 and 15 percent (Griffith, 2015).

This leads to an uncomfortable problem—schools are faced with a federal requirement to provide a specified level of services to special education students, but they are not given sufficient federal resources to do so. While different states approach the problem through many different funding strategies, it is often the case that school districts are left with a financial shortfall and must come up with the resources necessary to meet IDEA requirements on their own. Some research has been done on this shortfall, with evidence suggesting that districts must use their unrestricted, general education dollars to supplement insufficient state and federal funding of special education. Termed encroachment (Goldfinger, 1993), this reliance on local funding leads to inequities not only for special education students, but for general education students as well (Arsen, Delpier, and Nagel, 2019).

The implications of this encroachment have been studied, but only minimally. For instance, it was identified in California as early as the 1990s (Goldfinger, 1993). Lankford &

Wyckoff (1999) described structural conditions for its growth, and its implications for equity have begun to enter both public and academic spheres (*e.g.,* Special Education Funding Subcommission, 2017; Conlin and Jalilevand, 2018).

The presence of encroachment is not inherently a problem, for encroachment can be seen as local districts' share of special education funding. It is perfectly reasonable for local districts to bear some responsibility for the cost of special education services, particularly when considering the incentives to overidentify special needs in a fully funded system. Consequently, the problem in not encroachment *per se*, but rather the inequitable distribution of encroachment – especially when already-disadvantaged districts experience higher levels of unfunded costs (*e.g.,* Conlin & Jalilevand, 2018).

In this dissertation, I build on the burgeoning encroachment literature with a focus on encroachment's equity implications. I combine state and federal school finance data, along with a unique dataset of local special education revenues, to create a novel panel covering all special education revenues and costs for each local school district in Michigan from the 2013 to 2019 fiscal years. In doing so, I present a detailed picture of the encroachment school districts have faced and analyze differences in encroachment both among districts and over time. The creation of this dataset is in itself an important step in our broader understanding of encroachment as a phenomenon. Given the range of revenue sources and fungibility of resources, acquiring the necessary data to measure encroachment is a difficult process. The initial contribution of this dissertation, then, is the development of the most accurate measure of encroachment to date for the majority of Michigan school districts in a seven-year panel dataset.

Research Questions

I use this panel to address a series of questions targeting the relationship between encroachment and various school district characteristics, potential funding approaches to mitigate encroachment inequities, and how districts might modify their expenditures when experiencing encroachment.

Specifically, I ask the following research questions:

1. How has special education encroachment in Michigan school districts changed over time, and how are select policy conditions and various district characteristics associated with encroachment?
2. What is the impact of ISD special education millage allocation policies on the distribution of district-level encroachment?
3. How do school districts reallocate dollars when faced with encroachment?

To answer question one, I run standard OLS regressions to establish the potential relationships between encroachment and policy variables or district characteristics. I answer question two by simulating local district encroachment under various hypothetical ISD funding distribution policies. For this question, I calculate measures of equity to determine whether any formula for distributing ISD revenues can better equalize the burden of encroachment among school districts. For question three, I specify a two-way fixed effects model to determine whether there are systematic trends in the expenditure modifications districts undertake when encountering encroachment.

The answers to these questions, along with a deeper understanding of encroachment, are paramount as school budgets become increasingly constrained. Furthermore, as education policy becomes increasingly oriented around providing equitable access to educational resources,

school finance must play a central role. Special education finance is only one piece of that role, but due to the mandatory nature of funding special education, it is one that impacts the broader school finance system.

Additionally, inequities in special education finance may exacerbate pre-existing inequities within education more generally. For instance, Conlin & Jalilevand (2018) show that encroachment tends to be higher in lower-wealth districts, primarily due to having generally higher concentrations of special education students. Districts that are already struggling financially, then, must devote higher levels of their general education dollars to special education services, leading to an even further reduction in their general education funds.

Lastly, special education finance is beginning to enter the litigation limelight, and if school districts and those entities funding them are in the courtroom, attention is necessarily being drawn away from where it is needed most – the classroom. In 2020, Flint Community School District argued in court that the formula its intermediate school district (ISD) used to distribute ISD special education revenues was inequitable, and that the district was facing an undue financial burden as a result. In the end, their case was successful, and Genesee ISD was directed to modify its funding formula to establish greater equity in the encroachment burden among its constituent local districts. In the wake of this case, other ISDs may wonder if they might face similar litigation. One means to avoid additional litigation would be for the state to provide guidance on how ISDs should allocate their special education revenues, but currently no empirical evidence exists on which the state could base such guidance. This work begins to establish that base.

Chapter Organization

The remainder of the dissertation is organized as follows. Chapter 2 reviews the extant literature on encroachment and related research. Chapter 3 describes the dissertation's data and methods, beginning with the measurement of encroachment and then working through each research question. Chapters 4, 5, and 6 present the empirical findings for each of the study's three research questions, respectively. Chapter 7 provides an overview of the findings, considers their policy implications, notes limitations of the study, and outlines promising future work.

Chapter 2: Literature Review

Encroachment

Depending on a state's particular special education funding policies, state and federal revenues may fall short of meeting the cost of providing special education services. As a result, school districts are often faced with encroachment—dollars diverted from a district's general fund to supplement insufficient special education revenues. For instance, Lipscomb (2009) showed that 38 percent of the costs for students with disabilities in California were not covered by federal or state aid, leaving school districts to pay for those excess costs with general purpose funds. Consequently, inadequate special education funding may impact general education students as well. It is unclear how encroachment impacts districts, as no work has been done analyzing how districts respond to encroachment, including what expenditures are reduced or eliminated to compensate for special education spending.

Special education encroachment has been identified in the literature since at least the 1990s, when Paul Goldfinger (1993) notes that upwards of 25 percent of special education revenues in California were necessarily taken from districts' general education funds. Following that work, Murphy and Picus (1996) describe the equity issues resulting from encroachment, also in California. They note that "[e]ncroachment occurs when total expenditures for a school district's categorical program exceed the level of state funding" (Murphy and Picus, 1996, p. 367). Lankford and Wyckoff (1999) add to this, noting that as revenues become constrained, encroachment on regular education funds will increase.

Empirical estimates of encroachment are limited, and the bulk of the research is 20 or more years old. For instance, Cullen (1997, p. 49) concludes that "special education mandates redistribute funds from regular education students to special needs students." Thomas Parrish

(2001) finds that rising special education costs have no deleterious fiscal effect on general education, which has been taken to suggest the absence of encroachment. However, this claim is based on the fact that general education spending increased along with increasing special education costs, albeit at a lower rate. However, this finding does not imply an absence of encroachment. In fact, Parrish (2001) shows that the share of special education revenues coming from local sources had increased significantly over the previous two decades. Additionally, even if encroachment was a non-issue at the turn of the century, increasingly constrained budgets give reason to predict that encroachment is a more serious problem today.

Using data from 2004 through 2010, Conlin and Jalilevand (2018) attempted to find the extent of encroachment in Michigan, identifying an average district-level encroachment of $1.36 million, or about $11,000 per special education FTE. To calculate encroachment, the authors use data from the State of Michigan's Financial Information Database (FID). While the FID is generally a sound financial data source, given it is based on audited reports of local and ISD revenues and expenditures submitted to the state, two main issues arise. First, there is a lack of consensus regarding which FID reporting categories are or should be used to account for special education expenditures. Not all intermediate school districts (ISDs)—county-level education governance—apply the same codes to report their special education expenditures. Second, some expenditure categories within the FID include both special education and general education spending, which the FID cannot expressly distinguish. Consequently, the FID lacks precision for measuring special education costs (through expenditures). These challenges do not arise in using the FID to account for federal special education revenues.

More recently, states have begun to conduct formal investigations of encroachment. For instance, California's Legislative Analyst's Office estimated district-level encroachment for the

2017-2018 school year, noting that approximately $10,000 of the nearly $27,000 necessary to educate the average special education child came from unrestricted local dollars (Petek, 2019). In November of 2017, Michigan's Special Education Funding Subcommittee submitted to Lieutenant Governor Brian Calley a report estimating state-level unfunded special education costs of nearly $700 million, or about $11,500 per special education FTE (Koenigsknecht *et al.*, 2017). As encroachment becomes more prominent in policy discussions, it is crucial that rigorous research provide clear empirical evidence on the nature, extent, and consequences of the problem.

It is also important to recognize that potential policy solutions to encroachment will necessarily interact with a range of other policy considerations. For instance, school choice policy is closely linked to school funding arrangements when, as in Michigan, education dollars follow students to the districts and charter schools they attend. There is evidence to suggest that charter schools tend to enroll lower proportions of students with disabilities, though this tendency is fading over time (Citizens Research Council, 2012). As a result, larger proportions of students with special needs are left in their resident district. As general education students opt into school choice programs and leave their resident districts, they take with them their state-allocated funding. This leaves resident districts with higher shares of special education costs and less revenue with which to cover them.

Defining Equity

Given the influence of education on a host of social and economic outcomes, it is important that states develop their education systems—including funding—with conceptions of fairness at the forefront. In education finance, two principles of fairness are prominent: equity and adequacy. While similar, and not necessarily exclusive of one another, states must

understand these concepts if they are to design and implement an education system that supports the success of all students.

Considering equity in special education funding is crucial, since inequities in special education service could reinforce or exacerbate other inequities. For instance, lower socioeconomic status has been linked to low birth weight, as well as to a child's likelihood of being diagnosed with a learning disability (Litt, Taylor, Klein, and Hack, 2005). Furthermore, poverty has been shown to relate to higher disability rates, particularly among more severe conditions. Evidence of this relationship from the special education literature comes from Lipscomb (2009) and Parrish *et al.,* (2003) for California, and from Baker and Ramsey (2010) for Pennsylvania and New Jersey. Finally, Baker and Ramsey (2010) show that background factors collected from census data, including measures of poverty and geographical location, can be used to predict approximately one-third of the variation of populations of special needs students within a district. All of this is to say that inequities already exist along dimensions of social and economic disadvantage, and any inequities vis-à-vis special education funding would only serve to exacerbate already-present issues.

Berne and Stiefel (1984) provide the classic conceptual framework for analyzing school finance equity. They first examine who is considered in the equity framework. While traditionally school finance equity has been centered on students, equity among teachers, taxpayers, or other stakeholders may warrant consideration. They then ask how equity is being provided and what is being made equitable. To answer how equity is being provided, Berne and Stiefel (1984) introduce the concepts of horizontal and vertical equity. Baker and Green (2014) and Baker, Green, and Ramsey (2018) provide insights as to what is being made equitable.

In financing education, states could consider equity in the form of inputs, sometimes referred to as horizontal equity. Berne and Stiefel (1984) defined horizontal equity as the equal treatment of equals. Breaking down horizontal equity further, Baker, Green, and Ramsey (2018) separate equity of nominal fiscal inputs and equity of programs and services. Under the former, a funding structure would provide equal financial resources to each student. Such a system ignores the varied costs of providing education in a particular context to a particular student. For example, the cost of a providing technology to students in a rural school district is likely to be different than in a city district with already-developed infrastructure. Additionally, within the same district, a particular student may need different supports than their peers—something equity of fiscal inputs doesn't account for.

Equity of programs and services tackles one of the considerations noted above. This form of equity provides resources such that every student can receive the same bundle of supports. In this conception of equity, the state takes into consideration variations in the cost of services. Using the example of technology, equity of programs and services would assure both the rural district and city district have the resources necessary to provide the same technology, regardless of differences in cost. However, the individual needs of the student are still not considered until states adopt the conception of vertical equity.

Vertical equity, sometimes referred to as equal educational opportunity or equity of opportunity, provides that the funding tied to students is sufficient to provide "all children across the state equal opportunity to achieve comparable educational outcomes" (Baker, Green, and Ramsey, 2018, p. 3). Or, as Berne & Stiefel (1984) express, vertical equity is the unequal treatment of unequals. Within a framework of vertical equity, students who cost more to reach a given standard are tied to higher funding. While many states consider vertical equity a goal of

their education finance systems, rarely are the additional resources given to higher-needs students enough to realize full equality of opportunity (Baker, Green, and Ramsey, 2018).

More recently, education finance policy has often turned to educational adequacy, a conceptualization of equity that establishes a baseline level of achievement and then provides the resources necessary to reach that adequate level. This assumes efficiency, wherein costs are minimized but still sufficient to achieve the desired outcomes. As Ladd (2008) notes, this does not preclude disparities above the adequate level. So long as students are being provided the supports necessary to reach adequacy, inequities in resources are not issues that need resolution.

Striving for adequacy in a school finance system is a worthy goal, but one that requires answers to important questions. What constitutes an "adequate" education? In the era of accountability, this often comes down to achievement on standardized testing, though states may interpret adequacy differently. After an adequate level of education is determined, how does the state determine the costs of providing these services? To answer this, states must determine the baseline cost for educating a typical general education student, and then identify the additional resources needed to provide adequate service to students with special needs. States must also consider how to measure equity among the outcomes on which adequacy is based. The measurement of equity is crucial and constitutes Berne & Stiefel's (1984) fourth guiding question.

How Much More Does Special Education Cost?

An equitable and adequate education funding system must account for the higher costs of providing services for students with special needs (Duncombe & Yinger, 2008). Researchers have attempted to estimate special education costs, but these efforts raise inherent conceptual challenges. Available estimates of special education costs vary substantially.

One reason special education cost estimates vary is that "cost" is a hypothetical concept. Cost is defined as the minimum expenditures necessary to achieve a desired outcome (Baker & Green, 2018). It assumes that schools are using the most efficient service delivery. By definition, variations in cost across districts are due to factors beyond the district's control, including student characteristics, regional costs, and population density. Measurement of cost is inherently difficult. In most research in the economics of education, cost is based on the assumption that the desired outcome is improved achievement on standardized assessments. However, this may not be a sufficient outcome when assessing special education services, and this complicates the measurement of cost.

To address these difficulties in measuring special education costs, researchers use other measures as approximations. For example, Baker, Green, and Ramsey (2018) dichotomize education cost research as measuring "what is" or measuring "what should be." That is, one body of research—identified in Baker, Green, and Richards (2008) as common methodology—considers current spending on special education services or the summed input costs of *recommended* services to identify actual cost. Alternatively, they note, studies may attempt to estimate the costs of special education services and programs considered adequate for special needs students to achieve some defined measure of success. In both cases, it is important to note that these studies—to be discussed momentarily—use educational spending to estimate costs, which will be overstated unless services are being provided efficiently (Dhuey & Lipscomb, 2013). While neither method can definitively identify true cost, both yield valuable insights, and can, at the very least, give researchers and policymakers estimates to consider.

Extant research paints a mixed picture on the costs of special education needs. To my knowledge, no more recent national evidence exists than the Special Education Expenditures

Project (SEEP) in the early 2000s. The SEEP found that in 1999-2000 average expenditures for special education students were nearly double those for general education students—$12,474 vs. $6,556 (Chambers, Parrish, & Harr, 2004; Chambers, Shkolnik, & Perez, 2003). However, this spending differential varied substantially across states, ranging from 56 to 189 percent higher than spending on general education students (Parrish *et al.*,, 2003). Contemporaneous research falls in line with the SEEP findings, though it highlights a range of dimensions along which excess cost may vary. That is, special education costs vary not only by state, but by features of service delivery as well. Chambers (1999) finds that departmentalized programs—those programs which separate instruction into various departments, typically based on subject—were the least costly, with spending only 1.21 times larger than general education. Non-departmentalized (self-contained classrooms) and external assignments were more expensive, with spending 2.17 and 8.38 times higher, respectively.

Further evidence that additional expenditures on special education vary by setting stems from a host of educational adequacy studies. Dr. John Augenblick has been at the forefront of education finance adequacy studies for several decades. In the first decade of the new century, Augenblick and his associates performed 16 adequacy studies in 14 different states.[1] Relevant here is the fact that the funding weights determined for special education students—the additional funding above base cost funding—varied widely by state. For instance, their 2003 Tennessee adequacy study suggests that students with mild special needs require an additional 48% of the base funding compared to a general education student. Yet an adequacy study for

[1] For a list of adequacy studies conducted by Augenblick & Associates, see Baker, Green III, & Ramsey (2018).

Connecticut in the following year estimated a weight for students with mild disabilities of 1.12 (an additional 112% funding) (Augenblick, Palaich, & Associates, 2003; Augenblick, Palaich, Silverstein, Rose, & DeCesare, 2005). Some of this variation stems from the cross-state variation in outcome expectations and input prices, but it is also important to note imprecision due to methodology. In the majority of their adequacy studies, Augenblick and colleagues use a professional judgment approach, wherein experts come together to identify the costs of various programs and services. Different professionals may make different judgments, and thus the costs identified in professional judgment studies must be considered somewhat subjective.

In sum, the identification of the additional costs necessary to provide programs and services to students with special needs is difficult, but not impossible. By using expenditure data to identify what schools are spending on special education, previous research has approximated cost with the conclusion that special education students require resources above and beyond those in general education programs. Adequacy studies have come to the same conclusion, bringing together panels of education experts in an effort to determine cost. It is also clear that the additional costs of special education will vary by a range of factors, including regional cost adjustments and the means of service provision.

How do States Fund Special Education?

Though funding formulas are often complex, Ahearn (2010) identifies six primary structures, with two additional categories for states that have no separate special education funding, or that explicitly use a combination of formulas. She partnered with the American Institutes for Research to develop and administer a survey to state leaders regarding their special education finance policies. Likewise, Verstegen (2011) administered a survey to chief state school officers, collecting information on special education finance as part of a study of

education finance more broadly. More recently, the Education Commission of the States (ECS, 2019), by scanning state laws, compiled a list of all states and how they fund special education. Using the typology presented in Ahearn (2010), as expanded upon by ECS (2019), this section will review the various special education finance policies states currently employ.

In addition, this section will note the various incentives (or disincentives) present in given funding approaches. Each system presents districts with a set of financial considerations to take into account when identifying and offering services provided to special education students. In other words, the relationship between funding systems and district practice is complex, and how districts approach special education may vary with the approach states take to fund it (Mahitivanichcha & Parrish, 2005). For example, Cullen (2003) shows that fiscal incentives explained nearly 40 percent of student disability rates in Texas during the late 1990s. Concern that special education funding arrangements may create incentives for schools to over-identify students with disabilities has led nearly half of all states to include a cap on the special education funding a district can receive (Needham & Houck, 2019). When considering how to fund special education, then, states must necessarily consider how districts will respond to the policies put in place.

I focus here on funding systems' incentives regarding the identification and classification of students with special needs, as well as the level of services provided to meet those needs. It is not clear what the actual underlying rates of special education needs are among student populations. When researchers analyze changes in special education identification rates or changes to the services offered to special needs students, they cannot state whether those changes are toward or away from the "true" need. Additionally, IDEA requires school districts to provide the services identified as necessary to offer a free and appropriate education in the least

restrictive environment, so these incentives must necessarily be considered on the margin—those identification or service decisions for which the needs are more ambiguous or subjectively determined.

Weighted Funding Formulas – Single or Multiple Student Weights

The most commonly used approach to funding special education is to assign special education students an additional funding weight, which augments the resources provided in the base funding level. Some states' weighted funding formulas include a single weight for all special education students, while others include multiple weights calibrated to the severity and cost of different disabilities. Of the 27 states that use a weighted student formula, 16 use multiple weights and 11 use a single weight for all students with disabilities (ECS, 2019). The use of weighted student formulas is not unique to special education and can be more generally implemented on the assumption that external characteristics inherently affect the resources a district would need to meet a given standard (Sonstelie, 2007).

Under a weighted funding formula, districts may be incentivized to identify or reclassify needs into categories weighted more heavily in the formula. Of course, this would only apply under a system with multiple weights, and only for cases in which identification or classification can reasonably belong to multiple categories. States looking to combat such an incentive could apply weights only to the portion of a student's day for which they receive special education services. Additionally, incentives are closely tied to the weights identified in the system. As weights increase for a given needs category, districts would have larger incentives to classify students as such, particularly if the funding tied to the weight exceeds the costs necessary to provide the services.

Census-Based Funding

Under a census-based special education funding formula, financial resources are provided based on total enrollment, regardless of special education needs. In taking this approach, states assume that the additional costs to meet special education needs are distributed approximately uniformly across districts (Dhuey & Lipscomb, 2013). While the evidence that suggests this assumption is questionable—or plainly false (see Parrish *et al.*,, 1998, 2003; Baker & Ramsey, 2010)—a census-based approach does offer appealing features.

First, a census-based funding system is simple, and with that transparency is easy to maintain. Because funding is based on a discrete, measurable factor—student enrollment—there is little subjectivity in the distribution of funds. Supporters of census-based funding also argue that it encourages cost stabilization, incentivizing districts to not overidentify the needs of their special education population (Chambers, Parrish, and Hikido, 1996). With a disincentive to overidentify, and without knowledge of true needs due to the ambiguity of need and subjectivity of some classification, census-based funding gives school districts an incentive to underidentify special needs.

On this the evidence is abundantly clear: disability identification rates fall following census-based policy reforms (Greene and Forster, 2002; Mahitivanichcha and Parrish, 2005; Dhuey & Lipscomb, 2011; Kwak, 2010). Comparing nine states with census-based funding systems to other states with a different finance policy, Dhuey and Lipscomb (2011) link census-based reforms to a 10% reduction in special education identification rates. They find it particularly acute with respect to subjectively diagnosed categories (Dhuey & Lipscomb, 2011). More specific evidence comes from California, where Kwak (2010) found a decrease in special education classification following their 1997 policy shift to a census-based funding system.

Cost Reimbursement

A cost reimbursement funding system is precisely what it sounds like – school districts submit their special education costs to the state, which then reimburses the district for a portion or all of that cost. Seven states currently employ a cost reimbursement model of special education finance, with reimbursement rates ranging from approximately 25 percent in Wisconsin to full reimbursement (100 percent) in Wyoming. Michigan falls near the bottom of the seven states' reimbursement rates at just over 28 percent, with additional funding for transportation.

The incentives present under a system of cost reimbursement are largely dependent on the rate at which the state reimburses special education costs. For instance, in a state that reimburses districts for 100 percent of their additional special education costs, a district may be more willing to offer higher cost services on the margin. That is, when decisions on identification or service provision have subjective elements, higher reimbursement rates can encourage higher-cost offerings. Conversely, in a state which reimburses a smaller fraction of costs, and thus districts would be faced with a higher bill, incentives would lead districts to choose lower-cost services where available.

Resource-Allocation

A resource-allocation funding system of special education can be seen as targeting the goal of equity of programs and services, as presented in Baker, Green, and Ramsey (2018). In such a system, funding is based on the payment necessary for a specific set of education resources (*e.g.,* teachers, assistive technology), and can be guided by student need as it varies among students (Ahearn, 2010).

Seven states provide special education funding based on the resources necessary for a pre-determined basket of services. The services vary by state but are often centered on the provision of qualified teaching staff—of the seven states, five base their resource allocation on personnel. For instance, Delaware's allocations are based on prescribed teacher-student ratios—8.4 students per basic special education teacher in grades 4-12. Illinois and Vermont use similar formulas, providing for one full-time equivalent (FTE) teaching position for every 141 special education students and 9.75 special education teaching positions per 1000 students, respectively (ECS, 2019).

The basis on which states formulate their resource-allocation approach to funding special education will be tied directly to the incentives districts face. In cases where the bucket of resources funded by the state is equal to or—though unlikely—exceeds the cost for providing those services, districts would have an incentive to overidentify their special needs population. However, most resource-allocation models are based on the provision of personnel for special education needs, and assume—aside from Delaware—relatively large caseloads. In a state like Illinois, where the resources for one FTE special education teacher are given for every 141 identified special education students (on an FTE basis), the resources given to districts are likely below the costs necessary to provide for those needs. This may lead districts to underidentify, identify lower-cost needs, or potentially seek out less expensive teachers given restricted revenues from the state.

Block Grants

Only one state—Utah—utilizes a block grant funding program to finance special education. Under a block grant system, the state simply gives districts a grant to spend on special education services. The amount of the grant is often derived from base- or prior-year allocations,

revenues, and/or enrollment (Ahearn, 2010). In the case of Utah, grant allotments are based on a five-year average daily membership, also adding in a growth factor to account for rising costs (ECS, 2019).

The incentives presented in a block grant fiscal policy are similar to those mentioned in the discussion on census-based programs but are slightly weaker due to funding being tied directly to special education students. The block grants, at least as they are put into practice in the U.S., do not necessarily take into consideration varying student need, and are instead based on a special education membership count. In this situation, districts have an incentive to identify special education membership, but minimize expenditures, to capitalize on the flat grant provided. As such, districts may be likely to identify low-cost disabilities, or in the case of objectively high-cost needs, find lower-cost means to provide services.

Special Education Funding in Michigan

Special education funding in Michigan has its foundations in the 1990s, when the state put into law Proposal A, and the courts handed down a ruling in the *Durant* cases (*Durant v. Department of Education*, 186 Mich. App. 83, 463 N.W.2d 461 (Mich. Ct. App. 1990)). Proposal A transferred most responsibility for school operational funding from local districts to the state in an effort to mitigate inequities inherent in a locally funded system. Instead of local voters deciding on property tax rates to fund area schools, the state requires all districts to approve an 18-mill tax on non-homestead property, generating the local contribution to the state's *foundation allowance*—a per pupil appropriation that serves as the core of education funding under Proposal A. The *Durant* ruling, on the other hand, pertains specifically to special education funding. Prior to the decision, Michigan reimbursed districts for roughly 22 percent of special education costs, with the state's share of special education payments declining following

a constitutional amendment in 1980—the Headlee Amendment—limiting property taxes (Seilke and Russo, 1999). Instead, *Durant* required the state to reimburse school districts for 28.61 percent of their approved special education costs, and 70.42 percent of approved transportation costs—the level of reimbursement the state was providing prior to the passage of the Headlee Amendment (Seilke and Russo, 1999).

Michigan is one of six states to use a percentage reimbursement system for special education funding. The reimbursement rate—28.61 percent of approved special education costs and 70.42 percent of approved special education transportation—is among the lowest in the nation, comparable only to Wisconsin whose rate fluctuates between 25 and 30 percent pending appropriations. State-specific policy considerations in Michigan lead to special education finance becoming more complicated than simple reimbursement.

First, Michigan is the only state that provides services to students with special needs from birth to age 26. Federal law only requires special education to be provided until age 22, so Michigan will necessarily bear increased special education costs for those additional four years. Second, the state counts its funding of special education students' basic foundation allowance toward its roughly 30 percent reimbursement of special education costs. If the state's share of the foundation allowance exceeds the *Durant* obligation, the state considers its funding obligation met and special education students receive no additional state funding. In cases where the foundation allowance falls short of the state obligation, the state reimburses districts up to the obligation.

The state also makes its funding decisions based on three additional considerations. First, a certain subset of special needs students—*e.g.*, those in residential childcare institutions, those

assigned by a court-placement program—receives full reimbursement from the state.[2] These students account for a very small fraction of the special needs population in the state and thus do not require a substantial appropriation. Second, the state has a minor hold-harmless provision for cases in which the state's *Durant* obligation to the district would be less than the allocation given to that district in the 1996-97 school year—the year prior to *Durant* taking effect. This provision accounted for $1 million in the 2019-20 school year. Lastly, the state provides for a small tax base equalization program to support ISDs with very low property values, and thus low ability to raise revenues. While the average taxable value per pupil in the state is over $250,000, the tax base equalization program set the guaranteed base at just over $200,000 for the 2019-2020 school year. As a result, only 13 ISDs receive equalization funds, with over 60 percent of those funds going to one ISD (Arsen, Delpier, and Nagel, 2019).

These policies contribute approximately 30 percent of the revenues necessary to cover special education costs. When this is combined with a federal contribution of about 10 percent, local districts must fund the remaining 60 percent of special education costs. Yet Proposal A prohibits local districts from levying operational millages to raise revenue. This leaves districts with three revenue sources to cover the cost of required special education services: their ISD, their general fund revenues, or their available fund balance.

Intermediate school districts in Michigan are permitted to levy a property tax for the purpose of funding special education. However, the amount raised by these taxes is highly inequitable for two reasons. First, property values vary widely across ISDs, ranging from roughly $150,000 per pupil to over $600,000 (Arsen, Delpier, and Nagel, 2019). This means that, to raise the same special education revenue, the lowest taxable value ISD would have to levy more than

[2] For a description of the students eligible for full reimbursement, see MCL 388.1653a

four times the millage rate of the highest taxable value ISD. Additionally, even if an ISD's constituents wanted to tax themselves at a higher rate, the rate at which an ISD can tax is capped arbitrarily based on an ISD's special education millage rate in 1993. ISD special education millage rates cannot exceed 1.75 times the rate they levied nearly 30 years ago.

For the vast majority of Michigan school districts, special education revenues from federal, state, and ISD sources are insufficient to cover the costs of special education services. Unable to raise local revenue, most districts divert general education funds to meet IDEA mandates. This problem was greatly exacerbated over the last two decades by a sharp decline in Michigan's overall school funding. Between 2002 and 2015, total inflation-adjusted funding for Michigan's K-12 schools declined by 30 percent—the sharpest decline for any state over that timespan (Arsen, Delpier, and Nagel, 2019). This decline was primarily the due to a large decline in tax effort.

There remains much we don't know about encroachment in Michigan. We know that, in the 2016 fiscal year, statewide encroachment was approximately $700 million (see Koenigsknecht *et al.*, 2017), but we do not know how – or if – that number has changed over time. We also know that less affluent Michigan districts tend to experience higher levels of encroachment when compared to their wealthier counterparts (Conlin & Jalilevand, 2018). What factors help predict encroachment, potential policy solutions, and how districts respond to encroachment remain unexplored. This dissertation seeks to fill those gaps.

Chapter 3: Data and Methods

This chapter begins by restating the goals of the dissertation. I then outline the conceptual measurement of encroachment, and subsequently detail the dataset used in that measurement. Following this, I provide the methodologies used to address each research question.

In this dissertation, I seek to answer three primary research questions:

1. How has special education encroachment in Michigan school districts changed over time, and how are select policy conditions and various district characteristics associated with encroachment?
2. What is the impact of ISD special education millage allocation policies on the distribution of district-level encroachment?
3. How do school districts reallocate dollars when faced with encroachment?

The answers to these questions are predicated on the accurate measure of encroachment, defined as those unrestricted, general education dollars districts divert to special education programs and services. Because of IDEA regulations, any unfunded special education costs must be funded by the local school district, and thus encroachment can be measured as that excess cost. I define encroachment as shown in Equation (1):

$$(1) \qquad E_{it} = \Sigma C_{it} - \Sigma R_{it}$$

Encroachment in district *i* in year *t* is given by subtracting the sum of special education revenues, ΣR_{it}, from the sum of special education costs, ΣC_{it}. I measure encroachment both in gross terms and per general education pupil. As excess special education costs encroach on the funds which would otherwise be used for general education services, per pupil measures should only include the population which would otherwise benefit from those dollars. In essence, this

can be seen as how many dollars' worth of goods and services each general education student would receive if special education were fully funded by dedicated special education revenues

With these encroachment estimates, I show several trends. I first show patterns in statewide encroachment over the 2013-2019 fiscal years. Then, for the most recent fiscal year, I demonstrate how encroachment is distributed across Michigan school districts. Lastly, I describe differences in encroachment between Michigan's two primary education sectors: traditional public school districts and charter schools. Prior to doing so, I outline the process through which those measures were created.

Dataset Creation

The study relies on both financial and administrative data from several sources. The database combines federal, state, and local financial data with district-level, state administrative data to create a novel panel dataset covering the 2013-2019 fiscal years.

Financial data pertain to three revenue sources: federal, state, and local. Federal special education revenues come from the Financial Information Database (FID), which shows any federal revenue that school districts spend on special education services. Since the federal revenues districts receive are directly attached to costs of service provision, I generate a measure of "federal" special education costs that are not included in other cost measures.

The FID also includes detailed measures of district expenditures disaggregated by functions and objects, such as instructional support services, facilities, added needs instruction, and others. These data are used to determine how districts reorganize expenditures when burdened with encroachment.

I collect the special education revenues that each district receives from the state by using the Michigan Department of Education's State Aid Financial Status Reports (SAFSRs). These

reports constitute receipts of payment from the state to each district and ISD, with payments separated by the section of school aid statute to which they pertain. This allows me to isolate all of the dollars that a school district receives from the state to be used for special education. Special education costs incurred by the district are also reported on the SAFSRs, though note these constitute only state-approved costs, under which not all special education expenditures fall. As a result, and even after including federal costs from the FID, my measure of special education cost is likely to be an underestimate, potentially leading to an underestimate of encroachment.

Local revenues come in the form of special education millage revenues levied by a school district's intermediate school district (ISD) or regional education service agency (RESA / ESA)– throughout the work I will use these terms interchangeably. As a reminder, each ISD may levy a special education millage, or tax, equal to no more than 1.75 times that same millage levied in 1993. Previous research has estimated these revenues. My work takes a step forward by gathering these revenue data directly from ISDs. In February 2021, I provided each ISD with a form in which they could identify those special education millage revenues distributed to local school districts for all fiscal years in this study. Of Michigan's 56 ISDs, I received local special education financial distributions for 40. The ISDs for which I have complete data cover approximately 82% of all districts in the state for the years in my sample. This includes approximately 76% of all traditional public school districts and 92% of all public school academies (charter schools). Additionally, the districts for which I have ISD-submitted revenue data account for just over 86% of Michigan's student population.

By combining federal, state, and local financial datasets, along with administrative data covering student enrollment and demographics, I create a novel panel dataset with which I can

measure encroachment more accurately than has been done in any prior work. Table 1 shows, for each fiscal year in the sample, statewide totals of federal, state, and local millage (PA18) revenues, along with the total special education revenues in the state. All amounts are rounded to the nearest thousand dollars.

Table 1: Special Education Revenues by Source, Statewide

FY	Federal Revenues	State Revenues	Total PA18 Collection	Total SE Revenue
2013	$ 469,571,000	$ 921,193,000	$ 904,496,000	$ 2,295,260,000
2014	$ 460,623,000	$ 889,009,000	$ 908,737,000	$ 2,258,369,000
2015	$ 455,379,000	$ 897,609,000	$ 922,636,000	$ 2,275,625,000
2016	$ 448,418,000	$ 917,941,000	$ 959,099,000	$ 2,325,459,000
2017	$ 484,416,000	$ 936,805,000	$ 985,231,000	$ 2,406,452,000
2018	$ 475,041,000	$ 943,837,000	$1,006,925,000	$ 2,425,803,000
2019	$ 705,007,000	$ 981,565,000	$1,048,394,000	$ 2,734,966,000

Of note, there are insufficient revenues to cover all special education costs incurred by Michigan's school districts. As a result, Michigan school districts face encroachment on their general education funds. To measure encroachment accurately at the district level, I restrict the dataset as follows:

From the statewide sample, I remove any district which reported zero enrollment. These observations consist of districts which either closed or were annexed into a neighboring school district but continued to exist as an independent entity for fiscal resolution. As these observations do not represent districts serving students, retaining their revenues would serve to misrepresent the financial implications of funding special education. With this restriction, 49 district-year observations are removed from the sample, or 0.8%.

I also remove all observations identifying an ISD as a local school district. While technically educational entities, an ISD does not operate as a traditional school district. An ISD typically serves as a centralized service provider, offering support to its constituent local school

districts. When it comes to special education, ISDs typically offer some level of center-based programming and serve as a fiscal agent for local school districts. They do not, however, encounter encroachment, as revenues received by the ISD are, prior to being distributed to constituent districts, used to cover special education costs resulting from those central services. This work seeks to calculate encroachment for local school districts, and as such considers ISDs only in their capacity as fiscal agents. By omitting ISDs, the sample is reduced by 392 observations, or 6.2%.

The resulting sample consists of 5,834 district-year observations. Although I make further restrictions for each research question—to be discussed in their respective sections—this sample allows me to measure district-level encroachment across the state.

Research Question One: Measuring the Relationship Between Policy Variables, District Characteristics, and Encroachment

I turn first to identifying how encroachment is associated with a range of policy variables and district characteristics. To do so, I use OLS regression to estimate equation (2):

$$(2) \qquad E_{it} = \beta_0 + \boldsymbol{D}_{it}B_1 + \boldsymbol{C}_{it}B_2 + \varepsilon_{it}$$

where E_{it} is encroachment per general education pupil as calculated in equation (1) in district *i* in year *t*. $\boldsymbol{D}_{it}$ is a vector of policy variables of interest that may be correlated with encroachment. Included in $\boldsymbol{D}_{it}$ are the following measures:

- An indicator for the state-imposed special education millage cap for the ISD in which district *i* belongs. When more dollars can be raised by the ISD, fewer would need to be contributed by their constituent local districts. I expect encroachment to be higher for districts in ISDs with low millage rate caps.

- A measure of the special education millage rate levied by an ISD relative to its cap, identified as m_k/m_{cap}, where m_k and m_{cap} represent the millage levied in ISD *k* and ISD *k*'s millage cap, respectively. I expect that as m_k/m_{cap} increases, districts will face lower levels of encroachment because a higher ratio would indicate higher willingness to pay among the constituent tax base.
- A measure of taxable value per pupil within each ISD. An ISD with a high tax base can raise more revenue per mill when compared to an ISD with lower property values. As a result, I expect encroachment to be lower in ISDs with higher taxable values per pupil.
- A measure of the share of special education services provided by an ISD relative to those provided by local districts. When ISDs assume a greater share of the responsibility for providing special education services, constituent districts should have lower encroachment. I measure this as an ISD's special education FTE divided by total special education FTE within the ISD (local districts + ISD).
- The proportion of students within an ISD who attend charter schools. Charter schools tend to enroll lower proportions of students with special needs, often leaving higher concentrations of special education students in local districts that have lost many students to charter schools. I expect encroachment to be positively related to a district's share of resident students who enroll in charters.

$\boldsymbol{C}_{it}$ is a vector of district-level characteristics. These include:

- The proportion of students in the district receiving special education services. As a district's proportion of special needs students increases, it follows that district special education expenditures, and encroachment, will increase.

- The number of students in the district receiving special education services. This captures scale effects in service provision. For example, one district has four students who need a resource room, while another has eight. If both districts provide the same room, the latter district would have lower per pupil cost of the service.
- The share of special education students with high-cost disabilities, identified as the proportion of students not belonging to the IDEA categories of *specific learning disability (SLD)* or *speech or language impairment.* High-cost disabilities present districts with a difficult challenge, and Michigan does not have a high-cost reimbursement provision. As a result, districts become liable for a significant cost. As specific high-cost disabilities are rarer than the two categories presented here, data covering student counts are often suppressed. As a result, I proxy high-cost disabilities by identifying those special education students that do not have traditionally low-cost disabilities. I expect this measure to be positively correlated with encroachment.
- ε_{it} is an unobserved, idiosyncratic error term.

For this question, I restrict the sample to account for missing information. Namely, this analysis omits any districts belonging to ISDs for which I do not have ISD funding distributions. While aggregate encroachment is minimally affected by these missing data, their absence would meaningfully impact encroachment at the district level for constituent districts of those ISDs. As such, they must be excluded when attempting to analyze relationships between encroachment and other observable variables at the district level. The analytical sample consists of 4,741 district-year observations, or 81 percent of school districts in the state.

Research Question Two: Simulating Encroachment Under Various Funding Policies

For research question 2 I simulate the distribution of ISD special education millage collections to local districts following various allocation rules. Namely, I distribute millage revenues based on the share of special education costs, the share of special education students, or the share of total enrollment in local school districts. In doing so, I identify if there exists a funding approach that can enhance equity in the distribution of encroachment among an ISD's constituent local districts.

To prepare the data, I begin with my statewide financial dataset prior to any restrictions. As this simulation centers on the role of ISD financial policy, I do not initially remove observations tied to ISDs. I do, however, restrict this dataset to conduct an appropriate – and meaningful – simulation of ISD funding distributions.

Across the state, there are a number of ISDs which have insufficient revenues to cover their own costs. The simulations conducted here operate on the assumption that an ISD distributes to its constituent local districts all revenue in excess of its own needs. Under this assumption – which is informed by several discussions with ISD and other school business officials – if an ISD does not have sufficient revenue for its own costs, then by rule there are no funds to distribute, and thus nothing to simulate. As such, I exclude from the simulations any ISDs without excess special education revenues. In practice, these ISDs often bill constituent districts using their services to cover excess costs.

My sample consists of 26 of Michigan's 56 ISDs. In total, my sample accounts for 545 of Michigan's 832 school districts and public school academies in the 2018-2019 school year, or 66 percent. Broken down by district type, my sample consists of 56 percent of traditional public

school districts and 81 percent of public school academies in Michigan for the 2019 fiscal year, with similar shares for previous sample years.

These simulations do not require the omission of those ISDs which did not submit intra-ISD financial distributions. Since my simulations attempt to explore the equity implications of those distributions, they do not require the distributions that actually occurred. I do, however, compare simulated measures of equity to those calculated for ISDs which submitted the necessary data. I can make this comparison for 20 out of the 26 sample ISDs.

To run these simulations, I must first calculate each local school district's special education costs in excess of pre-ISD allocation revenues. Subsequently, I identify the revenues remaining at the ISD after the ISD has covered its own costs. Following these calculations are two analytical steps. The first is to simulate the distribution of excess revenues from ISDs to their constituent local districts under various conditions. After simulating those distributions, the second step is to calculate measures of within-ISD equity in the distribution of encroachment among those constituent districts.

Calculating Excess Costs and Available Revenues

Prior to running the simulations, I must calculate the excess special education costs faced by local districts without accounting for revenues received by the ISD as well as identify how much revenue each ISD has available to distribute. The sum of excess costs for constituent local school districts by ISD, along with the total enrollment within the ISD and the resulting excess cost per pupil, can be seen in the second, third, and fourth columns of Table 2, respectively. These numbers are for the 2019 fiscal year.

Table 2: Excess Special Education Costs for Fiscal Year by ISD, FY19

ISD	Total Local Excess Costs	ISD Enrollment	Excess Cost Per Pupil
Allegan	$ 9,330,000	14,368	$ 649.38
Alpena	$ 4,224,000	5,089	$ 829.97
Berrien	$ 17,715,000	25,375	$ 698.14
Calhoun	$ 15,107,000	22,378	$ 675.08
Charlevoix-Emmet	$ 5,605,000	8,561	$ 654.70
Cheb-Otsego-Presque Isle	$ 4,452,000	7,871	$ 565.64
Gratiot	$ 9,923,000	12,271	$ 808.68
Ingham	$ 46,806,000	43,938	$ 1,065.26
Jackson	$ 15,531,000	22,985	$ 675.69
Kalamazoo	$ 29,941,000	34,773	$ 861.03
Kent	$ 108,202,000	108,162	$ 1,000.37
Lenawee	$ 9,772,000	14,985	$ 652.11
Livingston	$ 20,407,000	25,573	$ 797.99
Macomb	$ 110,281,000	126,058	$ 874.84
Marquette-Alger	$ 10,762,000	9,381	$ 1,147.19
West Shore	$ 4,238,000	7,647	$ 554.20
Mecosta-Osceola	$ 4,464,000	8,170	$ 546.35
Monroe	$ 13,386,000	20,124	$ 665.17
Muskegon	$ 26,639,000	26,852	$ 992.06
Newaygo	$ 4,962,000	7,381	$ 672.27
Oakland	$ 239,868,000	182,695	$ 1,312.94
Ottawa	$ 48,596,000	49,076	$ 990.21
St. Clair	$ 13,471,000	21,736	$ 619.76
St. Joseph	$ 4,468,000	10,330	$ 432.57
Washtenaw	$ 77,591,000	46,573	$ 1,666.02
Wayne	$ 326,599,000	273,741	$ 1,193.10

As can be seen, local school districts are left with a tremendous amount of unmet special education cost prior to receiving revenue from their ISD. Indeed, the revenues received from the ISD, which include both special education millage collections and federal revenues, constitute nearly half of all special education revenues, on average. This table also shows that this unmet need varies tremendously across ISDs, even after taking into account district size.

After identifying outstanding costs within each ISD, I calculate the total amount of revenues each ISD has available to provide to its local school districts. To do this, I turn again to the State Aid Financial Status Reports produced by the state of Michigan. On these reports is the millage rate each ISD levies on constituent properties, along with the taxable value of those properties. By multiplying the millage rate and total taxable value (divided by 1,000), I can calculate the total revenue an ISD generates from its local special education millage. This calculation assumes a tax collection without underassessment, nonpayment, or other forms of evasion, however, which is rare. Following conversations with ISD officials, I measure an ISD's special education millage collection as 95% of the total possible to account for delinquency and uncollected tax revenues. For the total ISD revenues, I add in state and federal payments to the ISD.

From this total pot of special education revenue, each ISD first covers its own special education costs. Note, ISDs often provide some level of special education service provision to students or otherwise provide support to constituent local school districts. As such, not all of the collected revenues are available to distribute; to identify available revenues, I must deduct from their total collection any special education costs reported by the ISD. A comparison of the excess costs faced by local districts and the available ISD revenues, grouped by ISD, can be seen in Table 3.

Table 3: Comparing Excess Costs and Available Revenues, FY19

ISD	Total Excess Cost	Available Revenue	Maximum Costs Covered
Allegan	$ 9,330,000	$ 4,325,000	46.4%
Alpena	$ 4,224,000	$ 986,000	23.4%
Berrien	$ 17,715,000	$ 2,928,000	16.5%
Calhoun	$ 15,107,000	$ 3,018,000	20.0%

Table 3 (cont'd)

Charlevoix-Emmet	$ 5,605,000	$ 1,732,000	30.9%
Cheb-Otsego-Presque Isle	$ 4,452,000	$ 1,039,000	23.3%
Gratiot	$ 9,923,000	$ 1,051,000	10.6%
Ingham	$ 46,806,000	$ 28,239,000	60.3%
Jackson	$ 15,531,000	$ 6,757,000	43.5%
Kalamazoo	$ 29,941,000	$ 18,769,000	62.7%
Kent	$ 108,202,000	$ 69,583,000	64.3%
Lenawee	$ 9,772,000	$ 4,438,000	45.4%
Livingston	$ 20,407,000	$ 9,228,000	45.2%
Macomb	$ 110,281,000	$ 9,281,000	8.4%
Marquette-Alger	$ 10,762,000	$ 4,235,000	39.4%
West Shore	$ 4,238,000	$ 891,000	21.0%
Mecosta-Osceola	$ 4,464,000	$ 630,000	14.1%
Monroe	$ 13,386,000	$ 2,162,000	16.1%
Muskegon	$ 26,639,000	$ 4,040,000	15.2%
Newaygo	$ 4,962,000	$ 789,000	15.9%
Oakland	$ 239,868,000	$ 125,792,000	52.4%
Ottawa	$ 48,596,000	$ 36,172,000	74.4%
St. Clair	$ 13,471,000	$ 3,658,000	27.2%
St. Joseph	$ 4,468,000	$ 673,000	15.1%
Washtenaw	$ 77,591,000	$ 63,546,000	81.9%
Wayne	$ 326,599,000	$ 155,228,000	47.5%

Table 3 shows that there are insufficient revenues to cover all the remaining special education costs among constituent local districts for every ISD in the sample for the 2019 fiscal year. The extent to which an ISD can cover excess costs for its local school districts varies drastically among ISDs, with Macomb ISD only having enough revenue to cover 8.4 percent of outstanding costs, while Washtenaw ISD can cover almost 82 percent. Given this budget constraint, the ISD must decide how to distribute those remaining revenues, and ISDs have significant discretion on that distribution.

Distributing Millage Revenues and Calculating Encroachment

While there is no central source for the formulas ISDs use to distribute their net special education millage revenues, a review of available plans shows that three variables are more common than others when calculating funding allocations. These variables are (a) the share of costs incurred by constituent local districts, (b) the share of special education enrollment (full-time equivalent, or FTE), and (c) the share of total enrollment (FTE). Many ISDs take into account other considerations, such as additional weighting by free- or reduced-price lunch eligibility or the use of headcount variables over FTE, but these are less common and will be considered in future work.

I distribute the available millage revenues under three models, each weighted by one of those three primary variables:

Model 1 – hereafter "**Cost Model**" – weights distributions by the portion of ISD-wide special education costs incurred by the local district;

Model 2 – hereafter "**SE Pupils Model**" – weights distributions by the portion of ISD-wide special education enrollment (FTE) within the local district; and

Model 3 – hereafter "**Pupils Model**" – weights distributions by the portion of ISD-wide total enrollment (FTE) within the local district.

After simulating the distribution of ISD revenues under those three conditions, I measure encroachment for each district as the difference between pre-allocation excess costs and that district's millage allocation. I again measure encroachment per general education pupil, both to account for the population impacted, and to standardize the measure across districts of varying

size. With encroachment measured, I can calculate a measure of equity to determine if any particular allocation leads to a more equitable distribution of encroachment.

Measuring Equity

As Berne & Steifel (1984) outline, equity can be measured in a number of ways. For this study, I use the coefficient of variation for encroachment within an ISD as my equity measure. As with any measure, the coefficient of variation – alternatively, the relative standard deviation – has its benefits and its drawbacks.

By using the coefficient of variation, measured as the standard deviation of encroachment within an ISD divided by the mean of the same, I am measuring dispersion in the distribution of encroachment. As the coefficient of variation approaches zero, the ISD being considered approaches complete equity. Note, however, that this does not take into consideration a district's ability to cover the excess costs. A discussion of this measure, and the relationship between equity in the encroachment distribution and distribution of ISD payments to districts is presented later in this work.

I compare coefficients of variation both between ISDs in a given year, and within an ISD over time, under each of the three models. In doing so, I can identify which model leads to the most equitable distribution of encroachment and determine how or if equitable policies change over time or vary between ISDs. I also compare simulated coefficients of variation to those calculated for ISDs which submitted revenue. In doing so, I can look for baseline improvements to current policy.

Research Question Three: Expenditure Changes and Encroachment

To answer question three, I employ a fixed-effects regression model to analyze how changes in spending on specific services relate to encroachment. When faced with unfunded

special education costs, districts must necessarily divert dollars that would otherwise be expended elsewhere. We currently have no research which shows from where districts draw those diverted dollars, so while we know encroachment exists, and that it impacts general education students, we don't know how. If districts are systematically reducing expenditures from specific programs, identifying those programs will build an understanding of what impacts are being realized when encroachment exists.

To answer question three, I make two primary restrictions to the main dataset . First, I remove those districts belonging to ISDs which have not submitted intra-ISD revenue transfers. In these districts, encroachment may be inaccurately measured, and thus their inclusion may bias any results. As mentioned, in aggregate the effect of these missing data is not as impactful as in cases where district-level measures are the focus.

I also exclude charter schools from the sample. Charter schools and traditional public schools are likely to have unique tendencies in their expenditures for multiple reasons. Charter schools, for instance, tend to rent out their facilities. They also contract out more services than do traditional public schools. As a result, including charter schools may obscure relationships relevant to policy. Additionally – and more problematic – is that expenditure data for charter schools may be unreliable. Due to the nature of ownership and operation of charter schools, some expenditures, particularly those realized by the management organization (as opposed to the school itself), do not fall under the same reporting requirement as traditional public schools.

The analytical sample consists of 2,854 district-year observations. These represent approximately 76 percent of traditional public school districts in any given fiscal year. I run a two-way fixed effects regression model on these data, seeking relationships between

expenditures in various categories of interest or special education identification, and a district's encroachment burden. Specifically, I estimate equation (3):

$$(3) \qquad Y_{it} = \beta_0 + \beta_1 E_{it} + \boldsymbol{X}_{it} B_2 + \theta_i + \gamma_t + \varepsilon_{it} \ ,$$

where Y_{it} is the expenditure category of interest or other outcome in district *i* in year *t*. Expenditure categories include primarily support services, which cover pupil and staff supports, operations and maintenance financing, and business and administration expenditures. I also include a measure of the total support expenditures within each district. I also include as outcomes the percent of students within a district having individual education plans (IEPs) and the special education expenditure per special education student. These two outcomes may provide a look at encroachment's impact on special education services and inform any relationship between identification of need and unfunded costs.

Total support services account for dollars primarily spent outside of the classroom. For instructional support services, that includes the costs for speech therapists, psychologists, technology specialists, counselors, etc. Business and administration expenditures cover those for both building and district administrations, as well as business expenditures at both levels. Operations and maintenance expenditures pay for activities concerned with keeping school buildings open, clean, and usable. Examples include heating and cooling systems, janitorial services, and building or equipment repairs.

As discussed earlier, special education funding – regardless of how it is done – comes with incentives for school districts vis-à-vis special needs identification. If a district's special education costs are going to be covered, they will be less hesitant to identify needs that would otherwise be paid for out of their own pocket. Alternatively, if no funding is available, they may limit, where possible, mandated costs by lowering the amount or quality of services identified as

necessary. By including the percent of students with IEPs, I directly measure identification. Using a measure of special education expenditures per special education student, then, may identify a relationship between encroachment and the quality of services provided.

$\boldsymbol{X}_{it}$ is a vector of characteristics for school district *i* in year *t*, which have been previously shown to affect districts' expenditures across functions (see Monk & Hussain, 2000; Arsen & Ni, 2012). These characteristics include district enrollment, in log form, and per pupil overall expenditures. Additionally, $\boldsymbol{X}_{it}$ includes student characteristics aggregated to the district level, namely the proportion of students in the district identified as economically disadvantaged.

District enrollment, in log form, is included in the model to account for economies of scale. This is particularly pertinent for smaller districts, whose share of administrative costs is higher relative to large districts (Andrews, Duncombe, and Yinger, 2002). Additionally, because many special education services, and the equipment or resources used for special education services, can be provided to multiple students, relative costs per special education pupil should be smaller in larger districts relative to districts with fewer students. The proportion of economically disadvantaged students is a proxy for economic status in the district, while per pupil overall expenditures (in log form) are included to account for the fact that districts that spend more overall tend to spend a larger share on support services relative to lower-spending districts.

θ_i is a district fixed effect to account for unobserved district characteristics that do not vary over time. γ_t is a year fixed effect to account for any unobserved characteristics that affect all observations in a given year, and ε_{it} is an unobserved, idiosyncratic error term, assumed to have zero mean conditional on the independent variables.

In all estimations of equation (3), β_1 is the coefficient of interest. If positive, it suggests that higher levels of encroachment are associated with increased levels of the given expenditure or other outcome. Conversely, if β_1 is negative, the model would suggest that as encroachment increases, districts are expending fewer resources on the given outcome. I run the model three different ways – first with no fixed effects, second with only district fixed effects, and lastly with district and year fixed effects. Model three is the preferred specification.

Due to the testing of multiple hypotheses, I adjust prerequisite p-values for determining statistical significance using a Bonferroni adjustment. Given that I am measuring eight outcomes, determining statistical significance can be difficult. If all variables were distributed randomly, there is a decent chance one relationship would be significant due to random variation. By applying the Bonferroni adjustment, I help account for the potential of random variation to generate significant results. Doing so simply requires adjusting the output p-values in accordance with the number of outcomes being tested. By multiplying the p-values by the number of outcomes, the threshold for statistical significance becomes substantially harder to reach, and when reached provides for higher levels of confidence in interpretation.

Chapter 4: Encroachment in Michigan, Trends, and Predictors

In their 2017 report for Lieutenant Governor Brian Calley, Koenigsknecht *et al.,* show that nearly $700 million of special education costs remained unfunded after federal, state, and local millage funding. At the time, this equated to nearly a quarter of total special education costs across the state which necessarily had to come from districts' general education dollars. Conlin and Jalilevand (2018) note that some of Michigan's poorest districts, including Detroit and Flint, were among the most affected by this encroachment, primarily due to their larger fraction of special needs students. This chapter builds on these works, establishing a trend in encroachment for most Michigan school districts from the 2013 to 2019 fiscal years. Additionally, I use OLS regression to investigate how policy variables and district characteristics are associated with encroachment at the district level. Namely, I ask

1. How has special education encroachment in Michigan school districts changed over time?
2. How are select policy conditions and district characteristics associated with encroachment?

By calculating encroachment as the difference between each district's special education revenues and costs, I can show trends in encroachment across Michigan over time. Table 4 shows, by fiscal year, the total special education costs, total special education revenues, and the resulting encroachment—each rounded to the nearest thousand dollars—and the mean encroachment per general education pupil for all local school districts and public school academies in the sample.

Statewide Trends in Encroachment

Table 4: Statewide Costs, Revenues, and Encroachment

FY	Total SE Cost	Total SE Revenue	Total Encroachment	General Education Population	Mean Encr. per GE Pupil
2013	$2,180,609,000	$1,376,272,000	$804,337,000	1,476,569	$544.73
2014	$2,095,239,000	$1,380,278,000	$714,961,000	1,467,104	$487.33
2015	$2,105,213,000	$1,395,561,000	$709,652,000	1,453,748	$488.15
2016	$2,147,540,000	$1,396,460,000	$751,080,000	1,442,856	$520.55
2017	$2,180,432,000	$1,485,193,000	$695,239,000	1,439,164	$483.09
2018	$2,205,972,000	$1,500,735,000	$705,237,000	1,437,876	$490.47
2019	$2,276,025,000	$1,546,540,000	$729,486,000	1,425,279	$511.82

Table 4 shows that from the 2013 to 2019 fiscal years, encroachment has fluctuated around $500 per general education pupil statewide.[3] Over this time period, the average foundation allowance – that state-allocated aid distributed on a per pupil basis – was between $6,966 and $7,871. When considering encroachment consists of those dollars diverted from general education services, general education students were effectively losing between six and eight percent of their foundation to cover unfunded special education costs.

The encroachment estimates in Table 4 are consistent with previous research that estimated annual encroachment to be between $700 million and $750 million for a given year (Koenigsknecht *et al.,* 2017; Conlin & Jalilevand, 2018). However, each of these estimates likely serves as a lower bound for the true encroachment faced by school districts across the state. Not all special education costs incurred by a school district meet eligibility requirements for state

[3] For a table of state foundation allowances between FY95 and FY19, see https://www.house.mi.gov/hfa/PDF/Alpha/Fiscal_Brief_Basics_of_the_Foundation_Allowance_FY19_Update_Nov2018.pdf

reimbursement; as a result, available cost data may be lower than actual costs. The extent of ineligible special education costs is unknown.

Given that the totals in Table 4 include ISDs for which I have not received measures of intra-ISD funding distributions, revenues in the table may be understated, and thus encroachment overestimated. However, when aggregating to the ISD level, missing ISD funding distributions do not impact the encroachment estimates. That calculation – as done in Arsen *et al.*, (2019) – yields results nearly identical to those presented in Table 4. This can be explained in two ways.

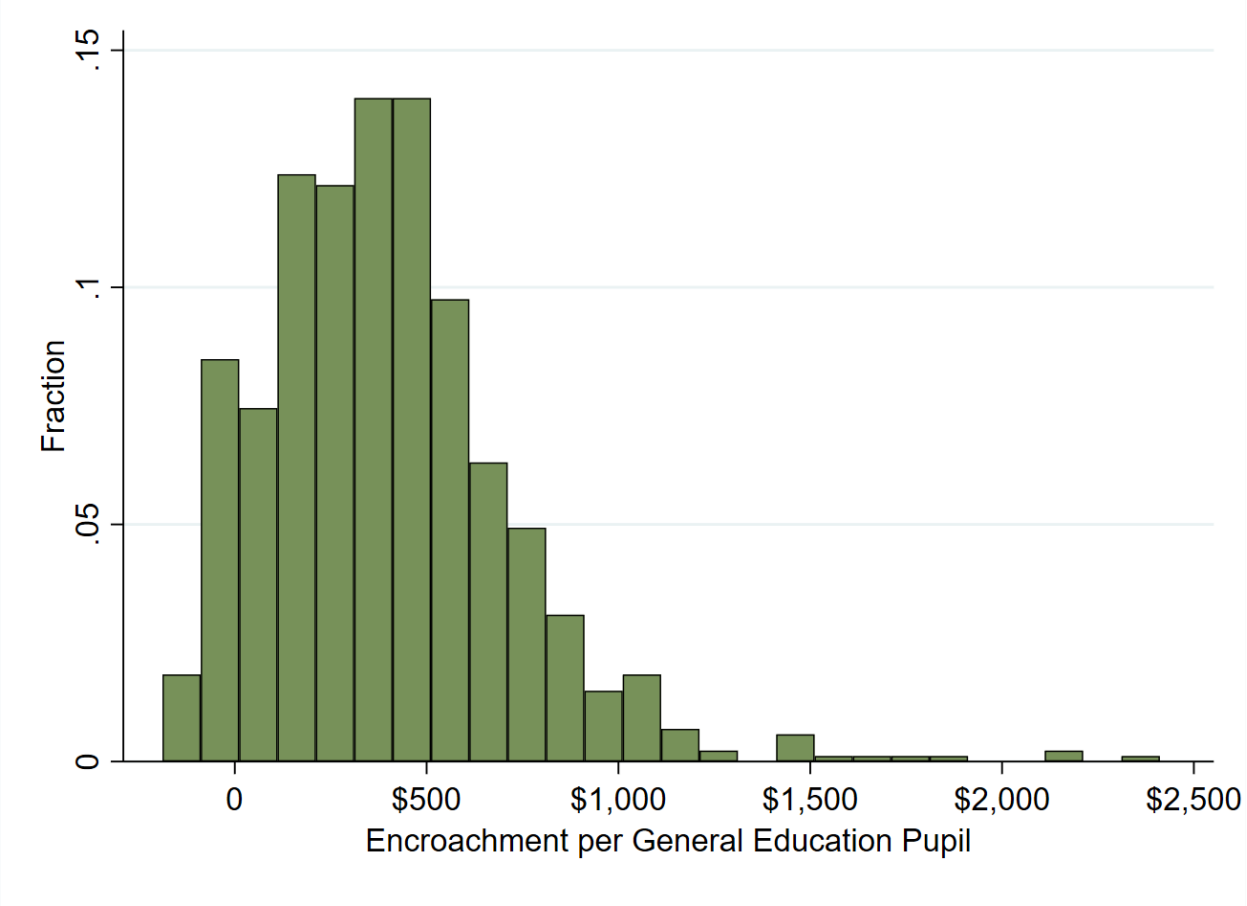
First, those ISDs which did not submit intra-ISD revenues may simply be retaining revenues that would otherwise be distributed. As a result, intra-ISD revenue flows would be zero, and thus would not impact encroachment. Alternatively, those ISDs may be retaining PA18 millage revenues while distributing IDEA revenues. As noted earlier, both revenue sources effectively enter the same pot of funds, but IDEA revenues received by districts are identified in the FID and thus not dependent on ISD submissions. Additionally, because each dollar of IDEA revenue is associated with an additional, equivalent cost, encroachment would be unaffected.

Encroachment Across Districts

As noted earlier, the presence of encroachment is not inherently an issue. Encroachment can be seen as the local school district's contribution to special education costs, and leaving some local responsibility for those costs helps avoid incentive issues within special education finance (as highlighted in the literature review). Encroachment becomes more problematic if the burden of these excess costs is distributed inequitably between districts. Figure 1 shows the dispersion of encroachment per general education pupil across all Michigan school districts and public school academies for the 2019 fiscal year. As shown, encroachment varies drastically across school districts, with many experiencing almost none (or even having excess revenues)

and others more than $2,000 per general education pupil. The burden of encroachment is clearly inequitable.

Figure 1: Histogram of Encroachment per General Education Pupil, FY19



Districts may have special education revenues in excess of their costs for several reasons. First, one ISD – Huron – regularly generates enough revenue from its special education millage to distribute more funds than costs incurred by constituent districts. For the remaining 23 traditional public school districts and 45 charter schools, the main drivers behind excess revenues is the result of Michigan's foundation allowance system or ISD funding distributions.

Special education students are provided the same foundation allowance as any other student. In some cases, the cost of these special education students is below the funds provided by the foundation allowance, but that foundation allowance is still recorded as special education revenue. In addition, many ISD distributions follow a formula which allocates funds based on

observable characteristics within local school districts. To my knowledge, ISD funding plans do not include provisions which exclude overpayments to districts, which may result in constituent districts receiving funds in excess of their costs.

I also investigate trends in encroachment separately for Michigan's two primary district types—traditional public school districts and public school academies (PSAs), also known as charter schools. Table 5 shows total encroachment, general education pupil count, and encroachment per general education pupil for both district types. The top set of columns represents traditional public schools, while the bottom represents charters.

From the table, two things largely stand out. First and foremost, encroachment is substantially higher in traditional public schools than in charters. In all sample years, traditional public schools averaged over $500 of encroachment per general education pupil. Charter schools, on average, experienced less than half of this, with calculated encroachment hovering around $200. Also clear is that while encroachment in traditional public schools has fluctuated over the sample, encroachment in charter schools has increased almost monotonically. At the end of the sample, charter school encroachment was nearly 30 percent higher than at the beginning.

Table 5: Encroachment per General Education Pupil by District Type.

Traditional Public Schools

FY	Total Encroachment	General Education Population	Encroachment per General Education Pupil
2013	$ 771,545,000	1,347,531	$572.56
2014	$ 678,934,000	1,327,354	$511.49
2015	$ 672,640,000	1,310,376	$513.32
2016	$ 712,820,000	1,298,679	$548.88
2017	$ 654,728,000	1,292,935	$506.39
2018	$ 660,745,000	1,292,958	$511.03
2019	$ 681,975,000	1,279,868	$532.85

Table 5 (cont'd)

Charter Schools

FY	Total Encroachment	General Education Population	Encroachment per General Education Pupil
2013	$ 23,445,000	128,865	$181.94
2014	$ 24,958,000	139,657	$178.71
2015	$ 27,644,000	143,345	$192.85
2016	$ 22,362,000	144,177	$155.10
2017	$ 29,176,000	146,164	$199.61
2018	$ 31,518,000	144,820	$217.64
2019	$ 34,131,000	145,284	$234.93

Estimating Relationships Between Policy Variables, District Characteristics, and Encroachment

Encroachment is widespread and highly inequitable, with differential levels pending district types. In the remainder of this chapter, I explore the question: *How are select policy variables and district characteristics associated with encroachment?* I run a standard OLS regression on Equation (2) to investigate the relationships between a range of policy variables, district characteristics, and encroachment. Equation (2) can be seen here:

$$E_{it} = \beta_0 + \boldsymbol{D}_{it}B_1 + \boldsymbol{C}_{it}B_2 + \varepsilon_{it} \quad (2)$$

Table 6 presents summary statistics for the independent variables for the full state and analysis sample. Statistically significant differences in variable means between the state and analysis sample, measured by two-sample t-tests, are indicated with asterisks.

Table 6: Summary Statistics for Independent Variables, Equation (2)

	Full State		Analysis Sample
PA18 Millage Cap	4.36		4.28**
	(1.70)		(1.59)

Table 6 (cont'd)

Share of Cap Taxed	0.69		0.71**
	(0.18)		(0.18)
ISD Taxable Value per pupil (in $10,000s)	26.2		26.0
	(104)		(114)
ISD Special Education Share	0.25		0.22**
	(0.19)		(0.19)
ISD Charter Enrollment Share	0.09		0.10**
	(0.08)		(0.08)
Special Education Proportion	0.12		0.12
	(0.07)		(0.07)
Total Special Education Enrollment	221		233
	(434)		(472)
High Cost Disability Share	0.04		0.04
	(0.03)		(0.03)
Percent Charter Districts	0.35		0.40**
	(0.48)		(0.49)
Observations	5,834		4,741

*Standard errors in parentheses. **p < .01*

The means of several variables differ between the full state and analysis sample. The analysis sample, on average, has a lower cap on the allowable PA18 millage rate while taxing constituent properties at a higher fraction of that cap. The resulting millage rate, on average, is similar between the two groups (3.00 vs. 3.03). The analysis sample also features a lower share of special education students served by the ISD and a higher share of students attending charter schools. More generally, charter schools tend to be overrepresented in the sample.

Results

Table 7 presents the results from estimating Equation (2). As established in Table 5 above, encroachment is substantially different between traditional public schools and charter schools. Because charter schools and traditional public schools are fundamentally different in

Michigan, primarily due to differences in governance and the self-selection of students into charter schools, I first estimate Equation (2) on the sectors separately. Column 1 of Table 7 shows the results of estimating Equation (2) only including traditional public schools, while Column 2 shows the results with the sample of charter schools. Column 3 combines both traditional public schools and charter schools. Note that, when estimating encroachment for the full analytical sample, I include an indicator for whether a district is a charter school to account for the established differences in encroachment between sectors.

Table 7: Relationships Between Policy, District Characteristics, and Encroachment

Variables	Traditional Public Schools	Charter Schools	Full Sample
PA18 Millage Cap	-71.20**	-46.50**	-66.14**
	(6.41)	(9.15)	(5.71)
Share of Cap Taxed	-414.6**	66.91	-265.8**
	(79.5)	(123.0)	(69.2)
ISD Taxable Value (in $10,000s per pupil)	-7.02**	-3.69*	-6.47**
	(1.10)	(1.67)	(0.94)
ISD Special Education Share	27.70	225.4*	76.02
	(85.3)	(100.0)	(65.5)
ISD Charter Enrollment Share	264.7	591.5**	513.7**
	(166.7)	(227.3)	(141.7)
Special Education Percent	1,495**	-72.27	344.9
	(353.1)	(464.4)	(364.0)
Special Education Enrollment	0.128**	0.475**	0.116**
	(0.03)	(0.21)	(0.02)
High-Cost Disability Share	1,938*	2,294**	2,591**
	(960.6)	(885.0)	(730.8)
Charter Indicator			-157.6**
			(24.9)
Constant	781.2**	182.6	737.7**
	(90.0)	(138.7)	(84.3)
Observations	2,857	1,871	4,728
R-squared	0.33	0.08	0.26

*Robust standard errors in parentheses. ** p < .01, * p < .05*

Prior to describing the results, I highlight here a few key observations. First, the phenomenon observed in Table 5, wherein charter schools experience lower encroachment on average, is repeated here. In the full sample, the charter school indicator is associated with a $158 decrease in encroachment per general education pupil. Additionally, the model as specified does not explain variation in encroachment within charter schools nearly as well as for traditional public schools. For traditional public schools, the model describes 33 percent of the variation in encroachment, while the same specification only explains 8.1 percent of the variation within the charter sector.

Policy Variables

To explore relationships between policy and encroachment, I single out four key policy variables. The first is the statutory cap on the Act 18 millage that an ISD may levy. For both traditional public schools and charter schools, there is a statistically significant, negative relationship between encroachment and that cap. For traditional public schools, a one-mill increase in the cap is associated with a $71 decline in encroachment per general education pupil While charter schools are affected less—$47 decline vs. $71—encroachment still drops. This matches expectations – If an ISD can levy a higher millage, it should permit increased special education revenues and reduced encroachment.

In a similar vein, as an ISD levies a millage closer to its cap, encroachment decreases substantially. However, this decrease only applies to traditional public schools, with the estimate among charter schools being statistically insignificant. Traditional public schools in an ISD taxing 10 percentage points closer to the millage cap experience over $41 lower per general education pupil encroachment (assuming linearity in the relationship). The insignificance of this

relationship in charter schools may be due to lower access to ISD resources among charters, but given the significance of the other ISD finance variables, it is difficult to be certain.

The relationship between taxable value and encroachment shows again that increased potential for revenue generation within an ISD is associated with lower encroachment in constituent districts. For every $10,000 of taxable value per pupil within an ISD, encroachment within constituent traditional public school districts decreases by $7 per general education pupil, while the decline is only $3.69 for constituent charter schools. These relationships are significant at the $p < .01$ and $p < .05$ level for TPS and charter schools, respectively. Combined with the previous two findings, it is clear that an ISD's ability to general revenue is meaningfully associated with encroachment, particularly for traditional public schools.

The results in Table 7 do not support the hypothesis that as ISDs takes on a larger responsibility for special education service provision, encroachment in constituent local districts declines. Instead, the estimate for ISD Special Education Share is imprecise and statistically indistinguishable from zero in traditional public schools, and positive in charters. This is surprising, as costs in constituent local districts should decline as the ISD takes on larger shares of special needs students. I hypothesize that the effect may be insignificant because, while costs are being taken on by the ISD, so are revenues associated with those students. As a result, encroachment would be unaffected.

For charter schools in an ISD that takes on an additional 10 percentage point share of the local special education students, encroachment per general education pupil increases by about $22.50. This might be expected if an ISD providing higher levels of services does so primarily for constituent traditional public schools while – intentionally or not – excluding charters. In this

case, charters would be essentially left on their own, while traditional school districts would see their costs (and revenues) decline.

Similar to the role of the ISD's special education student share, relationships between encroachment and the share of students within an ISD attending charter schools are only significant in charter schools. For every 10 percentage points of charter enrollment within an ISD, encroachment within charter schools increases by over $59 per general education student. As charter enrollment increases, they are likely also experiencing higher special education enrollment. This increase in encroachment would be particularly acute if charter schools are unable to increase capacity to match increased need, as traditionally low rates of special education enrollment may suggest that infrastructure for special education service provision is limited in charter schools.

District Characteristics

Table 7 also shows the relationship between encroachment and three district characteristics – proportions of special education students, special education student headcount, and the share of students in a district with high-cost disabilities.

For traditional public schools, the relationship between the share of special education students in the district and encroachment is statistically and substantively significant. A 10 percentage point increase in the share of special education students is associated with a nearly $150 increase in encroachment per general education pupil. This relationship is very large and shows that districts with high shares of special education students bear a particularly significant financial burden on their general education budgets.

The insignificance in the relationship between special education shares and encroachment in charter schools is difficult to explain. It could be that charter schools with higher shares of

special education students find efficiencies in service provision that traditional public schools do not. It could also indicate that the level of services provided to special needs students is lower in charter schools, which would be a significant policy concern. Regardless, this warrants additional work to ensure that special education services are being provided the necessary services within charter schools.

Traditional public and charter schools both experience higher levels of encroachment with each additional special education student. In traditional public schools, an additional special education student is associated with $0.13 higher per general education student, while in charters the number is slightly higher at $0.48. Both numbers are statistically significant, though more so in traditional public schools. The higher point estimate in charter schools could indicate a lower ability to leverage economies of scale within the sector, but given the low magnitude of the estimates, further work should be done before any significant conclusions are reached.

I hypothesized that the number of high-cost disabilities within a district would be associated with an increase in encroachment. Results as shown in Table 7 support this hypothesis for both school sectors, though statistical significance is marginal in traditional public schools. Within TPS, a 10 percentage point increase in the share of high-cost disabilities is associated with a $194 increase in encroachment per general education pupil ($p < .044$), while in charters the same increase in high cost share is associated with an increase of $229 ($p < .01$). These increases are remarkably large for practical purposes and emphasize the particular financial struggles associated serving students with high-cost disabilities.

Conclusions

In this chapter, I have shown trends in state-level encroachment over time. Between the 2013 and 2019 fiscal years, encroachment fluctuated around $700 million statewide, with the

average general education student foregoing approximately $500 in their per pupil foundation allowance. I then highlighted inequities among district-level encroachment in Michigan, showing that while some districts received special education revenues in excess of their costs, others were diverting over $2,000 per general education student from their general education funds to compensate for underfunding of their special education costs. Among Michigan's two primary education sectors—traditional public schools and charter schools—I noted significant differences in encroachment. Namely, average encroachment per general education pupil in charter schools was less than half of that faced by their TPS counterparts. As policymakers consider how to remedy inequities in encroachment, this finding suggests they should focus first on Michigan's traditional public schools.

After describing encroachment, I presented results of estimating a regression model tying encroachment to a range of policy and district characteristics. I estimated the model separately for traditional and public schools, but regardless of sector, showed that policy conditions and district characteristics are meaningfully tied to the encroachment local school districts face. Districts belonging to ISDs that have higher potential to raise revenue through local millages, whether due to higher caps on the allowable millage rate, higher willingness to tax themselves, or higher taxable values against which to tax, are more able to mitigate the financial burdens of unfunded special education costs. Though these relationships were more precisely estimated for traditional public school districts, the evidence presented here shows that charter schools can see benefits as well.

Additionally, it is important to note that charter schools experienced higher encroachment as they enrolled larger shares of students within their ISD and as their ISD took on larger shares of special education students. This may indicate that charter schools are less able to expand

capacity to provide services to special needs students as their enrollments increase. Furthermore, as ISDs take on a larger role, charter schools do not appear to take advantage, given the associated increase in charter school encroachment.

The share of special education students within a district is one of the strongest predictors of encroachment for traditional public schools. A 10 percentage point increase in the proportion of special education students within a district is associated with a $150 increase in encroachment per general education pupil. Compared to the average of about $500, this association cannot be understated. Similarly, higher shares of students with high-cost disabilities pose a particular financial challenge to both traditional public and charter schools, indicating that a high-cost provision in state special education funding may be warranted in Michigan.

Chapter 5: The Role of Intermediate School District Financial Policy in Encroachment Equity

In this chapter, I simulate alternative formulas for the disbursement of ISD special education revenue to their constituent local districts. Different formulas generate different patterns of encroachment, and presumably different degrees of encroachment inequality, among districts within an ISD. In doing so, I attempt to identify how ISD-level funding policy could increase or decrease these inequities. Specifically, I ask the question:

2. *What is the impact of ISD special education millage allocation policies on the distribution of district-level encroachment?*

Study Context

First, it is important to develop context for those ISDs in the sample to be studied. As detailed in Chapter 3, the simulations presented here are restricted to 26 of Michigan's 56 ISDs. Table 8 below shows characteristics of sample ISDs, the sample average, and the state average. Across sample ISDs, special education shares range from 10 to nearly 17 percent. There is significant variation in measures of socioeconomic status, with ISDs having anywhere from 31 to 66 percent economically disadvantaged students and taxable values per pupil ranging from $125,000 to nearly $650,000. Both small and large ISDs are represented, whether in terms of the number of districts or students. Lastly, the sample of 26 ISDs accounts for 77 percent of traditional public school students and 86 percent of charter school students.

Table 8: ISD Characteristics, Fiscal Year 2019

ISD	% Special Education	% Economically Disadvantaged	Taxable Value per pupil	TPS Districts	TPS Enrollment	Charter Districts	Charter Enrollment
Allegan	10.5%	44.3%	$ 205,282.10	8	14,202	2	166
Alpena-Montmercy-Alcona	10.3%	60.4%	$ 374,829.30	4	5,089	-	-
Berrien	11.0%	58.5%	$ 319,729.50	15	23,904	3	1,471
Calhoun	14.3%	57.0%	$ 163,698.70	12	20,866	5	1,512
Charlevoix-Emmet	11.7%	46.2%	$ 642,867.70	11	8,181	3	380
Cheb-Otsego-Presque Isle	10.1%	57.4%	$ 432,552.10	10	7,853	1	18
Gratiot-Isabella	15.5%	50.1%	$ 224,336.60	9	11,805	2	466
Ingham	13.0%	48.3%	$ 208,240.50	12	38,878	10	5,060
Jackson	13.1%	55.3%	$ 196,140.70	12	21,445	4	1,540
Kalamazoo	10.9%	50.0%	$ 221,561.50	9	33,457	8	1,316
Kent	12.9%	48.5%	$ 214,765.90	20	93,718	23	14,444
Lenawee	12.6%	48.7%	$ 231,048.30	11	14,985	-	-
Livingston	10.6%	22.0%	$ 306,049.70	5	23,857	4	1,716
Macomb	12.9%	48.3%	$ 219,976.80	21	118,799	16	7,259
Marquette-Alger	16.7%	41.9%	$ 287,434.70	12	9,114	1	267
West Shore	16.0%	66.4%	$ 430,916.30	8	7,525	1	122
Mecosta-Osceola	16.3%	59.0%	$ 251,665.00	5	7,575	1	595
Monroe	11.8%	41.6%	$ 286,850.40	9	19,291	2	833
Muskegon	13.2%	60.8%	$ 162,493.30	11	24,746	5	2,106
Newaygo	13.1%	62.1%	$ 191,862.00	6	7,381	-	-
Oakland	12.1%	32.9%	$ 311,688.90	28	170,971	22	11,724

Table 8 (cont'd)

Ottawa	11.0%	35.0%	$	259,309.00	11	45,718	7	3,358
St. Clair County	12.7%	45.7%	$	253,755.30	7	20,178	5	1,558
St. Joseph County	10.0%	56.9%	$	214,477.40	9	10,330	-	-
Washtenaw	12.9%	31.0%	$	345,329.60	9	40,834	13	5,739
Wayne	12.9%	64.7%	$	128,152.60	32	209,484	101	64,257
26 ISD Sample	12.6%	49.7%	$	272,500.50	306	1,010,186	239	125,907
Statewide	12.9%	51.9%	$	274,506.30	537	1,311,647	295	146,835

Note: Student count data retrieved from MISchoolData.org. Counts are aggregated to the ISD level. Data are for the 2018-2019 academic year.

These ISDs vary in the encroachment faced by constituent districts. Table 9 shows total encroachment and per pupil encroachment for each sample ISD in the 2019 fiscal year. Each ISD experiences encroachment, ranging from a low of $198 per pupil in Ottawa ISD to $854 in Muskegon ISD, with an ISD mean of roughly $500. For perspective, Michigan's basic per pupil foundation allowance in 2019 was $7,871, so approximately six percent of the average student's foundation allowance was devoted to special education costs.

Table 9: ISD-Level Encroachment, FY19

ISD	Total Encroachment	GE Pupil Count	Encroachment Per GE Pupil
Allegan	$ 4,560,208.00	14,082.20	$ 323.83
Alpena-Montmercy-Alcona	$ 3,048,964.00	5,006.69	$ 608.98
Berrien	$ 13,896,480.00	25,284.99	$ 549.59
Calhoun	$ 11,265,116.00	21,757.00	$ 517.77
Charlevoix-Emmet	$ 3,371,962.00	8,391.46	$ 401.83
Cheb-Otsego-Presque Isle	$ 3,159,606.00	7,836.66	$ 403.18
Gratiot-Isabella	$ 8,317,132.00	11,939.54	$ 696.60
Ingham	$ 16,504,928.00	42,633.92	$ 387.13
Jackson	$ 7,358,992.00	22,325.57	$ 329.62
Kalamazoo	$ 9,479,108.00	34,548.06	$ 274.37
Kent	$ 34,346,480.00	104,265.83	$ 329.41
Lenawee	$ 4,623,386.00	14,605.33	$ 316.55
Livingston	$ 9,907,344.00	27,319.57	$ 362.65
Macomb	$ 97,262,912.00	121,868.95	$ 798.09
Marquette-Alger	$ 6,257,277.00	8,995.25	$ 695.62
West Shore	$ 2,955,122.00	7,410.21	$ 398.79
Mecosta-Osceola	$ 3,490,443.00	7,930.16	$ 440.15
Monroe	$ 10,220,324.00	19,866.81	$ 514.44
Muskegon	$ 22,087,096.00	25,859.30	$ 854.13
Newaygo	$ 3,962,002.00	7,112.13	$ 557.08
Oakland	$ 107,015,680.00	180,682.00	$ 592.29
Ottawa	$ 9,672,856.00	48,841.42	$ 198.05
St. Clair County	$ 9,175,344.00	20,737.40	$ 442.45
St. Joseph County	$ 3,490,471.00	10,230.80	$ 341.17
Washtenaw	$ 9,808,848.00	45,464.98	$ 215.75
Wayne	$ 164,428,352.00	263,852.19	$ 623.18

For most ISDs in the sample, encroachment has remained relatively constant over time. Table 10 shows the average per pupil encroachment for sample ISDs over these seven years. Nominal encroachment increased in over two-thirds (18/26) of the ISDs in the sample between 2013 and 2019. Encroachment declined in eight ISDs, including three (Livingston, Kalamazoo, and Washtenaw) in which 2019 encroachment was roughly half the 2013 level. Importantly, each of these three passed a special education millage renewal or increase during the period. Livingston and Kalamazoo's proposals were approved in 2015, while Washtenaw's passed in 2016. Encroachment declined sharply thereafter in each of these ISDs. It fell in Kalamazoo from $459 to $166, and in Livingston from $577 to $316. Washtenaw's millage increase generated enough additional revenue to eliminate encroachment.

Note, however, that for each of these ISDs, encroachment increased each year following the initial drop. Though by the end of the sample none of these three ISDs had encroachment levels reaching to pre-proposal levels, subsequent increases could be reason for concern. It may indicate that as additional revenues become available, districts provide an increased level of services, or more costly services, than previously. If those services were needed but not delivered due to concerns over cost, then districts were not living up to their obligations under IDEA. It could also indicate reduced incentives to limit costs. Further research is necessary to determine the impact of ISD special education millage passage and encroachment.

Table 10: Average ISD Encroachment per Pupil, FY13-19

ISD	2013	2014	2015	2016	2017	2018	2019
Allegan	$ 422.34	$ 373.92	$ 381.13	$ 273.05	$ 306.00	$ 320.71	$ 323.83
Alpena-Montmercy-Alcona	$ 403.46	$ 434.04	$ 455.38	$ 433.20	$ 504.81	$ 527.03	$ 608.98
Berrien	$ 508.65	$ 438.79	$ 486.65	$ 519.35	$ 516.06	$ 514.28	$ 549.59

Table 10 (cont'd)

Calhoun	$ 422.62	$ 424.68	$ 497.74	$ 566.65	$ 547.09	$ 501.89	$ 517.77
Charlevoix-Emmet	$ 258.78	$ 284.23	$ 269.63	$ 295.98	$ 309.16	$ 333.93	$ 401.83
Cheb-Otsego-Presque Isle	$ 273.89	$ 264.13	$ 271.47	$ 341.11	$ 353.07	$ 362.98	$ 403.18
Gratiot-Isabella	$ 345.23	$ 306.68	$ 353.78	$ 444.38	$ 474.66	$ 599.90	$ 696.60
Ingham	$ 395.19	$ 419.82	$ 429.91	$ 438.71	$ 405.70	$ 384.99	$ 387.13
Jackson	$ 230.74	$ 178.78	$ 247.60	$ 269.84	$ 361.85	$ 366.62	$ 329.62
Kalamazoo	$ 433.16	$ 448.88	$ 449.19	$ 166.39	$ 243.02	$ 250.91	$ 274.37
Kent	$ 392.06	$ 393.94	$ 368.39	$ 380.68	$ 381.20	$ 342.88	$ 329.41
Lenawee	$ 218.60	$ 142.89	$ 217.10	$ 285.85	$ 350.90	$ 301.86	$ 316.55
Livingston	$ 617.27	$ 612.17	$ 563.42	$ 576.97	$ 315.99	$ 339.23	$ 362.65
Macomb	$ 631.89	$ 622.45	$ 638.76	$ 693.31	$ 726.55	$ 765.75	$ 798.09
Marquette-Alger	$ 378.88	$ 412.08	$ 453.96	$ 561.69	$ 624.37	$ 710.07	$ 695.62
West Shore	$ 232.56	$ 196.78	$ 169.45	$ 227.72	$ 282.24	$ 397.54	$ 398.79
Mecosta-Osceola	$ 378.11	$ 306.42	$ 383.51	$ 463.38	$ 493.14	$ 407.62	$ 440.15
Monroe	$ 450.44	$ 377.38	$ 396.11	$ 450.85	$ 513.10	$ 520.91	$ 514.44
Muskegon	$ 776.56	$ 688.87	$ 678.95	$ 708.21	$ 765.76	$ 793.28	$ 854.13
Newaygo	$ 421.70	$ 446.98	$ 344.56	$ 447.73	$ 560.40	$ 534.95	$ 557.08
Oakland	$ 579.05	$ 555.37	$ 559.53	$ 561.85	$ 560.43	$ 553.97	$ 592.29
Ottawa	$ 64.82	$ 58.08	$ 65.73	$ 62.35	$ 106.02	$ 158.63	$ 198.05
St. Clair County	$ 353.58	$ 397.15	$ 331.72	$ 418.25	$ 468.93	$ 465.18	$ 442.45
St. Joseph County	$ 392.42	$ 344.89	$ 333.86	$ 291.13	$ 323.12	$ 308.03	$ 341.17
Washtenaw	$ 350.77	$ 290.90	$ 370.96	$ 387.54	$ (17.10)	$ 112.64	$ 215.75
Wayne	$ 651.81	$ 585.35	$ 610.43	$ 603.93	$ 631.96	$ 619.87	$ 623.12

Previous research has found similar results to what is presented in Tables 9 and 10. Michigan's 2017 Special Education Funding Subcommittee Report (Koenigsknecht *et al.,* 2015) found a statewide encroachment of $459 per pupil in the 2014-2015 academic year, while Arsen *et al.,* (2019) calculate $534 of encroachment per general education pupil in the state. I take these one step further by simulating local district encroachment under varying assumptions regarding

an ISD's distribution of special education millage dollars. In doing so, I seek to determine if there are systematic patterns in the degree of encroachment inequality across local districts associated with different distribution rules.

Funding Allocation Models

I simulate these distributions following three allocation models:

A Cost Model, which weights distributions by the portion of ISD-wide special education costs incurred by the local district;

A Special Education (SE) Pupils Model, which weights distributions by the portion of ISD-wide special education enrollment (FTE) within the local district; and

A Total Enrollment (Pupils) Model, which weights distributions by the portion of ISD-wide total enrollment (FTE) within the local district.

Simulation Results

Tables 11 and 12 show the means and standard deviations of within-ISD encroachment, respectively. The first column in Table 11 shows the mean per pupil encroachment among constituent local districts in each ISD under a funding formula which allocates revenues based on the share of the ISD's special education costs incurred by each local district. Column two shows those same means in the case that ISDs distribute their funds based on the share of the ISD's special education enrollment at each local district. The third column shows the average encroachment for each local district if funding were allocated based on the proportion of total enrollment. Table 12 follows the same format, though instead of showing the means of encroachment for the respective models, it shows the within-ISD standard deviations.

Table 11: Mean Encroachment Among Constituent Local Districts by ISD, FY19

ISD Name	Cost Model	SE Pupils Model	Pupils Model
Allegan	$ 343.38	$ 389.09	$ 338.48
Alpena-Montmercy-Alcona	$ 506.03	$ 509.58	$ 470.04
Berrien	$ 514.80	$ 525.58	$ 505.05
Calhoun	$ 449.82	$ 434.10	$ 424.00
Charlevoix-Emmet	$ 471.20	$ 499.92	$ 473.81
Cheb-Otsego-Presque Isle	$ 385.56	$ 412.62	$ 384.23
Gratiot-Isabella	$ 505.52	$ 507.11	$ 485.85
Ingham	$ 301.04	$ 406.52	$ 181.99
Jackson	$ 341.08	$ 359.76	$ 312.31
Kalamazoo	$ 196.04	$ 215.71	$ 153.63
Kent	$ 211.26	$ 248.78	$ 88.19
Lenawee	$ 368.34	$ 363.24	$ 368.76
Livingston	$ 375.44	$ 456.85	$ 331.77
Macomb	$ 677.13	$ 676.57	$ 663.48
Marquette-Alger	$ 546.76	$ 564.07	$ 490.86
West Shore	$ 425.28	$ 424.53	$ 419.36
Mecosta-Osceola	$ 465.18	$ 462.88	$ 463.36
Monroe	$ 509.50	$ 516.70	$ 498.22
Muskegon	$ 761.56	$ 755.83	$ 740.74
Newaygo	$ 504.10	$ 500.00	$ 494.01
Oakland	$ 463.30	$ 474.72	$ 418.30
Ottawa	$ 202.99	$ 249.60	$ 158.38
St. Clair County	$ 290.22	$ 277.56	$ 259.15
St. Joseph County	$ 319.54	$ 321.60	$ 309.83
Washtenaw	$ 174.45	$ 192.31	$ 82.97
Wayne	$ 336.76	$ 381.23	$ 212.71

Table 12: Standard Deviation of Encroachment Among Constituent Local Districts by ISD, FY19

ISD Name	Cost Model	SE Pupils Model	Pupils Model
Allegan	$ 103.83	$ 217.94	$ 190.87
Alpena-Montmercy-Alcona	$ 196.41	$ 233.96	$ 246.14
Berrien	$ 269.81	$ 294.35	$ 310.12
Calhoun	$ 235.06	$ 251.86	$ 285.14
Charlevoix-Emmet	$ 323.37	$ 455.27	$ 466.93
Cheb-Otsego-Presque Isle	$ 192.26	$ 230.46	$ 222.63
Gratiot-Isabella	$ 321.44	$ 321.08	$ 345.60

Table 12 (cont'd)

Ingham	$ 159.82	$ 241.56	$ 261.32
Jackson	$ 165.61	$ 172.83	$ 239.73
Kalamazoo	$ 133.94	$ 175.52	$ 169.91
Kent	$ 177.02	$ 240.98	$ 354.50
Lenawee	$ 120.58	$ 169.22	$ 205.98
Livingston	$ 97.46	$ 157.68	$ 177.58
Macomb	$ 428.90	$ 426.59	$ 467.99
Marquette-Alger	$ 293.04	$ 383.37	$ 380.54
West Shore	$ 161.82	$ 202.71	$ 190.67
Mecosta-Osceola	$ 204.33	$ 239.27	$ 228.97
Monroe	$ 157.00	$ 160.60	$ 187.63
Muskegon	$ 314.89	$ 311.23	$ 371.60
Newaygo	$ 249.81	$ 252.98	$ 287.91
Oakland	$ 335.92	$ 381.25	$ 528.79
Ottawa	$ 104.22	$ 183.05	$ 281.62
St. Clair County	$ 201.78	$ 209.69	$ 229.14
St. Joseph County	$ 108.00	$ 113.43	$ 125.26
Washtenaw	$ 125.46	$ 299.53	$ 162.78
Wayne	$ 399.57	$ 445.56	$ 623.90

These tables show that the way in which an ISD allocates its millage revenue—which makes up nearly one third of total special education funding—has significant impacts on the encroachment faced by its constituent districts. Although aggregate encroachment within an ISD remains constant in all three scenarios, the burden on individual local districts varies under the different funding formulas.

Additionally, some ISDs are more sensitive to changes in funding policy than others. The mean encroachment across locals in Mecosta-Osceola ISD, for instance, changes no more than $3 per general education pupil across all models. On the other hand, Kent ISD's mean encroachment among constituent locals varies substantially between funding models based on cost and those based on total enrollment. This is largely a factor of how much revenue each ISD has available to distribute. If an ISD has a significant amount of revenue to allocate, there is more room for variation in those allocations.

These simulations also yield insights as to how ISDs may be able to allocate funding in such a way as to enhance equity in the encroachment burden faced by local districts. Table 13 combines the means and standard deviations to calculate the coefficient of variation. This coefficient shows the extent of encroachment among an ISD's local districts relative to the mean. A very low coefficient of variation suggests greater equity—that local districts face similar encroachment near the average of their peers. In Table 13, I also include the actual coefficient of variation for those sample ISDs which submitted internal revenue data. By comparing equity in simulated distributions to what is actually occurring in sample ISDs, I show whether ISDs can enhance equity through any of these three approaches. For each ISD, I highlight in green the approach for which equity is maximized, as well as bold and italicize the text.

Table 13: Coefficients of Variance for Encroachment, FY19

ISD	Actual	Cost Model	SE Pupils Model	Pupils Model
Allegan	0.954	***0.302***	0.560	0.564
Alpena-Montmercy-Alcona	0.730	***0.388***	0.459	0.524
Berrien	N/A	***0.524***	0.560	0.614
Calhoun	1.099	***0.523***	0.580	0.673
Charlevoix-Emmet	N/A	***0.686***	0.911	0.985
Cheb-Otsego-Presque Isle	0.849	***0.499***	0.559	0.579
Gratiot-Isabella	N/A	0.636	***0.633***	0.711
Ingham	0.820	***0.531***	0.594	1.436
Jackson	N/A	0.486	***0.480***	0.768
Kalamazoo	N/A	***0.683***	0.814	1.106
Kent	3.947	***0.838***	0.969	4.020
Lenawee	0.748	***0.327***	0.466	0.559
Livingston	0.376	***0.260***	0.345	0.535
Macomb	***0.591***	0.633	0.631	0.705
Marquette-Alger	1.218	***0.536***	0.680	0.775
West Shore	0.694	***0.381***	0.477	0.455
Mecosta-Osceola	0.545	***0.439***	0.517	0.494
Monroe	N/A	***0.308***	0.311	0.377
Muskegon	***0.386***	0.413	0.412	0.502
Newaygo	0.577	***0.496***	0.506	0.583

Table 13 (cont'd)

Oakland	1.240		***0.725***	0.803	1.264
Ottawa	2.598		***0.513***	0.733	1.778
St. Clair County	1.687		***0.695***	0.755	0.884
St. Joseph County	0.399		***0.338***	0.353	0.404
Washtenaw	1.490		***0.719***	1.558	1.962
Wayne	***0.694***		1.187	1.169	2.933

In defining the most equitable approach as that which has the minimum coefficient of variation, it is almost universally the case that distributing special education millage revenues based on cost is the most equitable. In the sample, 21 of the 26 ISDs (80.7%) maximize equity following this distribution. Another two maximize equity by distributing special education revenues based on local districts' share of special education FTE, though we should note that the coefficient of variation in these cases is nearly identical to that calculated under the cost model. As a result, I claim that distributing revenues based on a local district's share of special education costs within an ISD is likely the most equitable approach.

In three sample ISDs (Macomb, Muskegon, and Wayne), the coefficient of variation calculated from actual distributions is lower than that of any of the three simulated approaches. This shows that while distributing revenues based on special education costs is a generally sound approach, there are efficiencies to be gained beyond the three tested approaches. Currently, the formulas these ISDs use to distribute their funds are unclear, but as implemented they provide for more equitable encroachment for constituent districts. Future work should investigate these ISDs specifically to determine what factors are being considered that could inform more equitable distributions throughout the state.

I also show through these simulations that several ISDs currently implement funding approaches that are more inequitable than any of the simulated approaches. Ten ISDs in the sample have actual coefficients of variation higher than those simulated, showing that their

current approaches could be made more equitable. As with Macomb, Muskegon, and Wayne, the actual formulas used in these ISDs are not clear. It may be infeasible to modify their approaches even with the promise of greater equity, as changes to funding formulas require buy-in from constituent local districts. Those changes may lead to higher encroachment in some districts in order to lower encroachment in others, so gaining that buy-in may prove challenging.

No ISD maximizes equity following an approach based on total student enrollment. Indeed, among the simulated approaches, the pupils model was the most inequitable for every ISD in the sample. Though using a census-based approach may mitigate incentives to overidentify student needs, these simulations show that doing so is detrimental for equitable special education finance.

Table 13 also shows that maximum equity in encroachment dispersion does not mean the same thing for every ISD. For instance, in St. Joseph County, the coefficient of variation is between 0.338 and 0.404 across both actual and simulated distributions. Regardless of approach, then, encroachment will be more equitable in St. Joseph than in Marquette-Alger, where the minimum coefficient is 0.536. Thus, the least equitable approach in one ISD can still be more equitable than the best case scenario in another. This will be due in part to the number of districts within an ISD, with larger ISDs having higher potential for variation, but further work should investigate means to level the playing field further in those larger ISDs.

I also investigate whether the funding formula that yields the most equitable distribution of encroachment changes over time. If what is best for one ISD is not best for another, it is reasonable to suspect that, as conditions change within an ISD, the distribution model for special education funding should follow suit. Table 14 shows the coefficients of variation for sample ISDs for the seven-year analytical sample. Each set of three rows represents an ISD, with

columns representing the fiscal years 2013 to 2019. Within each set of three rows are the coefficients of variations under my three conditions – the top row is the coefficient of variation under a cost-based funding strategy, the second row in each set is for funding based on special education enrollment, and the third is for total pupil share. I have highlighted in green the minimum coefficient of variance for each ISD-year as well as bolded and italicized the text.

Table 14: Coefficients of Variation by ISD-Year

ISD	2013	2014	2015	2016	2017	2018	2019
Allegan	***0.335***	0.311	0.421	***0.353***	***0.302***	***0.379***	***0.302***
	0.383	***0.257***	***0.388***	0.459	0.441	0.647	0.560
	0.457	0.483	0.499	0.710	0.543	0.611	0.564
Alpena-Montmercy-Alcona	***0.525***	***0.547***	***0.361***	***0.460***	***0.318***	***0.340***	***0.388***
	0.630	0.622	0.377	0.564	0.391	0.415	0.459
	0.650	0.606	0.522	0.658	0.426	0.465	0.524
Berrien	0.513	***0.534***	***0.585***	***0.537***	***0.525***	***0.514***	***0.524***
	0.512	0.552	0.592	0.538	0.532	0.537	0.560
	0.675	0.722	0.775	0.642	0.618	0.640	0.614
Calhoun	***0.534***	***0.594***	***0.533***	***0.498***	***0.533***	***0.541***	***0.523***
	0.655	0.640	0.602	0.540	0.572	0.604	0.580
	0.872	0.868	0.723	0.672	0.678	0.698	0.673
Charlevoix-Emmet	***0.593***	***0.422***	***0.519***	***0.482***	***0.828***	***0.684***	***0.686***
	0.893	0.589	0.757	0.614	1.083	0.943	0.911
	0.898	0.699	0.870	0.735	1.254	1.058	0.985
Cheb-Otsego-Presque Isle	***0.464***	***0.443***	***0.425***	0.444	***0.444***	***0.471***	***0.499***
	0.490	0.463	0.449	***0.440***	0.460	0.525	0.559
	0.619	0.580	0.528	0.527	0.502	0.560	0.579
Gratiot-Isabella	***0.533***	***0.525***	***0.509***	***0.496***	***0.482***	***0.550***	0.636
	0.560	0.658	0.626	0.538	0.549	0.581	***0.633***
	0.921	1.167	0.935	0.773	0.695	0.682	0.711
Ingham	***0.679***	***0.738***	***0.706***	***0.635***	***0.666***	***0.588***	***0.531***
	0.792	0.756	0.823	0.701	0.746	0.691	0.594
	1.065	1.519	1.609	1.484	1.606	1.555	1.436
Jackson	***0.375***	***0.253***	***0.407***	0.372	0.426	0.379	0.486
	0.959	0.649	0.430	***0.371***	***0.418***	***0.374***	***0.480***
	1.242	0.867	0.752	0.725	0.630	0.628	0.768

Table 14 (cont'd)

	0.578	***0.497***	***0.352***	***0.659***	***0.623***	***0.650***	***0.683***
Kalamazoo	***0.516***	0.519	0.442	0.901	0.830	0.858	0.814
	0.828	0.731	0.620	1.574	1.531	1.478	1.106
	0.991	0.968	***0.864***	***0.858***	***0.839***	***0.876***	***0.838***
Kent	1.027	***0.958***	0.914	0.901	0.845	0.987	0.969
	4.150	3.777	3.751	3.818	3.665	3.886	4.020
	0.346	***0.321***	***0.221***	***0.231***	***0.335***	***0.335***	***0.327***
Lenawee	0.623	0.792	0.434	0.382	0.484	0.503	0.466
	0.611	0.706	0.468	0.410	0.535	0.575	0.559
	0.326	0.233	0.267	0.496	0.340	0.299	***0.260***
Livingston	***0.318***	***0.198***	***0.226***	***0.467***	***0.233***	***0.262***	0.345
	0.365	0.259	0.304	0.532	0.786	0.659	0.535
	0.797	***0.757***	***0.681***	***0.664***	0.729	0.612	0.633
Macomb	0.838	0.782	0.701	0.668	***0.725***	***0.610***	***0.631***
	0.961	0.892	0.812	0.769	0.814	0.673	0.705
	0.455	***0.566***	***0.544***	***0.535***	***0.583***	***0.476***	***0.536***
Marquette-Alger	0.674	0.819	0.772	0.735	0.778	0.584	0.680
	0.776	0.933	0.871	0.814	0.863	0.685	0.775
	0.474	***0.669***	***0.603***	***0.400***	***0.492***	***0.450***	***0.381***
West Shore	0.763	0.921	0.792	0.475	0.556	0.511	0.477
	0.743	0.977	0.906	0.758	0.590	0.519	0.455
	0.389	***0.478***	***0.315***	***0.324***	***0.330***	***0.427***	***0.439***
Mecosta-Osceola	0.407	0.541	0.335	0.339	0.355	0.550	0.517
	0.419	0.527	0.362	0.344	0.348	0.515	0.494
	0.439	***0.372***	***0.344***	0.326	0.301	0.290	***0.308***
Monroe	0.479	0.453	0.404	***0.324***	***0.293***	***0.281***	0.311
	0.608	0.560	0.499	0.425	0.367	0.354	0.377
	0.640	***0.501***	***0.522***	***0.485***	***0.495***	***0.415***	0.413
Muskegon	0.651	***0.501***	0.523	0.490	0.496	0.416	***0.412***
	0.740	0.588	0.633	0.624	0.626	0.526	0.502
	0.622	***0.615***	***0.708***	***0.634***	***0.635***	***0.492***	***0.496***
Newaygo	0.656	0.639	0.749	0.651	0.651	0.509	0.506
	0.674	0.705	0.806	0.683	0.668	0.581	0.583
	0.711	***0.874***	***0.798***	***0.823***	***0.743***	***0.694***	***0.725***
Oakland	0.769	0.956	0.925	0.969	0.810	0.701	0.803
	1.280	1.420	1.384	1.450	1.392	1.314	1.264

Table 14 (cont'd)

	0.459	***0.534***	***0.471***	***0.438***	***0.537***	***0.516***	***0.513***
Ottawa	1.347	1.290	1.125	1.019	0.908	0.713	0.733
	2.529	2.391	2.533	2.608	2.220	1.907	1.778
	0.877	***0.853***	***0.784***	***0.722***	***0.736***	***0.745***	***0.695***
St. Clair County	0.893	1.007	0.883	0.771	0.789	0.789	0.755
	1.100	1.068	0.982	0.911	0.934	0.960	0.884
	0.322	***0.344***	***0.338***	***0.406***	0.357	***0.318***	***0.338***
St. Joseph County	0.335	***0.344***	0.346	0.428	***0.352***	0.328	0.353
	0.359	0.435	0.460	0.582	0.482	0.431	0.404
	0.857	***0.751***	***0.753***	***0.731***	***0.616***	***0.691***	***0.719***
Washtenaw	1.014	1.005	0.904	1.036	2.087	1.843	1.558
	1.563	1.562	1.525	1.591	3.257	1.963	1.962
	1.351	1.293	1.254	1.248	1.218	1.191	1.187
Wayne	***1.320***	***1.287***	***1.250***	***1.234***	***1.203***	***1.160***	***1.169***
	3.103	3.125	3.074	3.192	2.966	2.940	2.933

For many ISDs, the funding strategy minimizing the coefficient of variation remains constant over time, though this is not universal. Of the 26 ISDs in the sample, 12 have at least one year in which the distribution model minimizing inequity is different than in other years. For instance, Monroe ISD would maximize equity in the burden of encroachment among constituent local school districts under a cost-based approach for the fiscal years 2013-2015, then under a special education enrollment-based approach for the fiscal years 2016-2018, then a return to a cost-based approach in the final year of the sample. This suggests that equitably distributing the burden of encroachment may be achieved through different funding strategies over time, and as such ISDs should review and revise their policies as the composition of local districts changes.

Though not universally the case, the majority of ISD-year observations have a minimum coefficient of variation under an approach that distributes funds based on local districts' shares of special education cost within an ISD. Only 25 of the 182 optimal ISD-year observations (13.7%) are not under a cost-based allocation model, with all 25 being a funding distribution based on

special education enrollment. In no ISD-year is the optimal policy to distribute funds based on total student enrollment. This reaffirms the previous finding that distributing revenues based on special education cost is a sound approach, absent more detailed information. In those cases where basing distributions on special education enrollment is more equitable, the difference between approaches is marginal, with relatively small gains to within-ISD equity.

None of these approaches leads to a situation of true horizontal equity, where each local district within an ISD bears the same level of encroachment per general education pupil. Future work will seek to determine what it would take for such a situation by measuring ex-ante the optimal level of encroachment and distributing funds accordingly. However, in practice, inequity in encroachment is all but inevitable. As a result, some districts will inherently need to divert more of their general education funds to special education programs and services than others. In the next chapter, I investigate trends in those diversions, specifically looking at whether there are programs or services from which districts systematically divert their general education funds.

Chapter 6: District Expenditures and Encroachment

In navigating encroachment, districts must necessarily use dollars that would otherwise be spent outside of special education on special education services. No previous research has looked at the patterns in district resource reallocation in response to special education encroachment. If districts systematically reduce spending in specific areas, knowing so may provide policymakers evidence for targeted interventions.

To investigate resource reallocation associated with encroachment, I estimate Equation (3) and ask: *How do school districts reallocate dollars when faced with encroachment?* I first estimate Equation (3) without θ_i – the district fixed effect – and γ_t – the year fixed effect. These are included sequentially, with the preferred specification including both.

$$(3) \qquad Y_{it} = \beta_0 + \beta_1 E_{it} + \boldsymbol{X}_{it} B_2 + \theta_i + \gamma_t + \varepsilon_{it}$$

Data Characteristics

Table 15 presents summary statistics for outcome variables in the analytical sample. Per pupil expenditures on basic needs instruction averages $5,345 across the sample. On average, districts spend about $4,700 per student in total support services, with about 17 percent of that being on pupil and staff supports. Business and administration expenditures, as well as those on operations and maintenance, make up much larger shares (relative to pupil and staff supports) of total support expenditures at $1,289.90 and $1,075.63 per pupil, respectively. On average, districts provide IEPs to 12.3 percent of their students, spending approximately $37,000 on special education services for each special education student.

Table 15: Summary Statistics for Outcome Variables, Equation (3)

Outcome	Mean	Std. Dev
Expenditure Category (per pupil)		
Basic Needs Instruction	$ 5,344.94	$ 2,613.54
Total Support	$ 4,734.78	$ 2,697.05
Pupil Support	$ 494.16	$ 357.10
Staff Support	$ 319.63	$ 245.45
Business and Administration	$ 1,289.90	$ 1,156.67
Operations and Maintenance	$ 1,075.63	$ 849.37
Other		
IEP Percent	12.3%	0.05
Special Education Expenditures (per special education student)	$ 37,393.23	$ 32,521.94

Table 16 presents summary statistics for the model's independent variables. Average per pupil expenditures hover just below $15,000, while student populations in sample districts are, on average, 50 percent economically disadvantaged.

Table 16: Summary Statistics for Independent Variables, Equation (3)

Variable	Mean	Std. Dev.
Enrollment (log form)	7.17	1.50
Total Expenditures (per pupil)	$ 14,897.65	$ 7,275.72
Percent Economically Disadvantaged	50%	0.20

Results of Estimating Equation (3)

Table 17 presents the results of estimating Equation (3). Model 3, with district and year fixed effects, is the preferred specification, while Model 2 includes only district fixed effects, and Model 1 includes neither district nor year fixed effects. Each row in Table 17 represents the expenditure category serving as the outcome measure in the given model, and in each row per model are both the estimated coefficient on encroachment (β_1) and, underneath that, the Bonferroni-adjusted p-value.

Table 17: Results of Estimating Equation (3)

Outcome Measure	Model 1	Model 2	Model 3
Expenditure Category (per pupil)			
Basic Needs Instruction	0.321	0.007	-0.053
	(1)	(1)	(1)
Total Support	0.635*	-0.038	-0.090
	(0.025)	(1)	(1)
Pupil Support	0.182***	0.107	0.086
	(0)	(0.154)	(0.246)
Staff Support	0.133**	-0.010	-0.021
	(0.003)	(1)	(1)
Business and Administration	0.095	-0.100	-0.096
	(1)	(1)	(1)
Operations and Maintenance	0.076	-0.014	-0.003
	(1)	(1)	(1)
Other			
IEP Percent	*a*	*a*	*a*
	(0)	(1)	(1)
Special Education Exp (per SE student)	24.37**	14.61	13.42
	(0.001)	(0.193)	(0.220)
District FEs		x	x
Year FEs			x

*Note: Coefficients represent association between encroachment per general education pupil and outcome in Column 1. Bonferroni-adjusted p-values in parentheses. * p < .05, ** p < .01, "a" indicates value < .001.*

I include expenditures on basic needs instruction to see if general education instruction was losing funding to cover unfunded costs for special education instruction. Across all models, I do not see districts systematically doing so. By including total support services, I sought to identify if districts were systematically shifting dollars away from supports in an effort to cover unfunded special education costs. In the preferred model (Model 3 above), I find no evidence that districts were doing so during the years for which I have data. It is reasonable to believe that,

in the face of a budget constraint such as that posed by encroachment, districts would opt to limit support expenditures in favor of those on instruction.

This finding is corroborated by insignificant estimates for all of the subcategories of support expenditures. Estimates of the relationship between encroachment and pupil or staff supports are near zero. There is marginal evidence that districts actually increase their pupil support services when faced with encroachment ($p = 0.031$), but after accounting for the possibility of random variation leading to that significance (through Bonferroni adjustment), the threshold for confidence is not met ($p = 0.246$).

The remainder of the support expenditures – those on business, administration, operations, and maintenance – again show no significant variation tied to encroachment. Even prior to Bonferroni adjustment, these findings in the preferred model are indistinguishable from zero. Again, conventional wisdom would suggest that when budgets become constrained, districts would opt to maintain funding for instructional programs while limiting those on support services. Business, administration, operations, and maintenance all serve as more tangential expenditures from which, hypothetically, districts would be more able to divert resources. While the point estimates are negative, they are so imprecise that this hypothesis simply cannot be verified.

Additionally, I find no significant relationship between encroachment and special needs identification or service provision, as measured by special education expenditures per special education student, at least in the preferred model. As for the share of students within a district given an IEP, point estimates are remarkably small, and even if the precision of the estimates were enhanced, it is likely that the relationship, at least as measured here, is substantively insignificant. Absent the Bonferroni adjustment, expenditures on special education services per

special education student would be significant at the $p < .05$ level. However, it is unclear if that significance would be due to random variation.

It is noteworthy that there is some significance in the relationships between encroachment and outcomes of interest in Model 1 – namely per pupil expenditures on total support services, pupil supports, staff supports, and per special education student expenditures on special education services. However, because these relationships disappear when including district and/or year fixed effects, it is likely the case that such significance is due to omitted variable bias.

Overall, the preferred model, which includes both district and year fixed effects, shows no significance between encroachment and measured outcomes. There are several possible explanations for this. As for expenditure categories of interest, it is highly likely that there is simply no systematic trend in expenditure changes across districts in response to encroachment. In other words, how one district redistributes its expenditures to shift dollars to unfunded special education costs is not the same as its peers. Alternatively, districts may redistribute their expenditures differently over time as budget priorities shift. It could also be the case that systematic shifts happen in expenditure categories that are not included here, a hypothesis which can be tested in future work.

In addition, I do not find evidence that special education identification is affected by encroachment levels. Given the potential for identification incentives within special education finance, the lack of significance between identification and encroachment is encouraging. In the case of the models estimated above, point estimates on encroachment vis-à-vis identification were substantively minuscule, and if precise would be too small to be worth policy consideration without additional work.

Chapter 7: Summary, Policy Implications, and Discussion

In the preceding chapters, I measured and studied the phenomenon of encroachment as it exists in Michigan school districts. While encroachment has received some attention in the broader research community and recently in the policy space, our understanding of the phenomenon is relatively nascent and unexplored. In Chapter 3, I outlined how I measured encroachment across Michigan school districts over the 2013 to 2019 fiscal years. This measurement, due primarily to novel data collections identifying the transfer of ISD-generated revenues to local school districts, is the best measurement to date of the encroachment burden. In Chapter 4, I went on to look at a range of policy variables and district characteristics, seeking to isolate relationships between them and the encroachment districts face. I then simulated what encroachment would be for local school districts under three different distribution methods which could be enacted by an ISD. Lastly, I attempted to identify trends in districts' responses to encroachment by employing a fixed effects regression model tying expenditures to encroachment. In doing so I generated a wealth of information current and future researchers and policymakers can use both to continue the study of encroachment and to adjust policy to potentially ease inequities in encroachment across school districts.

Overview of Results

First, in measuring encroachment, I show that, in aggregate, Michigan school districts have been diverting between $700 and $800 million from their general funds every year to compensate for insufficient special education revenues. This equates to approximately $500 per general education student, who would otherwise be supported with those funds.

As mentioned several times prior, this wouldn't *necessarily* be a problem if the burden was spread evenly across school districts, with each community bearing equivalent financial

responsibility for supporting their local special education needs. However, this is not the case, as I show the disparity in that financial responsibility is wide. While the statewide average encroachment is approximately $500 per general education student, some districts are burdened with over $2,000, and others have more revenues than they do costs. This is woefully problematic, particularly if those districts burdened with higher encroachment are those that are otherwise financially burdened, as shown by Conlin & Jalilevand (2018).

Additionally, compared to the statewide average of roughly $500 per general education pupil, the encroachment burden on the average district is much lower. Table 18 shows, by year, the average encroachment per general education pupil across the state, alongside the per general education pupil encroachment for the average district.

Table 18: Average Encroachment Per GE Pupil statewide vs. District-Level

FY	Mean Encroachment per GE Pupil	Mean District Encroachment
2013	$544.73	$329.63
2014	$487.33	$321.07
2015	$488.15	$331.60
2016	$520.55	$336.71
2017	$483.09	$342.68
2018	$490.47	$361.94
2019	$511.82	$382.41

This shows that, on average, larger school districts, which also tend to be in urban areas, face higher encroachment burdens. In column 3 of Table 18, each district is weighted evenly, whereas the column to its left is weighted by students. If smaller districts have, on average, lower levels of encroachment per general education pupil, then the statewide per general education pupil mean will be higher than that of the average district. This phenomenon requires significantly more study, as it is suggestive that encroachment may compound some of the unique financial challenges faced by large school districts.

I then describe the relationships between encroachment and a host of policy variables and district characteristics, laying the groundwork for potential funding solutions. In the realm of policy, I show that the millage rate ISDs may levy, ISD take-up of that rate, and the taxable value on which the millage rate is levied meaningfully contribute to the level of encroachment faced by constituent local school districts. In ISDs with higher permitted millage rates, higher shares of that rate actually taxed, and higher taxable values, encroachment is lower. This is the expected outcome, as all of these variables provide for revenue generation within ISDs, and with more revenue, encroachment burdens are mitigated.

The other two policy variables – the share of special needs students served by the ISD and the share of students attending charter schools in an ISD – are associated with encroachment but only in charter schools. As the share of special needs students taught by the ISD increases, so does encroachment within charter schools. This is likely due to charter schools not being able to take advantage of those ISD services to the extent of their neighboring traditional districts. Additionally, as enrollment in charter schools make up a larger share of total enrollment within an ISD, those charters experience higher encroachment. Given that increased enrollment will include special needs students, combined with lower capacity and less-developed special education infrastructure, I hypothesize that charter schools are less able to compensate for increased special education costs.

Building on previous literature (*e.g.,* Conlin & Jalilevand, 2015, 2018), I show that there exist district characteristics that are significantly correlated with encroachment, though those investigated again differed in significance between district type. A higher share of students with special needs is strongly associated with higher encroachment within traditional public school districts. This effect does not appear in charter schools, however. I find suggestive evidence that

charter schools are less able to take advantage of economies of scale, as an additional special education student is associated with a larger increase in encroachment in charter schools than in TPS. Note, however, that the magnitude of this effect is small. I also show that high cost disabilities pose a particularly acute financial burden on school districts, with a 10 percentage point increase in the share of students with high cost disabilities associated with a $194 and $229 increase in per general education pupil encroachment for TPS and charter schools, respectively. Given that Michigan operates on a percentage reimbursement system for special education finance without a provision for high-cost students, these relationships are expected.

Lastly, the variables which predict encroachment in traditional public schools are different than those in charters. My models account for significantly more of the variation in encroachment for TPS (R-squared = 0.33) than for charter schools (R-squared = 0.08). Further work should investigate characteristics which may more accurately explain encroachment in charters.

In investigating my second research question through a simulation of revenue flows, I show the important role that the intermediate school district can play in alleviating the inequitable encroachment in its constituent districts. My findings show that, when we choose among distribution policies which allocate the ISD's excess revenues based on local districts' shares of special education cost, special education enrollment, and total enrollment, a cost-based approach is often the best option. When there are exceptions, the differences are minute. Additionally, distributing revenues based on total enrollment leads to significant inequities, and while it may dissuade special needs overidentification, ISDs need to consider its equity implications.

I compared equity in simulated revenue distributions to equity in actual distributions for those ISDs which submitted internal revenue data. Of those 20 ISDs, three have implemented funding approaches that are more equitable than any of those simulated. It is crucial to investigate what is occurring in those ISDs, as doing so can inform equity-enhancing funding practices. In contrast, 10 ISDs had distribution policies in the 2019 fiscal year which were less equitable than any simulated approach. While modifications may be politically difficult, disparities in the financial burden faced by some of their constituent districts would be alleviated by revising the ISD funding allocation policies.

Through those simulations, I also show that the level of equity achievable under each ISD's optimal approach differs among ISDs. That is, for some ISDs, the equity-maximizing distribution method identified might still be highly inequitable compared to a neighboring ISD's equity-maximizing method. This is primarily due to two factors: the number of districts across which encroachment is to be made equitable, and the availability of resources to distribute. In ISDs with a high number of districts, it is more likely to be the case that, prior to the ISD's distributions, there is higher variation in the encroachment faced by local districts relative to smaller ISDs. In regard to the availability of revenues to distribute, it is inherently the case that lower levels of allocable revenues lead to a lower ability for the ISD to level the financial playing field. Simply put, they may just not have the resources to bring high-encroachment districts to the level of their neighboring low-encroachment districts, particularly when following policies that aren't weighted accordingly. Hypotheticals aside, my findings make it clear that the ISD plays a crucial role in managing the distribution of encroachment, if only for those districts within their boundaries.

Lastly, I sought to identify systematic patterns in how district expenditures respond to varying levels of encroachment. If districts are legally obligated to reorganize expenditures to compensate for insufficient special education revenues, are there patterns in what expenditures they reduce? When including appropriate controls, I find no significant relationships between encroachment and expenditure trends.

Though I do not find any systematic patterns in the expenditures districts choose to reduce, this is in and of itself an interesting result. It suggests that districts have different methods of approaching the budget constraint encroachment presents. Which expenditures one district draws from to cover unfunded special education costs may not be an option for another district, and the lack of any systematic relationship may simply be the result of variation in district preferences or resource availability.

Implications for policy

The findings of this dissertation could not be more timely when it comes to informing policy decisions. Encroachment has begun entering the policy space in Michigan, and should the state choose to act, it is important the state be as informed as it possibly can be. This is particularly salient given recent legal proceedings within the state. In Genesee County throughout 2020, a local constituent district argued – successfully – that the ISD's millage distribution formula was inequitable. Many ISD officials are now left wondering if the state of Michigan will offer guidance as to how they should distribute their millage revenues—an aspect of policy over which the state has traditionally given the ISD tremendous flexibility. In the absence of state guidance, there may be additional concerns within an ISD regarding whether their distribution formulas are or are not equitable and whether they may be confronted with a lawsuit similar to that in Genesee.

Lastly, state and local budgets have been increasingly constrained as time moves forward. While the economic impacts of the COVID-19 pandemic were relatively small when compared to expectations (in Michigan), particularly following inflows of federal stimulus dollars, the state and local school districts need to be able to effectively address encroachment amid budget concerns. An understanding of encroachment, and its relationship to budget characteristics, is crucial for effective navigation of these constraints.

With this in mind, I make the following policy considerations.

Policy should focus on the distribution of encroachment

First and foremost, encroachment is not something to be solved by simply giving more money to school districts to cover unmet costs. While unfunded special education costs may be undesirable, there are strong arguments for local districts to bear some level of responsibility for serving students with special needs. Additionally, increased funding brings with it incentives to overidentify student need (see Cullen, 2003; Mahitivanichcha & Parrish, 2005), and simply adding more money may not eliminate encroachment. For instance, Livingston, Kalamazoo, and Washtenaw ISDs all passed special education millage proposals during the time frame studied in this dissertation. In these ISDs, encroachment was lowered dramatically, but only temporarily. In each year following the initial drop, encroachment in these ISDs increased.

Instead, the problem of encroachment is in its distribution. Within the education policy community, fairness is generally a desirable goal. The current special education funding system is anything but fair. In the 2019 fiscal year, nearly 10 percent of Michigan's school districts experienced no encroachment. In that same year, more than a dozen school districts were diverting over $1,500 per general education student to cover unmet special education needs, equating to over 20 percent of those students' foundation allowances. If we believe money

matters in education (see Delpier, Nagel, Stec, Gilzene, & Arsen 2019) then systemic underfunding of special education is inequitably detrimental and likely to compound on other, preexisting inequities.

Traditional public schools should be the focus

Traditional public schools bear a disproportionate burden of encroachment when compared to schools in the charter sector. In fact, encroachment in the average traditional public school was more than double that in the average charter school for the 2019 fiscal year – $533 versus $235 per general education pupil, respectively. The burden of encroachment is particularly acute for large, urban districts, upon which inequities in encroachment compound other inequities, such as those in wealth or socioeconomic status (Conlin & Jalilevand, 2018). In seeking remedies for inequity in encroachment, reducing encroachment in traditional public schools is a crucial first step.

Account for high-cost disabilities in special education funding

In this dissertation, I showed that high-cost disabilities contribute substantially to the level of encroachment faced by local school districts. Because Michigan does not have a high-cost provision in its special education funding policy, these students represent significant financial challenges to local school districts which have few – if any – avenues through which to raise revenue. As these students are funded the same as all other special needs students at roughly 30% of cost, districts are liable for tens of thousands of dollars for each student with a high-cost disability. Michigan should consider implementing a provision to aid in funding students with high-cost disabilities.

The ISD is an effective entity to steer encroachment

This work shows that the intermediate school district – both as a focus and enactor of policy – may serve as a lynchpin for remedying inequity in encroachment. I first found that districts belonging to ISDs with higher allowable millages, those willing to levy millages closer to their limit, and those with higher value property experienced lower encroachment, on average. As a focus of policy, then, the state may be able to alleviate the financial burden of encroachment by easing restrictions on the allowable taxes ISDs may levy. In this there is currently tremendous inequity – millage caps range from 1.315 in Iosco RESA to 9.625 in Jackson ISD.

In addition to raising the millage cap through state-level policy, local communities would have to take advantage of their authority to levy higher millages. That is, local tax effort would have to increase to generate the additional revenues allowable under lifted or raised caps. While this would not account for disparities in taxable values between ISDs, it would be a step forward in revenue generation for special education purposes. On this, the state could consider expanding its tax-base equalization program by raising the taxable value threshold at which an ISD becomes eligible for funding (currently set at $201,700 per pupil). Michigan should also increase funding for the program, which for the 2021 fiscal year totaled just over $40 million. With over $700 million in unfunded special education costs, this contribution is woefully small.

I also show that how an ISD distributes its revenues has significant implications for the distribution of encroachment among its constituent local districts. In creating their policies governing the allocation of both Act 18 and federal IDEA revenues, ISDs should consider the resulting distribution of encroachment. With equity in mind, ISDs should draft allocation policies such that their districts are not differentially burdened and consider how various approaches may

alleviate that burden. This work provides an important first step, but by combining the models presented here and weighting different characteristics in line with local conditions, higher levels of equity are likely achievable.

ISDs need to review their millage allocation policies over time

Intermediate school districts, regardless of their policy choices vis-à-vis the distribution of revenues, should review and revise those policy choices over time. I show in this research that equitable funding approaches, even within ISDs, may change over the years. Particularly within Michigan's education ecosystem, which features a high prevalence of school choice and a per pupil allowance funding structure, ISDs will necessarily need to monitor and adjust funding for changes to student compositions and needs within local districts. Such revisions to policy can be politically difficult, as redistribution of funds is typically contentious. However, in order to maintain equity within special education finance, revisions are necessary.

Other Considerations

I made two important assumptions in this work that must necessarily be taken into account when interpreting any of the findings presented here. First, the work as presented assumes that the current mechanisms of special education finance in Michigan remain in place. This is primarily related to the role of the ISD as both a revenue generator and distributor. In my simulations, I assume that ISDs will continue to generate revenue for local school districts by levying millages at their current rates on constituent properties. In doing so, significant variation in revenue – and encroachment – will remain between ISDs.

In this case, some ISDs can maximize equity in encroachment but still be woefully more inequitable than other ISDs in the state. For instance, across my simulations, Kent ISD's most equitable funding distribution resulted in a coefficient of variation of 0.838. This coefficient is

greater than even the most *inequitable* distributions in 17 of the other 25 ISDs. By maintaining an institutional structure wherein ISDs provide a significant portion of special education revenue but have tremendously different abilities to generate that revenue, statewide equity in special education finance will inherently be hamstrung.

This work also assumes that districts do not exhibit a behavioral response to changes in funding policy. When simulating funding distributions over time, I assume that districts do not adjust their costs or enrollment in ways that would affect the share of the funding distribution received. As remarked earlier, increased levels of funding provide incentives to districts which may affect their identification patterns, at least for the marginal need. For instance, in the case a district would be reimbursed for 100 percent of special needs cost, it would be more likely to identify needs where there are none, or put in less effort to mitigate cost (and thus increasing expenditures on special education services).

I claim here that between models based on cost, special education enrollment, and total enrollment, distributions based on the share of costs incurred by each local district lead to the most equitable distribution of encroachment. In this approach, districts may be incentivized to bear a larger share of costs relative to other districts within their ISD. However, doing so would still incur costs greater than the additional revenue received and result in a financial loss to the district. While that district may receive a larger share of the pot from their ISD – assuming other local districts don't behave in the same manner – the overall pot remains constant and those additional revenues would be insufficient to cover the additional cost. If surrounding districts changed their behavior in a similar manner, then there would be only minor changes to the share of within-ISD cost faced by each local district, and costs would increase for every district without changes to revenue.

In implementing any policy based on the principle of equity, policymakers must be aware that how they measure equity will influence what is identified as equitable and what is not. In other words, what one equity measure shows as equitable, another may say the opposite. In running the simulations in Chapter 5, I measured equity using the coefficient of variation, which measures the dispersion of an object over the groups which receive that object. Berne & Steifel (1984) put forth 10 other measures of vertical equity, some of which may tell a different story than what I found in my analyses. Future work should measure the extent to which any conclusions vary with different measures of equity.

Limitations & Future Work

As is the case with any work, there are pathways to improving what has been presented here. That is not to say this research is anything but thorough, thoughtful, and rigorous, but rather that it is one piece of a burgeoning literature on which future work can be built. Here I discuss limitations to this specific project, along with how those limitations may be addressed, and next steps to be taken in a relatively nascent body of literature. I split the limitations into two primary categories: *Measurement* and *Conceptual*.

Measurement

The most intricate component of studying the phenomenon of encroachment lies in its measurement. Special education programs and services are funded through a litany of revenue streams, and given the nature of planning for each individual student's need there exist numerous areas of flexibility in identifying costs. As such, measuring encroachment – which requires accurate measures of both special education costs and special education revenues – is an inherently difficult task. In this work, I collected and combined the most accurate cost and

revenue data available, but the availability of that data is a primary barrier to studying encroachment effectively.

The primary limitation regarding data availability is in the revenue flows from each individual ISD to its constituent local districts. In the absence of a centralized repository for those revenue flows, I reached out to each ISD individually to collect them. The response was mixed, with 16 ISDs not fulfilling the request, and the majority of ISDs not having information preceding the 2013 fiscal year. As a result, a first obvious improvement to the work would be the inclusion of revenue flow data from those ISDs which had not yet provided them at the time of this research. Additionally, establishing trends in encroachment at the district level yields statistical power, and having additional years prior to 2013 – particularly given encroachment's relationship to budget constraints and the significant impact of the Great Recession on Michigan's budget – may help elucidate stronger or clearer relationships between district characteristics, policy, and encroachment.

In the realm of measurement, the identification of special education costs also comes with a limitation. Namely, not all special education costs serve as "allowable" costs, meaning that there exists some level of unmeasured costs districts necessarily have to pay for. This is partially overcome by adding in the federal component of costs (equal to federal revenues), though there are additional unreported – and currently unmeasurable – costs. Indeed, as learned through conversations with ISD officials, special education costs can be more than 20 percent higher than what are reported. Additionally, because these costs are not reportable, they are also not reimbursable, meaning that encroachment is certainly higher than what is found in this research. However, it is important to note the possibility that "allowable" costs are truly the costs necessary to provide a given level of services, and the unreported costs are instead simply

additional expenditures due to inefficient service provision. As I have defined encroachment throughout this work to be excess *cost*, expenditures in excess of costs should be excluded anyway, though it is unclear what the true level of special education cost is.

Also stemming from conversations with ISD officials, there are occasional measurement issues within the Financial Information Database regarding federal special education revenues. For example, in discussion with an official from ISD A (left unnamed), we found four constituent districts who over the sample misreported – unintentionally – special education revenues as general education revenues. In this case, revenues were understated and thus encroachment for those districts may be overstated. The extent to which this occurs is unknown, and is remedied in those ISDs which provided their intra-ISD revenue flows. As a result, I believe the impact of the occasional reporting error to be minimal.

Lastly, there may exist alternative revenue sources outside of state, federal, and ISD-allocated funds that are not recorded in the datasets merged here. For instance, Marquette-Alger RESA collects revenues from local mining endeavors and directs a portion of those funds to special education services. Similar provisions exist in other ISDs as well, and are largely captured for those ISDs which provided their revenue data. It cannot be currently known if alternative revenue sources in non-responding ISDs constitute a notable portion of special education revenues, but it serves as a potential measurement limitation.

Conceptual Limitations

The primary conceptual limitation to consider is related to measurement, but surrounds the question of "when?" In special education finance, revenues are not distributed at the same time as costs are covered. As such, revenues, particularly state revenues, make adjustments for prior year costs that differ from anticipated costs. Thus, revenues given in fiscal year t have some

ties not only to the costs of fiscal year t, but also the costs of fiscal year t-1. I have presented encroachment as measured in a practical sense, tying revenues to the year in which districts are making their expenditures (and covering costs). Revenue adjustments for the prior year, then, are included in the current year, as those revenues are in practice used for current year needs. Conceptually, encroachment could be considered as costs in excess of revenues assigned to those costs. This is not the reality faced by districts, however, as costs are covered as they are incurred. An extension of this applies to federal revenues. As a provision of IDEA, school districts have 18 months to spend their federal special education dollars. This occasionally results in carryover funds, meaning districts can use prior year revenues to cover current year expenditures. This poses less of an issue than state funding adjustments, as federal revenues are tied to an equal federal cost and as such costs and revenues are measured at the same time.

Future Work

This research has laid the foundation for future work that not only includes additional data and seeks to overcome the aforementioned limitations, but that builds upon and extends what I've presented here. With 16 ISDs omitted from the majority of the preceding analysis, the immediate improvement would be work that includes their special education revenue flows. Additionally, that first extension of this work should include additional years, particularly those encompassing the Great Recession (2008 and beyond).

In Chapter 5, I simulated intra-ISD revenue flows following different allocation rules and found that such rules have meaningful impacts on the resulting distribution of encroachment among local districts. I measured those impacts against the within-ISD coefficient of variation, claiming that by minimizing the coefficient of variation, an ISD is producing an equitable outcome. Taken to the limit, that coefficient of variation could be minimized (*i.e.*, the within-ISD

standard deviation of encroachment could be brought to zero) by calculating what the level of encroachment *should* be prior to the allocation of funds. By determining the average encroachment within the ISD, and allocating resources to each local school district such that their encroachment burdens were equal to that average, there would be no variation in the encroachment burden districts faced. Future work, then, could study the feasibility and practicality of such a policy wherein financial allocations were based on a calculable outcome rather than based on inputs (costs, enrollment, etc.).

I do not find significant relationships between expenditure modifications and encroachment at the district level. While there is suggestive evidence that purchased services and facilities expenditures may be, on average, more likely to be cut, additional work is necessary to robustly establish those relationships. Future work should include a qualitative element, including input directly from school district officials as to how they tackle encroachment within their district. Such qualitative work could shine a light on encroachment quantitative work cannot, and would have immeasurable substantive significance for school officials and policymakers alike.

REFERENCES

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Ahearn, E. (2010, April). Financing special education: State funding formulas. In *Alexandria, VA: Project Forum, National Association of State Directors of Special Education*.

Arsen, D., Delpier, T., & Nagel, J. (2019). Michigan school finance at the crossroads: A quarter century of state control. *Lansing, MI: Michigan State University, January*.

Augenblick, Palaich and Associates, Inc. (2003). Calculation of the cost of an adequate education in Tennessee in 2001-02 using the Professional Judgment and the Successful School District approaches (Prepared for the Coalition for Tennessee's Future). Denver, CO: Augenblick, Palaich and Associates, Inc.

Augenblick, J., Palaich, P., Silverstein, J., Rose, D., & DeCesare, D. (2005). Estimating the cost of an adequate education in Connecticut (Prepared for The Connecticut Coalition for Justice in Education Funding). Denver, CO: Augenblick, Palaich and Associates, Inc.

Baker, B., & Green, P. (2014). Conceptions of equity and adequacy in school finance. *Handbook of research in education finance and policy*, 203-221.

Baker, B. D., Green III, P. C., & Ramsey, M. J. (2018). Financing education for children with special needs. *Handbook of leadership and administration for special education*, 97-114.

Baker, B. & Ramsey, M. (2010). What we don't know can't hurt us? Equity consequences of financing special education on the untested assumption of uniform needs, *Journal of Education Finance*, 35(3), p. 245-275.

Baker, B. D., Green, P. C., & Richards, C. E. (2008). *Financing education systems*. Prentice Hall.

Berne, R., & Stiefel, L. (1984). *The measurement of equity in school finance: Conceptual, methodological, and empirical dimensions*. Johns Hopkins University Press.

Chambers, J. G. (1999). The patterns of expenditures on students with disabilities: A methodological and empirical analysis. *Funding special education*, *89*, 99-103.

Chambers, J. G., Levin, J. D., & Shambaugh, L. (2010). Exploring weighted student formulas as a policy for improving equity for distributing resources to schools: A case study of two California school districts. *Economics of Education Review*, *29*(2), 283-300.

Chambers, J. G., Parrish, T. B., & Harr, J. J. (2004). What are we spending on special education services in the United States. *Center for Special Education Finance*.

Chambers, J. G., Parrish, T. B., & Hikido, C. (1996). Special education expenditures and revenues in a census-based funding system: A case study in the Commonwealth of Massachusetts. *Journal of Education Finance*, *21*(4), 527-554.

Chambers, J. G., Shkolnik, J., & Perez, M. (2003). Total expenditures for students with disabilities, 1999-2000: Spending variation by disability. *Special education expenditure project*.

Citizens Research Council of Michigan (2012). Financing special education: Analyses and challenges. Report 378. Accessed at https://crcmich.org/publications/financing_special_education_analysis_challenges-2012

Conlin, M., & Jalilevand, M. (2015). Systemic inequities in special education financing. *Journal of Education Finance*, 83-100.

Conlin, M., & Jalilevand, M. (2018). Equity and Unrestricted Funds in Special Education. *Journal of Education Finance*, *44*(2), 218-234.

Cullen, J. B. (1997). *Essays on special education finance and intergovernmental relations* (Doctoral dissertation, Massachusetts Institute of Technology).

Cullen, J. (2003). The impact of fiscal incentives on student disability rates, *Journal of Public Economics*, 87, p. 1557 – 1589.

Delpier, T., Nagel, J., Stec, K., Gilzene, A., & Arsen, D. (2019). Does money matter in education? Reconsidering an old question with reference to Michigan.

Dhuey, E., & Lipscomb, S. (2011). Funding special education by capitation: Evidence from state finance reforms. *Education finance and policy*, *6*(2), 168-201.

Dhuey, E., & Lipscomb, S. (2013). Funding special education by total district enrollment: Advantages, disadvantages, and policy considerations. *Education Finance and Policy*, *8*(3), 316-331.

Downes, T., & Stiefel, L. (2008). Measuring equity and adequacy in school finance. *Handbook of research in education finance and policy*, 222-237.

Duncombe, W., & Yinger, J. (2008). Measurement of cost differentials. *Handbook of research in education finance and policy*, 238-256.

Education Commission of the States (2019). K-12 special education funding. Accessed at https://c0arw235.caspio.com/dp/b7f930000f26bd86ea194864a088

Goldfinger, P. M. (1993). *Revenues and limits: a guide to school finance in Calilfornia*. School Services of California, Inc.

Greene, J. P., & Forster, G. (2002). Effects of funding incentives on special education enrollment. Civic Report.

Griffith, M. (2015). A look at funding for students with disabilities. The Progress of Education Reform. Volume 16, Number 1. *Education Commission of the States*.

Koenigsknecht, S., Bodiya, P., Campbell, D., Conlin, M., Drake, B., Frank, C., Hoppstock, E., Liberati, F., Lipsitt, M., McWilliams, M., Sieloff, K., (2017). Special education funding subcommittee report. Accessed at https://www.michigan.gov/documents/calley/Special_Education_Finance_Report_-_final_2017_606751_7.pdf

Kwak, S. (2010). The impact of intergovernmental incentives on student disability rates. *Public Finance Review*, *38*(1), 41-73.

Ladd, H. F. (2008). Reflections on equity, adequacy, and weighted student funding. *Education Finance and Policy, 3*(4), 402-423.

Lankford, H. and Wyckoff, J. (1999). The allocation of resources to special education and regular instruction in New York State. In T.B. Parrish, J.G. Chambers, & C.M. Guarino (Eds.), Funding Special Education (pp. 147-175). Thousand Oaks, California: Corwin Press, Inc.

Mahitivanichcha, K., & Parrish, T. (2005). The implications of fiscal incentives on identification rates and placement in special education: Formulas for influencing best practice. *Journal of Education Finance*, 1-22.

Murphy, J., & Picus, L. O. (1996). Special program encroachment on school district general funds in California: Implications for Serrano equalization. *Journal of Education Finance*, *21*(3), 366-386.

Needham, C., & Houck, E. A. (2019). The inequities of special education funding in North Carolina. *Journal of Education Finance, 45*(1), 1-22.

Parrish, T. (2001). Who's paying the rising cost of special education?, *Journal of Special Education Leadership*, 14(1), p. 4-12.

Parrish, T.B., Kaleba, D., Gerber, M., McLaughlin, M. (1998) Special education: Study of incidence of disabilities: Final Report. American Institutes for Research. Submitted to the California Department of Education.

Parrish, T.B., Harr, J., Kidron, Y., Brock, L., Anand, P. (2003) Study of the incidence adjustment in the special education funding model: Final Report. American Institutes for Research. Submitted to the California Department of Education.

Petek, G. (2019). *Overview of special education in California*. Legislative Analyst's Office.

Sielke, C., & Russo, C. J. (1999). Special education funding in Michigan: Robbing Peter to pay Paul?. *Journal of Education Finance*, *25*(1), 81-96.

Sonstelie, J. (2007). *Aligning school finance with academic standards: A weighted-student formula based on a survey of practitioners*. Governor's Committee on Education Excellence.