Do Health Insurance Mandates Spillover to Education? Evidence from Michigan's Autism Insurance Mandate*

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Abstract

Social programs and mandates are usually studied in isolation, but unintended spillovers to other areas can impact individual behavior and social welfare. We examine the presence of spillovers from health care policy to the education sector by studying how health insurance coverage affects the education of students with Autism Spectrum Disorder (ASD). We leverage a state mandate that increased insurance coverage of ASD-related services, which often are provided by both the private sector and within public schools. The mandate primarily affected coverage for children with private health insurance, so we proxy for private insurance coverage with students' economic disadvantage status and estimate effects via triple-differences. While we find little change in ASD identification, the mandate crowds-out special education supports for students with ASD. A lack of short-run impact on achievement supports our crowd-out interpretation and indicates that the mandate had little net effect on the academic achievement of ASD students.

KEYWORDS: Special Education, Health Insurance, Insurance Mandate

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1 Introduction

How policy decisions in one area spill over to other areas in which there are no direct policy connections is a core question in economics. These spillovers often are unintended by policy-makers, but they can have large impacts on how individuals respond to policy changes and the resulting social welfare effects of those policies. The opportunity for these unintended spillovers is particularly large in the United States, where an array of different government organizations at the federal, state and local levels enact separate policies that interact with one another in complex ways. These interactions mostly have been studied with respect to the social safety net in the US.[1] Little research has addressed spillovers from health care policy into the educational sector.[2] This lack of research is surprising, since education and health together accounted for 25.2% of GDP in 2017. Health and education are strongly linked through their central role in the development of human capital, and there also are direct policy linkages between the health care and educational systems that both provide services to students with disabilities.

In this paper, we provide one of the first analyses of how healthcare policies spill over to the education sector by examining the effect of Michigan's Autism insurance mandate on the educational services received by, and achievement outcomes of, students diagnosed with Autism Spectrum Disorder (ASD). While our analysis contains broad lessons for how health care policies affect educational services and outcomes, the specific focus on students with ASD also is of high importance as ASD is one of the fastest-growing developmental disabilities in the United States. The diagnosis rate among eight-year-olds increased from 6.7 per 1,000 students in 2000 to 16.8 per 1,000 in 2014.[3] Among students 3-21 years old, the rate of special education primary disability identifications with ASD rose from 0.2% in 2000 to 1.2% in 2015 (a 500% increase). The overall student disability rate declined slightly over this time period, from 13.3% to 13.2%.[4] A recent study using self-reports from 2016 found that among children aged 3 to 17, 2.8% were diagnosed with ASD (Xu et al. 2018). Students with an ASD diagnosis are growing

[1] See for example Elwell (2018), Ham and Shore-Sheppard (2005), Yelowitz (1995), Moffitt and Wolfe (1992), and Blank (1989). These studies all find evidence that changing one program affects participation in other programs.

[2] Recent work by Benson (2018) estimates the effect of special education participation on Supplemental Security Income receipt and shows strong evidence of interactions among these programs. There also is some research that shows how direct health interventions in public schools affects student health and educational achievement, but these studies do not identify spillover effects across programs or policy areas (e.g., Lovenheim, Reback and Wedenoja 2014; Reback and Cox 2018; Buckles and Hungerman 2018).

[3] Source: `https://www.cdc.gov/ncbddd/autism/data.html`.

[4] These tabulations are taken from the 2017 Digest of Education Statistics, Table 204.30.

in absolute terms (617,000 children in 2015) and are an increasing proportion of all students with disabilities (9.2% in 2015, up from 1.2% in 2000). Children with ASD typically have substantial learning disabilities that require intensive therapy services throughout childhood as well as coordination between the health care system and the education system. These students cost schools $8,610 more than the average non-ASD student (Lavelle et al. 2014), while the cost to families varies dramatically by health insurance coverage but has been estimated to be as high as $47,000 per year in the US.[5]

Applied Behavioral Analysis (ABA) is the main therapy used to treat students with ASD. It is not a "cure" but has been shown to substantially improve symptoms through behavioral modification therapy (Peters-Scheffer, Didden, Korzilius, and Sturmey 2011; Dawson et al. 2010; Virués-Ortega 2010; Howlin, Magiati, and Charman 2009; Eldevik et al. 2009; Foxx 2008). Meta-analyses of ABA trials find that the therapy generates moderate to large positive effects on short-run measures of cognitive performance, including IQ and communication skills (Makrygianni, Gena, Katoudi, and Galanis 2018; Virueś-Ortega 2010). Although there is little direct evidence of ABA on academic achievement, one would expect these improvements in early childhood cognitive skills to lead to better academic outcomes (Duckworth, Quinn, and Tsukayama 2012; Fagan, Holland, and Wheeler 2007; Watkins, Lei, and Canivez 2007).

ABA is most effective when implemented early in life and when done intensively, often for at least 20 hours per week. Because of the high cost of these therapies, schools and families often lack the resources to provide sufficient services to ASD students. Until recently, ABA and other autism therapies were often excluded from health insurance because they were considered "experimental" and/or "educational." Even when a therapy is not explicitly excluded, coverage may be uneven across health insurance plans both in terms of what is covered and the ages for which therapies are covered.

The lack of coverage for autism services in many private health insurance plans highlights that what treatments students receive relies on the interaction between school-based services and the health insurance plan to which a family has access. The interaction of health insurance and school special education services is not unique to ASD, as these issues are present for many

[5]Source: `https://www.special-learning.com/article/funding$_$overview`.

student disabilities.[6] Currently, there is very little understanding of how the health insurance and special education systems interact in the production of education services for students with disabilities. The need for expensive extra-curricular treatments that are unevenly covered by health insurance plans makes students diagnosed with ASD an informative group through which to study this interaction.

We provide the first analysis in the literature of how mandating insurance coverage of ASD treatments such as ABA affects the special education services received by and educational outcomes of students diagnosed with ASD. Beginning in October 2012, Michigan required that all private state-regulated insurance plans cover ASD treatment services through age 18. Self-insured plans, while not mandated to cover ASD therapy, were provided generous financial incentives to do so. Medicaid also provided coverage, but only for children under age 6.[7] The difference between the Medicaid and private insurance coverage forms the basis of our empirical strategy.

We use administrative data on all public K-12 students in the State of Michigan from the 2009-2010 to the 2014-2015 school years. The data are extremely rich and include not only traditional test scores, demographics, and schools attended but also specific disability diagnoses and the services students receive in school through their Individual Education Plans (IEPs). The data do not include information on the health insurance plan under which each student is covered, so we rely on the close overlap of Medicaid and free/reduced price lunch (FRPL) eligibility. We estimate intent-to-treat models that examine how outcomes among non-economically disadvantaged students (who are mostly covered by private insurance) change when the mandate is enacted in 2012 relative to economically disadvantaged students (who are less likely to be covered by private insurance).[8] To further increase the accuracy of our proxies for insurance coverage, we restrict our sample to students who are economically disadvantaged in all years that we observe them in grades 2 through 8 and those never observed during those grades as economically disadvantaged, conditional on being observed for at least two years. We use this

[6] Given the strong positive correlation between health and education and the central role both play in the development of human capital, health policy is likely to have an impact on education for non-disabled students as well. For example, Cohodes et al. (2012) show that Medicaid expansions led to higher educational attainment among affected cohorts.

[7] As of January, 2016, Michigan began covering all youth in Medicaid up to age 18. Our analysis thus ends prior to the Medicaid expansion to focus on the private insurance mandate.

[8] "Economic disadvantage" status refers to students in poverty and the vast majority of students qualify based off eligibility for free or reduced-price lunch.

sample because students who are persistently eligible for FRPL are the most disadvantaged (Michelmore and Dynarski 2017), and therefore, most likely to be covered by public insurance.

In a difference-in-differences setting, we first show that the mandate has little effect on the likelihood that a student in grades 2-8 will have an ASD diagnois listed on an IEP. This finding is interesting in its own right, as private insurance can cover diagnostic services. However, most medical diagnoses for ASD occur before the age of six (Fountain, King and Bearman 2011), which is likely why we find no effect on ASD identification. We are also only able to observe identification for special education services from the student's IEP, which is distinct from a medical diagnosis. While these measures are likely highly correlated, special education identification probably underestimates the overall incidence: a surveillance study in the Atlanta metro area found that children with an ASD special education identification almost always met the medical criteria (Newschaffer, Falb, and Gurney 2005).[9] One net, the lack of any meaningful effect on overall ASD incidence supports a triple difference strategy to examine education services and achievement. We estimate how outcomes among ASD students who are not economically disadvantaged change relative to ASD students who are and how this change relates to the change in outcomes among non-ASD students who differ in disadvantage status.

We find that the insurance mandate reduces the set of special education resources ASD students receive and shifts students towards less restrictive environments. Among ASD students who are never disadvantaged, the mandate causes a 6.4 percentage point (9.5%) reduction in placement in resource room (pull-out) or cognitive impairment programs (self-contained classes for students with cognitive impairments) and a 3.4 percentage point (26.4%) increase in placement in no special education program. These ASD students are 2.3 percentage points (17.7%) less likely to be assigned an ASD-specialized teacher consultant and somewhat less likely to receive social work services. Taken together, these measures indicate that the private insurance mandate led to lower special education resource provision for affected students in schools.

Our data do not allow us to observe the use of ASD therapy services outside of school. To provide some evidence on whether the mandate generates crowd out versus reducing the need

[9]While medical diagnosis and identification of ASD for education purposes are similar, they are not the same. Some students may be diagnosed but not have an IEP or have a different primary identification. Alternatively, while it is extremely likely a child with an ASD identification also has a medical diagnosis, the latter is not a necessary condition for the former.

for in-school services, we examine student test scores that yield insight into the extent to which the mandate supports or detracts from student learning. There could be a negative effect if service crowd-out is more than 100% or if the privately provided services are of lower quality. Conversely, student learning may increase if overall services increase and/or if the quality of services provided increases. Additionally, providing ABA outside of school may facilitate more inclusion of ASD students in general education classrooms, which can be productive for learning among students with disabilities (Ruijs and Peetsma 2009). The inability to observe privately provided services precludes a direct analysis of these mechanisms, but we are able to identify the net policy effect that shows how the policy impacts achievement. The achievement results thus provide suggestive evidence of the mechanisms at work.

We find little evidence of a net change in reading or math test scores. In our preferred model that uses non-disabled students as a comparison group, the 95% confidence interval for math in standard deviation units is [-0.046,0.056], and in reading it is [-0.039,0.075]. We thus can rule out anything but modest-to-small changes in math and reading scores due to the mandate. This finding suggests either that crowd-out was complete (and thus total services did not change) or that any reduction in services is balanced by the effects of being in a more inclusive general education environment. Nonetheless, these results suggest there was no adverse effect on students' academic performance from the mandate.

We also examine heterogeneous effects by gender, race, and grade level. Our results do not vary much across groups, but we do find that girls are more likely to be removed from resource/cognitive programs and more likely to be placed in no special education programs than are boys. Effects are similar for White and Asian versus Black and Hispanic students, but we lack power to estimate precise effects for the latter group. We also find that the effects only begin to appear in grade 2. This grade heterogeneity is sensible, as nearly all students in Kindergarten and some in grade 1 are younger than six and therefore receive increased private ASD services under the mandate regardless of their health insurance status. In terms of test scores, we find little evidence of heterogeneous treatment effects.

This paper contributes to several different strands of research. The first is the small literature that examines the effects of health care policies on student achievement. Most of the prior

literature focuses on Medicaid (Cohodes et al. 2016; Levin and Schanzenbach 2009) or examines direct health interventions in schools (Lovenheim, Reback and Wedenoja 2014; Reback and Cox 2018; Buckles and Hungerman 2018). To our knowledge this is the first paper to examine the interaction between the health insurance and special education systems. More specifically, our study is the first to identify causal effects of Autism insurance mandates on the educational services disabled students receive and their subsequent educational achievement.

The second literature to which we contribute is the crowd-out of public goods by private provision (Bergstrom, Blume, and Varian 1986). Such crowd-out (or the lack thereof) has been documented in several contexts like Medicaid (Cutler and Gruber 1996; Gruber and Simon 2008; Ham, Ozbeklik, and Shore-Sheppard 2014; Hamersma and Kim, 2013), charitable donations (Payne 1998; Gruber 2007; Andreoni and Payne 2011), religion (Hungerman 2005), and school funding (Gordon 2004). Ours is the first analysis to show that private health insurance mandates crowd out special education services in public schools. This is an important contribution because special education is by design at the intersection of publicly provided education and often privately provided health care. That changes to private insurance can affect the services that disabled students receive in public schools is a novel finding that has implications for health insurance policies and the funding and provision of special education services.

We also contribute to a growing body of work on policies surrounding ASD students. ASD is a very expensive disability to treat, with current estimates in the US indicating that it costs about $17,000 per year to treat a student with ASD through health care and special education services (Lavelle et al. 2014). There also is suggestive evidence that ASD leads to lower labor force attachment and earnings among parents (Cidav, Marcus, and Mandell 2012). The lifetime cost of supporting a child with ASD, including potential labor force effects among parents, is between $1.4 and $2.4 million in the US (Buescher et al. 2014). A large literature has arisen that examines the causes of the rise in ASD (see e.g., Hansen, Schendel, and Parner 2015; Matson and Kozlowski 2011), but to date very little work has been done on what school or health policies can support the academic development of ASD students and how to deliver services to them in a cost-effective manner.

Finally, we present direct estimates of the effect of the Michigan insurance mandate on special education services and academic outcomes. These mandates are growing in prevalence: 46 states (plus D.C.) currently have some form of regulation that requires ASD services to be covered by health insurance plans. However, the scope of what is covered and the ages of children included in the regulations vary considerably across states.[10] A small literature has arisen that examines these mandates. Mandell et al. (2016), Barry et al. (2017), and Candon et al. (2019) find that they increase treatment prevalence and spending for those with private insurance: ASD mandates lead to a $77 increase in monthly spending on ASD services. Chatterji, Decker, and Markowitz (2015) use the passage of state Autism insurance mandates from 2005-2006 to 2009-2010 across the US to examine health care effects on children with ASD relative to non-ASD disabled children. Analyzing children with private insurance, their findings demonstrate no effect of ASD mandates on caregiver self-reports of financial burden, access to care, unmet need for health services, or private insurance coverage. These results are suggestive of full crowd-out of services due to the mandate. We add to this literature by directly examining special education services and student outcomes. Furthermore, the Michigan mandate is among the most expansive in terms of what must be covered and in terms of the ages of children included. Our analysis thus is informative with respect to the potential for these types of policies to impact educational services and outcomes among students with ASD.

2 Background

2.1 Austism Spectrum Disorder and Therapy Options

ASD is a developmental disability that generates problems with social, emotional, and communication skills (Centers for Disease Control, 2018). Children with ASD show a variety of symptoms, including difficulty with social interactions, delayed speech and inability to communicate verbally, repetitive behaviors, and stimming. These start to appear as early as 18 months of age, and diagnoses can be obtained as early as 24 months (Centers for Disease Control, 2018). Even so, diagnosis this early is uncommon. The median age of first diagnosis in the US as of 2012 was 4.2 years, and only 46% of children with ASD had a full evaluation prior to 3 years

[10] Regulations for each state can be found at `http://www.ncsl.org/research/health/autism-and-insurance-coverage-state-laws.aspx`.

of age (Baio et al. 2018).

ASD is a lifelong disorder. While there is no cure, there are treatments that can help alleviate symptoms and improve the ability of individuals with ASD to perform well behaviorally, both in school and in society more broadly. Children with ASD usually receive a variety of therapeutic interventions. These often include occupational therapy, speech therapy, sensory integration therapy, and ABA therapy.[11] Students may receive these services from private practitioners, through the special education system, which we discuss further in Section 2.3, or through a combination of private and public providers.

ABA, which involves using positive reinforcement and repetitive application of behavioral situations where cause and effect are outlined, has become one of the most widely used treatments for children with ASD.[12] There is substantial experimental and observational research that shows ABA to be effective at improving educational and behavioral outcomes for children. Further, providing intervention when the child is very young has been shown to be more effective than starting later (Zwaigenbaum et al. 2015; Dawson et al. 2010; Granpeesheh et al. 2009; Corsello 2005). ABA therapy is typically provided by licensed Board Certified Behavior Analysts (BCBAs), many of whom work outside of the public school system.[13] However, many students also receive some form of ABA therapy in school. For example, in 2011 - prior to the insurance reform - 59% of public school educators in Michigan reported using ABA therapies with ASD students (Ferreri & Bolt, 2011).

Data on the costs of these interventions are sparse, but the therapies are generally considered to be quite expensive. Total costs of treatment combined with opportunity costs (e.g. for lost work by a parent or caretaker) have ranged from $17,000 per year in the US to $44,000 in the UK and $68,000 in Sweden (Järbrink 2007; Knapp, Romeo, and Beecham 2009; Lavelle et al. 2014). Additionally, estimates of medical expenditures for individuals with ASD indicate they exceed those without ASD by $4,110 to $6,200 per year, 4 to 6 times larger than average (Shimabukuro, Grosse, and Rice 2008). Given these large costs, insurance coverage is potentially an important factor in whether children receive treatment. Cost-benefit analyses have

[11] While there is some research on how nutritional changes can help, these studies are largely observational or small sample experiments and show limited evidence of impacts on symptoms (Mari-Bauset et al. 2014).

[12] `https://www.autismspeaks.org/applied-behavior-analysis-aba-0`.

[13] Less than 30% of job postings for BCBAs come from the education sector, while nearly 60% come from the health care and social assistance sectors. See: `https://www.bacb.com/wp-content/uploads/2017/09/151009-burning-glass-report.pdf`.

shown ABA interventions to be highly cost effective over the long run. Jacobson, Mulick, and Green (1998) find lifetime benefits for the individual of up to $1 million. Ganz (2007) estimates the lifetime social costs of untreated autism at $3.2 million as of 2003, although it is unclear how much this can be mitigated by therapeutic treatment.

2.2 The Michigan Autism Insurance Mandate

Until recently, treatments for ASD beyond therapies for co-morbidities like speech and occupational therapy were not commonly covered by health insurance. As a result, states started mandating coverage for ABA and related therapies. Today, 46 states and the District of Columbia have some coverage requirements for autism services. Even in these states, however, coverage can be limited as affected children often have to go through a time consuming evaluation process and mandates may not apply to all health insurance plans.

In 2012, Michigan passed a law that expanded access to insurance coverage for children with ASD, with implementation on October 15, 2012. The law was passed in mid-April 2012 and had three main pillars. First, for people covered under state regulated insurance plans, mainly employer sponsored plans for small or medium sized employers and individually purchased plans, the law mandated coverage for "evidence-based behavioral health treatment" - typically ABA, pharmaceuticals, psychiatric care, psychological care, and other therapies - from birth through 18 years of age for children with diagnosed ASD.[14] Coverage requirements are generous: the maximum annual benefit starts at $50,000 for children under six and decreases with age to a floor of $30,000 at age 18. Co-pays, deductibles, and co-insurance rates cannot exceed those required by the individual's insurance plan for physical illness.[15]

A difficulty often faced by states in ensuring widespread coverage of Autism insurance mandates is that self-insured plans, mostly used by large employers, are covered under Federal law and so are not typically subject to state mandates. As of 2011, 61% of Michiganders with employer-provided coverage were in self-insured plans (Fronstin 2012). Michigan addressed this gap via Public Act 101 of 2012, which set up a reimbursement fund for self-insured plans that provided benefits in line with those required for regulated insurance plans. Plans were

[14] Diagnosis by a physician is required and insurance companies are permitted to require the evaluations be done through designated evaluation centers (Peters, Lausch, and Udow-Phillips 2014).

[15] Michigan Public Acts 99 and 100 of 2012.

permitted to request up to 100% of the claims from their beneficiaries for reimbursement from the state.[16] While there are no data on how many self-insured firms provided coverage under this law, the very generous reimbursement likely led to high take-up. The Autism Alliance of Michigan maintains a list of self-funded firms in Michigan that offer the insurance benefit, including many of the largest employers in the state such as General Motors, Ford, Meijer (a supermarket chain), and Beaumont Health System, along with the state government and most major universities.[17]

Children not covered under employer-provided or individually-purchased insurance plans in Michigan are almost all covered under Medicaid, including those covered through the Children's Health Insurance Program (CHIP). In 2014, 58% of children aged 0 to 18 in Michigan were covered by private insurance, while 39% were covered under Medicaid and only 3% were uninsured.[18] The Michigan reform provided insurance coverage for ASD to Medicaid beneficiaries as of April 2013, but the benefits were considerably less generous than the private insurance mandate. While pharmacy, psychiatric, psychological, and co-morbid therapies like speech therapy were already covered prior to the reform, the only ASD-specific therapy added to coverage from the law is ABA. Other evidence based therapies are not covered. This itself is only a minor difference as most therapy for ASD is based on ABA. More importantly, underfunding of the Medicaid benefit led to coverage expiring once the child reaches the age of six.[19] Generally, ABA therapy continues beyond this age and many years of therapy are needed for benefits to emerge and be maintained. Further reducing the value of this benefit is that often children are diagnosed relatively close to the age cutoff. According to the most recent report available, the average age at first ASD diagnosis for Medicaid recipients across the US was 5.4 years in 2002 - 2004 (Mandell et al. 2010). In our data, as shown in Online Appendix Table A-1, half of students who are eventually identified with ASD receive their identification after completing Kindergarten.[20] This leaves virtually no time for therapy to have an effect before access is cut

[16] In FY2016, the fund ran out of money and claim processing was suspended. While it is possible some firms have since removed their benefits due to the lack of reimbursement, since our data cover only through the 2015-16 school year and firms typically make insurance coverage decisions towards the end of the calendar year, this is unlikely to affect our results.

[17] A full list of self-insured employers with ASD benefit can be found at `https://autismallianceofmichigan.org/insurance-facts/`. Data on the largest employers in Michigan are from `https://www.zippia.com/advice/largest-companies-in-michigan/`.

[18] Kaiser Family Foundation estimates based on the Census Bureau's March Current Population Survey, 2014-2017.

[19] As of January 2016, due to requirements of the Affordable Care Act, the age limit was increased to 21. For this reason we focus our analysis on school years prior to 2015-2016.

[20] The table also shows that racial minorities are identified with ASD earlier than white students in Michigan, but identification timing does not differ much by gender or poverty.

off. National data shows that the median age of diagnosis across all ASD children in 2012 was 4.2 years, again leaving little time to garner substantial benefits from therapy prior to reaching six years of age (Christensen et al. 2016).

2.3 Special Education

Students deemed eligible for special education services are covered under the Individuals with Disabilities Education Act (IDEA). To receive such services, students first must be evaluated. An evaluation can be initiated by parents or the school and involves a review of the child's educational progress as well as factors potentially related to the suspected disability like health, vision and hearing, social and emotional development, academic performance, communication, and motor skills. Hence, eligibility is not simply based on standardized test scores or pure academic performance.

ASD is classified under IDEA as a specific disability category. The evaluation process for students who may be on the Autism spectrum involves examining the student's existing academic record, behavioral outcomes, interviews with teachers and parents, and an assessment by specialists trained in ASD diagnosis and treatment. These specialists can be provided by the school or outside of the school. Critically, under IDEA these assessments are to be provided at no cost to families, though parents can and often do use external assessments to inform the process. Once a child has been evaluated, parents meet with some combination of teachers, school administrators, school counselors, and specialists to determine whether the child qualifies for special education services. If so, they develop an Individualized Education Plaan (IEP) that specifies what educational environment and educational services the student will receive and the benchmarks that will be used to determine whether the student needs to continue receiving these services in the future. Typically, IEPs are updated in the spring of each year, with a full reassessment every three years. Since the mandate was passed in April of 2012, special education services could be affected starting in the 2012-2013 school year.

The special education services agreed to in the IEP need to be provided by the school at no cost to the family. However, the services being received outside of school can influence the in-school services on the IEP because the IEP is developed with direct input from the

parents. It is reasonable to assume that parents and schools consider the sum total of therapies and services available to students when crafting an IEP, and parents of students with ASD often report needing to ask schools to provide more services than initially offered (Ferreri & Bolt, 2011). However, we are aware of no research that examines the extent to which outside therapies influence IEP services. IDEA also includes a Least Restrictive Environment (LRE) provision that requires students be placed in the most general education setting possible. This provision is designed to avoid special education students being segregated from the rest of the school population, which could have negative consequences for their development.

The special education process is complex and involves many participants and constituencies. Together with the LRE provision of IDEA, there is significant scope for non-school resources and factors to play a role in the specific education services students receive and the educational environment to which they are exposed. Research on factors that influence how IEP plans are developed is thin; our paper is the first to empirically examine how external factors such as health insurance affect special education services, which is an important advancement in our understanding of how the special education system operates.

3 Data

3.1 Michigan Administrative K-12 Schooling Data

Our analysis relies on a student-level dataset provided by the Michigan Department of Education (MDE) and Center for Education Performance and Information (CEPI). The dataset contains administrative educational records on all students enrolled in pre-K through 8^{th} grade in Michigan's public schools from the 2009-10 to 2014-15 school years. These records provide rich information on students' demographic characteristics, disabilities, educational settings, special education programs and services, and achievement levels. Student demographic characteristics are reported by schools to MDE and include a student's race, gender, and eligibility for Limited English Proficiency (LEP) services. Our key demographic variable of interest is a student's "economically disadvantaged" status, which we use as a proxy for measuring a student's insurance status. A student is defined as economically disadvantaged if she qualifies for free or reduced-price meals under the National School Lunch Program, is in a household

that receives food (SNAP) or cash (TANF) assistance, is homeless, is a migrant, or is in foster care. Students' economic disadvantage status is updated annually to reflect changes in families' economic circumstances.[21] Typically a student who qualifies for any of the latter also qualifies for free/reduced price lunch, and so we interchangeably refer to this status as "economically disadvantaged" or FRPL.

For students with IEPs, which is synonymous with qualifying for special education, we obtain additional information on a student's primary disability, as defined on her IEP, and special education resources provided to the student.[22] The special education resources variables are classified into three distinct categories: (1) a student's special education program, (2) a student's educational setting, and (3) the special education support services received by a student.

The program category contains the IEP-designated programs in which a student is enrolled. Programs are state-defined special education settings that must adhere to specific regulations. To be considered an ASD program, a classroom must not have more than 5 students and must be served by a state-endorsed teacher of students with ASD who has completed ASD-specific education and training. Therefore, not all schools or school districts offer all special education programs, and a student's program need not exactly correspond with her disability. For example, students with ASD are commonly enrolled in a "cognitive impairment" program, which has classrooms with up to 10 students and is designed to provide instruction to students with an array of learning disabilities. There are 14 specific types of special education programs in Michigan, and students can be enrolled in up to 3 of them. We focus on four categories that are the most relevant for ASD students: ASD-specific special education programs, cognitive impairment programs, resource programs - which usually involve pull-out time in a "resource room" with a special education specialist, and no program (i.e. in a general education classroom 100% of the time). It also is important to note that even if a student is attached to a program, she could spend any percentage of time below 100% in a general education classroom. So in some cases students are technically placed in a program but spend very little time in the actual

[21] One concern with this measure is that some schools qualify for the Community Eligibility Provision for free-lunch that allows all students in a school to qualify regardless of individual circumstances. However, Michigan still requires schools to collect family income information to determine individual FRPL eligibility for record keeping purposes. Only 0.3% of observations in our data are in school-years with 100% FRPL eligibility, indicating that CEP does not affect our classifications.

[22] Students also may receive services through the use of 504 plans, which typically provide access for students who are not classified under conditions recognized via the Individuals with Disabilities Education Act. Since Autism is a category in IDEA and IEPs provide more legal protections and guarantees of educational (as opposed to simply disability related) services, most children with ASD are covered under IEPs. While we do not observe 504 plans directly, these students would have an ASD identification but no data on services, which accounts for only 0.5% of students with ASD in our analysis sample.

program classroom.

The educational setting category contains information on the primary educational setting where a student receives his education. For ease of exposition, we focus on whether a student is enrolled in a separate special education school, whether she is enrolled in a general education classroom more than 80% of the time, and the percentage of FTE enrollment that is in a special education setting averaged across the year. We hypothesize ex-ante that these education settings are the most likely to be associated with changes in ASD-related school services, however we provide estimates for other measures in the online appendix.

The services category records any special education support services a student receives within an academic year. These services include therapies, such as speech, occupational, and physical; work with school social workers and/or psychologists; special transportation; and assignment to teacher consultants who provide assistance to general education teachers.[23] There are 30 specific special education support service categories listed in the data, and up to 10 are recorded for a student. Our primary estimates examine ASD teaching consultants, language support, occupational therapy, social workers, and an aggregate measure that counts the number of these four services a student receives. We focus on these support services because they are the most relevant for ASD student: the average ASD student receives 2.2 services, of which about 2 (90%) come from these four areas. In the online appendix, we also examine non-ASD teaching consultants, physical therapy, and transportation services to demonstrate that services that are less important for ASD students are unaffected by the insurance mandate.

Finally, we obtain information on students' test-taking behavior and achievement on standardized math and reading exams. MDE reports the type of exams (standard or special education) students took in a given year, as well as any special education accommodations used. Test scores are recorded for students who take standard or particular types of special education exams. Because the special education exams assess different material and are scored on a different scale than the standard exams, we only consider test scores for students who take standard exams. As we discuss below, we do not find that the mandate led to changes in regular exam taking by students with ASD relative to non-disabled students, allowing us to analyze

[23]Teacher consultants in Michigan must have a Master's degree in education or in a field related to special education as well as teaching experience in a special education classroom. Moreover, teacher consultants may be approved to work with special education students generally or may be approved to work with students with particular disabilities by meeting additional education and experience standards.

the regular exams while avoiding sample selection concerns. We further standardized the scaled scores for these exams across all students in the state within a grade level and school year.

Our main sample consists of students in grades 2-8 in school years 2009-2010 through 2014-2015. While we have data for more grades and years, students in kindergarten and grade 1 are excluded because it is likely that publicly insured students in these grades also received increased access to private services through the Medicaid benefit, although we also estimate grade specific effects for the excluded grades. Furthermore, we drop the 2015-2016 school year due to the age six cutoff of Medicaid ASD benefits being removed in 2016. Table 1 presents means of all analysis variables for several subsamples of these students: all students, ASD students, non-ASD special education students, and non-special education students.[24] About 1% of the sample has an ASD identification; these students are more likely to be male and white than the sample overall and are less likely to be disadvantaged. ASD students also are less likely to be disadvantaged and more likely to be white and male than non-ASD special education students. There are substantive differences in the programs, educational environments and support services received by ASD and non-ASD disabled students.

3.2 Measuring Insurance Status

Because Michigan's mandate only applied to private health insurance plans, a central challenge in our analysis is our inability to observe whether a student is covered by public or private insurance. In some cases children may be uninsured but this is rare. According to the American Community Survey, 96% of individuals in Michigan under age 18 were covered by insurance in 2012, the year Michigan passed the Autism mandate.[25] Thus, those students who do not have private insurance are almost certainly covered by Medicaid/CHIP.

To proxy for private insurance coverage, we use a student's status as being economically disadvantaged, which is primarily based on free/reduced-price lunch (FRPL) eligibilty. The motivation for using this proxy is that the eligibility criteria for FRPL status overlaps closely with eligibility for public health insurance. In order to qualify for public health insurance,

[24]The sample sizes of ASD students in the top and bottom panel do not match because a small number of students receive an ASD identification through a 504 plan but receive no special education services.

[25]This is likely a lower bound of the child health insurance coverage rate because those who are eligible for Medicaid but who are not signed up would be signed up and receive treatment upon arrival at a hospital.

children must be in families that earn less than 200% of the Federal Poverty Line.[26] Eligibility for free or reduced price lunches in schools is set at 185% of the poverty line.

Table 2 shows health insurance status by free/reduced price lunch eligibility (top panel) and by family income as a percent of the federal poverty line (bottom panel) from the 2008-2016 American Community Survey among K-8^{th} grade students in Michigan. The top panel shows health insurance coverage is near-universal and varies little by whether students are eligible for free/reduced price lunch. What does vary across these groups is what type of insurance students have. Almost 89% of ineligible students have private insurance, while 73% of eligible students receive Medicaid. Despite the stark differences in insurance coverage by poverty status, the timing of ASD diagnosis does not differ much: 63% of ASD identifications for disadvantaged students occur prior to grade two while 66% occur prior to second grade among non-disadvantaged students (Online Appendix Table A-1).

FRPL status is a somewhat noisy proxy for family income. Research using data from education records linked to tax data indicates that there is a wide range of family incomes among students in the same FRPL category (Domina et al. 2018). The bottom panel of Table 2 shows that the poorest students, those whose families earn under 135% of the poverty line, are the most likely to be on Medicaid (81%). The percent on Medicaid declines with income, even in the eligible range. In order to strengthen the proxy we use for Medicaid eligibility, we use the fact that those who are persistently identified as FRPL are the most disadvantaged students (Michelmore and Dynarski 2017). These students are likely to come from the bottom of the income distribution, and Table 2 indicates that they are unlikely to have private insurance. Conversely, higher income students who are above 250% of the poverty line are very likely to have private insurance. Hence, our main analysis sample is comprised of those who are either identified as FRPL in every observed year of school enrollment from grade 2 to 8 or who are never identified as FRPL between grades 2 and 8. For completeness, we show robustness checks that include the "sometimes FRPL" students in the online appendix. The estimates that include these students are qualitatively similar but attenuated as expected because of the use of a weaker treatment proxy.

[26]Federal Medicaid eligibility is stricter, at 133% of the Federal Poverty Line. The Michigan Child Health Insurance Program (MCHIP) extends public insurance eligibility up to 200% of the poverty line for children of Michigan residents.

4 The Effect of the Autism Insurance Mandate on ASD and Special Education Incidence

4.1 Empirical Approach

Using data on students in grades 2-8 in Michigan from school years 2009-2014 as described in Section 3, we estimate difference-in-differences models that identify how the insurance mandate affects the likelihood that students are diagnosed with ASD or have any special education diagnosis. Our measure of special education is whether students have an IEP, and we designate a student as being diagnosed with ASD if the IEP lists ASD as the primary disability. Our difference-in-differences model for ASD identification is of the following form:

$$\begin{aligned} ASD_{igjt} = \quad & \beta_0 + \beta_1 NonDisadv_i + \beta_2 PostMandate_t \times NonDisadv_i \\ & + \mathbf{\Omega X_{it}} + \gamma_{gt} + \delta_j + \varepsilon_{igjt}, \end{aligned} \tag{1}$$

where ASD_{igjt} is an indicator equal to 1 if student i in grade g and school j is identified as having ASD (or an alternative disability that generates an IEP in companion estimates) in year t, $NonDisadv_i$ is an indicator that equals 1 if we never observe the student as economically disadvantaged in grades 2 through 8 (i.e., treated students), and $PostMandate_t$ is an indicator that is equal to 1 in the 2012-2013 school year and beyond. The model includes school fixed effects (δ_j) as well as grade-by-year fixed effects (γ_{gt}). The inclusion of school fixed effects ensures that we are only comparing students in the same school, since special education implementation often varies considerably across schools and special education policies are usually defined at the school district level.[27] Finally, we include controls for whether a student is white, male, or limited English proficient ($\mathbf{X_{it}}$).

The coefficient of interest in equation (1) is β_2, which is the difference-in-differences estimate of how the ASD (or other disability) rate of non-disadvantaged children changes in 2012 relative to disadvantaged students. The core identifying assumption is that trends in special education identification among disadvantaged students are a valid counterfactual for trends among non-disadvantaged children, conditional on the controls. It is important to stress that

[27] The school fixed effects subsume district fixed effects, but we show below that our estimates are similar when we only use district fixed effects and we always cluster our standard errors at the district level.

for identification it need not be the case that disadvantaged and non-disadvantaged students with a disability are treated similarly, only that their treatment would have changed in similar ways in the absence of the insurance mandates. This assumption can functionally be broken down into two pieces: 1) outcome trends between disadvantaged and non-disadvantaged children must be similar prior to 2012, and 2) there must be no shocks that occur in 2012 that disproportionately affect students by disadvantage status.

Using data prior to 2012, we generate direct evidence on whether there are pre-treatment relative trends. These figures are presented below in Section 4.2 and provide strong support for the assumption that ASD rates are trending similarly across disadvantaged and non-disadvantaged students prior to 2012. The second assumption of no correlated shocks is more difficult to examine in the data, as such shocks are by definition unobserved. Nonetheless, we are aware of no other state policy that was enacted during 2012 that would have disproportionately affected students across the SES distribution. The economy was recovering from the Great Recession, but this should be reflected in trends rather than a 2012-specific shock. The Affordable Care Act individual mandate came into effect in 2012. However, it was effective January 1 2012, while the ASD mandate went into effect in October 2012. Thus, any effects of the ACA mandate should be evident in the prior school year. We also do not believe it is plausible that the ACA affected these students: the ACA was focused on uninsured adults rather than on children. Health insurance coverage among children was nearly universal prior to 2012 due to Medicaid and CHIP, and Medicaid rules did not change in Michigan during this period.[28] In Section 5.3, we show that all of our effects occur after first grade. If there were correlated shocks, we would expect them to impact earlier grades as well, while the Autism insurance mandate should only affect students age six or older. To the extent the mandate caused some parents of children who are disadvantaged to switch from Medicaid to private insurance to use the ASD service benefits, our estimates will understate the effect of the mandate.[29]

[28] Michigan expanded Medicaid for adults under the ACA in April 2014, but this expansion did not affect eligibility among children.

[29] We are unable to examine this issue directly because we do not have data on insurance coverage. Chatterji, Decker, and Markowitz (2015) find no effect of Autism mandates on the likelihood of private insurance coverage, which further supports the validity of our approach.

4.2 Results

Table 3 presents estimates of β_2 from equation (1). Panel A shows the baseline estimates. In column (1), we show estimates using ASD diagnosis as the dependent variable; while the point estimate is statistically different from zero at the 10% level, it is small in magnitude. Non-disadvantaged students experience a relative *decline* in ASD diagnoses of 0.045 percentage points after 2012. This is 4.5% relative to the mean, and the 95% confidence interval rules out an ASD increase among this group of more than 0.03 percentage points.[30] Thus, our estimates indicate that the mandate led at most to a very small change in ASD special education identification. While Autism typically is diagnosed at earlier ages, in our data a large share of initial identification occurs at older ages.

As discussed above, a core assumption underlying our approach is that there are no trends in disability diagnosis that differ across students who do and do not receive free/reduced price lunch. The top panel of Figure 1 presents event study estimates of equation (1), where $PostMandate_t \times NonDisadv_i$ is replaced with a set of interactions between $NonDisadv_i$ and year indicators. The figure demonstrates that there is no systematic change in the likelihood of being diagnosed with ASD across the two groups prior to 2012. Furthermore, the year-to-year changes are extremely small, even relative to the low baseline mean of 1%. The figure also shows that there is little post-2012 change in the ASD diagnosis likelihood across the groups, which is consistent with estimates in Table 3.

Column (2) of Table 3 presents estimates for the incidence of all other non-ASD disabilities. The estimate is small in magnitude and is not statistically significant. It suggests that non-ASD diagnoses decreased by 0.04 percentage points (0.03% relative to the mean) among economically disadvantaged students relative to non-disadvantaged students post-2012.[31] The bottom panel of Figure 1 presents event study estimates for non-ASD disability incidence. The estimates in this specification are noisy, but similar to the ASD event study, there is little evidence of pre-2012 or post-2012 relative changes. Taken together, the panels of Figure 1 support the use

[30] In comparison, a 4.5% decline in ASD incidence is similar to the increased risk of ASD associated with having a parent 2.1 to 2.5 years older (Wu et al., 2017) and is a fraction of the size of the relationship with low birth weight, where the odds of having ASD are 63% higher compared to normal-weight births (Gardener, Spiegelman, and Buka, 2011). Chatterji, Decker, and Markowitz (2015) find Autism insurance mandates reduce ASD rates by between 1.4 and 10.8 percent, which is consistent with our results.

[31] If we remove the transition year of 2012 from the regressions, the estimate without linear trends increases slightly to 0.055 percentage points but there is no change in the estimates with linear trends.

of the free/reduced price lunch students as a control group in this analysis.[32]

Although there is no aggregate change in non-ASD disability incidence, the remaining columns of Table 3, Panel A present evidence of a shift in the composition of disabilities in this broad group. The mandate is associated with an increase in the prevalence of emotional and other health disabilities and a decline in the prevalence of speech disability. These relative changes in the composition of the special education groups complicates our preferred triple difference analysis in which we compare changes in outcomes by poverty status among ASD versus non-ASD special education students when the mandate comes into effect.

In Panel B of Table 3, we show estimates that include a linear time trend interacted with non-poverty status. Including this control, the ASD estimate shrinks substantially and no longer is statistically significantly different from zero at even the 10% level. Furthermore, the non-ASD disability effects are attenuated such that only emotional disability is significantly different from zero (at the 10% level). A comparison of Panel A and Panel B of Table 3 shows that the relative shifts in diagnoses are due to linear secular trends by poverty status. Event studies that exclude this control also demonstrate this point: the changes in disability incidence are mostly driven by secular trends that appear prior to 2012.[33] The linear non-disadvantaged trend accounts for this secular variation. Critically, we show in Section 5.3 that the rest of our results and conclusions are robust to including linear non-poverty time trend controls. Our results thus are not being driven by the small compositional changes that are evident in Panel A of Table 3. Furthermore, we show in Section 5.3 that our results are robust to using each non-ASD disability category as a separate control group, which explains why shifts in the disability composition of the control group does not impact our results.

Panel C of Table 3 demonstrates the robustness of our estimates to school district fixed effects. Since special education policies often are district-specific, it is not clear that school fixed effects are necessary or desirable. The results in Panel C are almost identical to those in Panel A, which further supports the validity of our empirical approach.

[32]Note that we are unable to use non-disabled students as a control group, since they have zero disability incidence by construction.
[33]These event study estimates are available from the authors upon request.

5 The Effect of the Autism Insurance Mandate on Educational Services and Test Scores

5.1 Empirical Approach

Motivated by the finding that the insurance mandate has a negligible effect on ASD incidence, we employ triple difference models that compare changes in outcomes among students with ASD by free/reduced price lunch status to changes in outcomes among non-ASD students by free/reduced price lunch status. Specifically, we estimate models of the following form:

$$\begin{aligned} Y_{igjt} &= \beta_0 + \beta_1 NonDisadv_i + \beta_2 ASD_{it} + \beta_3 PostMandate_t \times NonDisadv_i \\ &\quad + \beta_4 PostMandate_t \times ASD_{it} + \beta_5 NonDisadv_i \times ASD_{it} \\ &\quad + \beta_6 PostMandate_t \times NonDisadv_i \times ASD_{it} + \mathbf{\Omega X_{it}} + \gamma_{gt} + \delta_j + \varepsilon_{igjt}, \end{aligned} \tag{2}$$

where Y_{igjt} is an outcome for student i in grade g, school j, and year t. All other variables are as previously defined. The vector ($\mathbf{X_{it}}$) includes controls for whether a student is white, male, or limited English proficient. In models with test scores as the dependent variable, the vector also includes the lagged test score for the same subject. As with equation (1), standard errors are clustered at the school district level.

For special education outcomes, we are restricted to using other special education students as the comparison group since each of the outcomes we analyze are only provided to students with an IEP. One potential limitation is that, since special education funding is largely fixed in the short-run, districts may respond to higher (lower) needs in one group by reducing (increasing) services in other groups. There are several reasons to believe that this is not a first-order issue in our analysis. First, districts are not restricted to using only special education funding for special education services. In fact, it is common for special education funding to be insufficient and for districts to use general funds to supplement the costs (DeGrow, 2017). Since our results show a decline in ASD service provision due to the mandate, it is likely that most, if not all, of the money saved will go towards general education. Second, the fixed-effects in our model ensure that we are comparing students in the same school. This ensures that differences in how schools (or districts) respond to the funding changes do not affect the estimates.

The main variable of interest in equation (2) is β_6, which yields the triple difference estimate of the effect of the Michigan insurance mandate on student outcomes. The identification assumptions underlying this model are similar to those discussed above for equation (1). However, this model relaxes the common trends assumption somewhat: any differences in trends in outcomes across students who do and do not receive free/reduced price lunch must be similar for ASD and non-ASD students. Put differently, the non-ASD relative trends by free/reduced price lunch status need to be an accurate counterfactual for these trends among ASD students. Similar to the difference-in-differences model, there are two main sources of bias. The first is differential relative trends across treatment and control groups. In this case, ASD students who are/are not disadvantaged would have to exhibit different relative trends to non-ASD students prior to 2012. We present graphical evidence in the online appendix that these are not present. The second is contemporaneous and persistent shocks that differentially impact ASD students who are not eligible for free/reduced price lunch. We know of no reason to suspect that these shocks exist, especially since the ASD incidence rate does not change substantially when the mandate comes into effect.[34]

The plausibility of the identification assumptions rests heavily on the composition of the control group. When estimating impacts on programs, educational settings, and support services, the sample consists of all students with a disability (i.e., with an IEP). The control group thus is students with a non-ASD disability. When we estimate effects on test scores, we are able to consider both non-ASD disabled and non-disabled students as potential comparison groups. One important issue is that Michigan changed the format and structure of achievement exams, particularly those taken by students with disabilities, in 2014-15. Given this change, we restrict our achievement analysis to 2013-14 and earlier.

5.2 Results

One of the strengths of our administrative education data that is not commonly available is detailed information on special education services. As discussed in Section 3.1, we consider three types of services: education programs, the educational setting, and special education

[34]Theoretically, the treatment could affect the likelihood that students attend private school or leave the state and hence attrit from the sample. Online Appendix Table A-2 shows estimates from equation (2) where the dependent variable is an indicator equal to one if a student leaves the sample; there is no evidence that sample attrition is affected by the treatment.

support services. These categories are correlated with one another but imperfectly so. For example, enrollment in a particular program can affect special education support services and the extent to which students are in a general education setting. However, students can receive support services even if they are not enrolled in a program. Examining these three categories of educational inputs thus paints a rich picture of how the ASD insurance mandate affects the type of education students with ASD receive.

Table 4 presents our baseline estimates for the main set of special education service outcomes that are most associated with ASD. The special education program outcomes we examine are whether the student is in an ASD program (column 1), whether the student is in a resource or cognitive impairment program (column 2) and whether the student is in no special program (column 3).[35] The program does not have to match the disability listed on the IEP, so students with ASD diagnoses can be in non-ASD focused programs, and attachment to cognitive impairment programs in particular is common for students with ASD. Each column of the table shows results from a separate regression, and the first row presents the triple difference coefficient of interest. Column (1) shows that the ASD mandate increases the likelihood that students are placed in an ASD program by 3.1 percentage points, which is 15.7% of the ASD-specific mean (shown at the bottom of the table). However, the estimate is not statistically significantly different from zero. Enrollment in resource and cognitive programs decline substantially, by 6.4 percentage points (9.6%), and this estimate is statistically significant at the 5% level. The likelihood a student is enrolled in no special education program increases by a statistically significant 3.4 percentage points, which is a 4% drop in enrollment in any program - 87% of students with ASD are enrolled in at least one special education program. That the percentage of ASD students not in any special education program rises substantially suggests that the insurance mandate leads to lower intensity of special education interventions and less placement in self-contained special education classrooms. These results thus reflect crowding out of special education services offered by public schools from the private insurance mandate.[36]

[35]Appendix Table A-3 shows the difference-in-differences estimates for ASD and non-ASD disabled students separately. In general, the estimates for ASD students are similar to the baseline triple-difference estimates, but we see some shifts in outcomes for non-ASD, non-disadvantaged vs. disadvantaged students, highlighting the need to use triple-difference models instead of difference-in-differences. Further, while there are some shifts in the non-ASD service provision, there is no consistent indication that these are the result of spillovers due to resource reallocation. In Appendix Table A-4 we also show estimates that define a student's ASD and poverty status by their status when they are first observed in the data. The results are similar to those in Table 4.

[36]The estimates for other programs are provided in Appendix Table A-5 and show no effect.

As discussed in Section 5.1, one of the main assumptions under which our estimates are identified is that relative trends among free/reduced price lunch and non-free-reduced price lunch students are similar for ASD and non-ASD disabled students prior to 2012. Online Appendix Figure A-1 presents evidence on the plausibility of this assumption by showing event study estimates of the mandate on program placement.[37] For no outcome do we see any evidence of differential pre-2012 trends, which supports our identification strategy. Furthermore, there is a clear decline in the likelihood of being in a cognitive or resource program after 2012 and an increase in the likelihood of being enrolled in no program. Effects in 2012 tend to be smaller in absolute value than effects in 2013 and 2014. The mandate was passed in April 2012 and went into effect in October 2012, so students in the 2012-2013 school year are likely to be only partially treated. This is especially the case because IEPs are typically renegotiated in the spring, around the time that the mandate was passed. Larger effects post-2012 are due in part to the fact that it is more difficult for schools to alter special education services mid-way through the 2012-2013 school year.

Columns (4)-(6) of Table 4 present estimates of the effect of the mandate on students' educational setting. We focus on three outcomes: whether a student is placed in a special education school (column 4), whether the student is in a general education classroom more than 80% of the time (column 5), and the percentage of the student's time that is allocated to special education programs (column 6). The point estimates are small in magnitude and are not statistically significant at conventional levels. Thus, while the special education environment students are attached to during their time outside the general education classroom is changing to less intensive environments, they are not spending substantially more or less time in a general education classroom.[38] There are several explanations that are consistent with this pattern. First, it may be the case that marginal students who were attached to a cognitive impairment classroom were already spending more than 80% of their day in the general education classroom in the absence of the mandate. With insurance coverage post-mandate, they leave the cognitive impairment program but still spend some time outside the general education classroom for therapeutic and ancillary support services. Second, we are limited to analyzing rather broad

[37] Specifically, we replace $PostMandate_t \times NonDisadv_i \times ASD_{it}$ with $NonDisadv_i \times ASD_{it}$ interacted with a set of year dummies in equation (2). Year 2011 is excluded, so all estimates are relative to that year.

[38] In Appendix Table A-2, we also do not see shifts in likelihood of being in a general education classroom $< 40\%$ or between 40% - 79% of the time.

categories of general education classroom time, so it possible these are masking some changes. For example, a student could have been attached to a resource room and spent 80% to 90% of time in the general education classroom but with insurance the student now no longer uses the resource room and is in general education 100% of the day.

Online Appendix Figure A-1 presents event study estimates for these outcomes. The event study models are less informative for these measures because education setting variables are only available beginning in 2010 and the FTE measures are only available beginning in 2011. Hence, we have fewer pre-treatment years for these outcomes with which to diagnose any selection on relative trends. Nonetheless, the event study estimates support the validity of our empirical approach and match the findings in Table 4 closely.

Finally, columns (7)-(11) of Table 4 present our results for special education services. We focus on ASD teaching consultants (column 7), language support (column 8), occupational therapy (column 9), access to social workers (column 10), and the number of these four main support services students receive (column 11; "Aggregate Services"). Column (7) shows that the insurance mandate reduced the likelihood that a student received an ASD teacher consultant by 2.3 percentage points (17.7% relative to the mean), and this estimate is statistically significant at the 5% level. Column (10) further shows that students are 2.1 percentage points (3% relative to the mean) less likely to be assigned a social worker. Columns (8) and (9) indicate that there is little change in students' access to language and occupational therapy services following the mandate. The final column of the table shows that non-poor ASD students receive 0.04 fewer of these four support services, which is a reduction of 2.1% relative to the mean. This estimate is significant at the 10% level. Overall, the pattern of results is consistent with a crowd-out of special education services due to the ASD mandate. Online Appendix Figure A-1 shows event studies for these outcomes and supports the identification assumption of common relative trends in special education support services prior to 2012 between ASD and non-ASD disabled children.

The results presented thus far suggest that ASD students who are likely to have private insurance receive fewer special education supports in more inclusive environments after the insurance mandate is passed. The effect of this change on student achievement is unclear. If

the crowd-out we find is incomplete, overall support levels increase and student achievement is likely to increase. This is particularly the case if the quality of services provided by the private market is higher than those provided through the schools. However, if crowd-out is full (or more than full) or if support quality declines, student achievement should decline.

In Table 5, we focus on two achievement measures: standardized math test scores and standardized reading test scores for students in grades 4-8.[39] Given Michigan changed their exam structures in 2014-2015, we exclude that year from the estimates, leaving us with two pre-mandate and two post-mandate years. An added complication when we analyze these outcomes is that it is unclear which control group is most appropriate. This closely relates to the issue that we can only measure test scores for students who take Michigan's traditional standardized exams. Special education specific exams do not assess the same material, are scored on a different scale, and experienced substantial changes over the time period. In Appendix Table A-6, we show that when comparing ASD students to non-disabled students, there is no evidence that test-taking behavior was altered by the insurance mandate. Furthermore, non-disabled students are a useful control group because they are unaffected by any spillovers from the mandate onto other special education students. When comparing ASD students to other disabled students, there is some evidence that the mandate induced fewer students to take traditional exams. However, Non-ASD special education students still are an informative control group because they are likely subject similar secular shocks as are ASD students. We show triple difference estimates using three comparison groups - all non-ASD, non-Sped, and non-ASD sped. We prefer the estimates that compare ASD students to their non-disabled peers because there is no differential selection into taking the traditional exam for this group. The results are similar across comparison groups, however.

The first three columns of Table 5 show results for math scores and the second three show results for reading test scores, both of which are in standardized units. Across all columns, we find little evidence that academic achievement is affected by the private insurance mandate. For math, all of the estimates are very close to zero. Our preferred estimate using all non-sped students as the comparison group is in column 2 and has a coefficient of 0.005 with a 95%

[39]Students begin standardized testing in grade 3 but cannot be analyzed until grade 4 given our inclusion of lagged achievement as a control. In these specifications, our sample consists of all students who we observe taking a regular exam for at least two consecutive years and are either never or always disadvantaged in the years in which we observe them.

confidence interval of [-0.046,0.056]. Thus, we can rule out at the 95% level that the mandate changes math scores by more than 5-6% of a standard deviation.

The point estimates for reading (columns 4-6) are somewhat larger than for math but are also not statistically different from zero. In this case, the largest estimate is in column (4) using all non-ASD as a comparison group. The 95% confidence interval for reading with our preferred control group (column 5) is [-0.039,0.075]. We thus can rule out anything larger than modest effects on test scores at the 95% level. Additionally, in Online Appendix Table A-7, we provide triple-difference estimates for other academic outcomes, specifically attendance and grade retention. All of the estimates are small and not statistically significantly different from zero.[40]

Figure 2 shows event study estimates for math and reading using non-ASD special education students as the comparison group.[41] The figures do not show any evidence of differential pre-2012 trends that would bias our triple difference estimates, though we acknowledge that we are limited in this assessment by the need to control for prior achievement, which restricts us to only having two years of pre-mandate testing data.

Taken together, the results from Table 5 and Figure 2 indicate that academic achievement is likely unaffected and certainly does not decrease substantially due to the private insurance mandate. While improvements in one subject may be offset by lower scores in the other, it remains the case that in total we see little evidence of achievement impacts. It also is worth considering these estimates in the context of the performance gap between ASD and non-disabled students, which is between 0.3 and 0.5 standard deviations. Our point estimates are equivalent to only 1.5% of the math and 3.3% of the reading/ELA gap. Nonetheless, these are intent-to-treat estimates, so we caution that for the subset of students who do have service changes (the treatment-on-the-treated effect) we cannot rule out sizable achievement impacts.

Despite this caveat, our analysis indicates that the mandate *policy* itself has at most small impacts on achievement. This null result is important given the changes in education services we document. Because we cannot observe services provided outside of school, we cannot determine whether our results indeed reflect crowd-out or just a reduced demand for services driven by

[40] Appendix Table A-8 show the constituent difference-in-differences estimates for test scores. Since we observe some indications of increases in math achievement for non-disabled and non-ASD disabled students (panels B and C) that are similar in magnitude to those for ASD students (panel A), this indicates that the triple difference framework is more appropriate for this outcome.

[41] Event studies for the other control groups are shown in Online Appendix Figures A-2 and A-3 and are very similar.

health improvements. That student achievement does not substantially increase suggests our findings are most consistent with a crowd-out story, which is our preferred interpretation of the results. This interpretation also is consistent with the findings in Chatterji, Decker, and Markowitz (2015), who find no change in unmet need for services due to ASD mandates. That achievement does not substantially *decrease* in our setting further suggests that the shifting of responsibility to the private sector does not academically harm students with ASD. We caution, however, that these achievement analyses are short term, and so it is possible that cognitive improvements do not show up until more exposure time has elapsed.

5.3 Heterogeneous Treatment Effects and Robustness Checks

We examine several sources of heterogeneity: gender, race, and grade.[42] Table 6 presents estimates of the effect of the mandate on ASD incidence for each of these different groups. We see no evidence of a change in diagnoses for girls or for Whites & Asians vs. Black & Hispanic students. While there is evidence of reduced ASD incidence of 0.07 percentage points among boys due to the mandate, as with the overall estimates, this is very small relative to the mean rate of 1.7%. When we examine heterogeneity by grade in Panel B, there is a decline in ASD diagnosis in second grade that is significant at the 5% level. However, there is little evidence of any effects in higher grades except a positive estimate in grade 5, which suggests the mandate may shift the timing of diagnosis slightly to these later grades. Testing begins in grade 3, which may provide an impetus to identify students who would have been identified earlier in the absence of the mandate. Overall, there is little evidence that different groups experience a meaningful increase in ASD diagnosis, and there is no evidence of a positive shift along any dimension we examine.

We now turn to examining outcomes for these different groups. We caution that our sample sizes become small for some of these subgroups, which renders the estimates less precise and may limit the generalization of these results. As shown in Table 1, 85% of students with an ASD diagnosis are boys and in general, the condition is far more common among males: boys are 3 times as likely to be diagnosed as girls nationwide.[43] It thus is informative to examine

[42] When assessing heterogeneity by grade, our sample consists of all students in grades K-8 who we observe for at least two years and are either disadvantaged in all years in which we observe them or are never disadvantaged in the years in which we observe them.

[43] https://www.cdc.gov/nchs/products/databriefs/db291.htm.

effects separately by gender. Table 7 shows triple difference estimates of educational service outcomes for boys (Panel A) and girls (Panel B). The direction of the estimates is similar for boys and girls, but the effects tend to be larger both in absolute value and relative to the ASD identification rate for girls. Effects on resource/cognitive programs, no special education programs, and ASD teacher consultant are all larger for girls than for boys, but they are qualitatively similar across genders. Combined, the results show substantial crowd out effects on both genders that are somewhat larger for girls. The one exception is for the "aggregate service" outcome, where there is a sizable and negative effect for boys and no effect for girls. This is driven by a positive effect on language services for girls, which balances the negative effect on ASD teacher consultant and social worker services. Given that language services for girls is the only outcome across both genders consistent with an increase in school-based provision, we are unable to say whether this is a real effect or simply an artifact of multiple hypothesis testing.

Panels C and D show effects of the mandate for Black and Hispanic as well as White and Asian students, respectively. The crowd-out effects are most evident for White and Asian students, who make up nearly 3/4 of the ASD population in Michigan. The effects on Black and Hispanic students are quite noisy as a result. The results for Whites and Asians mirror the overall estimates quite closely. The findings for Black and Hispanic students are qualitatively similar but imprecise, which limits our ability to draw strong conclusions for this group.

Table 8 shows effects by grade, including kindergarten and 1^{st} grade. Kindergarten can be interpreted as a specification check, as ASD services for the vast majority of these students are covered by both private and Medicaid insurance plans after 2012. Furthermore, many first grade students are under age 6 and would also be able to receive services through Medicaid. If our identification strategy is valid, we would not expect to see significant impacts in these grades. Indeed, that is what the table shows. The estimates in both of these grades are small, and none is statistically significantly different from zero at even the 10% level. These estimates suggest that we are not picking up unobserved shocks or trends that differentially influence outcomes among non-disadvantaged ASD students.

The remaining estimates in the table test for heterogeneous treatment effects by grade for

higher grades. ABA can have differential effects by age, and the ability of schools to alter special education services also can differ for older versus younger students. Resource and cognitive program reductions are largest for students in grades 2 through 6 and start to fade after 4^{th} grade, though estimates never turn positive. Consistent with resource/cognitive program effects, the effects on non-participation in special education programs are positive in grades 2 through 6. Further, the reduction in the use of ASD teacher consultants is concentrated in early elementary grades. For the other outcomes, the estimates are generally small and are not statistically significant regardless of grade level. The crowd-out effects are mostly concentrated in elementary rather than middle school, which one would expect given ASD therapy is more effective, and hence more commonly used, when the child is younger.

We also examine test score effects along these dimensions of heterogeneity. Online Appendix Table A-9 shows reading and math score estimates by gender, race, and grade using non-disabled students as the comparison group. There are no strong statistically significant patterns across groups, though for girls and Black/Hispanic students the estimates are imprecise due to there being relatively few ASD students in each of these groups. The estimates by grade level also are noisy. Only one estimate is significant at even the 10% level, and the estimates are a mix of positive and negative coefficients.

We next estimate a series of robustness checks that assess the validity of several data limitations and identifying assumptions. First, we examine the importance of including the linear time trend interacted with non-disadvantaged status. As discussed in Section 4, this control accounts for secular linear trends in special education incidence, particularly in the comparison group of non-ASD disabled, and removes the composition changes we see within the comparison group in Table 3. In Panel A of Table 9, we present triple difference results that include this control. The estimates are virtually identical to baseline, which suggests that the composition changes have little effect on our program, educational setting, and special education service provision results. Panel A of Online Appendix Table A-10 shows a similar robustness check for math and reading test scores; the test score results are robust to including this control.

One reason why accounting for changes in the control group across disability categories does not affect our results is that our estimates are robust to using each non-ASD category

as a separate control group. Online Appendix Figure A-4 shows estimates that use each specific non-ASD disability category as a control group: cognitive disability, learning disability, emotional disability, other health disability, speech disability, and "all other" disabilities. The results are remarkably consistent across control group disabilities. While there is sampling variability across the estimates, there are no clear patterns that suggest our results are driven by a particular comparison between ASD and a given non-ASD disability group.

In Panel B of Tables 9 and A-10, we present estimates that include school district (rather than school) fixed effects. This robustness test assesses the stability of the estimates to not accounting for unobserved heterogeneity across schools within each district. The estimates are very similar to baseline, suggesting that this heterogeneity is not correlated with the treatment.

Panel C of these tables shows results that address the concern that both the ASD and poverty designations are endogenous to the mandate. While we find little evidence to suggest this is the case, the point estimate for ASD in Table 3 is significant at the 10% level. To check if endogenous ASD diagnosis is a concern, we use the pre-2012 (pre-treatment) ASD assignment and free/reduced price lunch status of students in place of their contemporaneous identification for post-treatment years.[44] The estimates again are very similar to those in Tables 4 and 5. Since students for this analysis have to be observed before 2012, the age profile in the post-treatment period skews older and so we believe the baseline estimates are more accurate.[45]

Throughout this analysis we have compared students who are always disadvantaged to students who never are to increase the strength of the proxy for Medicaid eligibility. In Online Appendix Table A-12, we show results using the full sample of students.[46] Relative to our baseline sample, this sample adds those who sometimes receive free/reduced price lunch or are observed only once in the data. The sample sizes increase, and the point estimates are attenuated relative to the main results as expected, since free/reduced price lunch receipt is a worse proxy for Medicaid eligibility among the sometimes-eligible students (Michelmore and Dynarski 2017; Domina et al. 2018). Nonetheless, the qualitative patterns do not change; the conclu-

[44]Data are restricted to students who are observed at least once before 2012. We classify students as non-disadvantaged if they are not on free/reduced price lunch in any year prior to 2012, and we classify them as disadvantaged if they receive free/reduced price lunch in every year prior to 2012.

[45]We also check whether using the student's status when first observed in the data (conditional on observing the student before 2012) affects the results. These results are provided in Appendix Table A-4 and A-11 for services and testing, respectively, and are very similar to our baseline estimates.

[46]Online Appendix Table A-13 shows disability incidence estimates using the full sample of students both with and without time trends by non-poverty status. The estimates are very similar to those in Table 3.

sion that the insurance mandate led to crowd-out of education services is robust to including these students. Online Appendix Table A-14 shows that we obtain similar results for math and reading test scores when we include these students as well. In Panel B of these tables, we show that the estimates using the full sample of students are robust to including a linear year trend interacted with non-poverty status. Together, the results in Table 9 and Appendix Tables A-12 through A-14 demonstrate that our results and conclusions are robust to the way in which we construct our analysis sample and to the use of linear time trends by non-poverty status.

The results thus far have focused on a set of special education services and outcomes that are most closely associated with ASD. As noted previously, in Online Appendix Table A-5 we present estimates for other services in our data that are less likely to be affected by the Autism insurance mandate. If we find effects on many of these outcomes, it is suggestive of bias in our main results. Specifically, we examine enrollment in another special education program, two categories of general education participation, any general education participation, non-ASD teacher consultant use, physical therapy services, and transportation services. None of the point estimates in Appendix Table A-5 is statistically significant at even the 10% level, and each estimate is close to zero. There is no evidence that these other service measures are affected by the insurance mandate; the services that change are those that are most closely aligned with the needs of ASD students.

Finally, in Panel D of Online Appendix Table A-10, we show that our test score estimates are robust to including the 2014-15 testing year when Michigan changed to a new exam format that could have affected ASD versus non-ASD students differently. In general, the estimates are similar with the exception of math relative to non-ASD special education students, which becomes negative and marginally significant. More importantly, however, these results are consistent with our overall conclusion that any achievement gains were at most modest.[47]

[47] One additional question is whether the mandate may have affected spending patterns by, for example, using money freed up by less ASD therapy needs for other purposes. Unfortunately we do not have data on spending or revenues for specific uses other than special education overall at the district level. Dose-response estimates using the share of special education students in a district with ASD and the share of non-poverty students on special education revenue received from the state provided by the US Department of Education's Common Core of Data are noisy but suggest only small and statistically insignificant increases in funding after the reform. These results are available by request.

6 Conclusion

We present the first estimates in the literature of how mandating insurance coverage of therapeutic services for children diagnosed with Autism Spectrum Disorder (ASD) affects the special education services students receive in public schools, as well as their educational achievement as measured by test scores. While we study Michigan's mandate, passed in 2012, 46 states and D.C. currently have some form of coverage mandate for children with ASD. The prevalence of these mandates makes them important to study, but our results also provide more general insight into how the effect of health policy spills over to education services and outcomes. The close connection between health and education in the production of human capital underscores the relevance of studying such policy spillovers more broadly.

Using administrative K-12 data on all 2^{nd} through 8^{th} grade students in the state of Michigan from 2009-2010 to 2014-2015 school year, we estimate how the insurance mandate affected a wide range of special education services as well as student test scores. We use the strong overlap between economic disadvantage and Medicaid to proxy for exposure to this mandate and estimate triple difference models that compare how services and outcomes change in 2012 among non-disadvantaged ASD students relative to disadvantaged ASD student and disadvantaged vs. non-disadvantaged differences among non-ASD students.

Our main findings indicate that the ASD coverage mandate led to sizable declines in the special education services students receive. ASD students who are not economically disadvantaged experienced declines in the likelihood of being placed in a resource or cognitive impairment special education program, the likelihood of being placed in any special education program, the likelihood of being given an ASD teaching consultant, and the likelihood of being provided in-school access to a social worker. However, test scores did not change on average, though we note that we estimate an intent-to-treat effect that is an attenuated measure of the average effect of treatment on the treated.

Taken together, we argue the evidence is most consistent with a crowd-out story, where the private provision of ASD therapies reduces special education services in schools. This would generate the service reductions we document and would lead to no change in academic achievement, as we find. The interpretation of our results as crowd-out is also consistent with

prior work by Chatterji et al. (2015) that finds that other state-level autism insurance mandates have little effect on families' self-reported access to care or financial burdens. Our work indicates that a potential explanation for their findings is that the sum total of services and spending on those services are the same because of the crowd-out phenomenon we document. If services that were being paid for by public schools are now being paid for via families' private insurance, the setting where students receive services may have changed, but parents would have no change in how much they spend out-of-pocket nor in the amount of services provided to their children.

Our results are important in showing that supply-side health policies focused on health insurance have spillover effects to the education system that likely were unintended by policymakers. The findings from this paper suggest that the crowd-out of special education services undoes some of the intent of policymakers to help provide more therapy services to autistic children. Nonetheless, we see little evidence that the mandate was harmful to students, and there is a potential for welfare enhancement if provision through the health insurance system is more efficient than through the education system or if it frees up instruction time for students by shifting receipt of these services to after school periods rather than removing the child from instruction to provide them.

That these spillovers occur in this setting is suggestive that other health care policies, such as recommendations against teens taking anti-depressants or medical practices surrounding ADHD disabilities, also may have effects on the services students receive in schools and their academic achievement. There could also be implications for wider health reforms. Most research on the crowd-out effects of these programs focuses on how public insurance crowds out private insurance (e.g. Ham, Ozbeklik, and Shore-Sheppard, 2014; Hamersma and Kim, 2013; Gruber and Simon, 2008; Cutler and Gruber, 1996). Our study suggests that expansion to the Children's Health Insurance Program and Medicaid also may have led to changes in developmental and mental health related school spending, although this is complicated by the fact that Medicaid pays directly for some of these services. More generally, changes to public and private insurance regulations driven by policies such as the ACA and state-level Medicaid expansion decisions may interact with the provision of services disabled students receive in schools. Understanding the interactions between health policies and schools and how they affect students is a ripe area

for future research.

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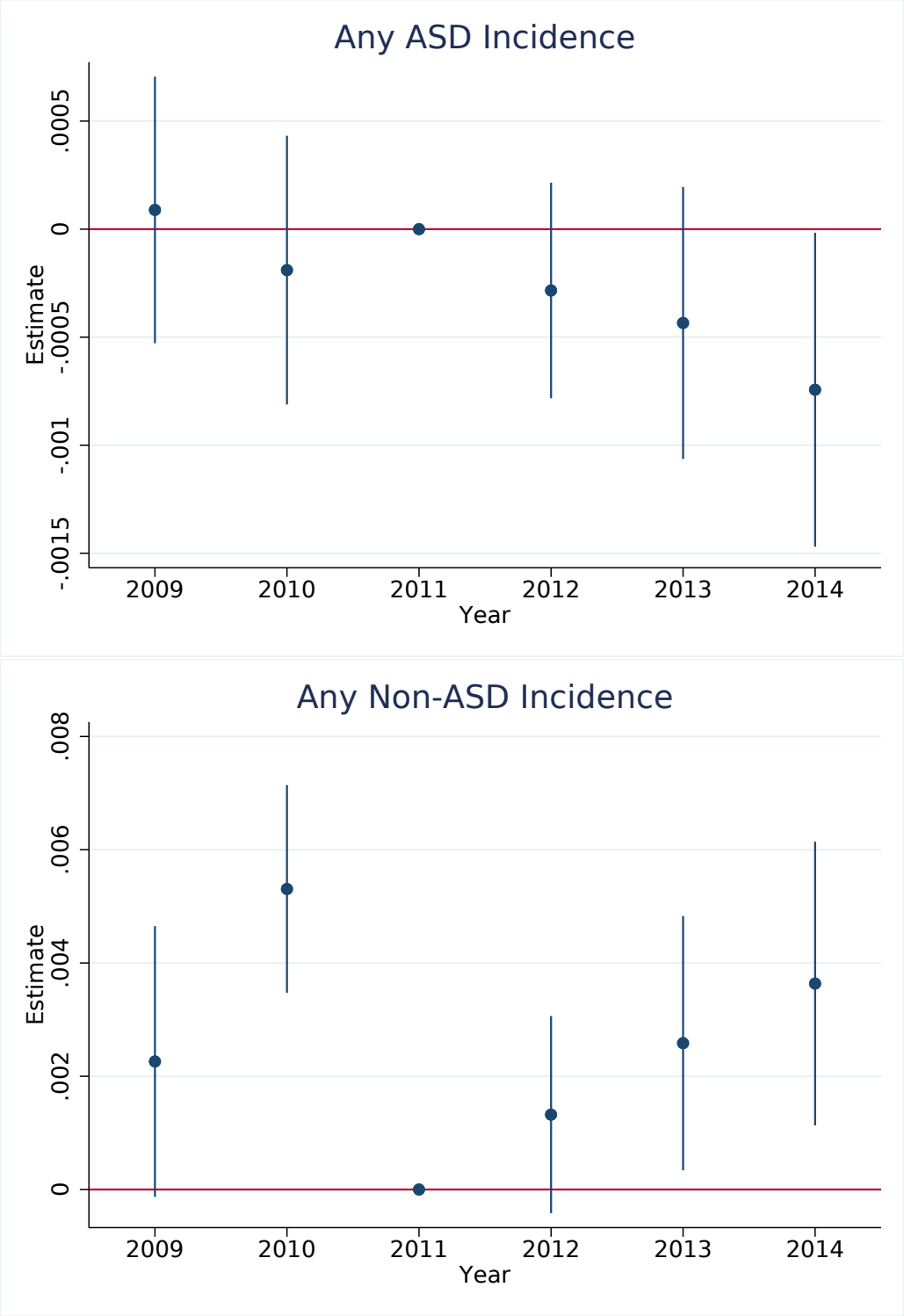
Figure 1: ASD and Non-ASD Special Education Incidence Event Studies



This figure plots event study estimates in which we replace $PostMandate_t \times NonDisadv_i$ with $NonDisadv_i$ interacted with a set of year dummies in equation (1). The $NonDisadv \times t$ control is excluded because of collinearity with the event study variables. Year 2011 is excluded, so all estimates are relative to that year. Each point represents the point estimate and the bars extending from each point show the 95% confidence interval that is calculated from standard errors that are clustered at the school district level.

Figure 2: Test Scores Event Studies, using Non-Disabled Control Group

This figure plots event study estimates in which we replace $PostMandate_t \times NonDisadv_i \times ASD_{it}$ with $NonDisadv_i \times ASD_{it}$ interacted with a set of year dummies in equation (2). Year 2011 is excluded, so all estimates are relative to that year. Each point represents the point estimate and the bars extending from each point show the 95% confidence interval that is calculated from standard errors that are clustered at the school district level.

Table 1: Descriptive Tabulations of Analysis Variables

Variable	All	ASD			Non-ASD	Non-
		All	Non-Pov	Pov	Special Ed.	Special Ed.
Demographics						
White	0.683	0.754	0.848	0.630	0.651	0.687
Male	0.513	0.858	0.856	0.860	0.644	0.489
LEP	0.055	0.030	0.023	0.040	0.053	0.055
Poverty	0.509	0.434	0.000	1.000	0.691	0.482
Disability						
ASD	0.010					
Any Non-ASD	0.133					
Cognitive	0.011					
Emotional	0.009					
Speech	0.036					
Learning Disability	0.055					
Other Health	0.016					
Observations	3,854,234	38,803	21,953	16,850	506,432	3,308,999
Special Education Program						
ASD		0.197	0.179	0.220	0.001	
Resource		0.551	0.567	0.531	0.611	
Cognitive		0.119	0.098	0.147	0.090	
Other		0.031	0.026	0.037	0.046	
None		0.129	0.154	0.097	0.268	
Education Setting						
Special Ed. School		0.056	0.041	0.075	0.018	
Gen. Ed. $> 80\%$		0.455	0.497	0.401	0.594	
Gen. Ed. 40-79%		0.149	0.150	0.148	0.143	
Gen Ed. $< 40\%$		0.207	0.173	0.252	0.074	
Average FTE		0.353	0.308	0.412	0.194	
Special Education Support Services						
ASD Teaching Consultant		0.130	0.144	0.112	0.003	
Non-ASD Teaching Consultant		0.091	0.111	0.065	0.074	
Language		0.790	0.802	0.775	0.478	
Social Worker		0.691	0.710	0.666	0.220	
Occupational Therapy		0.401	0.417	0.380	0.085	
Physical Therapy		0.031	0.037	0.024	0.027	
Transportation		0.041	0.036	0.048	0.009	
Other Service		0.042	0.040	0.044	0.023	
Aggregate Service Measure*		2.013	2.073	1.933	0.929	
Observations		38,621	21,846	16,775	506,432	

Authors' tabulations from data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample sizes for the ASD groups in the top and bottom panels differ slightly because a small number of students with an ASD diagnosis do not receive any special education services.

* Aggregate Service Measure is defined as the number of services a student receives from ASD teaching consultant, language, social worker, and occupational therapy.

Table 2: Overlap Between Free/Reduced Price Lunch and Medicaid in Michigan, by Family Income

By Free/Reduced Price Lunch Status			
Free/Reduced Price Lunch Status	Percent Insured	Percent Medicaid	Percent Private Insurance
Eligible	95.40%	72.93%	31.03%
Not Eligible	97.54%	12.86%	88.53%
By Family Income as Percent of Poverty Line			
Family Income	Percent Insured	Percent Medicaid	Percent Private Insurance
$\leq$ 135% FPL	95.63%	81.05%	22.50%
135-185% FPL	94.75%	50.87%	54.19%
185-250% FPL	95.95%	29.13%	74.53%
250-350% FPL	96.84%	14.60%	86.82%
$\geq$ 350% FPL	98.57%	5.16%	95.29%

Authors tabulations from the 2008-2016 American Community Survey among children who were in grades K-8 at Michigan public schools (N = 84,477). "FPL" stands for Federal Poverty Line. Note that insurance counts may exceed 100% as some people remain eligible for Medicaid while enrolled in private plans.

Table 3: The Effect of the ASD Insurance Mandate on Disability Incidence

Panel A: Main Estimates

	Dependent Variable:						
Independent Variable	ASD (1)	Non-ASD Disability (2)	Cognitive Disability (3)	Emotional Disability (4)	Speech Disability (5)	Learning Disability (6)	Other Health Disability (7)
Non-disadv* Post-2012	-0.00045*	-0.00004	0.00001	0.00126***	-0.00283***	0.00399***	-0.00266***
	(0.00024)	(0.00105)	(0.00032)	(0.00028)	(0.00065)	(0.00088)	(0.00043)

Panel B: Including Linear Time Trend Interacted with Non-Disadvantaged Status

	Dependent Variable:						
Independent Variable	ASD (1)	Non-ASD Disability (2)	Cognitive Disability (3)	Emotional Disability (4)	Speech Disability (5)	Learning Disability (6)	Other Health Disability (7)
Non-disadv* Post-2012	-0.00004	-0.00004	-0.00028	0.00051*	-0.00013	-0.00033	0.00034
	(0.00022)	(0.00097)	(0.00031)	(0.00029)	(0.00064)	(0.00063)	(0.00039)

Panel C: School District Fixed Effects

	Dependent Variable:						
Independent Variable	ASD (1)	Non-ASD Disability (2)	Cognitive Disability (3)	Emotional Disability (4)	Speech Disability (5)	Learning Disability (6)	Other Health Disability (7)
Non-disadv* Post-2012	-0.00044*	-0.00013	-0.00005	0.00125***	-0.00303***	0.00418***	-0.00254***
	(0.00023)	(0.00108)	(0.00031)	(0.00031)	(0.00066)	(0.00098)	(0.00041)
Incidence Rate	0.010	0.133	0.011	0.009	0.036	0.055	0.016

Authors estimates of equation (1) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression; N=3,854,234. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch in all observed years of schooling. Students who are eligible for free/reduced price lunch in only some years of schooling are excluded from the regression. All regressions include controls for whether a student is white, male, and limited English proficient as well as grade-by-year fixed effects. Estimates in Panels A and B include school fixed effects, while those in Panel C include school district fixed effects. Estimates in Panel B also control for a linear time trend interacted with non-disadvantaged status. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table 4: The Effect of the ASD Insurance Mandate on Special Education Services

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012*ASD	0.031	-0.064**	0.034***	0.004	0.000	-0.008	-0.023**	0.005	-0.004	-0.021*	-0.043*
	(0.035)	(0.030)	(0.011)	(0.004)	(0.015)	(0.009)	(0.011)	(0.013)	(0.012)	(0.013)	(0.026)
Non-disadv	0.002	-0.133***	0.143***	-0.001**	0.122***	-0.056***	0.000	0.101***	0.023***	-0.089***	0.035***
	(0.002)	(0.004)	(0.004)	(0.001)	(0.005)	(0.003)	(0.001)	(0.004)	(0.003)	(0.005)	(0.008)
ASD	0.187***	-0.048	-0.104***	0.009*	-0.145***	0.115***	0.125***	0.300***	0.257***	0.406***	1.087***
	(0.0449)	(0.0367)	(0.0104)	(0.005)	(0.019)	(0.024)	(0.016)	(0.015)	(0.014)	(0.019)	(0.034)
Non-disadv*Post-2012	0.000	0.007	-0.012***	0.000	-0.031***	0.012***	-0.001	-0.020***	0.001	0.004	-0.015
	(0.002)	(0.005)	(0.005)	(0.001)	(0.005)	(0.002)	(0.001)	(0.004)	(0.003)	(0.006)	(0.009)
Non-disadv*ASD	-0.062	0.152***	-0.109***	-0.006	-0.018	-0.001	0.039**	-0.068***	0.014	0.105***	0.090**
	(0.040)	(0.034)	(0.012)	(0.004)	(0.019)	(0.023)	(0.018)	(0.015)	(0.015)	(0.018)	(0.035)
Post-2012*ASD	-0.022	0.032	-0.008	-0.007	-0.017	0.005	-0.015	0.009	0.003	0.028**	0.024
	(0.038)	(0.032)	(0.009)	(0.006)	(0.014)	(0.009)	(0.011)	(0.013)	(0.012)	(0.013)	(0.029)
Observations	545,053	545,053	545,053	455,751	455,751	332,372	545,053	545,053	545,053	545,053	545,053
ASD Mean	0.197	0.670	0.129	0.056	0.455	0.353	0.130	0.790	0.401	0.691	2.013

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch in all observed years of schooling and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. The "Aggregate Services" outcome is the sum of the four special education services outcomes: ASD Teacher Consultant, Language Services, Occupational Therapy, and Social Worker. The final row of the table provides dependent variable means for the ASD sample. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table 5: The Effect of the ASD Insurance Mandate on Test Scores

	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	0.001	0.005	-0.010	0.021	0.018	0.004
	(0.026)	(0.026)	(0.027)	(0.029)	(0.029)	(0.030)
Non-disadv	0.156***	0.144***	0.139***	0.197***	0.181***	0.157***
	(0.005)	(0.005)	(0.006)	(0.004)	(0.004)	(0.007)
ASD	-0.091***	-0.129***	0.112***	-0.097***	-0.166***	0.195***
	(0.016)	(0.016)	(0.018)	(0.017)	(0.018)	(0.019)
Non-disadv*Post	0.014***	0.011**	0.033***	-0.002	0.001	0.014*
	(0.005)	(0.005)	(0.007)	(0.003)	(0.003)	(0.007)
Non-disadv*ASD	-0.079***	-0.070***	-0.016	-0.186***	-0.168***	-0.143***
	(0.018)	(0.018)	(0.020)	(0.022)	(0.022)	(0.024)
Post*ASD	0.023	0.022	0.064***	0.014	0.025	0.029
	(0.021)	(0.021)	(0.021)	(0.023)	(0.023)	(0.024)
Lagged Achievement	0.738***	0.731***	0.598***	0.644***	0.618***	0.564***
	(0.006)	(0.006)	(0.014)	(0.003)	(0.003)	(0.010)
Observations	1,754,971	1,579,046	185,814	1,749,290	1,578,937	180,172

Authors estimates of equation (2) as described in the text using data on students in grades 4-8 from the 2010-2011 to the 2013-2014 school years. 2009-2010 is excluded to allow for a lagged test score measure. 2014-2015 is excluded as Michigan changed from the Michigan Assessment of Educational Progress to the M-Step exam and restructured alternative examination options. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch in all observed years of schooling and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table 6: Heterogeneous Effects of the ASD Insurance Mandate on ASD Incidence

				Panel A: By Gender and Race					
Independent Variable	Girls (1)	Boys (2)		White & Asian (3)	Black & Hispanic (4)				
Non-disadv* Post-2012	-0.00020	-0.00073*		-0.00027	0.00034				
	(0.00016)	(0.00044)		(0.00024)	(0.00082)				
Observations	1,878,120	1,976,114		3,272,013	582,221				
Incidence Rate	0.003	0.017		0.011	0.007				
				Panel B: By Grade					
Independent Variable	KG (1)	Grade 1 (2)	Grade 2 (3)	Grade 3 (4)	Grade 4 (5)	Grade 5 (6)	Grade 6 (7)	Grade 7 (8)	Grade 8 (9)
Non-disadv*Post-2012	-0.00036	-0.00082	-0.00204***	-0.00068	-0.00024	0.00121**	0.00037	-0.00048	-0.00065
	(0.00051)	(0.00052)	(0.00055)	(0.00057)	(0.00058)	(0.00060)	(0.00063)	(0.00059)	(0.00054)
Observations	594,630	545,212	526,440	520,105	524,539	538,197	559,531	588,427	503,930
Incidence Rate	0.007	0.008	0.009	0.010	0.010	0.011	0.010	0.010	0.010

Authors estimates of equation (1) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch. All regressions include the full set of controls listed in equation (2), including controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table 7: The Effect of the ASD Insurance Mandate, by Gender and Race

Panel A: Boys

Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
					Dependent Variable:						
Non-disadv*Post-2012*ASD	0.032	-0.057*	0.029**	0.006	0.000	-0.008	-0.021*	-0.003	-0.006	-0.024**	-0.054**
	(0.034)	(0.029)	(0.012)	(0.005)	(0.016)	(0.008)	(0.011)	(0.014)	(0.013)	(0.012)	(0.027)
Observations	359,165	359,165	359,165	300,256	300,256	218,809	359,165	359,165	359,165	359,165	359,165
ASD Mean	0.193	0.662	0.130	0.062	0.529	0.349	0.130	0.788	0.400	0.694	2.011

Panel B: Girls

Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
					Dependent Variable:						
Non-disadv*Post-2012*ASD	0.012	-0.092**	0.066***	-0.005	-0.002	-0.011	-0.031	0.050*	0.009	-0.022	0.006
	(0.047)	(0.046)	(0.023)	(0.011)	(0.031)	(0.029)	(0.021)	(0.026)	(0.030)	(0.030)	(0.060)
Observations	185,888	185,888	185,888	155,495	155,495	113,563	185,888	185,888	185,888	185,888	185,888
ASD Mean	0.222	0.644	0.123	0.076	0.489	0.380	0.131	0.805	0.410	0.676	2.022

Panel C: Black & Hispanic

Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
					Dependent Variable:						
Non-disadv*Post-2012*ASD	0.083	-0.058	-0.016	0.012	0.005	0.019	-0.012	0.012	-0.001	-0.007	-0.009
	(0.091)	(0.082)	(0.034)	(0.012)	(0.049)	(0.028)	(0.025)	(0.035)	(0.043)	(0.040)	(0.068)
Observations	82,393	82,393	82,393	58,337	58,337	29,426	82,393	82,393	82,393	82,393	82,393
ASD Mean	0.320	0.579	0.093	0.073	0.428	0.396	0.088	0.849	0.387	0.662	1.986

Panel D: White & Asian

Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
					Dependent Variable:						
Non-disadv*Post-2012*ASD	-0.008	-0.033**	0.039***	0.001	0.009	-0.010	-0.016*	-0.010	-0.005	-0.020	-0.051*
	(0.009)	(0.014)	(0.010)	(0.003)	(0.013)	(0.009)	(0.009)	(0.012)	(0.012)	(0.013)	(0.026)
Observations	462,660	462,660	462,660	397,414	397,414	302,946	462,660	462,660	462,660	462,660	462,660
ASD Mean	0.183	0.668	0.133	0.063	0.533	0.350	0.135	0.784	0.403	0.695	2.016

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression; N=707,376. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include the full set of controls listed in equation (2), including controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. The "Aggregate Services" outcome is the sum of the four special education services outcomes: ASD Teacher Consultant, Language Services, Occupational Therapy, and Social Worker. The final row of each panel provides dependent variable means for the ASD sample. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table 8: The Effect of the ASD Insurance Mandate, by Grade

Grade	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
KG	-0.006	0.027	-0.005	0.006	-0.001	-0.002	-0.006	-0.014	-0.012	-0.049	-0.079
	(0.038)	(0.038)	(0.028)	(0.013)	(0.033)	(0.033)	(0.023)	(0.018)	(0.042)	(0.033)	(0.069)
1	0.045	-0.037	-0.017	-0.007	-0.032	0.004	-0.035	0.022	-0.018	-0.002	-0.033
	(0.041)	(0.041)	(0.028)	(0.012)	(0.032)	(0.025)	(0.025)	(0.021)	(0.032)	(0.033)	(0.065)
2	0.022	-0.072*	0.049**	-0.011	-0.021	0.012	-0.047**	0.025	-0.037	-0.022	-0.081
	(0.046)	(0.042)	(0.025)	(0.010)	(0.031)	(0.031)	(0.022)	(0.024)	(0.030)	(0.029)	(0.058)
3	0.053	-0.10**	0.041*	0.013	-0.014	0.006	-0.040*	0.008	-0.058**	-0.010	-0.100*
	(0.047)	(0.047)	(0.024)	(0.012)	(0.031)	(0.025)	(0.021)	(0.022)	(0.027)	(0.027)	(0.056)
4	0.055	-0.080*	0.029	-0.010*	-0.031	-0.001	-0.003	0.007	0.066**	-0.015	0.056
	(0.044)	(0.042)	(0.021)	(0.006)	(0.033)	(0.021)	(0.018)	(0.026)	(0.029)	(0.026)	(0.054)
5	0.011	-0.040	0.018	-0.004	0.007	0.031	-0.008	0.002	0.040	-0.041*	-0.007
	(0.037)	(0.039)	(0.020)	(0.008)	(0.030)	(0.025)	(0.018)	(0.026)	(0.026)	(0.024)	(0.051)
6	0.004	-0.033	0.037**	0.002	0.013	-0.022	-0.011	-0.018	0.013	-0.020	-0.036
	(0.030)	(0.031)	(0.017)	(0.008)	(0.030)	(0.023)	(0.018)	(0.025)	(0.024)	(0.023)	(0.051)
7	0.020	-0.020	0.000	0.004	-0.015	-0.022	-0.015	-0.035	-0.029	0.001	-0.078
	(0.040)	(0.039)	(0.019)	(0.011)	(0.031)	(0.024)	(0.020)	(0.026)	(0.023)	(0.026)	(0.052)
8	0.022	-0.010	-0.004	0.010	0.020	-0.039*	-0.021	-0.041	0.015	0.002	-0.044
	(0.025)	(0.032)	(0.021)	(0.009)	(0.032)	(0.022)	(0.022)	(0.028)	(0.023)	(0.025)	(0.057)

Authors estimates of equation (2) as described in the text using data on students in grades Kindergarten-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each cell is a separate regression and shows the estimate of the coefficient on the triple interaction term of Non-disadv*Post-2012*ASD. All regressions include the full set of controls listed in equation (2), including controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects.The "Aggregate Services" outcome is the sum of the four special education services outcomes: ASD Teacher Consultant, Language Services, Occupational Therapy, and Social Worker. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table 9: The Effect of the ASD Insurance Mandate – Robustness Checks

Panel A: Including Linear Time Interacted with Non-Disadvantaged Status

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012*ASD	0.031	-0.064**	0.034***	0.004	0.000	-0.009	-0.023**	0.005	-0.004	-0.021*	-0.044*
	(0.035)	(0.030)	(0.011)	(0.004)	(0.015)	(0.009)	(0.011)	(0.013)	(0.012)	(0.012)	(0.026)
Observations	545,053	545,053	545,053	455,751	455,751	332,372	545,053	545,053	545,053	545,053	545,053
ASD Mean	0.197	0.670	0.129	0.056	0.455	0.353	0.130	0.790	0.401	0.691	2.013

Panel B: School District FEs

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed <80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012*ASD	0.028	-0.068**	0.041***	-0.006	0.014	-0.013	-0.023**	-0.000	-0.017	-0.015	-0.055**
	(0.036)	(0.030)	(0.011)	(0.007)	(0.016)	(0.011)	(0.011)	(0.014)	(0.013)	(0.014)	(0.027)
Observations	545,053	545,053	545,053	455,751	455,751	332,372	545,053	545,053	545,053	545,053	545,053
ASD Mean	0.197	0.670	0.129	0.056	0.455	0.353	0.130	0.790	0.401	0.691	2.013

Panel C: Pre-Treatment Assignment of ASD & Poverty Variables

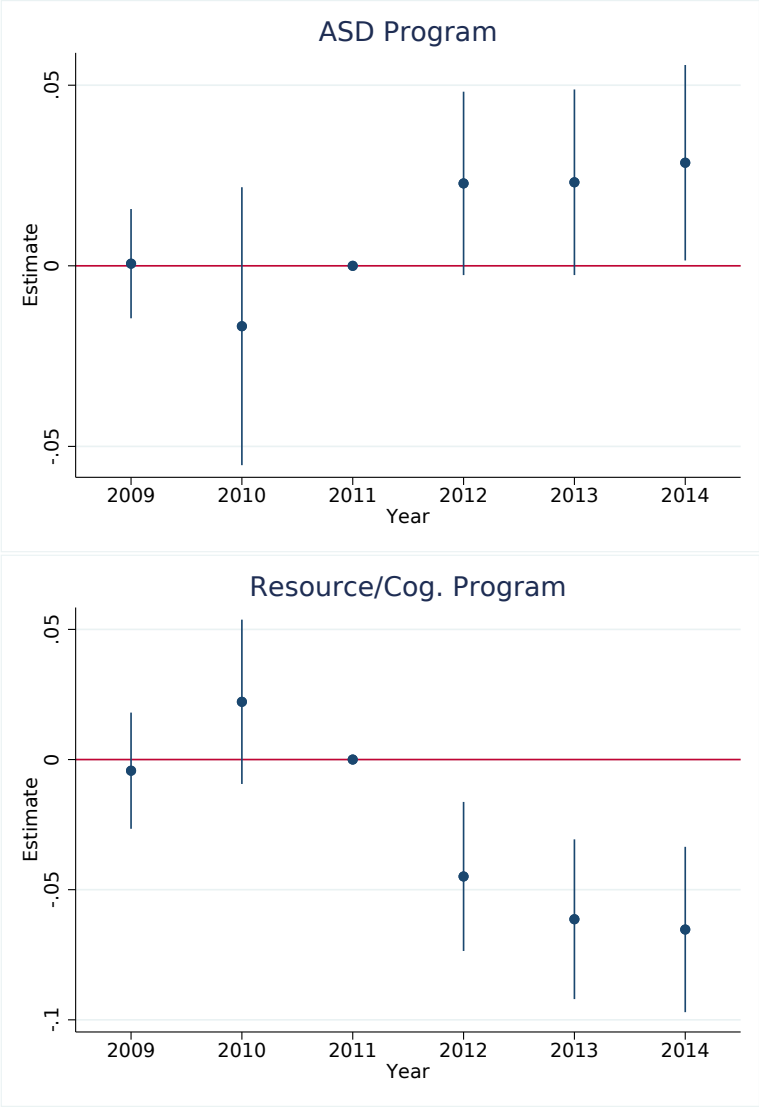
	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012*ASD	0.024	-0.056***	0.032***	0.0034	-0.006	-0.006	-0.013	-0.000	-0.007	-0.044***	-0.064***
	(0.029)	(0.020)	(0.010)	(0.004)	(0.013)	(0.007)	(0.010)	(0.012)	(0.012)	(0.011)	(0.024)
Observations	621,309	621,309	621,309	531,046	531,046	397,944	621,309	621,309	621,309	621,309	621,309
ASD Mean	0.196	0.659	0.129	0.051	0.527	0.346	0.131	0.777	0.373	0.698	1.979

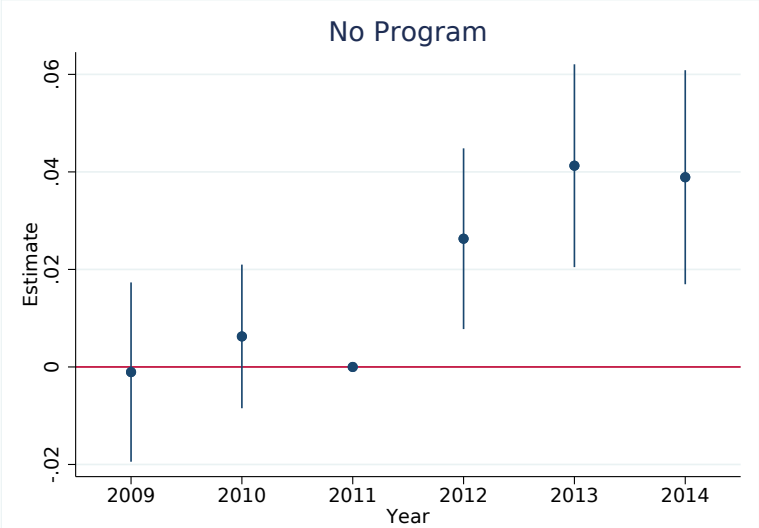
Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample in Panel A includes only students who are always or never eligible for free/reduced price lunch, while the sample in Panels B and C include all students. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include the full set of controls listed in equation (2), including whether a student is white, male, and limited English proficient as well as grade-by-year fixed effects. Estimates in Panels A and C include school fixed effects, while those in Panel B include school district fixed effects. Estimates in Panel A also control for a linear time trend interacted with non-disadv status. The "Aggregate Services" outcome is the sum of the four special education services outcomes: ASD Teacher Consultant, Language Services, Occupational Therapy, and Social Worker. The final row of each panel provides dependent variable means for the ASD sample. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

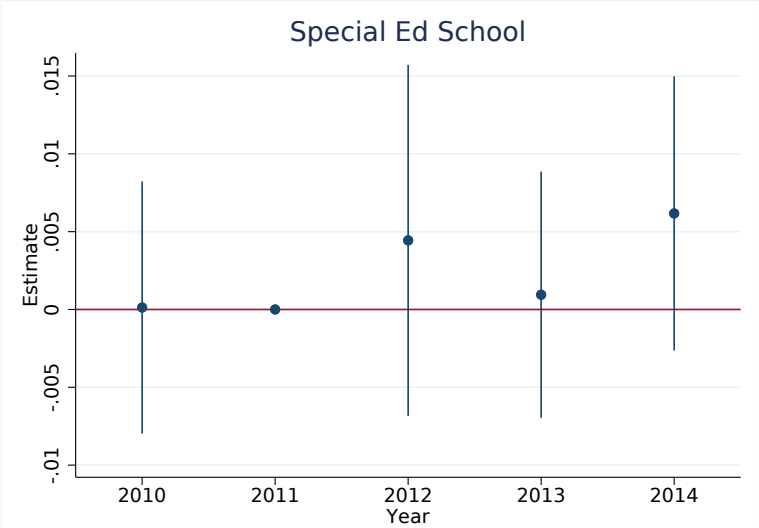
7 Online Appendix

Online Appendix: Not for Publication

Figure A-1: Event Study Estimates of Main Outcomes




No Program
Estimate
-.02
0
.02
.04
.06
2009
2010
2011
2012
2013
2014
Year


Special Ed School
Estimate
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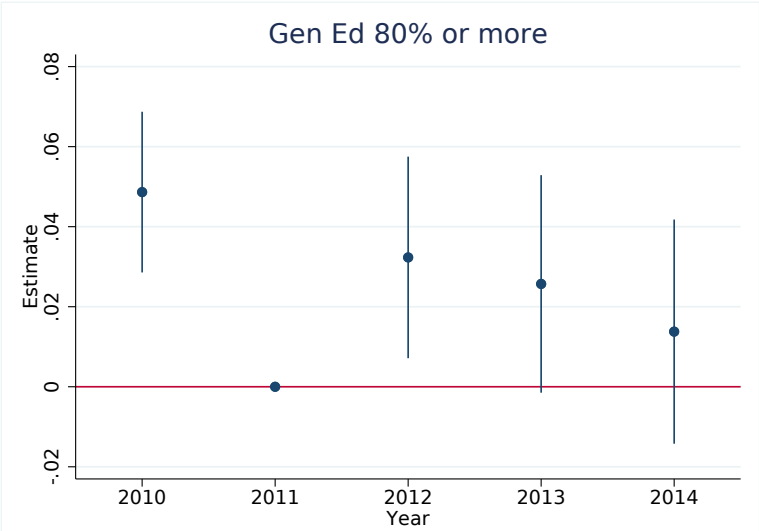
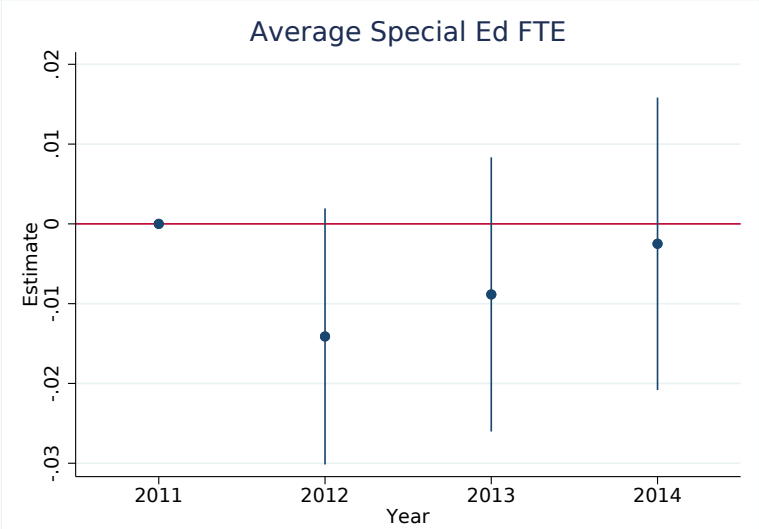
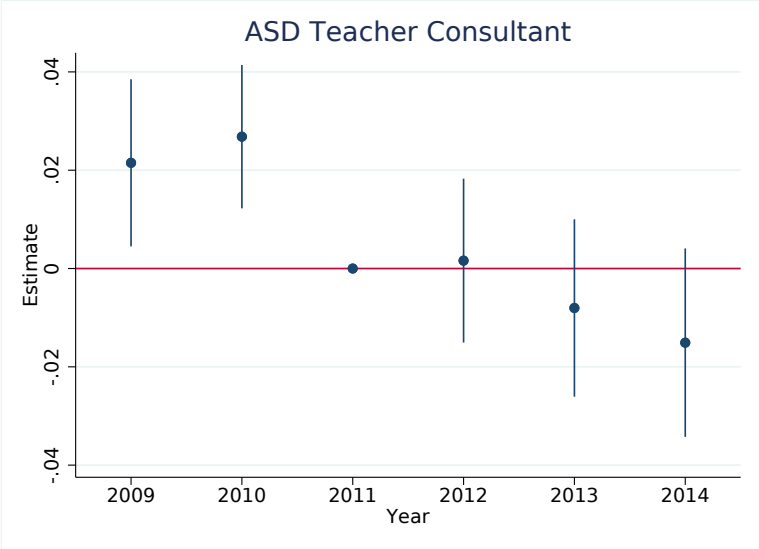
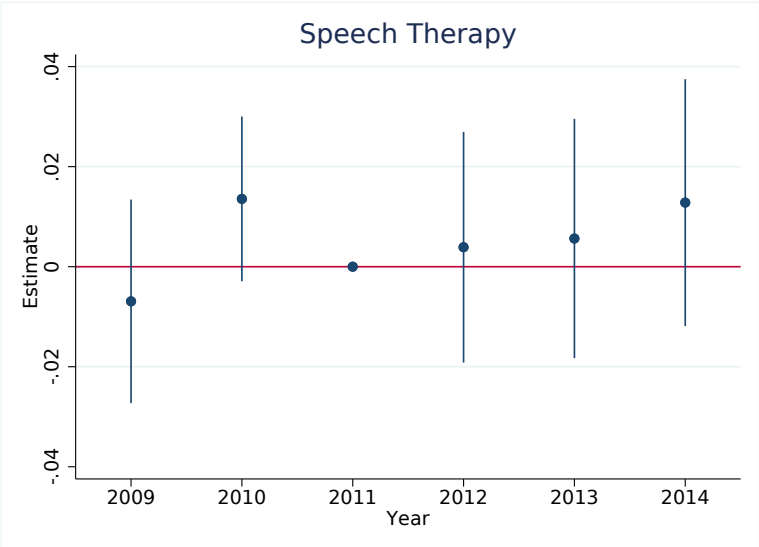
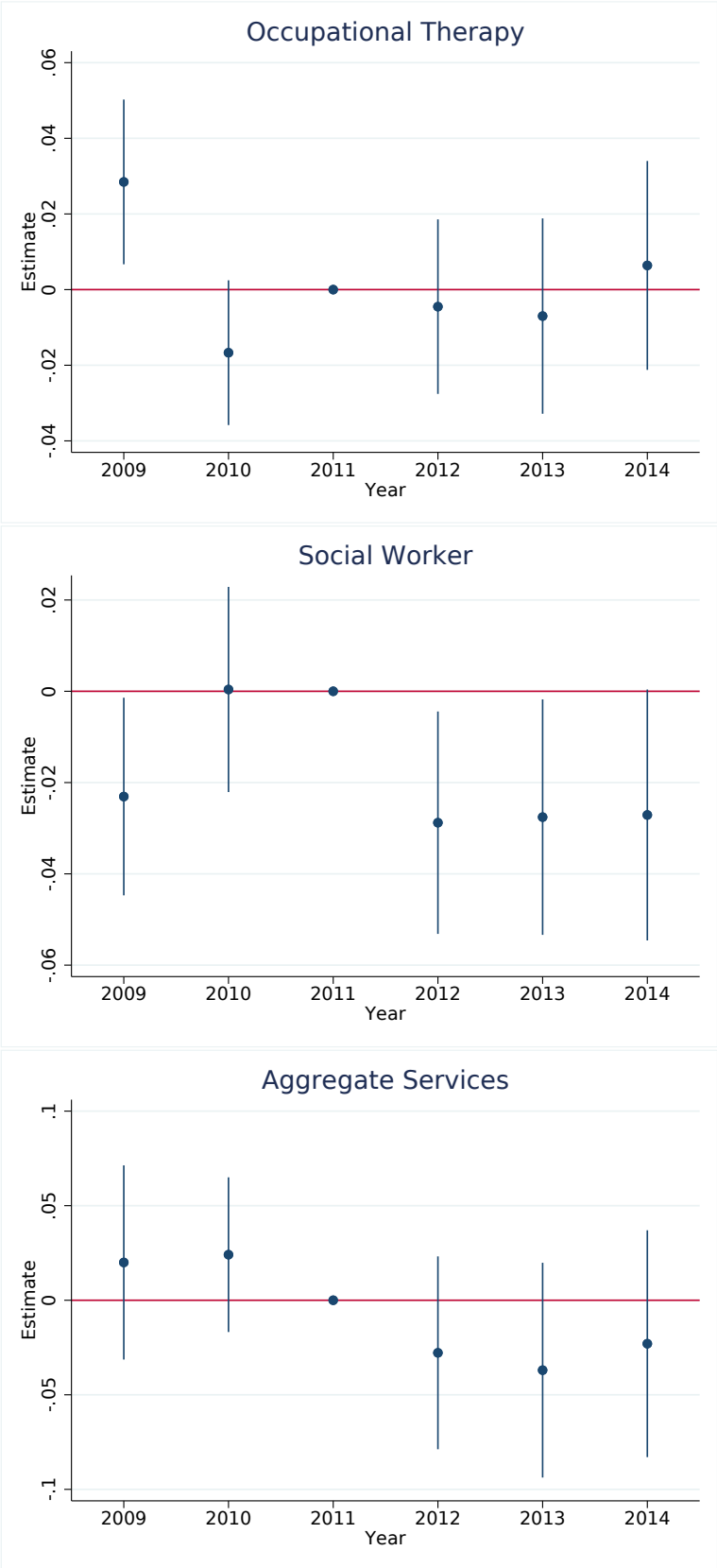
-.005
0
.005
.01
.015
2010
2011
2012
2013
2014
Year


Gen Ed 80% or more
Estimate
-.02
0
.02
.04
.06
.08
2010
2011
2012
2013
2014
Year


Average Special Ed FTE
Estimate
.02
.01
0
-.01
-.02
-.03
2011
2012
2013
2014
Year


ASD Teacher Consultant
Estimate
.04
.02
0
-.02
-.04
2009
2010
2011
2012
2013
2014
Year


Speech Therapy
Estimate
.04
.02
0
-.02
-.04
2009
2010
2011
2012
2013
2014
Year

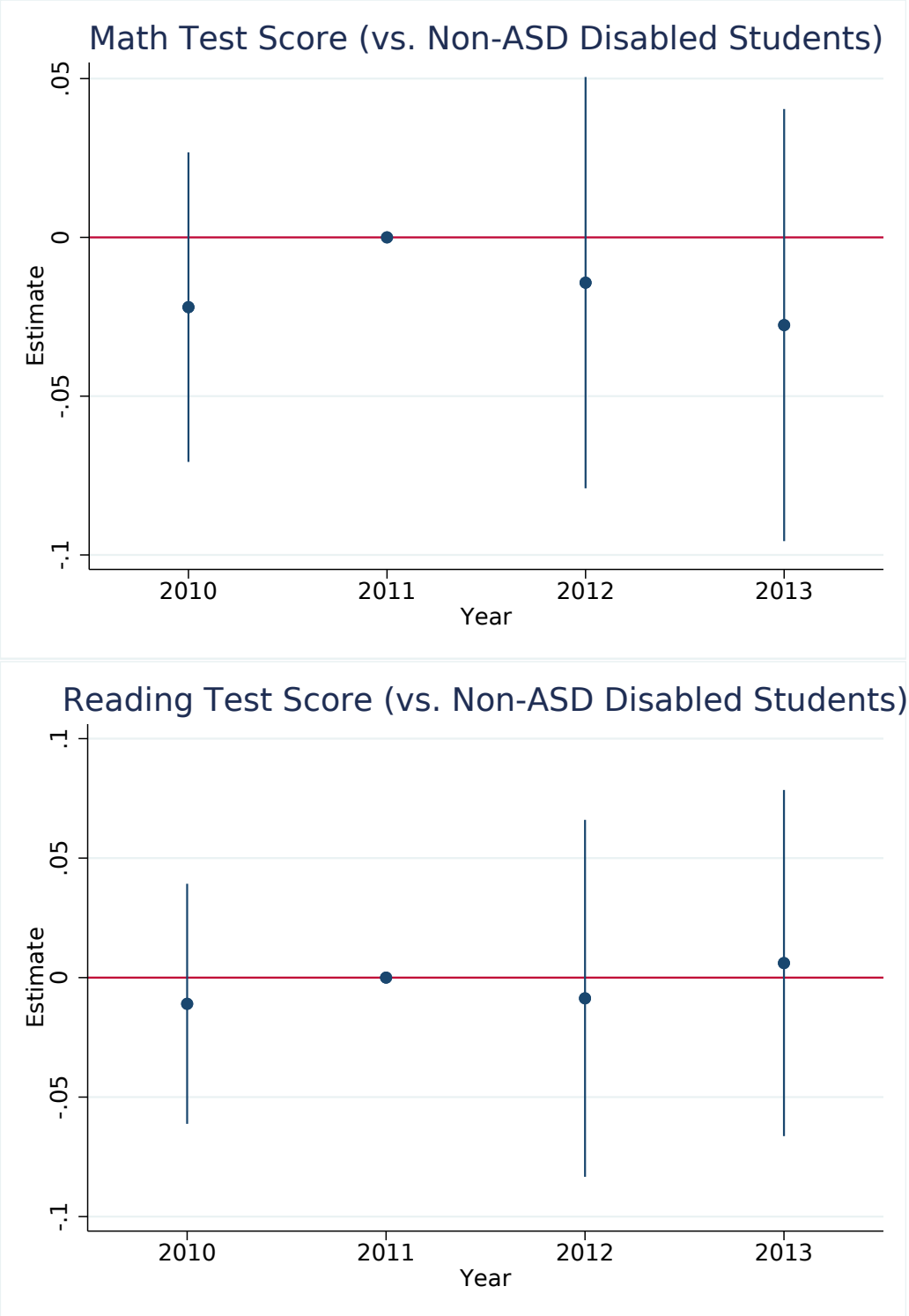


This figure plots event study estimates in which we replace $PostMandate_t \times NonDisadv_i \times ASD_{it}$ with $NonDisadv_i \times ASD_{it}$ interacted with a set of year dummies in equation (2). Year 2011 is excluded, so all estimates are relative to that year. Each point represents the point estimate and the bars extending from each point show the 95% confidence interval that is calculated from standard errors that are clustered at the school district level.

Figure A-2: Test Scores Event Studies, using All Non-ASD Control Group

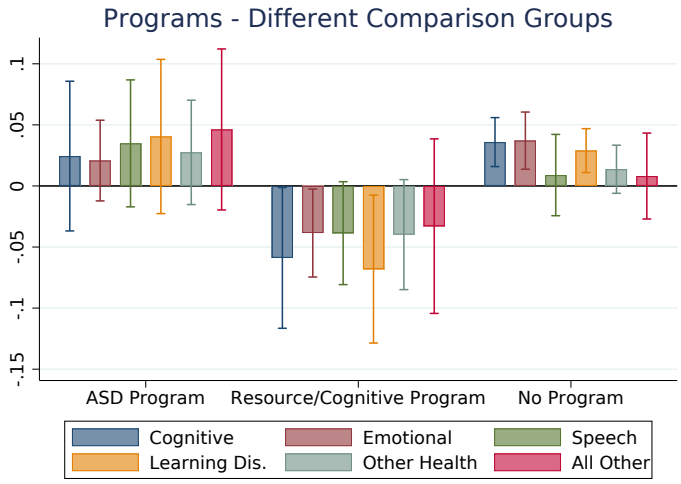
This figure plots event study estimates in which we replace $PostMandate_t \times NonDisadv_i \times ASD_{it}$ with $NonDisadv_i \times ASD_{it}$ interacted with a set of year dummies in equation (2). Year 2011 is excluded, so all estimates are relative to that year. Each point represents the point estimate and the bars extending from each point show the 95% confidence interval that is calculated from standard errors that are clustered at the school district level.

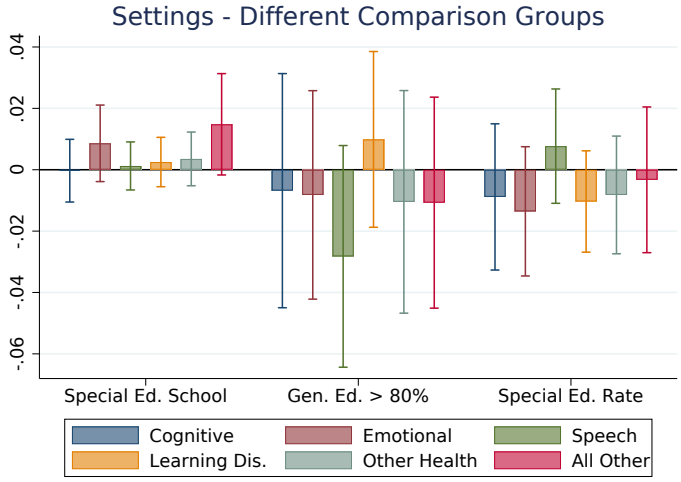
Figure A-3: Test Score Event Studies, using Non-ASD Special Ed Control Group



This figure plots event study estimates in which we replace $PostMandate_t \times NonDisadv_i \times ASD_{it}$ with $NonDisadv_i \times ASD_{it}$ interacted with a set of year dummies in equation (2). Year 2011 is excluded, so all estimates are relative to that year. Each point represents the point estimate and the bars extending from each point show the 95% confidence interval that is calculated from standard errors that are clustered at the school district level.

Figure A-4: Main Estimates, using Different Comparison Groups





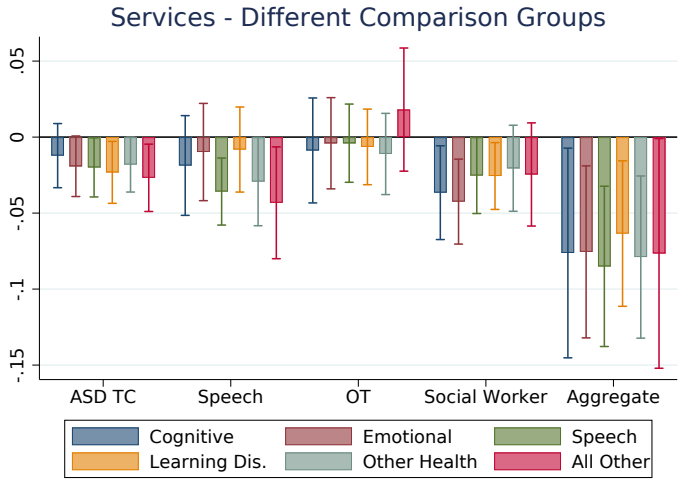


Table A-1: Diagnosis Timing for ASD Students

		By Gender		By Race		By Poverty	
Diagnosis Grade:	All	Boys	Girls	White	Non-White	Pov	Non-Pov
KG	0.505	0.502	0.521	0.485	0.561	0.489	0.521
1	0.136	0.136	0.138	0.143	0.116	0.137	0.135
2	0.111	0.112	0.106	0.105	0.126	0.109	0.113
3	0.081	0.080	0.091	0.082	0.079	0.086	0.077
4	0.070	0.073	0.051	0.073	0.061	0.083	0.057
5	0.060	0.061	0.059	0.072	0.029	0.054	0.066
6	0.037	0.037	0.035	0.040	0.029	0.043	0.031
Before Grade 2	0.641	0.638	0.658	0.628	0.677	0.626	0.656
Observations	11,441	9,667	1,774	8,468	2,973	5,867	5,574

Authors' tabulations from data on students who were enrolled in kindergarten in 2009-2010, remained in the data through 2015-2016, and had an ASD diagnosis in at least one year. Diagnosis grade is defined as the first grade in which a student presents with an ASD diagnosis.

Table A-2: The Effect of the ASD Insurance Mandate on Sample Attrition

Control Group:	All Non-ASD (1)	Non-Sped (2)	Non-ASD Sped (3)
Non-disadv*Post-2012*ASD	0.002	0.003	0.002
	(0.003)	(0.003)	(0.003)
Non-disadv	0.001	0.000	0.002***
	(0.001)	(0.001)	(0.001)
ASD	0.002	0.001	0.004*
	(0.002)	(0.002)	(0.002)
Non-disadv*Post	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)
Non-disadv*ASD	0.000	0.001	-0.002
	(0.002)	(0.002)	(0.002)
Post*ASD	-0.004*	-0.005**	-0.003
	(0.002)	(0.002)	(0.002)
Observations	3,854,087	3,347,668	544,935

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch in all observed years of schooling and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-3: Difference-in-Differences Estimates of the Effect of the ASD Insurance Mandate on Special Education Services

Panel A: Difference-in-Differences Estimates for ASD Students

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012	0.023*	-0.042***	0.018**	0.003	-0.023*	-0.003	-0.008	-0.024**	-0.005	-0.027**	-0.064**
	(0.013)	(0.016)	(0.008)	(0.004)	(0.012)	(0.007)	(0.008)	(0.010)	(0.014)	(0.013)	(0.029)
Observations	38,621	38,621	38,621	33,590	33,590	25,807	38,621	38,621	38,621	38,621	38,621

Panel B: Difference-in-Difference Estimates for Non-ASD Students

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012	0.001*	0.006	-0.012***	0.000	-0.031***	0.013***	-0.001	-0.020***	0.001	0.005	-0.015*
	(0.000)	(0.005)	(0.005)	(0.001)	(0.005)	(0.002)	(0.001)	(0.004)	(0.003)	(0.006)	(0.009)
Observations	506,432	506,432	506,432	422,161	422,161	306,565	506,432	506,432	506,432	506,432	506,432

Authors estimates of equation (1) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample in Panel A includes only ASD students, while the sample in Panel B includes only non-ASD special education students. The "Aggregate Services" outcome is the sum of the four special education services outcomes: ASD Teacher Consultant, Language Services, Occupational Therapy, and Social Worker. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-4: The Effect of the ASD Insurance Mandate – First Observation Assignment of ASD & Poverty Variables

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012*ASD	0.0190	-0.0507*	0.0295***	0.00596	-0.00213	-0.00643	-0.0128	0.00548	-0.00498	-0.0367**	-0.0490*
	(0.0355)	(0.0293)	(0.0108)	(0.00428)	(0.0149)	(0.00718)	(0.0104)	(0.0138)	(0.0121)	(0.0148)	(0.0283)
Observations	681,378	681,378	681,378	553,266	553,266	400,656	681,378	681,378	681,378	681,378	681,378

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. Students' ASD and poverty variables are assigned based on the first year they are observed in the data. The "Aggregate Services" outcome is the sum of the four special education services outcomes: ASD Teacher Consultant, Language Services, Occupational Therapy, and Social Worker. The final row of each panel provides dependent variable means for the ASD sample. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-5: The Effect of the ASD Insurance Mandate on Other Special Education Services

	Dependent Variable:						
Independent Variable	Other Sped Program (1)	Gen Ed 40-79% (2)	Gen Ed <40% (3)	Any General Ed (4)	Non-ASD Teacher Consultant (5)	Physical Therapy (6)	Trans-portation Services (7)
Non-disadv*Post-2012*ASD	-0.001	-0.005	-0.001	-0.006	0.003	-0.002	-0.001
	(0.005)	(0.010)	(0.014)	(0.004)	(0.007)	(0.005)	(0.006)
Observations	545,053	455,751	455,751	455,571	545,053	545,053	545,053
ASD Mean	0.031	0.149	0.207	0.811	0.091	0.031	0.041

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include the full set of controls listed in equation (2), including controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. The final row of the table provides dependent variable means for the ASD sample. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-6: The Effect of the ASD Insurance Mandate on Taking Regular Exams

	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	-0.025	0.001	-0.047*	-0.030	-0.003	-0.050*
	(0.024)	(0.024)	(0.025)	(0.024)	(0.024)	(0.026)
Non-disadv	0.028***	0.001*	0.058***	0.031***	0.000	0.065***
	(0.001)	(0.000)	(0.006)	(0.001)	(0.000)	(0.006)
ASD	-0.351***	-0.406***	-0.203***	-0.351***	-0.413***	-0.183***
	(0.026)	(0.028)	(0.028)	(0.026)	(0.028)	(0.029)
Non-disadv*Post	0.017***	-0.000	0.046***	0.018***	-0.001***	0.045***
	(0.001)	(0.000)	(0.007)	(0.001)	(0.000)	(0.007)
Non-disadv*ASD	0.057**	0.089***	0.017	0.048*	0.083***	0.005
	(0.025)	(0.026)	(0.027)	(0.025)	(0.025)	(0.027)
Post*ASD	-0.060**	-0.098***	0.039	-0.049**	-0.089***	0.057**
	(0.025)	(0.024)	(0.025)	(0.025)	(0.025)	(0.026)
Observations	2,712,322	2,352,871	385,960	2,712,322	2,352,871	385,960
ASD Mean	0.554	0.554	0.554	0.547	0.547	0.547

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2013-2014 school years. 2014-2015 is excluded as Michigan changed from the Michigan Assessment of Educational Progress to the M-Step exam and restructured alternative examination options. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch in all observed years of schooling and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-7: The Effect of the ASD Insurance Mandate on Intermediary Outcomes

	Attendance			Grade Retention		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	-0.003	-0.003	-0.002	-0.000	-0.000	0.002
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Non-disadv	0.020***	0.019***	0.023***	-0.012***	-0.012***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ASD	0.001	-0.003	0.009***	0.001	0.001	-0.004
	(0.002)	(0.003)	(0.002)	(0.004)	(0.004)	(0.004)
Non-disadv*Post	0.005***	0.005***	0.003**	0.007***	0.007***	0.005**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Non-disadv*ASD	-0.002	0.001	-0.005**	0.006	0.006	0.006
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)
Post*ASD	-0.003	-0.003	-0.001	-0.003	-0.002	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	3,744,047	3,254,237	527,317	3,273,931	2,844,920	462,729
ASD Mean	0.937	0.937	0.937	0.019	0.019	0.019

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch in all observed years of schooling and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-8: Difference-in-Differences Estimates of the Effect of the ASD Insurance Mandate on Test Scores

Panel A: DID Estimate for ASD Students		
	Math	Reading
	(1)	(2)
Non-disadv*Post-2012	0.008	0.002
	(0.033)	(0.036)
Observations	9,919	9,849
Panel B: DID Estimate for Non-Disabled Students		
	Math	Reading
	(1)	(2)
Non-disadv*Post-2012	0.011**	0.001
	(0.005)	(0.003)
Observations	1,569,127	1,569,088
Panel C: DID Estimate for Disabled, Non-ASD Students		
	Math	Reading
	(1)	(2)
Non-disadv*Post-2012	0.011**	0.001
	(0.005)	(0.003)
Observations	175,925	170,353

Authors estimates of equation (1) as described in the text using data on students in grades 4-8 from the 2010-2011 to the 2014-2015 school years. 2009-2010 is excluded to allow for a lagged test score measure. 2014-2015 is excluded as Michigan changed from the Michigan Assessment of Educational Progress to the M-Step exam and restructured alternative examination options. The sample in Panel A includes only ASD students, while the sample in Panel B includes only non-disabled students, and the sample in Panel C includes only non-ASD special education students. All three sample include only students who are always or never eligible for free/reduced price lunch. All regressions include controls for whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-9: Heterogeneous Effects of the ASD Insurance Mandate on Test Scores, using Non-Special Education Control Group

Panel A: Math, by Gender and Race				
Independent Variable	Girls (1)	Boys (2)	White/Asian (3)	Black/Hisp. (4)
Non-disadv* Post-2012	0.079	-0.005	0.006	-0.008
	(0.070)	(0.028)	(0.028)	(0.091)
Observations	803,320	775,726	1,365,614	213,432
Panel B: Reading, by Gender and Race				
Independent Variable	Girls (1)	Boys (2)	White/Asian (3)	Black/Hisp. (4)
Non-disadv* Post-2012	0.061	0.008	0.035	-0.115
	(0.087)	(0.030)	(0.031)	(0.108)
Observations	803,315	775,622	1,365,950	212,987

Panel C: Math, by Grade					
Independent Variable	Grade 4 (1)	Grade 5 (2)	Grade 6 (3)	Grade 7 (4)	Grade 8 (5)
Non-disadv*Post-2012	0.136*	-0.079	-0.013	0.006	0.019
	(0.073)	(0.066)	(0.058)	(0.059)	(0.061)
Observations	298,060	300,174	309,489	326,170	343,020
Panel D: Reading, by Grade					
Independent Variable	Grade 4 (1)	Grade 5 (2)	Grade 6 (3)	Grade 7 (4)	Grade 8 (5)
Non-disadv*Post-2012	0.024	0.072	-0.069	0.039	0.069
	(0.067)	(0.063)	(0.066)	(0.064)	(0.068)
Observations	298,012	299,973	309,512	326,192	343,089

Authors estimates of equation (2) as described in the text using data on students in grades 4-8 from the 2010-2011 to the 2014-2015 school years. 2009-2010 is excluded to allow for a lagged test score measure. 2014-2015 is excluded as Michigan changed from the Michigan Assessment of Educational Progress to the M-Step exam and restructured alternative examination options. The sample includes only students who are always or never eligible for free/reduced price lunch. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include the full set of controls listed in equation (2), including controls for whether a student is white, male, limited English proficient, as well as school and grade-by-year fixed effects. Estimates also include controls for lagged test score. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-10: The Effect of the ASD Insurance Mandate on Test Scores – Robustness Checks

Panel A: Including Linear Time Trend Interacted with Non-Disadvantaged Status						
	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	0.001	0.005	-0.010	0.021	0.018	0.004
	(0.026)	(0.026)	(0.027)	(0.029)	(0.029)	(0.030)
Observations	1,754,971	1,579,046	185,814	1,749,290	1,578,937	180,172
Panel B: School District FEs						
	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	0.010	0.014	-0.001	0.029	0.027	0.014
	(0.026)	(0.026)	(0.027)	(0.029)	(0.029)	(0.029)
Observations	1,754,971	1,579,046	185,814	1,749,290	1,578,937	180,172
Panel C: Pre-Treatment Assignment of ASD Variable						
	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	0.000	0.002	-0.017	0.031	0.028	0.007
	(0.027)	(0.027)	(0.028)	(0.029)	(0.029)	(0.032)
Observations	1,542,200	1,387,847	162,767	1,537,785	1,388,220	157,909
Panel D: Including 2014-15						
	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	-0.019	-0.005	-0.045*	0.028	0.034	0.008
	(0.024)	(0.024)	(0.025)	(0.026)	(0.026)	(0.028)
Observations	2,184,874	1,961,605	236,273	2,179,192	1,961,404	230,726

Authors estimates of equation (2) as described in the text using data on students in grades 4-8 from the 2010-2011 to the 2014-2015 school years, except where otherwise specified. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include the full set of controls listed in equation (2), including whether a student is white, male, and limited English proficient as well as grade-by-year fixed effects. Estimates in Panels A, C, and D include school fixed effects, while those in Panel B include school district fixed effects. The estimates in Panel A also include a linear time trend interacted with non-disadv status. Estimates also include controls for lagged test score. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-11: The Effect of the ASD Insurance Mandate on Test Scores – First Observation Assignment of ASD & Poverty Variables

	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	0.016	0.014	0.014	0.037	0.031	0.028
	(0.023)	(0.023)	(0.026)	(0.028)	(0.027)	(0.030)
Observations	2,151,197	1,931,179	229,852	2,145,000	1,931,862	222,885

Authors estimates of equation (2) as described in the text using data on students in grades grades 4-8 from the 2010-2011 to the 2014-2015 school years. 2009-2010 is excluded to allow for a lagged test score measure. 2014-2015 is excluded as Michigan changed from the Michigan Assessment of Educational Progress to the M-Step exam and restructured alternative examination options. Students' ASD and poverty status are assigned based on the first year they are observed in the data. All regressions include the full set of controls listed in equation (2), including whether a student is white, male, and limited English proficient as well as grade-by-year fixed effects. Estimates also include controls for lagged test score. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-12: The Effect of the ASD Insurance Mandate – No Sample Exclusion Based on Disadvantaged Status

Panel A: Including All Students Who are Ever Observed Disadvantaged

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Aggregate Services (11)
Non-disadv*Post-2012*ASD	0.021	-0.041*	0.020**	0.002	-0.006	-0.010	-0.017*	0.005	0.003	-0.011	-0.020
	(0.030)	(0.025)	(0.010)	(0.003)	(0.014)	(0.007)	(0.009)	(0.011)	(0.012)	(0.011)	(0.024)
Observations	705,616	705,616	705,616	577,221	577,221	421,418	705,616	705,616	705,616	705,616	705,616
ASD Mean	0.200	0.672	0.125	0.056	0.444	0.359	0.129	0.784	0.395	0.688	1.996

Panel B: Including All Students Who are Ever Observed Disadvantaged and Linear Time Trend Interacted with Non-Disadvantaged Status

	Dependent Variable:										
Independent Variable	ASD Program (1)	Resource or Cognitive Program (2)	No Sped Program (3)	Special Ed School (4)	General Ed >80% (5)	Sped FTE Rate (6)	ASD Teacher Consultant (7)	Language Services (8)	Occupational Therapy Services (9)	Social Worker (10)	Any Sped Services (11)
Non-disadv*Post-2012*ASD	0.021	-0.041*	0.020**	0.002	-0.006	-0.010	-0.017*	0.005	0.003	-0.011	-0.020
	(0.030)	(0.025)	(0.010)	(0.003)	(0.014)	(0.007)	(0.009)	(0.011)	(0.012)	(0.011)	(0.024)
Observations	705,616	705,616	705,616	577,221	577,221	421,418	705,616	705,616	705,616	705,616	705,616
ASD Mean	0.200	0.672	0.125	0.056	0.444	0.359	0.129	0.784	0.395	0.688	1.996

Authors estimates of equation (2) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. The sample includes all students. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include the full set of controls listed in equation (2), including whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. The estimates in Panel B also include a linear time trend interacted with non-disadv status. The "Aggregate Services" outcome is the sum of the four special education services outcomes: ASD Teacher Consultant, Language Services, Occupational Therapy, and Social Worker. The final row in each panel provides dependent variable means for the ASD sample. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-13: The Effect of the ASD Insurance Mandate on Disability Incidence - No Sample Exclusion Based on Disadvantaged Status

Panel A: Excluding Linear Time Trend Interacted with Non-Disadvantaged Status

	Dependent Variable:						
Independent Variable	ASD (1)	Non-ASD Disability (2)	Cognitive Disability (3)	Emotional Disability (4)	Speech Disability (5)	Learning Disability (6)	Other Health Disability (7)
Non-disadv*	-0.00032	0.00123	0.00004	0.00113***	-0.00215***	0.00420***	-0.00214***
Post-2012	(0.00024)	(0.00136)	(0.00028)	(0.00027)	(0.00053)	(0.00093)	(0.00040)

Panel B: Including Linear Time Trend Interacted with Non-Disadvantaged Status

	Dependent Variable:						
Independent Variable	ASD (1)	Non-ASD Disability (2)	Cognitive Disability (3)	Emotional Disability (4)	Speech Disability (5)	Learning Disability (6)	Other Health Disability (7)
Non-disadv*	0.00009	-0.00050	-0.00038	0.00040	0.00012	-0.00113*	0.00056
Post-2012	(0.00026)	(0.00110)	(0.00030)	(0.00031)	(0.00061)	(0.00069)	(0.00039)
Incidence Rate	0.010	0.133	0.011	0.009	0.035	0.056	0.016

Authors estimates of equation (1) as described in the text using data on students in grades 2-8 from the 2009-2010 to the 2014-2015 school years. Each column is a separate regression; N=4,970,113. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch. All regressions include the full set of controls listed in equation (1), including whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. Estimates in Panel B include the control for a linear time trend interacted with non-disadvantage status. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.

Table A-14: The Effect of the ASD Insurance Mandate on Test Scores - No Sample Exclusion Based on Disadvantaged Status

Panel A: Including All Students Who are Ever Observed Disadvantaged						
	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	-0.011	-0.009	-0.023	0.014	0.010	-0.001
	(0.023)	(0.023)	(0.024)	(0.026)	(0.026)	(0.026)
Observations	2,158,249	1,940,574	230,304	2,151,497	1,940,733	223,320
Panel B: Including All Students Who are Ever Observed Disadvantaged and Linear Time Trend Interacted with Non-Disadvantage Status						
	Math			Reading		
Control Group:	All Non-ASD	Non-Sped	Non-ASD Sped	All Non-ASD	Non-Sped	Non-ASD Sped
	(1)	(2)	(3)	(4)	(5)	(6)
Non-disadv*Post-2012*ASD	-0.012	-0.009	-0.023	0.014	0.010	-0.001
	(0.023)	(0.023)	(0.024)	(0.026)	(0.026)	(0.026)
Observations	2,158,249	1,940,574	230,304	2,151,497	1,940,733	223,320

Authors estimates of equation (2) as described in the text using data on students in grades 4-8 from the 2010-2011 to the 2013-2014 school years, except where specified. The sample includes all students. Each column is a separate regression. "Non-disadv" is an indicator for whether the student is eligible for free/reduced price lunch and "ASD" is an indicator for whether the student has an ASD diagnosis in that year. All regressions include the full set of controls listed in equation (2), including whether a student is white, male, and limited English proficient as well as school and grade-by-year fixed effects. The estimates in Panel B include the linear time trend interacted with non-disadvantaged status. Estimates also include controls for lagged test score. Standard errors are clustered at the school district level: *,**,*** indicate significance at the 10, 5, and 1 percent level, respectively.