Funding Special Education by Capitation: Evidence from State Finance Reforms

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Running Head: Funding Special Education by Capitation

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Abstract

This study examines responses to state capitation policies for special education finance between 1991-92 and 2003-04. Capitation refers to distributing funds based on the entire student enrollment. We find that disability rates tended to fall following capitation reforms, primarily in subjectively diagnosed categories and in early and late grades. The association appears immediately in less severe categories but gradually in severe categories. More frequent program exiting partly accounts for falling disability rates among high school students. Capitation also is associated with a rising local share and a falling state share of funding. The evidence supports an increased use of outside school placements among severe disabilities, consistent with an incentive-based response. We find weaker evidence of a relationship between capitation and higher request rates for dispute resolution. Finally, we present evidence of differential effects based on both the pre-reform funding system and the presumed strength of the policy change.

<A> **1. Introduction**

Special education services are tailored to students with disabilities based on their individual needs, constituting a significant financial commitment for school districts. One study estimates that districts in the United States spend 90 percent more money on the average special education student than they do on the average regular education student (Chambers, Parrish, and Harr 2004). Between 1991 and 2003, the U.S. special education enrollment rate grew steadily from 11.6 percent to 13.5 percent, suggesting that the nation's financial commitment to special education is growing as well.[1]

Several recent studies examine whether special education fiscal policies that change funding incentives may be one of many factors affecting special education practice. Cullen (2003) attributes 40 percent of the Texas's growth in special education enrollment between 1992 and 1997 to changes in incentives to identify disabilities. Kwak (2008) concludes that changing funding incentives brought about by a 1997 special education finance reform in California affected local disability rates. The fiscal policy that California adopted is to distribute special education funds largely on the basis of total student enrollment instead of factors related to special education service. Mahitivanichcha and Parrish (2005a) reach qualitatively similar conclusions about the average relationship between similar state reforms and disability rates using a state-level panel.[2] We refer to fiscal policies such as the one California adopted as capitation systems because they resemble health plans that reimburse providers based on the

[1] We refer to school years by their start year (i.e. 2003 = 2003-04).

[2] See Greene and Forster (2002) for a similar analysis, and Mahitivanichcha and Parrish (2005b) for a thorough review of the literature.

number of enrolled patients they are assigned rather than the cost of the services they provide.[3] These special education policies are also known as census funding, terminology we use as well.

This study builds on the work of Mahitivanichcha and Parrish (2005a) to answer additional questions about special education finance under capitation. The analysis utilizes evidence from a natural experiment brought about by nine states adopting capitation for special education between 1991 and 2003, reforms that are predicted to change the fiscal incentive to identify disabilities.[4] Most special education finance systems allocate funds based on factors like special education enrollment, resource usage, or a percentage of expenditures. Capitation models try to remove the link between funding and local decision making over disability identification and placement. The link exists because school districts should be more likely to provide special education services as the additional compensation they receive from the state rises in relation to the additional cost. Under a pure capitation system, districts do not receive funds based on the disability conditions they identify or the placement settings they use.

We add to the literature on capitation reforms in special education by considering a more diverse set of outcomes, by examining a longer time period, and by testing for differential effects of reform policies. For instance, we investigate relationships at the category of disability level and by grade.[5] We also examine year-to-year responses and test for possible pre-existing differences in enrollment rate trends using policy lead and lag variables. Other sections of the

[3] Newhouse (1996) provides a summary of this literature.

[4] The nine states are Alabama, Alaska, California, Connecticut, Idaho, Massachusetts, Montana, North Dakota, and Pennsylvania. See Appendix for further details.

[5] The federal disability categories are emotional disturbance, learning disabilities, other health impairments, speech and language impairments, autism, deaf-blindness, developmental delay, hearing impairments, mental retardation, multiple disabilities, orthopedic impairments, and traumatic brain injury.

analysis consider the possibility that capitation reforms relate to distributional shifts in educational placement settings, more frequent program exiting, a higher rate of dispute resolution requests, and patterns of school resource usage. Lastly, we use several strategies to examine whether states may experience heterogeneous responses to capitation based on their pre-reform funding system and the presumed strength of the incentive change they experience.

The results contribute to the general literature on cost containment strategies for public service provision, where fee-for-service type payment can lead to excessive spending. Health care plans like Medicare increasingly use capitation rather than fee-for-service as the reimbursement model for providers. Providers who are part of Health Maintenance Organizations (HMOs) generally receive a fixed payment to treat plan members. The capitation model reduces the inherent moral hazard problem in a fee-for-service system but increases a provider's incentive to avoid costly patients and to provide as little care as possible (Newhouse 1996). Hill and Brown (1990) present evidence that is consistent with healthier individuals choosing to enroll in HMOs in larger numbers. Krueger (1990) and Kubik (1999) also examine the sensitivity of disability caseloads to benefit generosity. Much of the literature in these areas has focused on programs where families are the target of the financial incentives rather than institutions. Special education differs because the financial implications of student placements are for the school and not the family.[6]

Using a state-level panel, we associate state adoption of capitation reforms with an approximately ten percent reduction in their special education enrollment rates between 1991 and

[6] Parents and schools share the authority of determining special education eligibility and designing individualized educational programs for each disabled student. Our state-level data is generated by the outcome of this collective decision-making process.

2003, primarily in "soft" categories like specific learning disabilities and mental retardation. Diagnosing soft disabilities is more subjective and less medically determined than diagnosing impairments like deafness or blindness (Parrish 2002). Mental retardation, however, is oftentimes more severe than most learning disabilities. We find that severe disability rates actually declined more as a percentage of their baseline rate, although more gradually.

The data also support a relationship between capitation and distributional shifts in educational placement setting usage. Most notably, there is a higher rate of outside school placement among students with severe disabilities, potentially because all capitation systems provide exceptions for extraordinarily high-cost student needs. Our findings are consistent with the possibility that school districts began relying more heavily on outside school placements—the most expensive and least used treatment option—in part because states removed any additional reimbursement for making in-house placements.[7]

Disability rates can fall either because more students leave special education or because fewer students are identified. We explore all eight federally recognized reasons for exiting special education programs and find that, among 9th through 12th grade students with disabilities, capitation is associated with a higher dropout rate and marginally significant increases in transfers to regular education, graduation with a diploma and moving to a different school. Higher exit rates among high school students support our additional finding that the disability rate response was largest in the earliest and latest grades. Growth in exit rates, however, accounts for less than half of the reduction in disability rates in these grades. We conclude that the

[7] Similarly, Cullen (2003) finds that the use of different placement settings in Texas relates to the funding weight attached to each.

majority of the reduction represents either more frequent exiting at earlier ages or a latent decline in disability identification.

We also consider the possibility that capitation reforms may lead to more requests for dispute resolution in special education matters. A capitation system could increase disputes between parents and school districts on the margin because the state ceases to reimburse districts for providing additional services, even if parents demand them. The average relationships across states in our time series are positive but statistically imprecise.

The last section of analysis explores possible heterogeneity across states in the relationship between adopting capitation and the disability rate. First, we interact an indicator for a census-based system with each state's disability rate in 1991—the start of our sample period—to proxy for the presumed strength of incentive changes. Second, we test for differential relationships based on the type of pre-reform system in place. Third, we expand our definition of census systems to include states that use capitation in part, and then test for different responses. The findings support differential relationships across states in each case.

Fiscal policies are just one of numerous factors potentially affecting special education practice. In light of this, we do not interpret our results causally although the estimates are robust to various specifications and controls. We also do not attribute any relationships to substitution effects brought about by funding incentive changes alone because we also find associations between capitation and factors like the state-local funding mix. Specifically, education revenue after switching to capitation appears to come more from local sources and less from the state, raising the possibility of income effects due to changes in state aid generosity. Excluding one state, Alaska, attenuates these patterns but does not substantively change any other findings.

Overall, the goal of this research is to describe how, all else equal, fiscal policy might affect practice.

<A> **2. The Disability Identification and Placement Process**

The Individuals with Disabilities Education Act (IDEA), originally passed in 1975, requires that children with disabilities have access to a free appropriate public education for their specific needs. The federal law describes the framework that districts need to follow for identifying disabilities and developing special education programs. Disability identification and placement under IDEA is a collaborative process. The identification process begins with a referral by either a child's parent or a qualified school employee, such as a teacher. A school's psychologist, a physician, or an educational diagnostician then conducts an evaluation to assess whether the child has a disability. School officials along with the child's parents determine eligibility for special education based on the outcome of the evaluation.

If a child is identified as disabled, a team is formed to draft an Individualized Education Program (IEP). An IEP is a legal document that outlines the services that districts must provide, the anticipated frequency and duration of the services, how the child is assessed, and how progress toward annual goals is measured. The IEP team consists of the parents, regular education teacher, a special education teacher, a qualified district official, an individual trained in assessment evaluation, and in some cases the child.

Special education enrollment rates vary by state, ranging from 10.5 percent in California to 19.9 percent in Rhode Island during 2003. Factors like state laws concerning various aspects related to special education practice are likely to explain a sizable part of this variation. Even within states, disability rates are likely to vary because the outcome of the federal identification

and placement process is subjective; school officials and parents make all the decisions. Local decision-making is one way that enrollment rates can vary over time within states even if the incidence of disabilities does not.

<A> **3. Special Education Funding Systems**

Special education funding systems are complex and differ by state. They all require that districts provide services to meet special education needs. The differences lie in how funding formulas distribute revenue for special education to districts. Parrish et al. (2003) classify state special education finance systems into six broad categories: pupil weights, flat grant, resource-based, percentage reimbursement, variable block grant, and census. These systems typically make district apportionments a function of factors like special education enrollment, the services provided, or the number and type of staff members employed. Pupil weights attach a funding weight to each disability category. Flat grants provide a fixed amount per special education student. A resource-based formula weights the educational inputs that districts use, such as types of special education teachers. The percentage reimbursement formula subsidizes a portion of special education expenditures. Finally, variable block grants base apportionments on prior year allocations, expenditures, and special education enrollment.

The census model is different because the vast majority of funding is based solely on total district enrollment or average daily membership. Equally sized districts receive practically the same grant regardless of whether they have one child with an identified disability or one thousand. Census funding does not eliminate fiscal incentives so much as it redirects them in the opposite direction. Like capitation policies in health applications, census-based models

incentivize reducing caseloads and services provided as a cost-containment strategy.[8] They force districts spending more on special education than they receive from the state to pay for the full difference by raising additional taxes or by reducing expenditures in other areas of the budget. Districts have less of an incentive to control placements with other models because the cost of additional placements is split between the district and the state.

The typology of funding systems is a broad classification because states have their own institutional structures. For instance, funding levels had been restricted for several years under California's resource-based system prior to switching to a census-based model in 1998 (Parrish, et al. 1998). Its current system distributes funding based on total student enrollment, but different funding rates apply across the state. While our analysis accounts for some heterogeneity in state structures, fundamentally it describes mean state-level responses to capitation policies.

<A> **4. Data Sources**

The U.S. Department of Education annually collects state-level information on identified disability counts, the educational environments serving children with disabilities, and program exits.[9] This study uses data on all 50 states from 1991 to 2003.[10] The total sample size is 650 state-year observations. We combine these data with state-level fiscal, demographic, and policy

[8] Capitation could raise identification if overall benefit generosity rises too. In practice, expenditures on children with disabilities exceed most districts' special education funds, making additional special education funds fungible in theory. Any reason to increase identification because of capitation makes our disability rate findings conservative.

[9] These data are available online at https://www.ideadata.org/StateLevelFiles.asp.

[10] The exit data are first available in 1993. We do not include the 2003 data in the analysis because of substantial missing observations.

variables from the Common Core of Data, the *Digest of Education Statistics*, and other government documents.

The Department of Education's disability count data tabulate the number of students in each disability category by age. Over 70 percent of all children with disabilities have either a specific learning disability or a speech or language impairment, which are generally classified as "non-severe." Learning disabilities alone represent over half of special education enrollment. Since non-severe and severe disability rates may respond differently to capitation policies, we consider them separately as well as together. Following California's designation that is outlined in Parrish et al. (2000), we define non-severe disabilities to include specific learning disabilities, speech or language impairments, emotional disturbances, and other health impairments. Other health impairments include children diagnosed with Attention Deficit Disorder and Attention Deficit Hyperactivity Disorder. All remaining categories form our severe disability definition.

Assigning severity at the category of disability level is a rough approximation of the severity of individual student needs. However, we believe our distinction between non-severe and severe disabilities is reasonable because it closely approximates the difference between lower and higher cost disabilities. Chambers, Shkolnik, and Pérez (2003) estimate per pupil spending in each disability category for 1999-00. The four lowest cost disabilities in Exhibit 1 of their report are the four categories included in the non-severe grouping.

Figure 1A combines the child count data with total student enrollment from the *Digest of Education Statistics* and plots the special education enrollment rate trend between 1976 and 2003. The figure corroborates the widely documented growth in special education enrollment. Figure 1B focuses on the sample period used in this research and reveals that disability rates increased in both non-severe and severe categories.

The educational environment data disaggregate the child count data by the type of instructional setting. There are eight educational environment categories that can be separated into two main groups: in-school placements and outside placements. About 96 percent of all special education students are educated in regular schools. Students in this group differ in how much of the school day they spend receiving special education instruction outside the regular classroom. Children with speech impairments, for example, typically spend most of the day in a regular classroom and receive targeted special education services on a periodic basis. In contrast, children with severe disabilities may receive most of their education in special day classes.

The educational environment categories for in-school placements count the number of children by disability spending less than 21 percent, 21 percent to 60 percent, and more than 60 percent of their school days outside the regular classroom. The remaining education environments are outside placements, which we aggregate, given the small number of children in these settings.[11] This leaves us with four educational environment categories in the analysis.

Figure 2A to Figure 2D depict the trends for each educational environment. Each line represents the percentage of children in a disability category placed in a given educational environment. These figures suggest that children with disabilities are spending more time in the regular classroom, even in severe categories. For example, Figure 2A shows that share of special education enrollment spending less than 21 percent of the school day out of the regular class increased 15 percentage points from 35 percent to 50 percent between 1991 and 2003. This increase was matched by reductions in each of the more intensive environment categories.

[11] Outside school educational environments are: homebound/hospital, private residential facilities, private separate schools, public residential facilities, and public separate schools.

Collectively, Figures 1 and 2 indicate that disability rates grew while disabled children, on average, spent less time outside the regular classroom. Although Figure 2 suggests greater school efforts to involve disabled students in the regular classroom, it does not provide conclusive support. In particular, it may describe increased disability identification at the non-severe end of the spectrum as much as it suggests greater school efforts to involve disabled children in the regular classroom.

The program exit data count the number of 14-22 year old students with disabilities in each state and year that leave special education programs. The data separate exits by the following categories: transfers to regular education, drop outs, graduates with a diploma, graduates with a certificate of completion, students who move and are known to be continuing, students who move and are not known to be continuing, students reaching the maximum age, and death.[12] Since exit data are collected from age 14, we calculate exit rates by dividing the number of students in each category by total special education enrollment among 9^{th} through 12^{th} graders.

Finally, dispute resolution data come from Ahearn (2002). Parents and school districts have a right to due process in the event that disagreements arise. In practice, the parties settle most disagreements prior to formal adjudication. Our dispute resolution analysis uses data on requests for due process hearings, rather than data on the smaller number of hearings that occur.

<A> 5. Empirical Framework

Our base specification is the following empirical model:

[12] According to the data definitions, dropouts refer to traditional dropouts, runaways, General Equivalency Degree (GED) recipients, expulsions, status unknown, and other students not specified in other categories. GED recipients may be counted as graduates with a certificate of completion if they can enroll in a GED program and secondary school simultaneously.

$$Y_{st} = \beta_0 + \beta_1 C_{st} + X_{st}\gamma + T_t\delta + S_s\phi + \varepsilon_{st} \qquad .$$

The subscript *s* denotes states and the subscript *t* denotes years from 1991 to 2003. The dependent variable Y_{st} varies by regression equation. For the initial part of the analysis, Y_{st} represents the fraction of total state enrollment with an identified disability.[13] We then separate the enrollment rate into non-severe and severe categories, and then by individual disability categories. Next, Y_{st} describes the educational environment. In these specifications, it is the fraction of special education enrollment placed in each environment calculated separately for non-severe and severe disabilities. In the third part of the analysis, Y_{st} represents program exit rates. Finally, Y_{st} represents is the number of requests for dispute resolution per 1,000 special education students.

The variable C_{st} is an indicator for whether state *s* used capitation (i.e. census-based funding) in year *t*. Parrish et al. (2003) surveyed states about their special education funding systems up to 1999. *Education Week* (2004) updated the Parrish et al. survey data to 2003. The Appendix lists the nine states that adopted census funding and the school year these reforms became effective. Our census indicator is zero in pre-reform years regardless of the type of system that was in place and one in post-reform years.

The vector X_{st} includes time-varying controls. The first variable is an indicator for a change in all other state special education finance reforms (i.e. not to capitation). We include this variable because several states changed from one system to another during the sample period.[14] The other elements of X_{st} are the state unemployment rate, the percent enrolled in free lunch, the

[13] Most of the analysis uses special education enrollment among children who are 6-21 years old. Restricting special education enrollment to 6-17 year olds leads to similar findings.

[14] The indicator takes the value one once a switch in funding regime occurs and then in all later years.

percent black, Hispanic, or other race, the average monthly Supplemental Security Income disability payment, an indicator for the date of the introduction of an accountability system, and an indicator for whether plaintiffs have won a school finance case at the state Supreme Court level.[15] The vector *S* is a set of state fixed effects that isolates all time invariant factors. The time trend, *T*, is a series of year indicators that accounts for average annual changes in the dependent variables. We also include specifications that use a more flexible form for *T* in several places along with our main findings. This latter parameterization of *T* takes the form of a formula-based time trend—year indicators that account for separate trends among states with the same type of special education funding system at the beginning of our sample period (i.e. pupil weights, flat grant, resource-based, percentage reimbursement, and variable block grant). The formula-based trend, along with the indicator for other special education finance reform efforts, partly accounts for heterogeneity in pre-reform institutional structures across states in estimating responses to capitation policies.[16]

The coefficient of interest is β_1, the net response to switching financing regimes that may include a change in the level of funding per student. The policy response is likely to differ across

[15] Most of these variables come from the Common Core of Data or the *Digest of Education Statistics*. The SSI data was collected from the Social Security Bulletin - Annual Statistical Supplement for each year. Data regarding accountability systems are from Hanushek and Raymond (2005) and supplemented by government documents. Data on school finance cases comes from the National Center for Education Statistics. Murray, Evans, and Schwab (1998) show that school finance reform affected the distribution of educational resources. Finally, state-level unemployment data was collected from the BLS. Data on Limited English Proficiency (LEP) is available from 1998-2003. Including the available LEP data along with an indicator for missing information does not qualitatively change any results and the LEP variable is statistically insignificant. These results are available from the authors upon request.

[16] Results in all specifications are similar with regional time trends.

states both because of variation in pre-reform structures and because of post-reform details in adopted capitation policies. Our estimates of β_1 are average relationships and we report clustered standard errors at the state level.

Whenever identification comes from a policy change there is an endogeneity concern related to a state's motivation for implementing the policy. In this case, states may adopt capitation policies in part to mitigate funding incentives that promote disability identification.[17] From the standpoint of measuring the average state response to the policy, this is not problematic so long as omitted time-varying factors are uncorrelated with both the fiscal policy change and the dependent variables. Our vector of control variables helps account for this possibility.

Another possible issue is whether states introduce capitation policies following a period of rapid special education enrollment rate growth. The concern is that the relationships we attribute to fiscal policy changes reflect the degree of pre-reform growth, growth that plateaus and falls on its own. Our examination of state level trends indicates that census-based states did not have special education growth rates exceeding the national average in the years preceding reform.[18] We also include specifications that add three lead and lag terms of C_{st} to directly test for deviations in trend.

Lastly, changing budget sizes, enrollment trends, resource costs, and resource usage may be important predictors of changing disability rates that relate to capitation policies. These factors are endogenous and are not part of X_{st}, meaning that our estimates are net of their

[17] For instance, California's reform bill, AB 602 (1997), describes reducing inappropriate placement incentives as one of its main goals although it already had one of the lowest disability rates among states.

[18] State level special education enrollment trends are available from the authors upon request.

influence. Instead, we use them as outcome variables in the analysis to directly test for associations with capitation reforms.[19]

<A> **6. Results**

<B> *A. Special Education Enrollment and School Resource Levels*

Table 1 presents the first set of empirical results. The dependent variable is the number of 6 to 21 year old children identified with disabilities divided by total student enrollment.[20] Column 1 includes only state and year fixed effects as controls and is not population weighted. Arguably, the unweighted approach is the most policy relevant because it reports average responses to capitation policies across census states, treating states equally regardless of size.[21] The coefficient estimate suggests a relationship between adopting census funding and a 1.25 percentage point reduction in the special education enrollment rate.

Column 2 is our preferred specification, which includes a vector of time-varying controls along with the state and year fixed effects but leads to a similar coefficient on census funding. Based off a mean of 12.86, the coefficient implies a 9.6 percent reduction—similar to Mahitivanichcha and Parrish (2005a).[22] In contrast, switching among non-capitation funding

[19] The specific variables are education revenue per pupil (by source and in total), the log of average teacher salaries, the pupil teacher ratio, and the log of state enrollment. These controls come from the *Common Core of Data* and the *Digest of Education Statistics.*

[20] Total enrollment includes all students in grade 1 through grade 12 in addition to students in ungraded classes.

[21] Findings are qualitatively similar in total enrollment-weighted specifications, but the coefficient on census funding is somewhat smaller in magnitude.

[22] Their Table 2 includes a main effect of census funding and an interaction with a linear time trend. For 1995 – the midpoint of their sample – we interpret a 10.2 percent reduction based off a mean rate of 11.5.

systems has little relationship to changes in disability rates. The third column uses the formula-based time trend to account for funding structures across states. The coefficient of interest is somewhat larger but the inference is similar. The negative association on the percent Hispanic in column 2 is the only statistically significant control variable in either specification.

Table 2 examines relationships between census-based systems and changes to funding per student, school enrollment, teacher salaries, and the pupil teacher ratio. Most of the findings are statistically insignificant. The exception is that capitation is associated with changes to the state-local funding mix. Specifically, we see a positive relationship with local revenue and some evidence of a negative relationship with state revenue. The change to the overall amount of education funding from all sources is statistically insignificant. As with any switch in funding regime, adopting capitation could increase the local share if reform policies were coupled with reductions in the percentage of state aid generosity because schools still must meet special education mandates.

The patterns in Table 2 provide evidence that our findings are not responses to program funding incentive changes alone. Reductions to the state aid share would introduce an income effect along with the substitution effect that is brought about by changes to the incentive structure. Alaska's finance reform bill, SB 36 (1998), did lead to lower special education funding in some school districts after an initial period of holding them harmless at the levels of the old funding regime.[23] We find that omitting Alaska attenuates the findings about changes in revenue. We then examined the sensitivity of our results by re-estimating our empirical models with Alaska excluded. The findings are similar, increasing our confidence that the associations we report describe substitution effects at least in part.

[23] See Alaska Department of Education and Early Development (2001).

Table 3 separately examines the percentage of total enrollment identified with non-severe and severe disabilities. Cullen (2003) found that the response to incentive changes was strongest for non-severe disabilities in Texas. Our results suggest a negative relationship between capitation and the enrollment rate in both categories. Similar to Table 1, we use three different specifications for each level of severity and find that adding control variables does not measurably change the parameter estimates on census funding. The linearity of the specifications means that the point estimates in each respective set of non-severe and severe results add to the point estimates for all disabilities in Table 1. Thus, the evidence from our preferred specifications (columns 2 and 5) suggests that 73 percent of the total percentage point decline comes from non-severe disability categories. The percent reduction implied by the point estimates, however, is actually larger for severe disabilities (15 percent versus 8.5 percent) when compared to each respective baseline rate.

The third and sixth columns use the formula-based time trend. The point estimate on census funding for non-severe disabilities grows slightly and the point estimate in the severe disabilities category loses some of its precision, but the general findings are the same. One difference is that the introduction of an accountability system becomes marginally significant in the positive direction for non-severe disabilities. Several recent state and local level studies find that accountability systems are associated with increased special education placement (Cullen and Reback 2006; Figlio and Getzler 2002; Jacob 2005). Hanushek and Raymond (2005) find an insignificant relationship between disability rates and the introduction of state accountability systems between 1995 and 2000.

We explore associations between capitation reforms and disability rates further in Table 4 by considering how quickly rates of non-severe and severe disabilities responded. The

specifications are similar to columns 2 and 5 in Table 3 except that they represent census reforms through three lag and lead variables along with a variable to indicate the reform year.[24] The table also reports corresponding F-statistics that test for year-to-year differences.

The findings suggest that the rate of severe disabilities responded more gradually than the rate of non-severe disabilities. The F-statistic is statistically significant in the reform year for non-severe disabilities, indicating a quick response. In contrast, F-statistics are insignificant for severe disabilities at the five percent level until two and three years following the reform year. The more gradual policy response for severe disabilities suggests that school districts have relatively less flexibility over classifying students in these categories and in changing the status of already classified students.

Both specifications report insignificant coefficient estimates and F-statistics in pre-reform years. The lack of significant relationships helps to mitigate the concern that what we are calling a policy-based response is actually a pre-existing difference in trend between census and non-census states. As with most reform initiatives, state legislatures debated capitation reforms prior to passing them. For instance, California's finance reform passed in 1997 even though it did not become effective until 1998. It is likely that educators in other census states anticipated their impending finance reform as well. The findings for non-severe disabilities do show some imprecise evidence of reductions immediately prior to reform, but the predominant response is in the reform year itself.

Table 5 completely disaggregates disabilities into the thirteen federally recognized categories and presents specifications side-by-side with and without the formula-based time

[24] We define the third lead variable as "3 or more years after reform." The reference group includes state-year observations that are four or more years prior to reform.

trend. Examining associations at the disability category level provides a finer level of detail with which to study responses to capitation reforms. Panel A shows the point estimates on census funding for non-severe disability categories and Panel B displays the point estimates for the severe disabilities. The point estimates in each column of Panel A sum to the estimates in columns 2 and 3 of Table 3. The data support statistically significant relationships for specific learning disabilities (i.e. dyslexia, developmental aphasia, etc.) and other health impairments, with estimates that suggest reductions of at least 7 percent and 36 percent, respectively.

Panel B displays the results for severe disability categories. Although many of the estimates are close to zero in magnitude and statistically imprecise, we find that capitation is associated with reductions in mental retardation, visual impairments, and—with slightly less precision—hearing impairments. We are unaware of any previously documented evidence to corroborate the findings about vision and hearing, although the percentage decreases from their baseline rates were at least as large as for learning disabilities.

Nevertheless, mental retardation accounts for over 80 percent of the overall relationship in Table 3 between adopting capitation and falling severe disability rates. Drops in severe disability rates suggest that some definitions may be subjectively applied. Parrish (2002) refers to mental retardation as a "soft" disability for this reason. IDEA defines mental retardation as "…significantly subaverage general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifested during the developmental period, that adversely affects a child's educational performance."[25] The definition provides no context for what constitutes subaverage intellectual functioning or a deficit in adaptive behavior, let alone which adaptive behaviors must apply. The American Association of Mental Retardation (AAMR) quantifies

[25] 20 U.S.C. 1401(3); 1401(30)

subaverage intellectual functioning as an IQ score of 70-75 or below.[26] The IQ threshold that school districts choose in practice helps distinguish between cases of mild mental retardation and cases of severe learning disability.

At least one study documents the role of definitional changes in affecting disability rates. Shattuck (2006) concludes that autism growth in the U.S. partly reflects diagnostic substitution in specific learning disabilities and mental retardation. Related evidence suggests that states with special education funding formulas based on categories of disabilities—unlike census models—are more likely to over-identify minorities in mental retardation (Parrish 2002). To the extent that capitation relates to changes in diagnostic practices such as using non-severe categories more frequently than categories like mental retardation, our estimates under-represent changes that are occurring in non-severe categories.[27]

<B> *B. Educational Environments*

The next set of results, found in Table 6, describe patterns of educational placement settings for students with non-severe and severe disabilities. The dependent variable in each column is the percentage of non-severe or severe disability placements in each of the four educational environment categories we consider. The point estimates characterize the distributional changes across placement settings once states adopt capitation.

In theory, the direction of the association is ambiguous. On one hand, capitation is a cost-containment strategy that could lead to less time outside the regular classroom because special

[26] See www.aamr.org.

[27] Part of the debate about the rise of autism includes concerns about subjective identification. Table 5 suggests it may not be as subjective as other categories.

education services are expensive.[28] This would be consistent with the overall placements trends in Table 2. On the other hand, the average share of the day outside the regular classroom may rise if the average severity of the disabled population does as well, assuming that students who are marginally in need of special education services are the ones who are no longer identified as disabled.

The findings suggest that the latter compositional story is relatively stronger. Panel A describes a relationship between capitation and a 7.1 percentage point—or a 13 percent—reduction in placements in the least intensive setting for students with non-severe disabilities. We see equivalent cumulative percentage point growth in the other educational environments. Panel B indicates that distributional shifts across educational environments among children with severe disabilities are somewhat different. The key result is the relationship between capitation and a 30 percent increase in outside placements. This finding is consistent with an incentive-based response because all census-based formulas contain provisions for reimbursing exceptionally high cost placements as most non-census funding models do (Parrish et al. 2003). For example, California continued to reimburse 100 percent of the "excess cost" of some nonpublic school placements.[29] The continued reimbursement of some of these expenses under capitation systems may make nonpublic school placements more cost effective for school districts because states stopped reimbursing other types of placements.

The finding about outside school placements is consistent with observations in the health insurance literature about hospital "upcoding" of Medicare patients to more highly reimbursed

[28] Children can receive special education services in the regular classroom. For instance, schools can assign special education aides to children with disabilities in regular classrooms.

[29] Excess costs are spending amounts above a district's average annual per pupil spending.

diagnoses. Medicare provides a fixed payment to hospitals for each eligible patient they treat within certain diagnosis categories. Silverman and Skinner (2004) find that the share of patients with pneumonia and respiratory infections in the most highly reimbursed diagnosis category rose 10 to 37 percentage points between 1989 and 1996. Dafney (2005) uses a 1988 Medicare reform that changed reimbursement rates for a large number of patients to show that hospitals upcoded patients to the categories with the largest reimbursement increase. Dafney further notes that diagnostic upcoding augments hospital revenue without changing any real aspects about patient care. Switching children with disabilities to an outside school placement is different because these settings typically involve higher levels of both service intensity and special education spending. Nevertheless, state reimbursements make these high-cost educational placements attractive under capitation finance from a district budgetary perspective, even if they do not contain costs from the perspective of states.

<B> *C. Program Exiting*

Students with disabilities can exit special education programs through a variety of means, such as by transferring to regular education, dropping out of school, graduating, moving, or reaching the maximum legal age for services. This section explores whether capitation is associated with an increased exit rate from special education programs. If so, the findings suggest one mechanism through which census-based systems may reduce the enrollment rate.

Table 7 reports findings from the exiting analysis.[30] Panel A shows point estimates for census funding using the number of 14-22 year old special education students who exited in each

[30] These specifications add an additional control for changes in compulsory education laws to those listed in column 2 of Table 1.

category divided by 9th through 12th grade special education enrollment as dependent variables. We find a statistically significant relationship between census funding and higher rates of dropping out: the estimate implies growth of 25 percent from a baseline dropout rate of 5 percent among students in these age ranges. The data also show marginally significant positive associations between capitation and rates of both transfers to regular education and graduation with a diploma. These estimates imply growth of 38 percent and 17 percent, respectively. As with findings in the previous analysis of educational placement usage, the exiting findings are not causal relationships because they may pick up compositional changes to special education enrollment. For example, the dropout rate among disabled children may rise under capitation if the disability rate falls primarily among those children with the least propensity to dropout.

Although capitation relates to higher special education exit rates, this relationship describes less than half of the overall relationship between capitation and lower disability rates among high school aged students. Panel B replaces the denominator of each dependent variable with overall 9th through 12th grade enrollment. Most of the resulting coefficients are insignificant, but each represents the part of the overall relationship between capitation and the disability rate among high school students that is described by each category of program exiting. Adding them together suggests an association between adopting capitation and a 0.36 percentage point increase in the share of high school enrollment that exits special education programs. In contrast, the bottom of Table 7 notes that the overall association between capitation and the disability rate among 9th through 12th grade students is -1.16 percentage points. In other words, higher rates of program exiting in high school describe just 31 percent of the relationship between capitation and the disability rate for these students. Since more exiting and less identification are the only two mechanisms through which census funding can affect the enrollment rate, we conclude that

the residual part of the relationship reflects either greater exiting in earlier grades or a latent reduction in disability identification.

<B> *D. Grade Level Responses*

The next set of results explores whether the relationship between adopting capitation and falling disability rates differs by grade level. We calculate grade-level special education enrollment rates using IDEA information on childhood disabilities by age along with information from the *Digest of Education Statistics* on enrollments per grade.[31] Therefore, the first grade disability rate, shown in column 1 of Table 8, is the number of disabled six year olds divided by first grade enrollment in each year and in each state. Subsequent grades are calculated similarly.

We find suggestive evidence of stronger relationships with respect to census funding during the earliest and latest grades, although grade-to-grade differences are not statistically different. For instance, the data support a relationship in 1st grade that is more than 11 percent lower than baseline. By the 6th grade, the relationship between capitation and disability rates is only 7 percent below baseline, but it increases again to 12 percent below baseline by grade 12. In conjunction with the findings on exiting, the evidence supports a reduction in disability rates in all grades rather than just in primary grades where most disabilities are initially identified.

<B> *E. Requests for Dispute Resolution*

[31] The measure will include measurement error because school entry cut-off dates, retention, and delayed entry may cause each grade to have children of different ages. However, our state and time fixed effects should pick up much of these differences.

Capitation finance may also relate to higher rates of requesting dispute resolution for special education matters. In collaborative processes like determining special education eligibility and placement, disagreements are bound to arise in some cases. IDEA guarantees parents and school districts the right to due process in resolving special education disputes. In practice, the vast majority of disputes settle before needing adjudication by an administrative law judge, making the request for a due process hearing a more relevant outcome variable than the number of judicial decisions issued.

It seems plausible that disagreements would become more frequent under capitation because school districts incur additional costs when they provide additional special education services but no longer receive any additional state funding for offsetting those costs. We explore the relationship between adopting capitation and requests for due process using data collected by Ahearn (2002). Table 9 shows the results from specifications that use both the total number of requests and the number of requests per 1,000 special education students as outcome variables.

Columns 1 and 5 present results from unweighted specifications as in previous tables, and reveal positive but statistically imprecise relationships. Yet the data raise the possibility of above-average associations in larger census states because the estimates from enrollment-weighted specifications (columns 2 and 6) are larger and statistically significant.[32] As a sensitivity check, we re-ran both models without California, the largest census state. The resulting estimates (columns 3, 4, 7, and 8) become much smaller and statistically insignificant.

<B> *F. Heterogeneous Responses to Census Funding Policies*

[32] See Lipscomb (2009) for a related analysis.

The last section of the analysis conducts several tests for differential state responses to capitation policies. First, we explore whether the association between adopting a capitation system and falling disability rates was larger in states where reform arguably represented a bigger incentive change. As a proxy for the strength of pre-reform incentives, we use each state's disability rate in 1991, the initial year of our sample. We interact the initial student disability rate with the census indicator and include the interaction as an additional regressor. Panel A of Table 10 contains the results, which are run separately for the overall disability rate and by severity. The interaction term has a statistically negative coefficient in all three specifications, consistent with a stronger the relationship between capitation and disability rates in states experiencing larger presumed incentive changes. For instance, column 1 suggests a 5 percent reduction for a state with 1991 disability rate of 10 percent but a 20 percent reduction if the initial disability rate was 16 percent.[33]

In Panel B, we test for differential relationships between capitation and disability rates based on the type of pre-reform system. Our specifications include three main explanatory variables: indicators for census states that switched from pupil weighting models, percent reimbursement models, and other types.[34] Each variable is associated with a statistically significant reduction in the overall special education enrollment rate. The key result is that switching from a pupil weighting system is related to a more substantial drop in the disability rate than is switching from a percent reimbursement model. In other words, the evidence supports a larger association in states where pre-reform allocations were a function of identified

[33] The size of these relationships is relative to the average disability rate of 12.86 percent in our time series.

[34] See Table 10 for the pre-reform system used in each census state.

disability counts rather than a percentage of special education spending. We see similar patterns by focusing just on non-severe or severe disabilities, although the estimates are noisier.

Several states use hybrid finance models that involve both capitation and another type of funding process. We might expect switching to a partial capitation model to have a smaller association with disability rate changes than switching entirely to capitation funding. We examine this possibility in Panel C by including an indicator for adopting a partial census model. We also expand our definition of census-based reform to include these additional states.[35] The findings again support heterogeneous responses for overall and non-severe disability rates. For example, full census models are associated with a 1.24 percentage point reduction in the overall disability rate but partial models are associated with a 0.15 percentage point rise. These two associations are statistically different, and we fail to reject a zero response for partial census models.

In Panel C, column 3, we do not reject equal associations for severe disabilities. The similarity of the two models in this case highlights how responses to partial capitation reforms will depend on the details of the system designed. The empirical findings for severe disabilities based on the partial census models currently in use suggest that they may place greater emphasis on reducing severe disability rates than non-severe disability rates.

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[35] The states are Missouri, South Dakota, Utah, and Vermont. Funding formulas in these states involve both total district size and factors related to resource usage or identified needs. Missouri's formula uses average daily membership and the number and type of special education staff. South Dakota uses a census-based model for non-severe disability categories and a pupil-weighting model for other categories. Utah bases funding amounts on changes to total district enrollment and a measure of reported special education needs in 1989. Finally, Vermont uses a cost reimbursement framework along with average daily membership (Parrish et al. 2003).

<A> **7. Conclusion**

This paper provides evidence of wide-ranging responses to capitation policies in special education holding other factors constant. Capitation involves different fiscal incentives and we conclude that districts responded to these changes. An enticing question following the analysis is whether capitation contributes to under-identification and under-serving of disabilities because it refocuses incentives in that direction. The problem is that we do not know the extent to which disabilities were previously over-identified or over-served.

Other states that may consider switching to a capitation framework should treat fiscal policies as a likely factor affecting special education practice. When program reforms are developed, changes such as those to identification incentives should be carefully considered so that the outcomes of new policies can align closely with state objectives. Our findings suggest that policymakers should pay special attention to impacts on the overall level of disabilities, the disability mix, the share of funding from different levels of government, the rate of outside school placements, and potentially rates of program exiting and requests for dispute resolution. It is also important to keep in mind that fiscal policies are just one variable among many that influence how children are served by special education programs.

An important direction for future research would be to examine whether causal relationships underlie these findings. For instance, does capitation affect special education practice in ways that directly lead some students to drop out of school? Even a conclusion that it does not would help education policymakers potentially by suggesting that the higher dropout rates among disabled students that follow capitation reforms result from less identification among students with low dropout potential.

A second area for future research is to better understand how special education classification affects students' schooling experiences. Do special education programs increase student performance? Is it beneficial or detrimental to have classmates with identified disabilities? Research evidence on student outcomes in special education is remarkably rare. Much of it comes from Hanushek, Kain, and Rivkin (2002), who find that special education programs boost math achievement among students with disabilities in Texas. Friesen, Hickey, and Krauth (2008) find that attending a school with a higher special education enrollment rate does not have a large effect on the test scores of either disabled or non-disabled students in British Columbia. In contrast, Fletcher (2009) concludes that having classroom peers with serious emotional problems does lead to lower student achievement in first grade. Given the financial commitment involved in special education, further research along these lines would contribute greatly to the ability to make informed special education policy decisions.

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Table 1
Special education enrollment rate regression results, 1991-2003

Census funding	**-1.251**	**-1.239**	**-1.415**
	(0.285)	(0.299)	(0.336)
Other special ed funding change		0.016	-0.061
		(0.192)	(0.190)
Plaintiff victory		-0.434	-0.235
		(0.389)	(0.329)
Percent free lunch		1.581	1.670
		(1.181)	(1.265)
Accountability system		0.203	0.299
		(0.143)	(0.159)
SSI payment		-0.003	0.042
		(0.189)	(0.212)
Unemployment Rate		-0.021	-0.036
		(0.080)	(0.081)
Black		-0.059	-0.070
		(0.140)	(0.156)
Hispanic		**-0.114**	-0.087
		(0.053)	(0.060)
Other race		0.017	0.003
		(0.150)	(0.164)
Formula based time trend?	no	no	yes
Dependent var. mean	12.859	12.859	12.859
Dependent var. sd	(2.023)	(2.023)	(2.023)

Note: All regressions include state and year fixed effects. Columns 2 and 3 also include an indicator for missing free lunch data. SSI payments are reported in $1,000's. Standard errors are clustered at the state level and each regression contains 650 observations. Bold coefficients are significant at the 5% level.

Table 2
Census funding and school resource levels

	Coefficient (Std. Dev.)	Dep. Var. Mean (Std. Dev.)
Revenue Measures		
Local revenue per pupil	**0.433**	3.973
	(0.198)	(1.719)
State revenue per pupil	-0.685	4.555
	(0.361)	(1.538)
Federal revenue per pupil	0.041	0.707
	(0.038)	(0.269)
Total revenue per pupil	-0.205	9.221
	(0.280)	(2.041)
Other Outcomes		
Ln(average teacher salary)	-0.008	3.869
	(0.025)	(0.171)
Pupil teacher ratio	-0.244	16.296
	(0.304)	(2.265)
Ln(enrollment)	0.003	13.165
	(0.016)	(0.980)

Note: Special education revenue per pupil, other school revenue per pupil are reported in $1,000's. Average teacher salary was converted to $1,000's before taking the natural log. All regressions include state and year fixed effects. Additional controls include an indicator for change in funding formula other than census, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Number of observations is 650. Bold coefficients are significant at the 5% level.

Table 3
Special education enrollment rate regression results, by severity

	Non-severe disabilities			Severe disabilities		
Census funding	**-0.919**	**-0.899**	**-1.102**	**-0.332**	**-0.339**	-0.313
	(0.275)	(0.282)	(0.333)	(0.133)	(0.132)	(0.163)
Other special ed funding change		0.089	0.028		-0.074	-0.089
		(0.204)	(0.207)		(0.060)	(0.075)
Plaintiff victory		-0.248	0.083		-0.186	-0.318
		(0.348)	(0.309)		(0.154)	(0.168)
Percent free lunch		1.539	1.404		0.042	0.266
		(1.038)	(1.139)		(0.568)	(0.521)
Accountability system		0.169	0.271		0.034	0.028
		(0.150)	(0.157)		(0.062)	(0.060)
SSI payment		0.012	0.084		-0.015	-0.042
		(0.187)	(0.226)		(0.052)	(0.090)
Unemployment Rate		0.000	-0.022		-0.022	-0.014
		(0.079)	(0.081)		(0.029)	(0.025)
Black		-0.090	-0.097		0.030	0.027
		(0.156)	(0.152)		(0.056)	(0.055)
Hispanic		-0.081	-0.034		**-0.034**	**-0.053**
		(0.050)	(0.060)		(0.015)	(0.017)
Other race		-0.021	0.012		0.004	-0.009
		(0.142)	(0.151)		(0.041)	(0.048)
Formula based time trend?	no	no	yes	no	no	yes
Dependent var. mean	10.571	10.571	10.571	2.288	2.288	2.288
Dependent var. sd	(1.920)	(1.920)	(1.920)	(0.818)	(0.818)	(0.818)

Note: All regressions include state and year fixed effects. Columns 2, 3, 5 and 6 also include an indicator for missing free lunch data. SSI payments are reported in $1,000's. Standard errors are clustered at the state level. Each regression contains 650 observations. Bold coefficients are significant at the 5% level.

Table 4
Special education enrollment rate regression results with policy lead and lag variables, by severity

	Non-severe disabilities		Severe disabilities	
	Coefficient (Std. Dev.)	F statistic Test: $year_t$-$year_{t-1}$=0	Coefficient (Std. Dev.)	F statistic Test: $year_t$-$year_{t-1}$=0
3 Years Before Reform	-0.41		0.01	
	(0.29)		(0.07)	
2 Years Before Reform	-0.65	2.25	0.28	1.33
	(0.37)		(0.25)	
1 Year Before Reform	-0.60	0.04	-0.04	1.28
	(0.41)		(0.08)	
Reform Year	-0.93	**8.30**	-0.08	0.64
	(0.50)		(0.09)	
1 Year After Reform	**-1.07**	3.00	-0.13	3.06
	(0.51)		(0.10)	
2 Years After Reform	**-1.19**	1.61	-0.20	**7.48**
	(0.47)		(0.12)	
3 or More Years After Reform	**-1.57**	1.34	**-0.40**	**5.88**
	(0.53)		(0.18)	

Note: All regressions include state and year fixed effects. Additional controls include an indicator for change in funding formula other than census, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Rates based on disabilities identified in children aged 6-21. Number of observations is 650. Bold coefficients are significant at the 5% level.

Table 5
Special education enrollment rate regression results, by disability category

	Coefficient (Std. Dev.)		Dep. Var. Mean (Std. Dev.)
Panel A: Non-severe Disabilities			
Emotional Disturbances	-0.180	-0.213	1.068
	(0.136)	(0.139)	(0.533)
Other Health Impairments	-0.195	**-0.242**	0.547
	(0.100)	(0.096)	(0.509)
Specific Learning Disabilities	**-0.462**	-0.512	6.356
	(0.231)	(0.279)	(1.414)
Speech and Language	-0.062	-0.135	2.600
	(0.095)	(0.110)	(0.719)
Panel B: Severe Disabilities			
Autism	-0.006	-0.002	0.122
	(0.013)	(0.017)	(0.109)
Deaf - Blindness	-0.004	-0.004	0.005
	(0.005)	(0.004)	(0.008)
Developmental Delay	-0.006	-0.055	0.120
	(0.057)	(0.064)	(0.223)
Hearing Impairments	-0.014	-0.020	0.159
	(0.008)	(0.011)	(0.035)
Mental Retardation	**-0.282**	**-0.307**	1.440
	(0.114)	(0.130)	(0.804)
Multiple Disabilities	-0.001	0.063	0.263
	(0.080)	(0.168)	(0.335)
Orthopedic Impairments	-0.005	-0.021	0.145
	(0.015)	(0.033)	(0.166)
Traumatic Brain Injury	-0.002	-0.003	0.032
	(0.007)	(0.008)	(0.035)
Visual Impairments	**-0.010**	**-0.010**	0.057
	(0.004)	(0.004)	(0.016)
Formula based time trend?	no	yes	

Note: All regressions include state and year fixed effects. Additional controls include an indicator for change in funding formula other than census, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Rates based on disabilities identified in children aged 6-21. Number of observations is 650 except in the developmental delay regression where it is 350. Bold coefficients are significant at the 5% level.

Table 6
Census funding and educational placement settings

	In school placement			Placement outside school
	Out of regular class <21% of school day	Out of regular class 21% to 60% of school day	Out of regular class >60% of school day	
Panel A: Non-severe disabilities				
Census funding	**-7.11**	**6.16**	0.77	0.18
	(3.04)	(2.79)	(0.91)	(0.25)
Dependent var. mean	54.92	30.77	11.84	2.46
Dependent var. sd	(14.88)	(12.69)	(7.42)	(1.67)
Panel B: Severe disabilities				
Census funding	-2.30	3.17	-3.93	**3.06**
	(3.03)	(2.25)	(3.53)	(1.13)
Dependent var. mean	19.81	25.93	43.97	10.29
Dependent var. sd	(12.66)	(11.72)	(14.55)	(8.24)

Note: All regressions include state and year fixed effects. Additional controls include an indicator for change in funding formula other than census, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Rates based on disabilities identified in children aged 6-21. Number of observations is 650. Bold coefficients are significant at the 5% level.

Table 7
Census funding and exiting from special education programs among 14-22 year olds by exit category, 1993-2002

	Regular Education	Dropped Out	Graduated		Moved		Reached Max Age	Died
			Diploma	Certificate	Known	Not Known		
Panel A: Exits per 9th-12th Grade Special Ed Enrollment								
Census funding	1.61	**1.28**	1.45	0.17	1.18	-0.23	0.05	0.015
	(0.89)	(0.49)	(0.77)	(0.34)	(0.66)	(0.89)	(0.08)	(0.01)
Dependent var. mean	4.24	5.06	8.64	1.77	7.43	3.20	0.30	0.11
Dependent var. sd	(3.45)	(1.95)	(2.97)	(2.19)	(3.72)	(2.24)	(0.33)	(0.05)
Panel B: Exits per 9th-12th Grade Total Enrollment								
Census funding	0.16	0.11	0.03	-0.01	0.08	-0.02	0.004	0.001
	(0.13)	(0.07)	(0.11)	(0.03)	(0.10)	(0.10)	(0.01)	(0.001)
Dependent var. mean	0.55	0.67	1.16	0.23	0.97	0.41	0.04	0.01
Dependent var. sd	(0.42)	(0.28)	(0.52)	(0.23)	(0.53)	(0.28)	(0.04)	(0.01)
Sample size	488	500	500	464	489	490	490	492

Note: The overall reduction in the special education enrollment rate among 9th-12 grade students is 1.16 percentage points. All regressions include state and year fixed effects. Additional controls include an indicator for change in funding formula other than census, compulsory education laws, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Bold coefficients are significant at the 5% level.

Table 8
Census funding and the percentage enrolled in special education, by grade

	Grade											
	1	2	3	4	5	6	7	8	9	10	11	12
Census funding	**-1.03**	**-1.22**	**-1.34**	**-1.16**	**-1.11**	**-0.99**	**-1.07**	**-1.07**	**-0.91**	**-1.04**	**-1.25**	**-1.31**
	(0.46)	(0.42)	(0.35)	(0.28)	(0.30)	(0.29)	(0.26)	(0.30)	(0.30)	(0.29)	(0.28)	(0.30)
Percent of baseline	-11.4%	-10.9%	-10.3%	-8.2%	-7.8%	-7.2%	-8.2%	-8.3%	-8.0%	-8.7%	-10.5%	-12.1%
Dependent var. mean	9.03	11.21	13.01	14.01	14.16	13.73	13.16	12.96	11.46	12.00	11.85	10.75
Dependent var. sd	(2.27)	(2.36)	(2.23)	(2.16)	(2.16)	(2.20)	(2.27)	(2.36)	(2.21)	(2.53)	(2.84)	(2.75)

Note: All regressions include state and year fixed effects. Additional controls include an indicator for change in funding formula other than census, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Rates based on disabilities identified in children aged 6-21. Number of observations is 650. Bold coefficients are significant at the 5% level.

Table 9
Census funding and due process hearings requested, 1991-2000

	Total requests				Requests per 1,000 students with disabilities			
Census funding	115.93	**342.94**	4.62	-9.79	0.22	**0.59**	0.04	0.18
	(100.98)	(102.18)	(21.88)	(30.03)	(0.23)	(0.19)	(0.19)	(0.18)
Weighted?	no	yes	no	yes	no	yes	no	yes
Includes California?	yes	yes	no	no	yes	yes	no	no
Dependent var. mean	137.98	361.89	109.88	188.62	1.20	1.35	1.17	1.14
Dependent var. sd	(278.66)	(534.48)	(185.98)	(230.47)	(1.32)	(1.35)	(1.31)	(1.28)
Sample size	464	464	454	454	464	464	454	454

Note: All regressions include state and year fixed effects. Additional controls include indicator for change in funding formula other than census, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Number of observations is 650. Bold coefficients are significant at the 5% level.

Table 10
Heterogeneity in relationships between disability rates and census reforms, by severity

	All Disabilities	Non-Severe	Severe
Panel A: Presumed Strength of Incentive Change			
Census	**2.67**	**2.52**	**0.33**
	(0.97)	(0.93)	(0.13)
Initial disability rate * census	**-0.33**	**-0.34**	**-0.34**
	(0.09)	(0.10)	(0.04)
Panel B: Pre-Reform Funding Structure			
Pupil weight	**-2.23**	**-1.72**	-0.51
	(0.40)	(0.50)	(0.37)
Percent reimbursement	**-0.85**	-0.66	-0.19
	(0.42)	(0.41)	(0.10)
Other (flat rate/resource/excess cost)	**-1.18**	**-0.73**	-0.45
	(0.40)	(0.20)	(0.26)
F statistic: Pupil - reimbursement=0	**5.02**	2.69	0.77
F statistic: Pupil - other=0	3.48	3.84	0.02
F statistic: Reimbursement - other=0	0.35	0.03	0.83
Panel C: Partial Census Funding			
Expanded census indicator*	**-1.24**	**-0.90**	**-0.34**
	(0.30)	(0.29)	(0.13)
Partial census indicator	**1.39**	**1.32**	0.08
	(0.45)	(0.38)	(0.18)
F statistic: Census + partial census = 0	0.20	1.85	**4.87**
Dependent var. mean	12.86	10.57	2.29
Dependent var. sd	(2.02)	(1.92)	(0.82)

Note: All regressions include state and year fixed effects. Additional controls include an indicator for change in funding formula other than census, state level unemployment rate, percent free lunch, percent black, Hispanic and other race, average monthly SSI disability payment, an indicator for a plaintiff victory in a school finance case at the supreme court level, an indicator for the date of introduction of accountability system and an indicator for missing free lunch data. Standard errors are clustered by state. Rates based on disabilities identified in children aged 6-21. Number of observations is 650. Bold coefficients are significant at the 5% level.

Panel B: Pupil weight states include AK and MA. Percent reimbursement states include CT, ID, MT, ND. Other states include AL(flat grant), CA (resource based), and PA (excess cost).

* The expanded census indicator includes the four states with partial census models along with the nine states with full census models. The partial effect for adopting a partial census model is the sum of the two coefficient estimates listed in Table 9.

Appendix

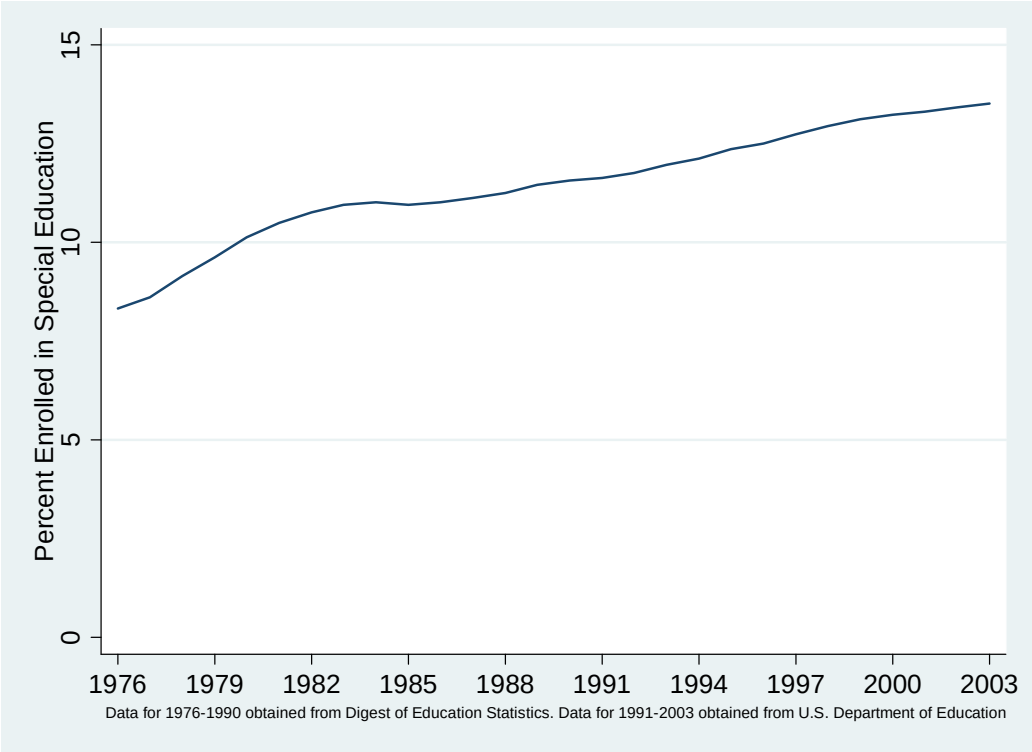
States using census funding for special education, 1991-2003

	School year of change (fall)
Alabama	1995
Alaska	1998
California	1998
Connecticut	1995
Idaho	1994
Massachusetts	1993
Montana	1994
North Dakota	1995
Pennsylvania	1992

Note: Missouri (1998), South Dakota (1998), Utah (1991), and Vermont (1991) use either total district enrollment or average daily membership as the basis for a portion of special education funding.

Figure 1: Enrollment Rates for Children with Disabilities

1A: U.S. Special Education Enrollment Rates, 1976-2003



1B: U.S. Special Education Enrollment Rates, 1991-2003

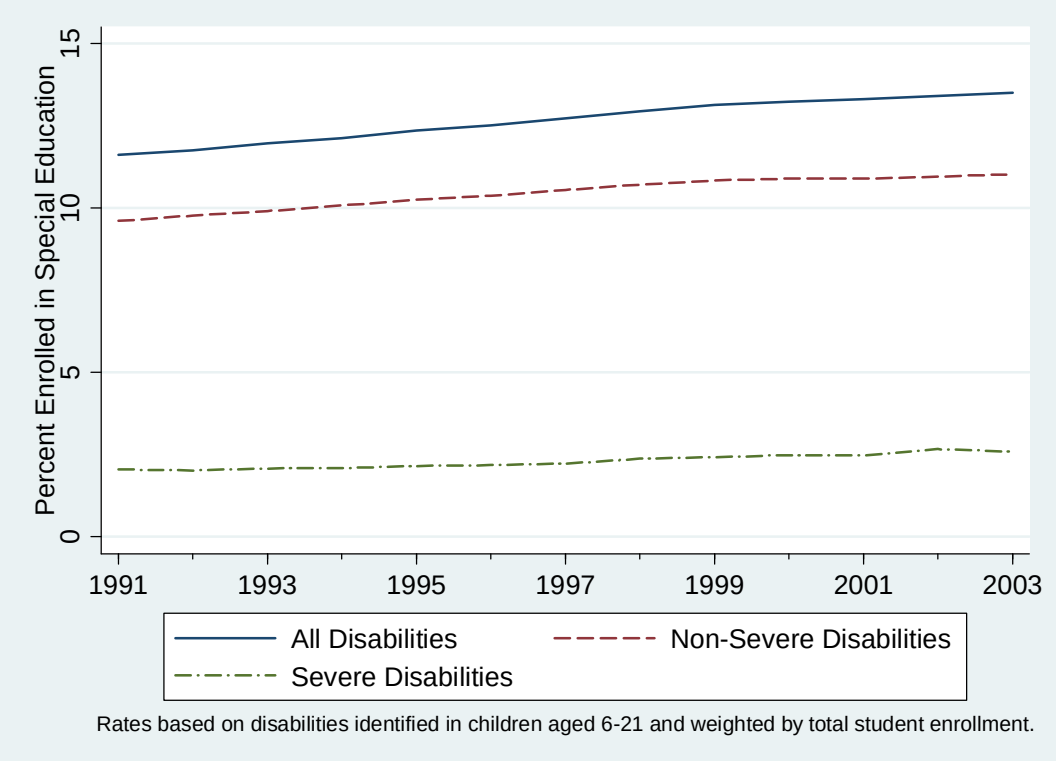
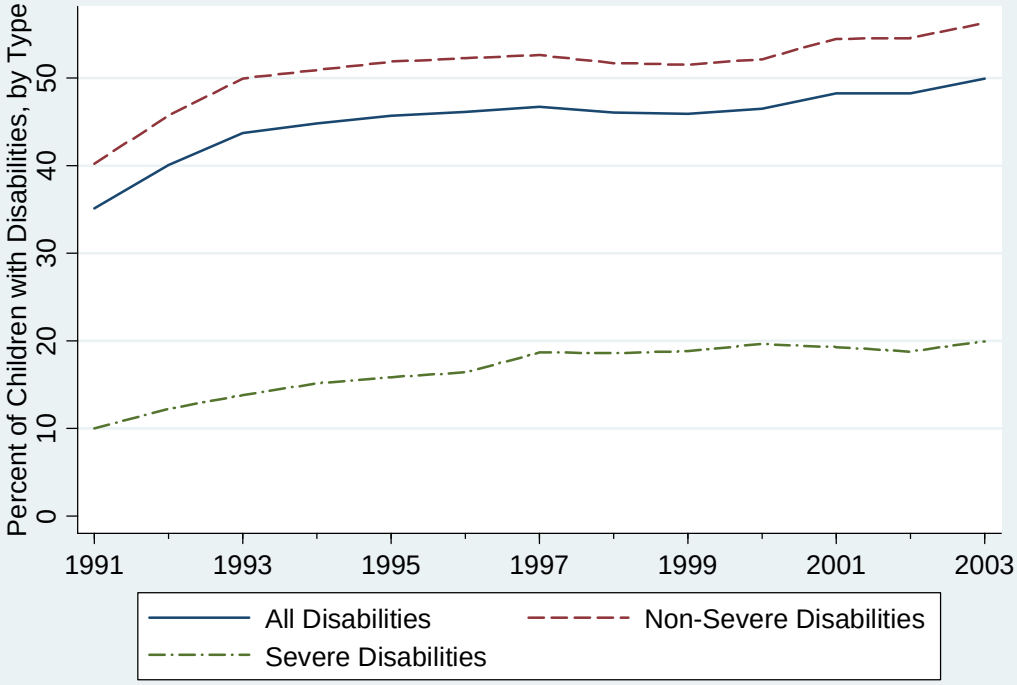


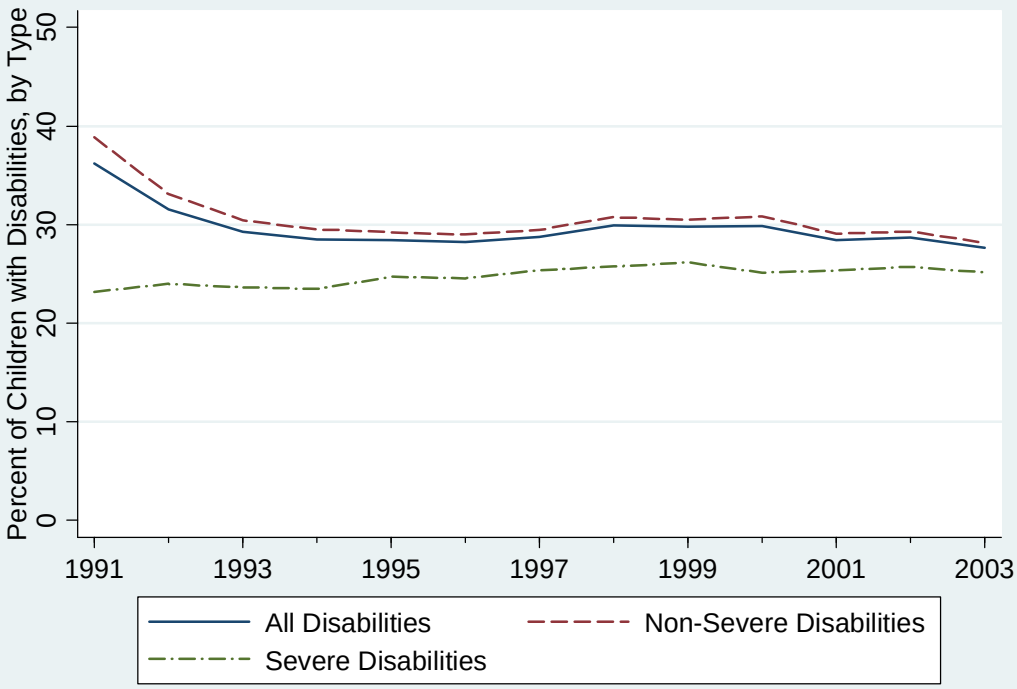
Figure 2: Educational Environments for Children with Disabilities, 1991-2003

2A: Out of the Regular Class <21% of the School Day



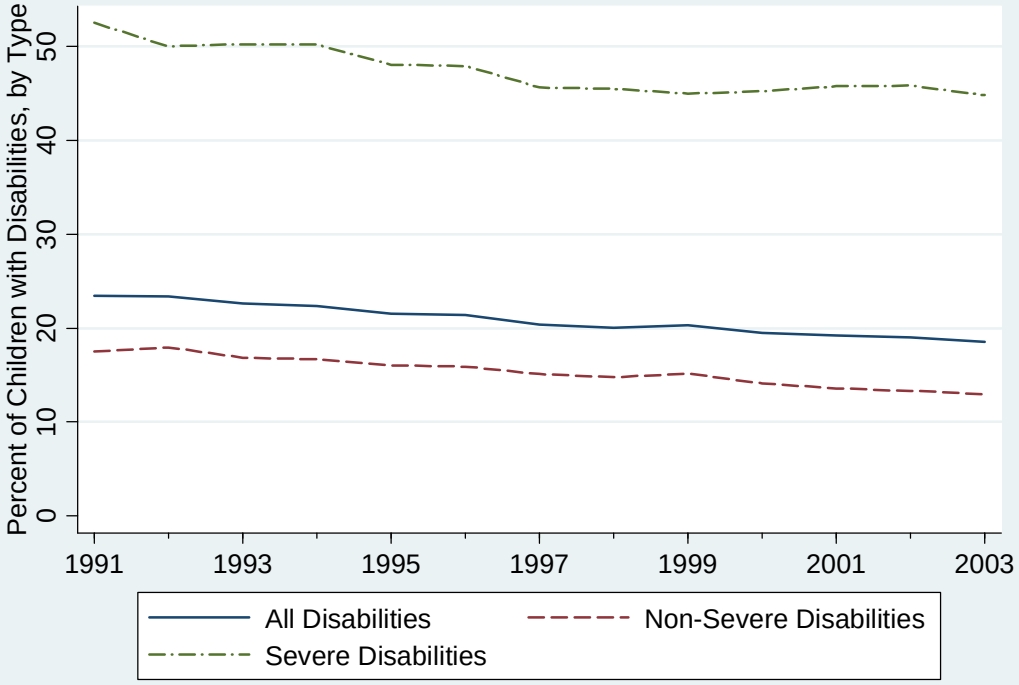
Means are weighted by enrollment in each disability type.

2B: Out of the Regular Class 21% to 60% of the School Day



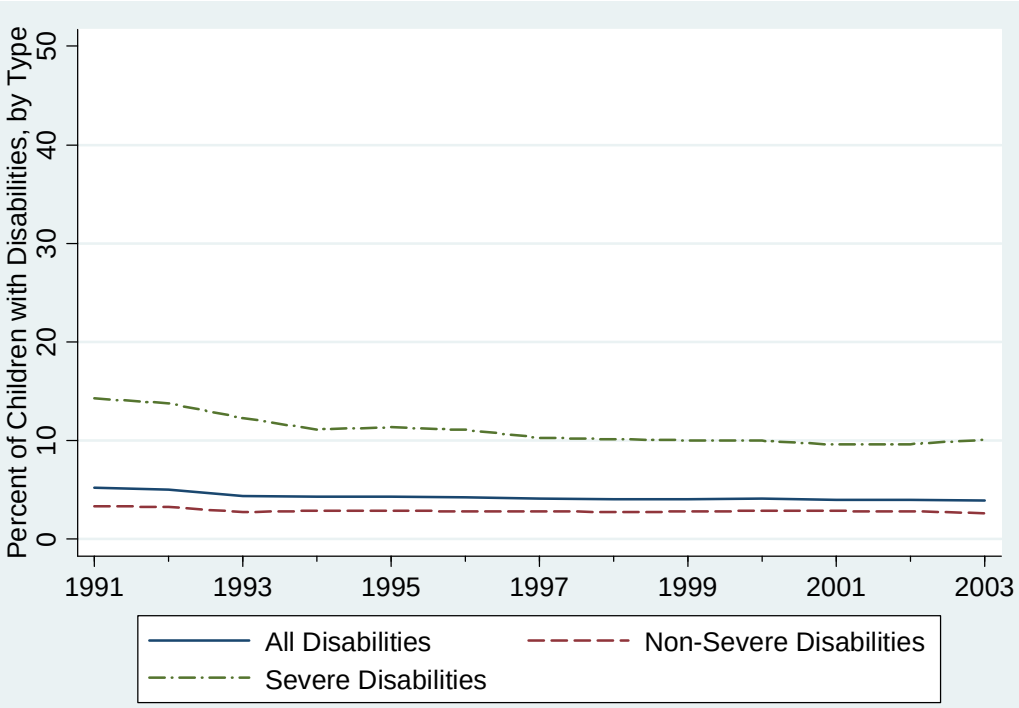
Means are weighted by enrollment in each disability type.

2C: Out of the Regular Class >60% of the School Day



Means are weighted by enrollment in each disability type.

2D: Placement Outside School



Means are weighted by enrollment in each disability type.