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Impact of States' Adoption of Response to Interventions (RTI) on Disability Identifications

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Introduction

Students with disabilities often face developmental, academic, and social challenges throughout their educational trajectory (Petersen, 2012). Public policies play an important role in shaping services for these students by ensuring opportunities for optimal growth and development. Policies like the Individuals with Disabilities Education Act (IDEA) determine the eligibility criteria for services and regulate the methods and locations of service delivery. In turn, the policy levers within IDEA can either bolster the provision of beneficial services to students with special needs or, conversely, obstruct their access to necessary services.

To better identify and serve students with specific learning disabilities (SLD) or with other special needs, the federal government included in the 2004 reauthorization of IDEA, a policy mandate to scale up Response to Intervention (RTI) [IDEA 2004, Sec. 614.b.6.B]. States then started requiring RTI in schools.[1] RTI is a multi-tiered, data-driven system of instruction that provides increasing levels of support to students based on their individual learning needs. RTI is also a comprehensive evaluation criterion that is used for both the identification of students with SLD and intervention provision purposes. Specifically, RTI includes evidence-based instruction, screening and monitoring assessments, and targeted interventions across school years (Berkeley et al., 2009; Fletcher et al., 2019). In 2006, fifteen states adopted RTI, with more states gradually joining after 2006 (Zirkel & Thomas, 2010).

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[1] Please note that the federal government introduced RTI in 2004, but states did not change their practices until 2006. Consequently, the RTI start year is considered 2006 moving forward.

National IDEA data show that the implementation of RTI coincided with a noticeable slowing—and in some states, a reversal—of the long-term upward trajectory in SLD identification rates, which had risen steadily from the 1975 through the early 2000s (Office of Special Education Programs [OSEP], 2023; Shifrer et al., 2011). At the same time, national reading achievement trends have been declining or stagnating for more than a decade. For example, fourth-grade reading scores began to plateau around 2012 and have declined significantly in the years since, with 2022 marking the largest drop in reading achievement attributed to the pandemic (National Center for Education Statistics [NCES], 2022, 2023). These diverging patterns of stable special education identification alongside worsening achievement raise concerns about whether RTI is supporting the students who need them most.

Yet, scientific evidence of the effects of statewide introduction on students' identification rates for SLD and disabilities remains limited (Hughes & Dexter, 2022). Recent studies have investigated the effects of specific state RTI policies and found that SLD rates significantly decreased after RTI implementation (Ainsworth et al., 2024; Gilmour et al., 2023; Hall-Mills, 2021). However, these findings may be specific to the states examined and may not generalize to other states' responses to the federal RTI policy, given the diverse ways RTI has been adopted nationwide. Some states fully mandated RTI implementation, including the use of RTI as an identification model for SLD, whereas others merely encouraged or supported RTI adoption without specifying implementation requirements. As a result, more research is needed to rigorously evaluate the impact of RTI adoption disability rates, particularly SLD, at the national level.

We address this research gap by causally examining how the national adoption of RTI across states affected whether students in that state were identified with SLD. We use a differences-in-differences (DID) framework to leverage the variation in the timing of states' RTI adoption to isolate the impacts of the policy change on SLD identification. We use data from 2000 to 2019 to capture the full span of state RTI implementation. states varied substantially in their timelines and approaches to RTI adoption: some required RTI by law, others supported RTI through guidance or funding, and many did not formally adopt statewide RTI policies (Zirkel & Thomas, 2010; Education Commission of the States, 2020). This cross-state variation offers a unique opportunity for causal analysis.

Current Study

Leveraging the 2004 federal mandate, we explore patterns of SLD and disability identification rates before and after RTI adoption across states. We then investigate whether states' adoption of RTI affected SLD and disability rates across the country and whether states with distinct RTI adoption methods had differential impacts on outcomes. In so doing, we contribute to this policy literature by conducting the first causally informative analysis that leverages the variation in the timing of RTI adoption across different states. Utilizing a quasi-experimental design we effectively isolate the impact of state-introduced RTI on student disability identification across states. Our study timeframe, 2000-2019, allows us to fully capture changes in state RTI policy before and after IDEA (2004) reauthorization.

We ask three research questions:

- RQ 1: What are the patterns of SLD and disability identification rates before and after RTI adoption across states over time?

- RQ 2: Does state RTI adoption lead to changes in identification rates for SLD and disabilities?

- RQ 3: How do disability identification changes differ across states with varying RTI adoption policies (i.e., no RTI policy, RTI supported but not mandated, and RTI required by law)?

Methods

Data

Our analysis data is integrated from multiple sources and is aggregated at the state and year levels. We used the Federal Information Processing Standard (FIPS) for states and years to merge the datasets. The sources include states' Department of Education websites, reports from the Institute of Education Sciences, and the papers of Berkeley et al. (2009) and Zirkel & Thomas (2010), Unlocking Potential Data Center (UPDC), the Office of Special Education Programs (OSEP) under Individuals with Disabilities Education Act (IDEA), CDC wonder, and the American Community Survey (ACS).

Measures

Treatment Variable

State RTI adoption. State RTI adoption. RTI status is an indicator variable that equals 1 in the years a state adopted RTI (i.e., a state adopted RTI in a specific year) and 0 otherwise. For example, Colorado adopted RTI in 2005. Colorado thus has a

value of 1 for the RTI indicator variable from 2006 to 2018 and 0 for the years before 2006. The variable information is primarily drawn from sources on each state's Department of Education website, multiple reports from the Institute of Education Sciences (Detgen et al., 2011; Harr-Robins et al., 2009; Sawyer et al., 2008; Stepanek & Peixotto, 2009), and the papers (Berkeley et al., 2009; Zirkel & Thomas, 2010).

Appendix Table 1 lists the RTI start year for each state by its switching status: those that had RTI early between 2006 and 2008 ("early-switched states"), those that had RTI later than 2009 ("later-switched states"), and those that never had RTI ("never-on states") as of 2018. Figure 1 shows the adoption of RTI across states by year. The number of states that adopted RTI increased gradually from 2006 to 2015. The first state adopted RTI in 2006, and the last state began in 2017. Fifteen states adopted RTI in 2006, and forty-five states required RTI by 2017, providing sufficient variation to support the analysis.

Indicated in Appendix Table 2, we used the evidence from Detgen et al. (2011), Harr-Robins et al. (2009), Sawyer et al. (2008), and Stepanek & Peixotto (2009), to further categorize states into three groups: (1) states that never adopted RTI (e.g., AK) or not in law (e.g., AL), (2) states that supported RTI implementation (e.g., OR), and (3) states that required RTI (e.g., NY). For never RTI states (n=8), states have not adopted RTI, or RTI was not in state law. For RTI-supported states (n=27), RTI is considered a promising practice, not mandatory. The state supports its development as part of broader educational strategies, and the traditional discrepancy model is often continuously used for identifying SLD. Districts can develop and implement their own

RTI systems. For RTI-required states (n=16), districts and schools are required to implement RTI models for identifying SLD.

Outcome Variables

The proportions of students identified with all disabilities and SLD. The measure for the proportion of students with disabilities is calculated by using the aggregated count of all types of disabilities present in public schools derived from UPDC, OSEP, and CDC data. We calculated the proportion of students with disabilities by dividing the total number of students between 6 and 21 with disabilities in a state and year by the total number of 6- to 21-year-old students enrolled in schools in that state and year. Similarly, we calculated the proportion of students with SLD by dividing the total number of students between 6 and 21 with SLD in a state and year by the total number of the 6-21-year-old students enrolled in schools in that state and year.

Covariates

All covariates are presented in Table 1 from ACS.

Empirical Framework

We use a DID framework to exploit policy changes during the period in which individuals were exposed to RTI during their school years. This method enables three comparisons: first, we compare the changes in disability outcomes in states that adopted RTI to changes in these outcomes in states that did not; second, we compare the changes in outcomes before states introduced RTI to the changes in outcomes after states adopted RTI; Third, we compare changes in outcomes for states that adopted RTI with changes observed in states that had not yet adopted the policy.

Event Study

The main identifying assumption of a DID design is the existence of parallel

trends in outcomes between treatment and control groups before the start of

treatment. In this study, parallel trends mean that the proportion of students identified

with disabilities, or the proportion of students identified with SLD would be parallel

between states with and without RTI in the absence of RTI adoption. Specifically, we

tested the plausibility of the parallel trends' assumption and found no systematic pre-

existing trends.

Results and Implications

Descriptive Analysis Results

To answer our first research question, we plotted the trends of SLD and

disability rates by each state over time with the RTI adoption year, and the SLD and

disability rates by states relative to the RTI adoption year. Figures 3 and 4 display the

percentage of students (K–12) identified with SLD and disabilities over time (2000–

2019), with the gray bars indicating each state's RTI adoption year. As indicated in

Figure 3, the proportion of students identified with SLD declined gradually following

RTI adoption across most states. This suggests that the RTI adoption intended to

improve early identification and intervention may have reduced SLD classifications, at

least temporarily, during the post-adoption years. However, the decline is not uniform.

Some states (e.g., AZ, GA, WA) show steady rates, while others (e.g., FL, NC, NY, MA)

exhibit clear downward trends after adoption. Figure 4 indicates that across most

states, the percentage of students identified with disabilities remained relatively stable

between 2005 and 2019, typically hovering between 12% and 15%. This pattern aligns with national data showing that while the disability identification rate fluctuated slightly, there was no detectable national increase or decrease following RTI adoption. Some states (e.g., IA, NC, NY, WA) show a slight decline in disability identification, but other states (e.g., AZ, CA, CO, MA) show stable or even slight increases after RTI adoption. Several states (e.g., FL, GA, OH) maintained flat trajectories, implying little change before and after RTI adoption.

Figures 5 and 6 present the trends in the proportion of students identified with SLD and disabilities relative to each state's year of RTI adoption. The vertical dashed red lines represent the year of first RTI implementation in each state, and the horizontal axis shows years relative to adoption. Figure 5 indicates that across most states, SLD identification rates appear relatively stable before RTI adoption but show modest declines within five years post-adoption, followed by leveling off. For example, states (e.g., IA, FL, NC) indicate clear downward trends following RTI adoption, while others (e.g., CA, TX), show minimal change. The variation likely reflects differences in states' RTI policy implementations fidelity: some states mandated RTI for SLD eligibility decisions, while others allowed multiple identification methods. Figure 6 shows that disability identification rates remained largely stable before and after adoption, though several states (e.g., NC, FL, IA) showed modest declines within five years post-adoption.

Impacts of RTI on SLD and Disability Identification Rates

Table 2 presents the main results examining the impact of RTI adoption on SLD and overall disability identification rates. The analyses were conducted separately for

four sets of state groupings: (1) all states, (2) states that supported RTI versus states that required RTI, (3) states that required RTI versus those without RTI, and (4) states that supported RTI versus those without RTI. After running the (1) states model, we first tested for heteroskedasticity among states, indicating significant variation in the residuals across states (F-test = 6.16, $p <$.001). This result suggests considerable heterogeneity in states' post-RTI trajectories, potentially reflecting differences in policy implementation (e.g., identification model) influencing identification practices. We then ran models (2)-(4) described above because of the variations in RTI adoption methods.

When all states were considered together, RTI adoption was associated with a reduction of approximately 0.23 percentage points (Column 1; $p = $.011) or 3.8% percent change in the proportion of K–12 students identified with SLD. This negative effect remained marginally significant when comparing states that required RTI with those that supported RTI (Column 2; $\beta = -0.002$, $p = $.058) and when comparing states that required RTI with those without RTI (Column 3; $\beta = -0.003$, $p = $.059). The RTI effect was also statistically significant when comparing states that supported RTI versus those without RTI (Column 4; $\beta = -0.002$, $p = $.019).

The event study results present similar findings in Figures 7-8. The figures indicate event study plots with relative time to RTI adoption on the x-axis and the difference in SLD and disabilities identification rates for K-12 students on the y-axis. A dashed line is plotted at time 0 to represent the first year that states adopted RTI. Ninety-five percent confidence intervals are displayed in blue shade for each pre- and post-treatment point estimate. As indicated in Figure 7, RTI adoption had a significant effect on SLD identification. In the first six years after RTI adoption, the SLD

identification rate declined about 0.20 percentage points. In all post-treatment years, except for the first year of RTI adoption (year 0) and six years after (year 5), the ninety-five percent confidence intervals do not overlap with 0, indicating that the effects are statistically significant at the .05 level. Notably, the effects of RTI adoption are no longer significant at the .05 level after six years of RTI adoption. Given that the average SLD identification rate for RTI states prior to RTI adoption was 6%, these changes represent 2.21% to 3.83% declines compared to baseline identification rates. Looking at the pre-RTI period, all point estimates are close in magnitude to 0, while none are statistically distinguishable from 0 at the .05 level. This suggests that the observed declines in SLD identification after RTI adoption reflect changes brought about by RTI adoption rather than the continuation of a preexisting trend in SLD identification.

In contrast, RTI adoption did not significantly affect the overall disability identification rate. Coefficients are near zero across all comparisons (ranging from –0.0001 to -0.0002), none reaching statistical significance. Although the plot of event study (Figure 8) shows a slight decline in disabilities rate after the first year of RTI adoption, none of these points are significant at the .05 level. One possibility of the null effect on overall disability identification may reflect offsetting increases in proportions of other disability types such as students identified with autism or developmental delay.

Overall, the results indicate RTI adoption corresponds with a small but statistically significant reduction in the proportion of students identified with SLDs, with no change in the overall disability rate. This finding is consistent with theoretical expectations and empirical work on within state RTI adoption (Ainsworth et al., 2024;

Gilmour et al., 2023; Hall-Mills, 2021). The results from different comparison groups suggest substantial variation across states — the effects appear strongest for states that required RTI (rather than states that supported RTI), likely reflecting better alignment between guidance and implementation capacity. Given that RTI depends heavily on classroom-level data collection, progress monitoring, and intervention delivery, the small magnitude of effects may indicate challenges in implementation.

The regression results align with the descriptive trends illustrated in Figures 3–6, which show substantial heterogeneity across states following RTI adoption. While some states (e.g., FL, IA, NC) demonstrated modest declines in SLD identification rates within several years post-adoption, others exhibited stable or even slightly increasing trends. These descriptive differences are reflected in the regression analyses, which reveal a small but statistically significant reduction in SLD identification rates (–0.21 percentage points) across states adopting RTI, with no measurable change in overall disability identification.

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Tables

Table 1

Baseline Descriptive Statistics in 2006

	RTI sample		Non-RTI sample		
	Mean	SD	Mean	SD	Mean *Diff*
Outcome Measures					
% of students with disabilities	0.13	0.02	0.13	0.02	0.00
% of students with SLD	0.06	0.01	0.05	0.01	0.01
Covariates					
% White	0.78	0.11	0.74	0.17	0.04
% Hispanic	0.11	0.09	0.11	0.12	0.00
% Black	0.11	0.10	0.11	0.13	0.00
% Other	0.11	0.06	0.16	0.15	-0.04
% In school	0.83	0.01	0.83	0.02	0.00
% Female	0.49	0.01	0.49	0.01	0.00
% Enrolled in public school	0.70	0.03	0.70	0.04	0.00
% Enrolled in pre-K and K-12	0.87	0.02	0.87	0.03	0.00
% High-school dropout	0.01	0.00	0.01	0.00	0.00
Personal income (2018 dollars)	6413.35	680.24	6551.94	920.00	-138.59
Family income (2018 dollars)	84122.37	8372.84	89963.47	18677.43	-5841.10
% Received Food stamp	0.14	0.06	0.13	0.05	0.01
% of students in poverty	0.12	0.03	0.12	0.03	-0.01
% Rural	0.23	0.18	0.22	0.20	0.01
Total enrollment	996944.53	742447.46	954490.94	1288960.69	42453.59
Pupil-teacher ratio	16.02	2.82	14.76	2.10	1.26*
Per pupil expenditure (2018 dollars)	13177.14	1962.92	14655.28	3659.34	-1478.14
% of students received free- or reduced-price lunch	0.40	0.09	0.39	0.11	0.01
% ELL students	0.07	0.04	0.07	0.05	0.00

State population	6222432.80	4928055.34	5695650.56	7212950.48	526782.24
% AFDC recipients	0.01	0.00	0.01	0.01	0.00
% SNAP recipients	0.10	0.04	0.09	0.03	0.01
Gross state product	0.04	0.01	0.05	0.02	0.00
Unemployment rate	4.29	0.79	4.52	1.07	-0.24
Poverty Rate	11.98	2.44	11.80	3.48	0.18
State *N*	15		36		

Table 2.

Overall and Differential Effects of RTI Adoption on SLD & Disability Identifications

	(1) All States	(2) States Required RTI vs. States Supported RTI	(3) States Required RTI vs. States without RTI	(4) States Supported RTI vs. States without RTI	(5) All States	(6) States Required RTI vs. States Supported RTI	(7) States Required RTI vs. States without RTI	(8) States Supported RTI vs. States without RTI
	% of students with SLD (K-12)				% of students with all disabilities (K-12)			
RTI Adop tion	-0.00226*	-0.00182+	-0.00260+	-0.00244*	-0.00147	-0.00130	-0.000599	-0.00218
	(0.0008)	(0.0009)	(0.0013)	(0.0009)	(0.0012)	(0.0013)	(0.0012)	(0.0016)
N	765	645	375	510	765	645	375	510

Notes. The analyses were separate for four different sets for each outcome by state RTI adoption groups. The first set contains all states. The second set includes both state-supported and state-required RTI. The third set includes states that require RTI and those without RTI. The fourth set includes states that support RTI and those without RTI. All covariates in Table 1 are included in all models.

Figures
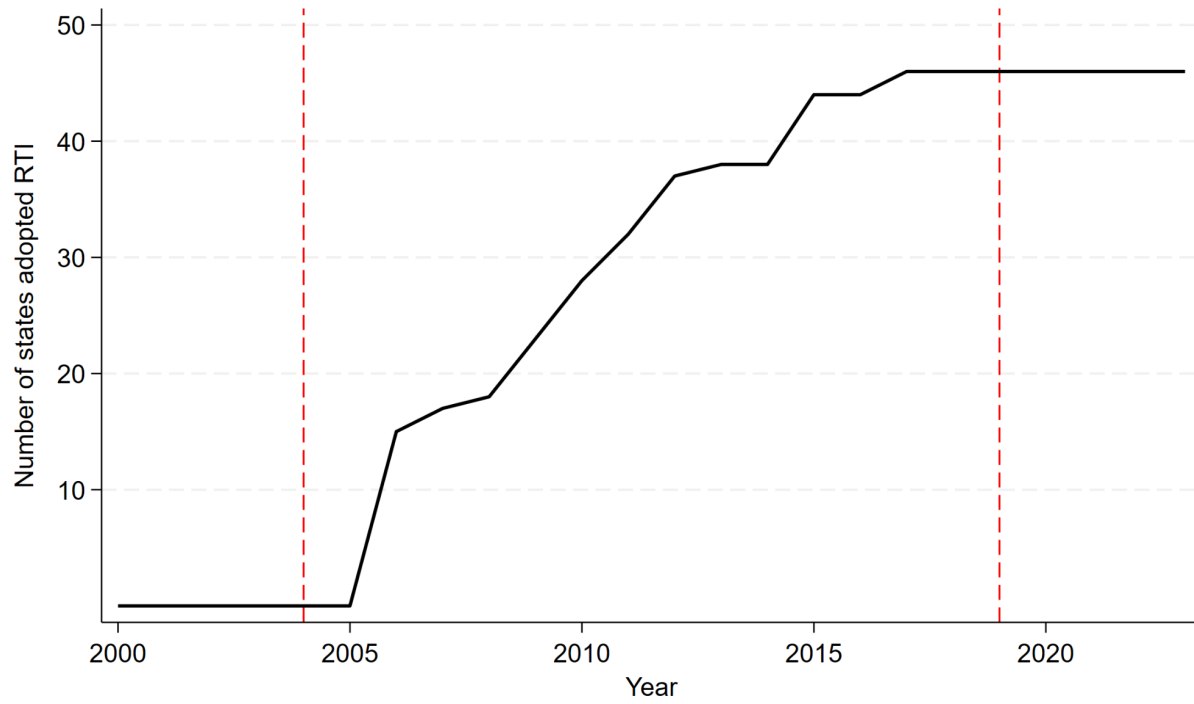
Figure 1
Number of States with RTI between 2000 and 2019
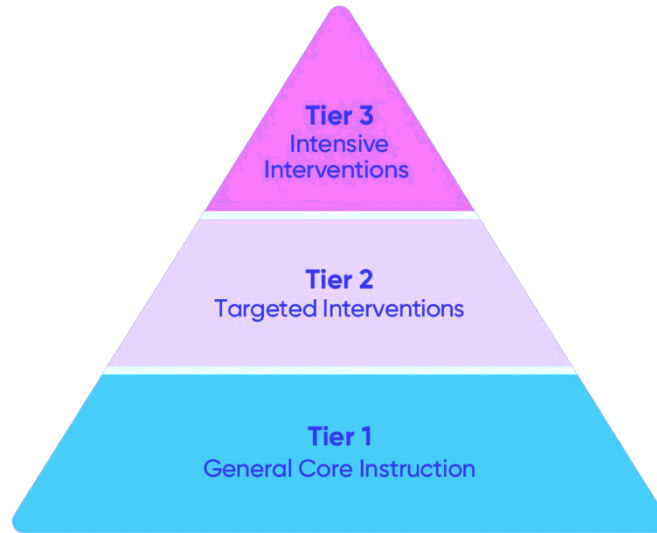
Figure 2
Response to Intervention in Three Tiers

Figure 3
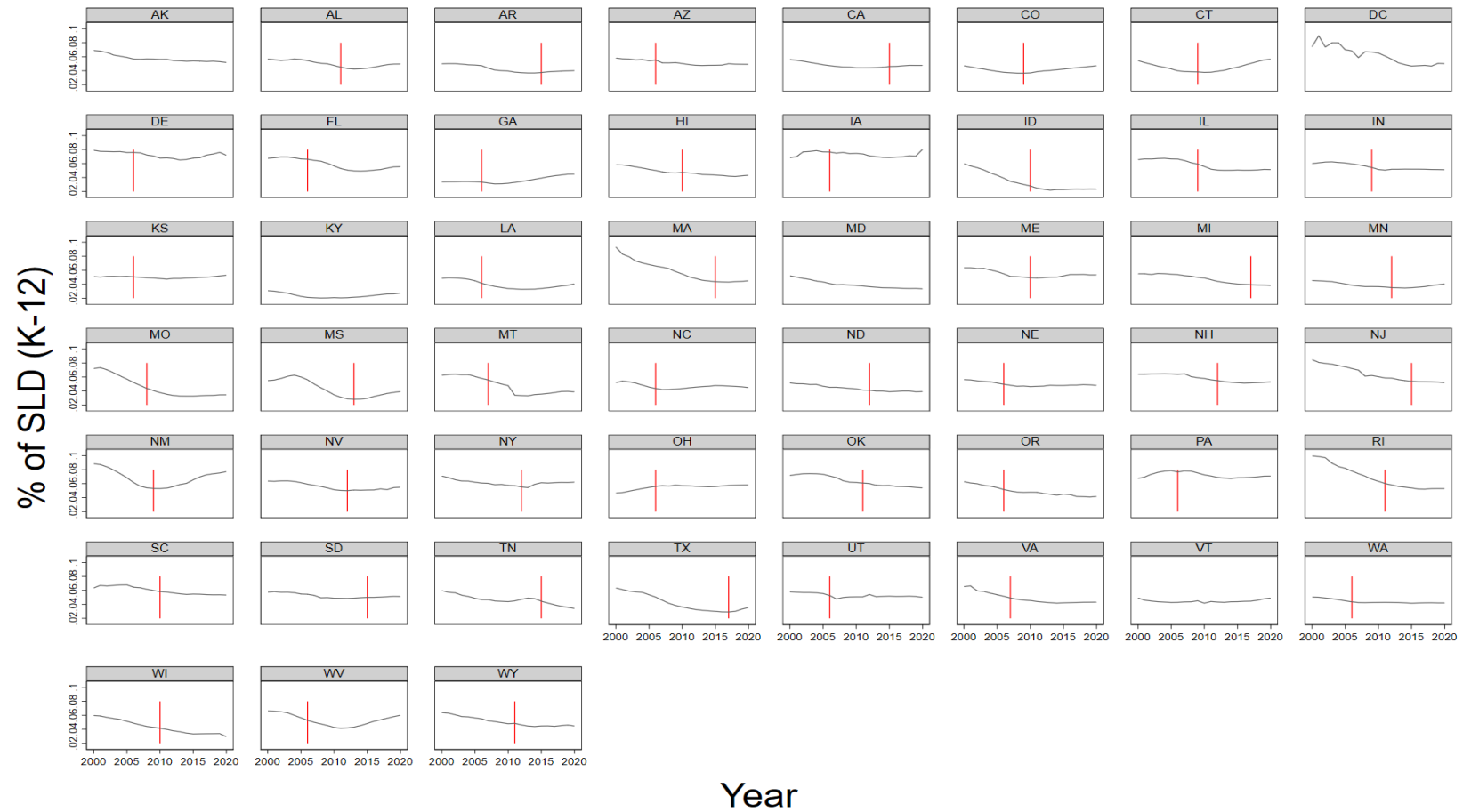
Percentage of Students (K-12) with SLD by States over Years

% of SLD (K-12)

Year

% of SLD (K-12) ——— RTI Adoption Year

Figure 4

Percentage of Students (K-12) with Disabilities by States over Years

Year

% of Disabilities (K-12)

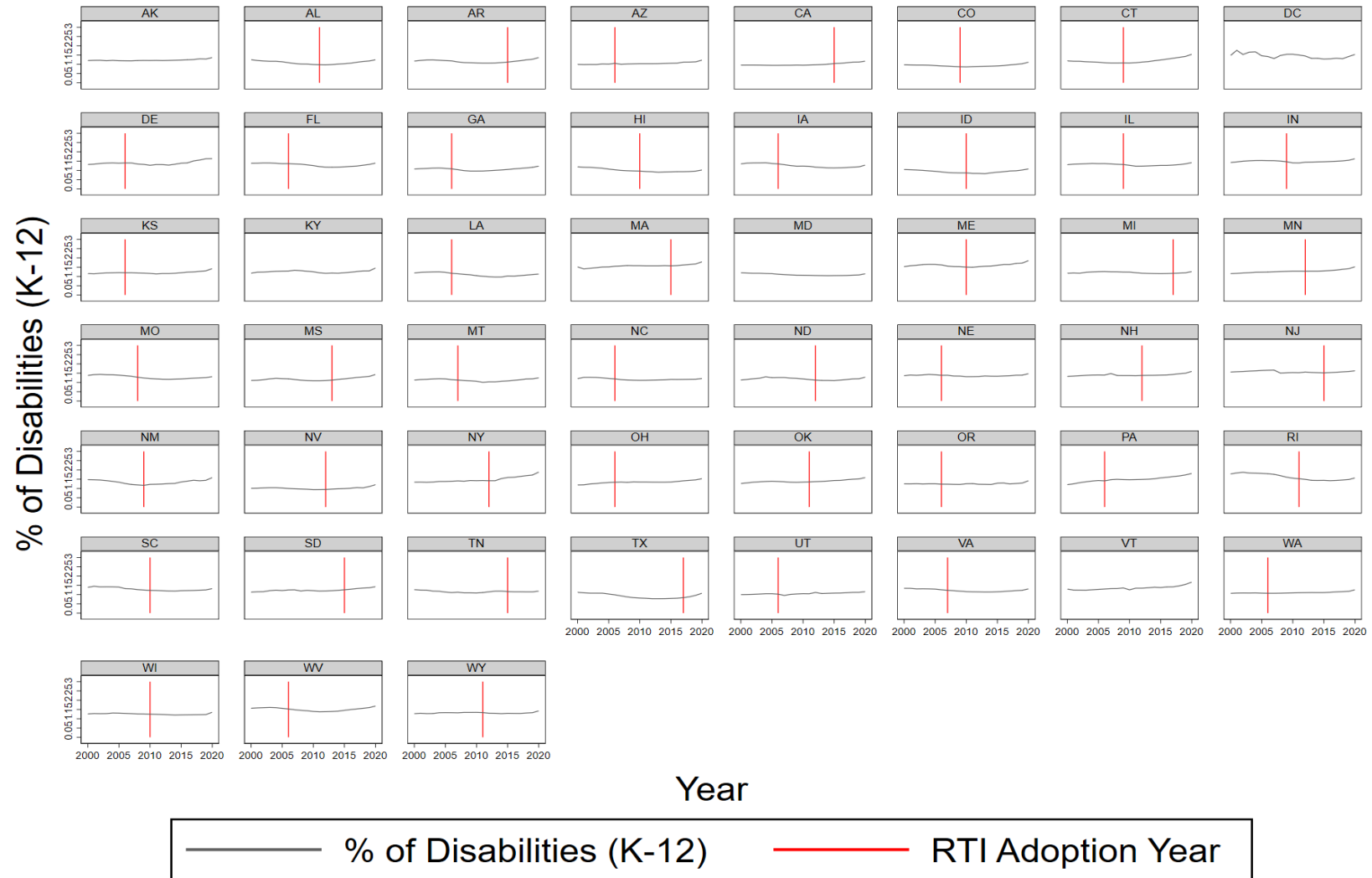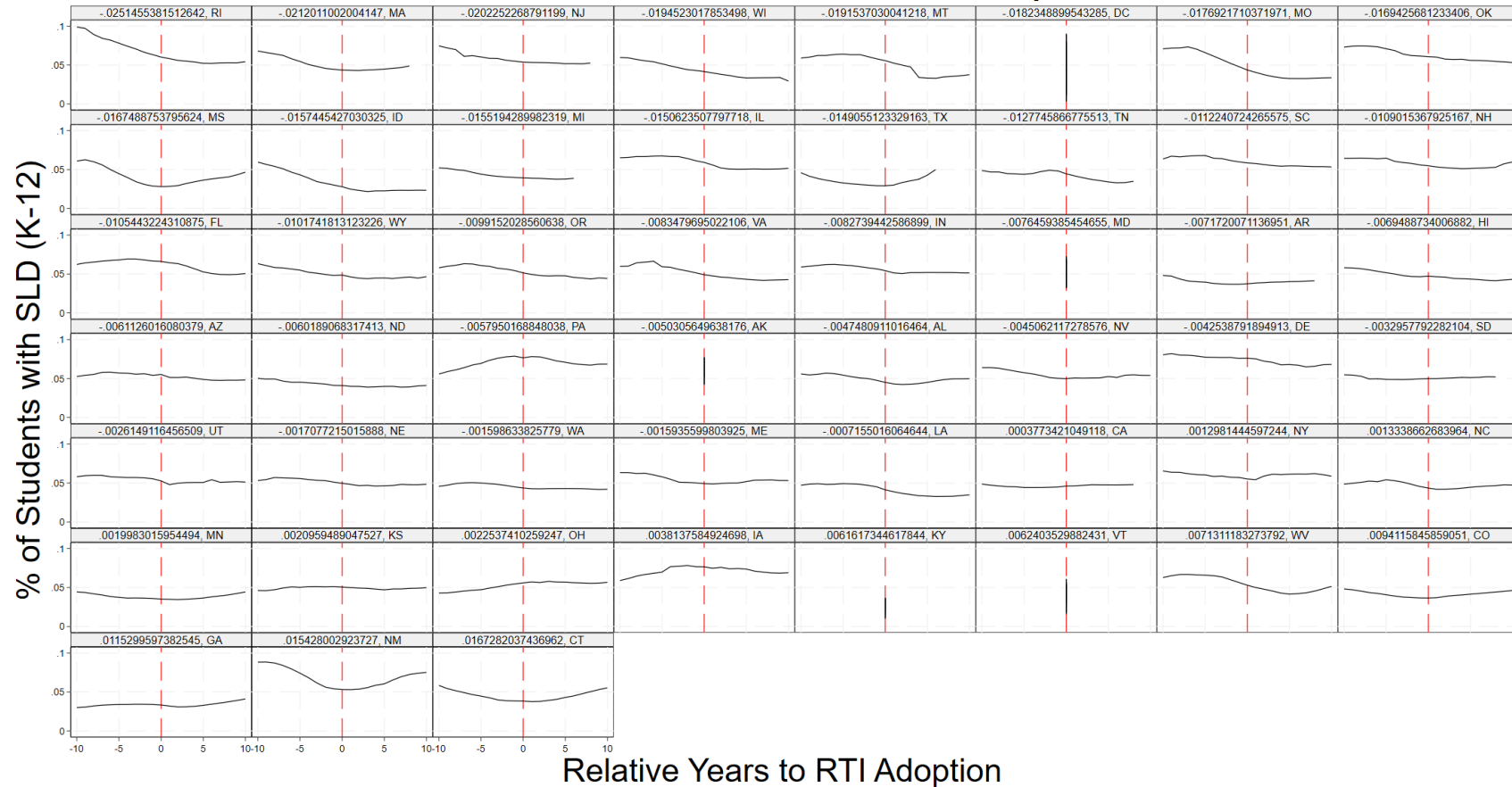% of Disabilities (K-12) —— RTI Adoption Year

Figure 5

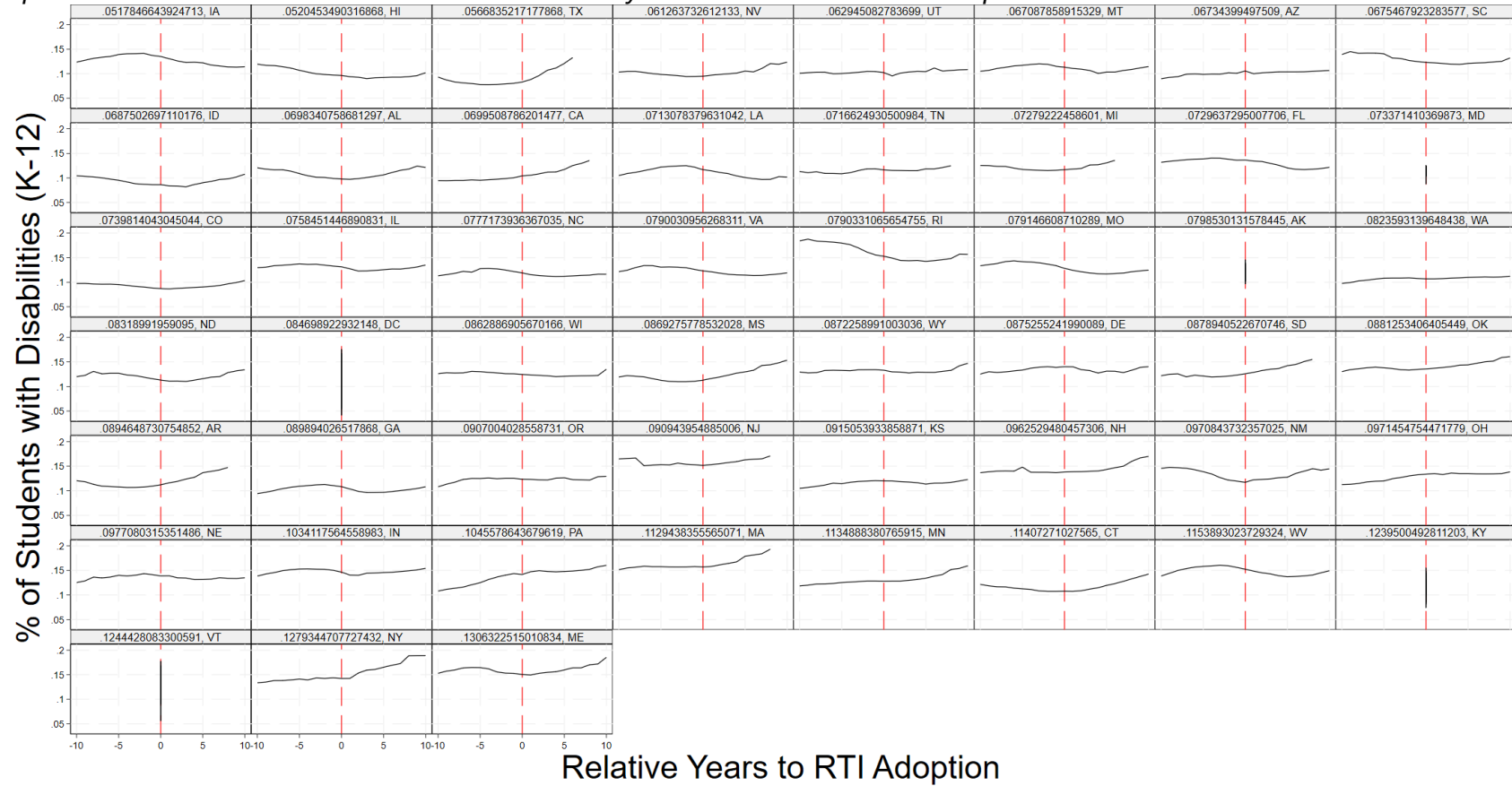*Proportion of Students Identified with SLD by States Relative to RTI Adoption Years*

X-axis is years relative to the first RTI adoption year

Notes. The graph is ordered by each state's relative decline in SLD rates, calculated as the 2020 rate divided by the 2006 rate. The value shown before each state abbreviation represents this decline.

Figure 6

Proportion of Students Identified with Disabilities by States Relative to RTI Adoption Years

X-axis is years relative to the first RTI adoption year

Notes. The graph is ordered by each state's relative decline in disability rates, calculated as the 2020 rate divided by the 2006 rate. The value shown before each state abbreviation represents this decline.

Figure 7

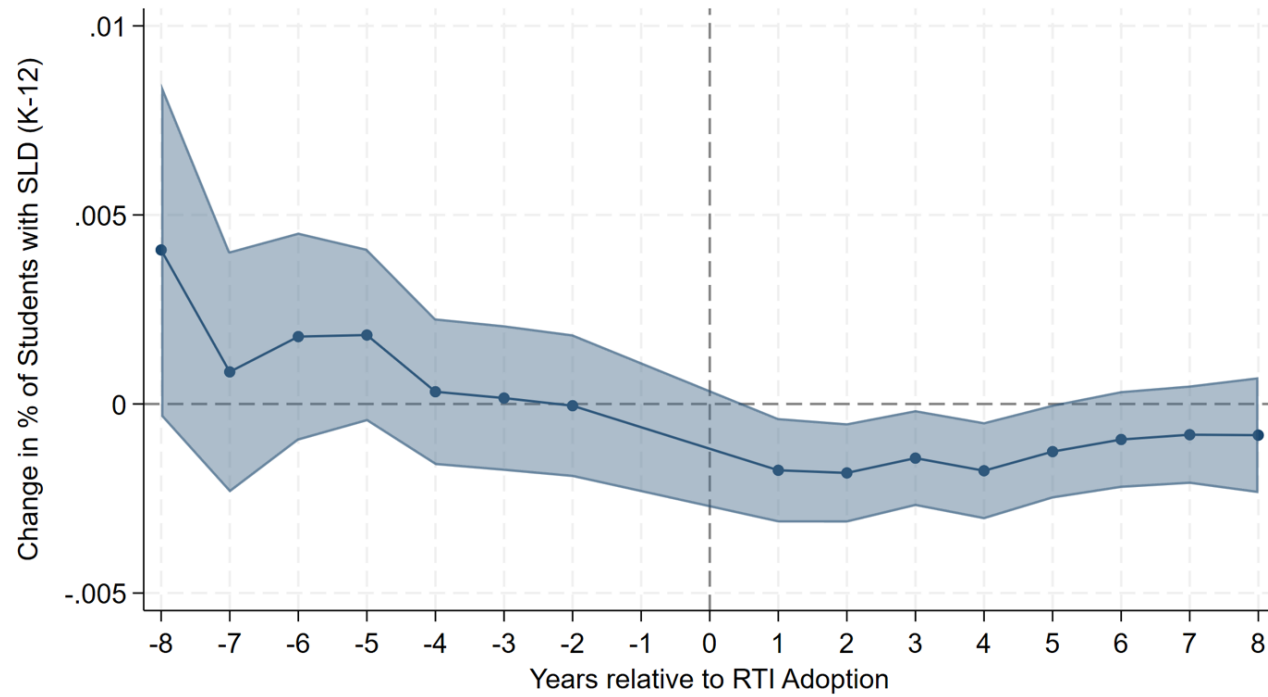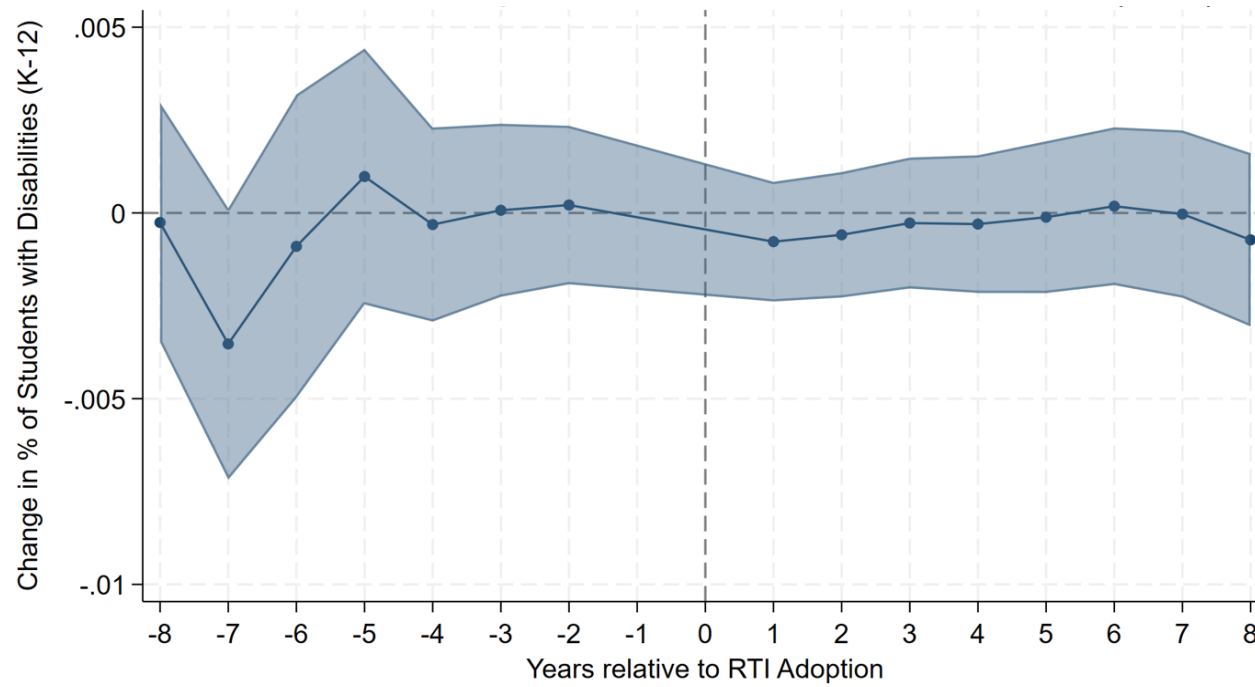*Event Study Estimates of State RTI on the Proportion of Students Identified with SLD*

Figure 8

Event Study Estimates of State RTI on the Proportion of Students Identified with Disabilities

Appendix Table 1

RTI Start Year by State and Switching Status between 2006 and 2017

Early switched States		Later switched States		Never-on States	
Arizona	2006	Hawaii	2010	Alaska	no
Delaware	2006	Maine	2010	Kentucky	no
Florida	2006	South Carolina	2010	DC	no
Georgia	2006	Wisconsin	2010	Maryland	no
Iowa	2006	Idaho	2010	Vermont	no
Kansas	2006	Alabama	2011		
Nebraska	2006	Rhode Island	2011		
North Carolina	2006	Oklahoma	2011		
Ohio	2006	Wyoming	2011		
Pennsylvania	2006	Minnesota	2012		
Louisiana	2006	Nevada	2012		
Oregon	2006	North Dakota	2012		
Washington	2006	New York	2012		
West Virginia	2006	New Hampshire	2012		
Utah	2006	Mississippi	2013		
Montana	2007	Arkansas	2015		
Virginia	2007	New Jersey	2015		
Connecticut	2009	Tennessee	2015		
Missouri	2009	California	2015		
New Mexico	2009	Massachusetts	2015		
Colorado	2009	South Dakota	2015		
Illinois	2009	Michigan	2017		
Indiana	2009	Texas	2017		
Total *N*	23		23		5

Notes. Most information for RTI adoption is from papers of Berkeley et al. (2009) and Zirkel & Thomas (2010). Since these two papers only had RTI information during the study year, we checked each state's website of the Department of Education for details and double-checked the information with the two papers.

Appendix Table 2

RTI Policy Adoption Categorizations

	RTI-Supported States	RTI-Required States	Non-RTI States
	California	Arkansas	Alabama
	Connecticut	Colorado	Alaska
	Delaware	Idaho	Arizona
	Florida	Illinois	DC
	Georgia	Iowa	Kentucky
	Hawaii	Maine	Maryland
	Indiana	Mississippi	South Carolina
	Kansas	Missouri	Vermont
	Louisiana	Montana	
	Massachusetts	New Mexico	
	Michigan	New York	
	Minnesota	North Dakota	
	Nebraska	Tennessee	
	Nevada	Texas	
	New Hampshire	Virginia	
	New Jersey	West Virginia	
	North Carolina	Wyoming	
	Ohio		
	Oklahoma		
	Oregon		
	Pennsylvania		
	Rhode Island		
	South Dakota		
	Utah		
	Washington		
	Wisconsin		
Total *N*	26	17	8

Notes. The categorization is different from Appendix Table 1, specifically for non-RTI states, which include states that did not have RTI in law.