

**Title:** Spending More on the Poor? A Comprehensive Summary of State-Specific Responses to School Finance Reforms from 1990-2014

**Context:** There has been a spate of school finance reforms (SFRs) since 1990: sixty-seven reforms in 26 states. One reason for this activity is that SFRs are an effective policy for increasing spending in lower-income districts. Indeed, recent research shows that SFRs increase spending in poorer districts (Candelaria & Shores, in press; Jackson, Johnson, & Persico, 2016; Lafortune, Rothstein, & Schanzenbach, 2018; Sims, 2011) and improve multiple student outcomes, including graduation rates (Candelaria & Shores, in press; Jackson et al., 2016), test scores (Lafortune et al., 2018) and adult earnings (Jackson et al., 2016).

**Objective:** Despite the (i) prevalence of SFR-based activity, (ii) expectations that SFRs will have heterogeneous effects, and (iii) significance of this variability for lower-income students, a comprehensive evaluation of these reforms has not been conducted. We examine the extent to which SFRs from 1990–2014 increased progressive spending among districts within states. Our study aims to document variation in progressivity among states before and after SFRs.

We answer the following research questions:

1. How much variation is there among states in the effect of SFRs on spending progressivity and resource type between 1990 to 2014?
2. What economic, political, and legal factors predict cross-state heterogeneity in the effects of SFRs?

**Population:** The universe of U.S. school districts between 1990 and 2014.

**Data:** SFR treatment indicators are based on a compiled and updated list of all major finance reforms beginning in 1990 (Hightower, Mitani, & Swanson, 2010; Jackson et al., 2016; Lafortune et al., 2018; Versteegen, 2017). Indicators of high- and low-income districts are based on district-level median income from the 1990 U.S. Decennial Census. Financial outcomes are taken from the National Center for Education Statistics (NCES) Local Education Agency Finance Survey (F-33). Non-fiscal outcomes are taken from multiple sources, including: the percentage of children attending full-day kindergarten (U.S. Census Bureau's Current Population Survey (CPS)); the number of minutes and days spent in school (NCES Schools and Staffing Survey (SASS)); teacher per student ratios (NCES Common Core of Data (CCD)).

Predictors of SFR heterogeneity come from multiple sources, including: state partisanship (Shor, 2018), citizen ideology (Berry et al., 1998), and collective bargaining strength (Brunner et al., 2018; Winkler et al., 2012). We construct a state-by-year dataset of funding formulas from multiple studies (Card & Payne, 2002b; Hightower et al., 2010; Jackson et al., 2016; Versteegen, 2017).

### **Research Design and Analysis:**

*Research Question 1.* We construct two sets of outcome measures, M1 and M2, for all of our district-level resource variables. M1 is a relative measure, which is the difference between average resource levels (e.g., average per-pupil revenues) in top-tercile/high-income districts and bottom-tercile/low-income districts for each state and year. M2 is an absolute measure, which is defined as the average level of resources among bottom-tercile districts in each state and year.

Next, we estimate the effect of each finance reform between 1990 and 2014 on outcome measures M1 and M2 using the method of synthetic controls (Abadie, Diamond, & Hainmueller, 2010, 2015). This method works by identifying a single treatment state undergoing SFR, and states not undergoing SFR serve as a potential pool of controls. Control states most similar to treatment states based on pre-SFR outcome measures (i.e., M1 or M2) are combined into a synthetic counterfactual group that describes what would have happened to the treatment state in the absence of reform. We subtract “synthetic control” outcomes from treatment state outcomes in each year after a reform to obtain treatment effects. Finally, we summarize the estimates of SFR in each state by estimating a regression adjusted mean that accounts for the occurrence of multiple reforms, as well as unit and time effects.

*Research Question 2.* With each of these progressivity statistics, summarized over the post-SFR period, we then estimate the relationship between these effects and each of the predictors described in the data section. The regression-adjusted means describing the effect of SFR on progressivity are outcome variables in a regression, and the covariates are the economic and political/legal factors described in data.

### **Findings:**

*RQ 1: Variation in total expenditures and resources.* We display results from the regression-adjusted means as funnel plots. The estimated effect is shown as a gray square and the 90% confidence interval bounds the estimate; the vertical black line indicates a null effect. Estimates of changes in total spending, kindergarten expansion, and time spent in school are shown in Figure 1 – 3. These estimates reflect substantial variation across indicators and states, indicating important heterogeneity in both how states responded to SFR and how states chose to allocate spending.

*RQ 2: Predictors of Reform.* Our last set of results identifies correlates of variation in SFR effect sizes; the outcome of interest in this analysis is effect size variation in the logarithm of total per pupil revenues. Specifically, we present precision-weighted average effects based on state characteristics, including: (a) income inequality, (b) income per capita, (c) citizen ideology, (d) government ideology, (e) house polarization, (f) senate polarization, and (g) union strength. These results are presented in Table 1. Heterogeneity of SFR effect sizes by funding formula (indexed to the timing of reform) are shown in Figure 4. Income inequality and right-wing citizen ideology negatively predict spending gains; income per capita and right-wing government ideology positively predict spending gains. Foundation plans and flat grants increase spending; all other funding formula reduce spending.

**Conclusions:** Understanding the heterogeneity of SFRs is urgent if the goal is to increase educational opportunity for disadvantaged students. For example, states can vary in the extent to which resources are distributed in favor of low-income students. Moreover, because some resources—e.g., additional teachers, increases to teacher salaries, new capital construction, expansions to early childhood education—will be more effective at improving student outcomes than others, any heterogeneity in the types of resource states emphasize will also be relevant. Finally, states considering SFR would benefit from understanding the tensions and tradeoffs of reform impacts.

[Word Count: 996]

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## Tables

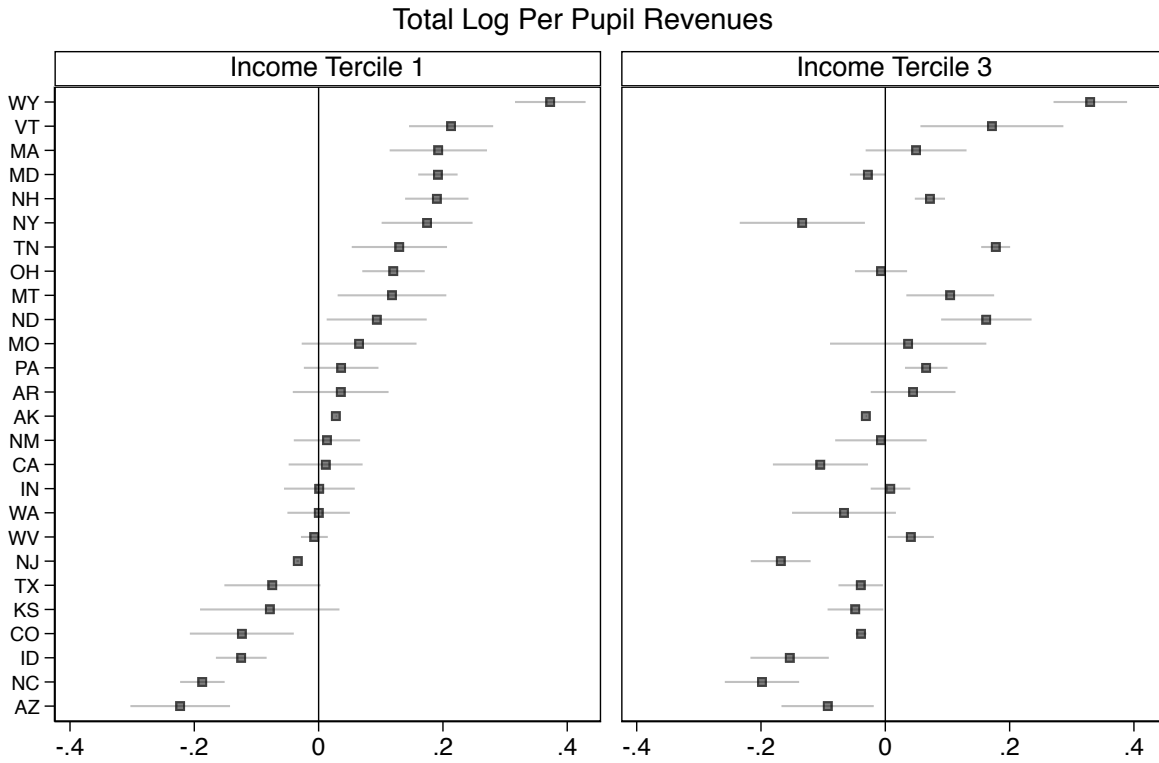
**Table 1: Predictors of SFR Effect Size Heterogeneity. Outcome: Effects Sizes of Logarithm of Per Pupil Revenues among High-Poverty Districts (Tercile 1)**

	<b>Income Inequality</b>	<b>Income per Capita</b>	<b>Citizen Ideology</b>	<b>Government Ideology</b>	<b>House Polarization</b>	<b>Senate Polarization</b>	<b>Union Strength</b>
Beta	-0.032***	0.051***	-0.023***	0.095***	0.029	-0.026	-0.018
	(0.00)	(0.01)	(0.00)	(0.01)	(0.03)	(0.03)	(0.02)
$R^2$	0.817	0.697	0.89	0.838	0.051	0.048	0.029
N	26	26	23	23	17	16	25

Significance level: \*\*\*  $p < 0.001$ . All regressions are weighted by the precision of the SFR estimate.

## Figures

Figure 1: State Variation in Total Log Per Pupil Revenues in Tercile 1 and Tercile 3



Notes: Income tercile 1 represents high-poverty districts within states and income tercile 3 represents low-poverty districts.

Figure 2: State Variation in Full and Part Day Kindergarten Enrollment in Tercile 1 (high-poverty districts)

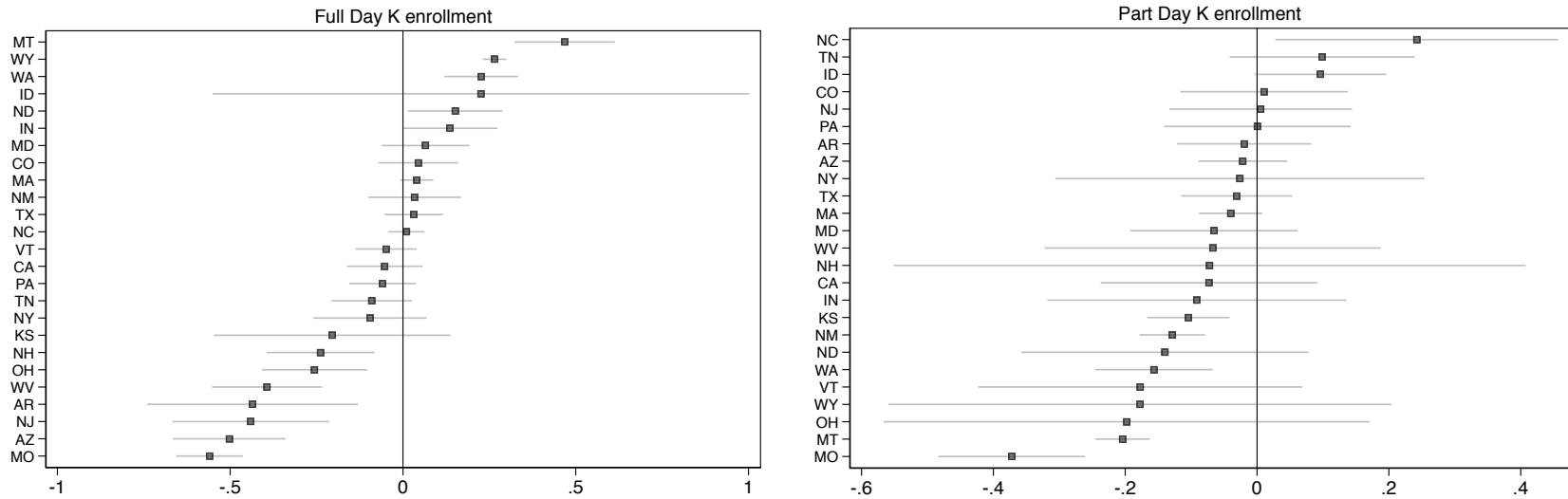


Figure 3: State Variation in Days and Minutes of School in Tercile 1 (high-poverty districts)

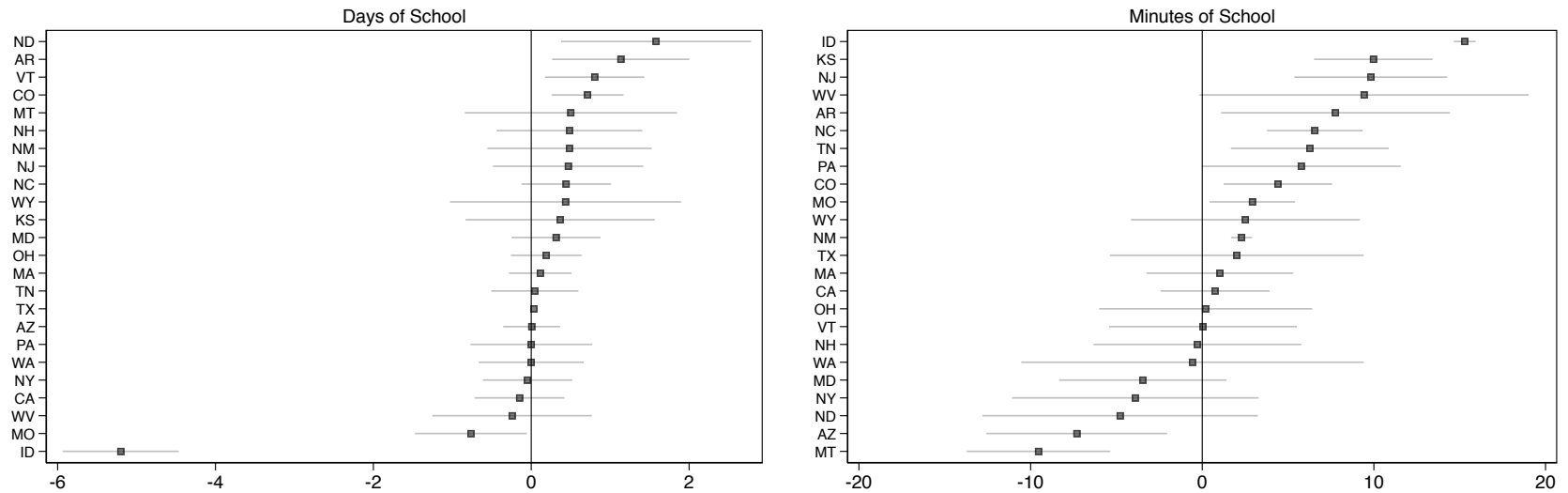


Figure 4: State Funding Formula and Effect Size Heterogeneity in Tercile 1 (high-poverty districts)

