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EdWorkingPaper No. 23-796

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Ishtiaque Fazlul
Kennesaw State University

Benjamin Scafidi
Kennesaw State University

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VERSION: June 2023

Suggested citation: Fazlul, Ishtiaque, and Benjamin Scafidi. (2023). The Heterogeneous and Longer-Term Effects of the Great Recession on Public School District Finances. (EdWorkingPaper: 23-796). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/fnrc-bd07

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Ishtiaque Fazlul[a] and Benjamin Scafidi[b]
Kennesaw State University

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Abstract

During the Great Recession and in the years that immediately followed, previous research has well-documented that U.S. public school districts receiving larger shares of their funding from state governments experienced larger declines in expenditures per student, as the GR impacted state tax bases more than it impacted local tax bases. Using detailed financial data from academic years 2004 to 2020, we analyze the longer-term effects of the GR on a broader array of U.S. public school district finances. Employing both difference-in-differences and event study approaches, our results indicate that public school expenditures and unspent end-of-year fund balances recovered and eventually exceeded pre-GR levels on an inflation-adjusted and per student basis. However, the funding increases were heterogeneous such that districts receiving larger shares of funding from states were less successful at increasing spending and fund balances through 2020—more than ten years after the GR officially ended. Our empirical strategy survives a host of robustness checks. This pattern is concerning as more state-dependent districts tend to have higher proportions of disadvantaged students.

JEL Codes: I22, G01, H75

[a] Clinical Assistant Professor of Economics, Kennesaw State University
[b] Professor of Economics, Kennesaw State University

Acknowledgement
The authors thank Cora Wigger, Melissa (Mimi) Lyon, Tom Downes, and seminar participants at the 2023 Association for Education Finance & Policy conference for helpful suggestions and comments. All remaining errors are ours.

I. Introduction

Using data from academic years (AY) 2004 to 2020 from the Census Bureau's Annual Survey of School System Finances (ASSSF) and the Common Core of Data and, we analyze the longer-term effects of the Great Recession (GR) on an array of U.S. public school district finance metrics. The Great Recession (GR), officially dated from December 2007 to June 2009, was the largest shock to the U.S. macroeconomy since the Great Depression of the 1930s. Unsurprisingly, the GR led to a reduction in public school district expenditures. While the federal government began increasing funding for school districts in AY 2010 to offset declines in school district revenues, this funding increase was temporary.

Previous research has well-documented that, during the GR and in the years that immediately followed, public school districts receiving larger shares of their funding from state governments experienced larger declines in expenditures per student relative to less state-dependent districts, as the GR impacted state tax bases more than it impacted local tax bases (e.g., Chakrabarti and Sutherland, 2013; Chakrabarti and Livingston, 2013a, 2013b, 2019, 2021; Chakrabarti et al., 2015, 2014; Evans, Schwab, and Wagner, 2019; Jackson et al., 2021). This pattern is concerning as districts that rely more on funding from state governments tend to serve higher proportions of disadvantaged students (Knight, et al., 2022). However, these studies consider the fiscal effects of the GR on public school districts only through AY 2017 and they only analyze expenditures.

To our knowledge, we are the first study to analyze the longer-term impacts of the GR on public school district finances, as we analyze data on an array of public school finances through AY 2020. In addition, we are also the first study to analyze the effect of the GR on the long-term fiscal position of school districts by analyzing changes in end-of-year fund balances and debt positions. Specifically, we ask:

- Were public school districts that rely more on funding from state governments differentially impacted by the GR relative to other school districts on a wide array of financial outcomes?

The measures of long-term financial outcomes for districts include four per capita (per student) measures of unspent end of year fund balances (total, debt, bond, and "other" where the latter equals total fund balances minus debt and bond fund balances); two measures of end of year per capita debt (long run and short run), and four measures of per capita expenditures (total current spending, instruction spending, support service spending, and capital outlay expenditures, where total current spending is the sum of instruction and support service spending).

Employing both difference-in-differences and event study approaches, our results indicate that public school expenditures and unspent end-of-year fund balances recovered and eventually exceeded pre-GR levels on an inflation-adjusted and per student (per capita) basis. However, the funding increases were heterogeneous such that districts receiving larger shares of funding from states were less successful at increasing spending and fund balances through 2020—more than ten years after the GR officially ended.

During the entire 2004 to 2020 time period under study, districts that had a higher than median level of state dependence had lower average per capita total fund balances and total current spending compared to districts with lower than median level of state dependence. Further, our estimates indicate that these gaps widened over time between 2008 and 2020. For example, in both 2019 and 2020, due to the GR, these disparities were, on a per capita and inflation-adjusted basis, over $1,100 larger for total fund balances and over $900 larger for total current spending, when compared to the disparities present in 2008. Thus, the disparities in total fund balances and total current spending between more- and less-state dependent districts widened significantly in the 11-year period after the end of the GR.

In addition, public school districts have been increasing year-end and unspent "other" fund balances since the end of the GR to levels that far exceed pre-GR levels, where "other" fund balances excludes unspent funds reserved for future debt service and capital projects and comprise a large

majority of total fund balances. Nevertheless, districts receiving higher shares of funding from state governments were also less successful at increasing these fiscal cushions such that the disparity between more and less state-dependent districted widened by over $900 per capita, over the 11 year post-GR period. The fiscal cushions from "other" fund balances will allow public school districts to better maintain expenditures in any upcoming economic downturns.

Given that disparities in expenditures per student and fiscal cushions that existed before the GR were even wider more than ten years after the official end of the GR suggests that districts that rely on state governments for more of their funding did not benefit from the post-GR economic recovery as well as other school districts and, consequently, will be less able to weather any economic storms in the future.

Short term debt levels appear to have been unaffected by the GR. That said, on a real and per student basis, school districts' long-term debt levels are significantly higher in recent years as compared to the years just prior to the GR. Nevertheless, the increases in long-term debt levels were significantly less than increases in unspent end-of-year fund balances, indicating that the long-term fiscal health of districts was better in recent years as compared to the years prior to the GR. With respect to disparities, districts with larger proportions of funding from state governments had less long-term debt prior to the GR and no significant changes in this regard relative to other districts after the GR.

These findings can inform federal, state, and local policymakers with respect to funding in future economic crises and how periods of economic distress impact school districts differently, in both the short and long terms.

The rest of this paper is organized as follows. Section II provides reviews of the literature on the effects of the GR on school district expenditures and the general literature on district fund balances. We

describe our data in section III and our empirical models in section IV. The results are presented in section V, and concluding remarks and a list of next steps with respect to this paper are in section VI.

II. Literature Review

Previous research has well-documented that during the Great Recession (GR) districts receiving larger shares of their funding from state governments experienced larger declines in expenditures per student, as the GR impacted state tax bases more than it impacted local tax bases. This pattern is concerning as districts that rely more on funding from state governments tend to serve higher proportions of disadvantaged students. This literature also showed that the extra $100 billion in federal funding given to public school districts to help them financially during the GR provided a larger financial benefit to some districts and some states given the formula to distribute those additional federal funds. Nevertheless, when those additional federal funds ended, public school districts more dependent on state funding were less successful at increasing per student expenditures relative to districts more reliant on local taxpayer funding in the first few years after the GR officially ended in 2009.

In this section we first review this literature on the effects of the GR on expenditures per student during the GR and in the first few years immediately after its end. Our paper extends their analyses up through the 2020 academic year (2019-20).

Our paper also considers a broader array of school finances that speak more to the longer-term fiscal health of districts, including unspent end-of-year fund balances and debt. Therefore, this section concludes with a review of the general literature on district fund balances and district debt levels.

Literature on the Effect of the GR on District Expenditures

In a series of papers with various colleagues Rajashri Chakrabarti showed that public school districts in New York and New Jersey experienced expenditure cuts due to the GR, and the school districts in New York State received about twice as much federal funding per student relative to New Jersey districts under the American Relief and Recovery Act (ARRA) of 2009 (Chakrabarti and Sutherland, 2013; Chakrabarti and Livingston 2013a, 2013b, 2019, 2021; Chakrabarti et al., 2015, 2014).[1] Given that they received more ARRA funding, districts in New York state were more able to maintain real funding levels on a per student basis relative to New Jersey districts (Chakrabarti, et al., 2015; Bhalla, et al., 2017), and consequently New Jersey districts had to reduce per student spending during the GR and immediately after. Nevertheless, when ARRA funding ended, New York districts also had to cut expenditures, as its other revenue sources did not recover rapidly enough to maintain prior spending levels (Chakrabarti and Livingston, 2017). And, reduced funding levels in New Jersey continued, even four years after the end of the GR (Chakrabarti and Livingston, 2021).

Using nationwide data, Evans, et al. (2019) showed that after the GR and through 2013 districts that relied more heavily on funding from state governments were less successful at increasing expenditures after federal ARRA funding ended in September 2011. Thus, disparities in funding between districts widened up through 2013. Evans et al. also report that property tax collections, typically the main source of local revenues for public school districts, increased in the first few years after the start of the GR. However, general sales tax, income tax, and corporate income tax collections—often important components of state tax revenues given to public school districts—were lower for several years after the start of the GR. Finally, they show that the trend of increasing spending

[1] The ARRA provided about $100 billion of federal funding to public school districts to improve their financial situation during the GR, and it was in addition to the routine federal funding given to districts. Districts began spending ARRA funds in academic year 2010 and had to finish spending these additional funds by September 30, 2011, which was early in the 2012 academic year.

inequality between more and less state-dependent districts had begun earlier in the 21st century, prior to the start of the GR. Jackson, et al. (2021) documents that the adverse impact of the GR on per student expenditures and student outcome in districts more dependent on state government funding persisted up through 2017, six years after the official end of the GR.

Figure 2 in Knight, et al. (2022) reports that in 2017-18 high poverty school districts (90th percentile) received 56.3 percent of their funding from state governments, while low poverty school districts (10th percentile) relied on state funding for only 38 percent of their total revenues. This paper goes on to show that across the board reductions in base state funding during economic downturns therefore yield a larger financial loss to districts that serve higher proportions of students living in poverty.

Our paper contributes to this literature in two important ways. First, it extends the analysis of GR's effect on school finance up to 2020. Second, we consider a broader array school finance metrics—in addition to per student expenditures, we also analyze various fund balances and debt measures in order to analyze the effects of the GR on long-term school finance outcomes.

In the next two subsections, we review studies that examine public school district fund balances and debt levels, respectively.

Literature on Public School District Fund Balances

There are two opposing schools of thought regarding public school districts, or any government entity, accumulating unspent end-of-year fund balances. One view is that fund balances are an important component of a school district's long terms fiscal health (Arapis and Reitano, 2016) because they allow for more flexibility in fiscal planning (Barrett et al., 2018). Fund balances not earmarked for capital or debt service allow for cushions during times of macroeconomic downturns, which allow districts to limit

or eliminate the need to cut instructional and other operational spending when their federal, state, and/or local tax revenues are reduced due to macroeconomic distress.

The second view is that accumulating fund balances is merely budget-maximizing bureaucracies endeavoring to increase their power or influence in ways that are beneficial to government employees, but not necessarily beneficial to taxpayers (Niskanen, 1971).

Moulick and Taylor (2017) provide evidence that Texas public school districts that had higher fund balances as a percent of annual expenditures had higher student test scores, all else equal, when the negative shock to budgets from the GR hit Texas school districts. Thus, this evidence suggests that it is prudent for public school districts to maintain fund balances to help them limit cuts in expenditures during times of economic distress.[2] This evidence gives credence to our use of fund balances as an indicator of school a district's fiscal health.

Literature on Public School District Debt

Public school districts incur short-term debt when they issue bonds with a maturity of one year or less, and they incur long-term debt when they issue bonds with a maturity over one year in length. Short-term debt is issued when districts have temporary and minor cash flow needs, or when districts face an expected or unexpected reduction in revenues or increase in expenses. Many public and private organizations occasionally face a cash flow issue that necessitates the issuance of short-term debt. However, the issuance of large levels of short-term debt relative to annual revenues may signal that a school district does not generate enough revenues to cover their costs.

[2] Moulick and Taylor (2017) analyze two forms of public school district "slack": (1) unspent end of year fund balances and (2) slack that results from public school districts hiring excess personnel. While their results indicate that the first form of slack benefits student learning outcomes, they find that this second form of slack appears to have a negative impact on student test scores.

Typically, districts rely on long term debt to build or renovate schools. This method of debt financing makes sense to pay for projects that will provide benefits to students over many years, such as the construction of a new school building that will likely last five or six decades (NCES, 1999). Diallo (2019) quotes school finance expert Ross Rubenstein, "One of the fundamental ideas behind debt is you want to try and match the life of what you're purchasing to the life of the debt."

Nevertheless, Diallo documents how some school districts that serve large proportions of disadvantaged students are issuing debt to finance technology purchases, such as laptops for students. These technology items typically last far less than the 20- or 30-year life of long-term bonds. About this relatively new phenomenon, Diallo writes, "Using long-term debt to pay for technology that may be obsolete in a couple of years, he (Rubenstein) says, is 'like taking out a mortgage to buy groceries.'" When districts use long-term debt to finance the purchase the items that will not last but a few years, then future students will have less of the districts' contemporaneous revenues devoted to their education, because some contemporaneous funding will be used to retire debt that financed items used in prior years. Thus, funding challenges that engender school districts to finance short-term items with long-term funding will only exacerbate those funding challenges in future years.

Benson and Marks (2005) show that public school districts that have lower credit ratings, which means they are expected to face greater risk in paying back the bondholders who lent them money, face higher interest costs when they borrow money. Issuing more debt relative to annual revenues is one factor that lowers the credit ratings of districts. Therefore, issuing more debt, all else equal, raises the interest costs districts face when they borrow money to finance projects.

The presence of more debt (or higher interest costs) also implies that any additional state funding that districts may receive in the future may have to be used to retire that debt (or pay the higher interest costs), rather than spent on other things. For example, Lyon, Bleiberg, and Schueler (2022) find that

when states take over local school districts, and when those districts had higher debt levels, that the influx of state funding was more likely used to retire that debt rather than being spent on instruction. Richmond (2019) profiles several districts that have found it difficult to pay back their debt, which resulted in either local tax increases or reductions in expenditures on their current students.

The next section describes the data we use to analyze the effects of the GR on an array of school district finances, including per student fund balances, debt, and expenditures.

III. Data

In this study we use two primary sources for our public school district level data. First, the U.S. Census Bureau's Annual Survey of School System Finances (ASSSF) includes information on the financial activity of all public elementary and secondary school districts in the U.S. (Census Bureau, 2019). The ASSSF is our data source for each district's enrollment, expenditures, state dependence (percent of revenues from their state government), unspent fund balances held at the end of the fiscal year, and debt. The second data source we use is the Common Core of Data (CCD) from National Center for Education Statistics (NCES), which gives us district level student demographic data. We use school district level data ranging from 2003-2004 to 2019-2020 (henceforth academic years 2004 and 2020) from these sources.

To create a balanced panel of public school districts from academic years 2004 to 2020, we do a few data cleaning operations. First, we only keep school districts that were present in all 17 years from 2004 to 2020 and had a non-zero enrollment in all of these years. Second, to make sure that the districts are comparable, we only keep the districts that are "Regular" or "Local" according to CCD's classification in both 2004 and 2020, and at least 7 out of the 15 years in between. A vast majority of school districts (e.g., 90% in 2020) are one of these two types. Finally, we drop districts with 0 total

current spending (9 districts), and states where all districts in the state reportedly do not have any unspent fund balances held at the end of the fiscal year (8 states).[3] We also drop 59 district-years for missing share of students eligible for a free or reduced price meal. After this clean-up, our analytic sample consists of 12,023 school districts (which is 85% of the 14,135 school districts present in Annual Survey of School System Finances 2020) and 204,349 district years.

Table 1 shows district-year level summary statistics for the analytic sample for our study period of 2004 to 2020. In all our analyses, we use dollar amounts in real, inflation-adjusted, January 2020 U.S. dollars.[4] Hereafter, we use the term "per capita" to refer to variables that are reported on a per student basis.

The average district over this time period had 3,441 students, and the standard deviation is large, as there are many very small public school districts in many states and some extremely large districts (e.g. New York City, Los Angeles, Chicago). On average, districts received 48.7 percent of their revenues from state governments during the 2004 to 2020 time period.

With respect to unspent fund balances at the end of each fiscal year, the Census Bureau separates these funds into unspent funds earmarked to pay future debt service, unspent funds earmarked for bonds, and unspent "other" funds. Debt must be repaid, of course, and bonds are typically used to finance major repairs of older school buildings and the construction of new schools when they are needed to accommodate enrollment growth or to replace very old school buildings. While we report trends in debt service fund balances and bond fund balances, we focus our attention on "other" fund balances, as these funds may be used to pay for future operational spending, such as teachers, aides, classroom materials,

[3] States dropped due to having 0 total fund balances for all their districts for all 17 years are Alaska, Washington DC, Hawaii, Maryland, Massachusetts, North Carolina, Rhode Island, and Virginia.

[4] To make inflation adjustments, we used the annual Consumer Price Index values as reported by the St. Louis Federal Reserve FRED database, https://fred.stlouisfed.org/series/CPIAUCSL#@W. If we had instead used the Personal Consumption Expenditures (PCE) price index, real expenditures, fund balances, etc. would have increased by more over time than is suggested by our use of the CPI to adjust dollar figures across time. For example, the CPI increased by 6.1 percentage points more than the PCE price index between 2004 and 2020.

counselors, etc. As discussed in the prior section, fund balances may play an important role in helping school districts maintain student achievement and funding levels when bad economic times reduce their incoming revenues.

As shown in Table 1, districts averaged $6,698 per capita (per student) in unspent total fund balances at the end of each year, but the standard deviation is over 2.6 times as large as the mean indicating substantial heterogeneity across districts. Given the ages of school buildings vary across districts and given that many districts experienced net enrollment growth of the time period under study while others experienced net enrollment declines, it is not surprising that there are large differences in fund balances earmarked for debt service and bond funds, as districts surely have vastly different future capital needs. Table 1 shows that the standard deviation of debt service fund balances is over triple its mean, and the standard deviation of bond fund balances is over 10 times its mean.

At over 75 percent of total fund balances ($5,040 per capita), "other" fund balances is the largest component of total fund balance. These unspent end of year funds are substantial when compared to annual per capita expenditures—for instance, unspent other fund balances are on average 37.7 percent as large as per capita current spending. However, the standard deviation of unpent other funds per capita is over twice the mean, indicating substantial heterogeneity across districts and, as shown below, across time as well.

The top left panel of Figure 1 shows the trend of per capita total fund balances held at end of fiscal year as well as its three components: per capita debt service fund balances, per capita bond fund balances, and per capita "other" fund balances. We will refer to these as per capita total funds, debt funds, bond funds, and other funds henceforth. As mentioned above, all of these per capita variables are adjusted for inflation using the CPI-U and are in 2020 dollars.

There is a general upward trend in real per capita total fund balances between 2004 and 2020—in 2004, total fund balances per capita were $4,761, which increased to $8,868 by 2020, an increase of 86.3 percent on a per student and inflation-adjusted basis. Per capita other funds, the largest component of total fund balances, drove this upward trend, as per capita bond and debt funds were relatively smaller portions of the total in 2004 and did not experience as much growth during this time period. Per capita other fund balances almost doubled in real terms during this time period from $3,416 to $6,706, a 96.3 percent increase.

Per capita bond funds increased by 56.8 percent in real terms, from $1,031 in 2004 to $1,617 in 2020. Per capita debt funds increased by 73.4 percent during this time period, from $314 to $545. While these percent increases were large between 2004 and 2020, the absolute increases were minor when compared to the $3,290 per capita real increase in other funds.

The top right panel of Figure 1 shows the trend of per capita total funds as a share of total expenditure and per capita other funds as a share of total current spending. Per capita total funds increased from 33 percent of per capita total spending in 2004 to 48 percent in 2020. We also compare the ratio of per capita other funds to current spending, because current spending omits expenditures on capital and debt service. In 2004, the national average across public school districts in the ratio of per capita other funds to per capita current spending was 28 percent, while the ratio increased to 43 percent by 2020. The top right panel of Figure 1 also shows a bump in total and other funds per capita in 2007 relative to spending, which was perhaps districts anticipating the economic downturn that was to become the Great Recession (GR). After 2007 per capita total and other fund balances initially declined, relative to spending, and did not reach 2007 levels again until 2012 for total funds and 2011 for other funds. After 2012, these fund balances experienced a general and significant upward trend until 2020, the end of our sample period.

The bottom left panel of Figure 1 shows that real per capita long run debt outstanding at the end of the year had a general upward trend between 2004 and 2020 with a modest decline in the few years after 2010. Per capita long run debt did not regain its 2010 level again until 2015. In 2004 long run debt per capita was $6,680, and it increased to $8,883 by 2020. This 33 percent real increase in average per capita long run debt was much smaller relative to the increases in per capita bond funds (56.8 percent) and debt funds (73.4 percent). Thus, on average and relative to long run debt outstanding, school districts had more unspent fund balances earmarked for debt and bonds in 2020 as compared to 2004. Per capita short run debt outstanding at the end of the year was, in contrast, fairly steady during this time period, decreasing from $304 per capita in 2004 to $271 per capita in 2020, which is about a 10 percent decline in real terms.

In the bottom right panel of Figure 1, we see that per capita total current spending, which is total expenditures minus expenditures for capital and debt service, has had a general upward trend during our study period—from $11,898 per capita in 2004 to $14,861 in 2020. Nevertheless, there was a real decline in per capita current spending at the end of the Great Recession from $13,459 in 2010 to $13,039 in 2012, a decrease of 3.1 percent in real current spending per capita.

These national trends of higher per capita current spending and higher other fund balances after 2012 hide significant heterogeneity across districts, especially between districts that rely more on state funding as compared to districts that get a smaller fraction of their revenues from state government sources. And we explore these heterogeneous trends in the next two sections.

IV. Empirical Model

In this paper we estimate the effects of the Great Recession (GR) on the long-term financial health of American public school districts. Our measures of long-term financial health include per capita

fund balances held at the end of fiscal year, per capita debt outstanding at the end of the year, and per capita current spending. As the GR was a nationwide phenomenon that began in December 2007, we don't have a pure control group of states or districts that was not affected by the GR at all. However, there are some districts whose finances were affected more by the GR than others. Existing literature finds that the GR led to significant declines in state revenues but did not affect local revenue as much (e.g. Knight et al, 2022). In fact, according to Evans et al. (2019), local revenue from property tax increased during the GR fueled by increased property tax millage rates to combat declining property valuations. So, districts that depend more on state funds were more vulnerable to the adverse financial effects of the GR than districts that were less dependent on state funds. We use this variation in district vulnerability to the GR in a so-called "bite" method to estimate the effect of the GR on districts' fiscal health.

We estimate the following difference in differences model to identify the effect of GR on the long term financial health of public school districts, where the sources of differences are time and pre-GR (2007) dependence on state funding.

$$y_{dst} = \beta_0 + \beta_1 Treat_{ds} + \beta_2 Treat_{ds} \times Post_t + \beta_3 \boldsymbol{X}_{dst} + \tau_t + \alpha_s + \varepsilon_{dst} \quad (1)$$

Here, y_{dst} is one of the financial outcomes for district d in state s in year t. In our preferred specification $Treat_{ds}$ is an indicator variable assuming the value of 0 if the district s's state dependence in 2007 was lower than the national median level and 1 if it was higher than the national median. The median level of state dependence for districts in 2007 was 51.8 percent. We use the district-specific state dependence in 2007 because a district's vulnerability to the GR depends on its state dependence in the pre-GR period. Any post-GR state dependence may be a response to the GR and is therefore not useful variation in identifying the effect of the GR in our design. As discussed below, we use a continuous state dependence variable as a robustness check, but we prefer the above-median indicator variable, given the

recent methodological debate around interpreting the coefficients of a continuous treatment variable in difference in differences empirical models (Callaway et al. 2021).

$Post_t$ is an indicator variable that takes the value 1 for years after 2008, as the GR officially began during the 2008 academic year. $\boldsymbol{X}_{dst}$ is a vector of time varying district-specific characteristics. In our preferred specification X_{dst} includes district enrollment, percent of free and reduced-price meal (FRM) students, percent female students, and percent non-White students. The inclusion of enrollment as a covariate on top of converting all dollar amounts to per capita amounts allows us to control for the size of the district in a linear fashion.[5] τ_t and α_s are year and state fixed effects, respectively. Note that the $post_t$ is not in this equation independently. Instead, the year fixed effects control for nationwide year effects in a more flexible way. The state fixed effects, on the other hand, control for time invariant state specific characteristics. We cluster standard errors at the state level.

In equation (1), the differential effect of GR on the financial outcomes of high state dependence districts as compared to low state dependence district is given by β_2. β_2 captures the causal effect of GR on our measures of district financial outcomes under the identifying assumption that in absence of the GR, financial outcomes would be trending similarly in low and high state dependence districts. Though we cannot test the identifying assumption directly, we can test if the outcomes of districts with different levels of state dependence trended similarly on average in the pre-GR period. We show evidence of parallel pre-trends using an event study design in the results section.

Alternate specifications and robustness checks

Along with the event study, we conduct three additional robustness checks of our empirical design for our primary outcomes of interest – per capita fund balances held at the end of fiscal year.

[5] We also ran more flexible specifications with enrollment squared as a covariate on top of linear enrollment, but our results don't change qualitatively or in meaningful quantitative ways.

First, we estimate a version of our preferred specification using a continuous treatment variable instead of a binary indicator. In this version, we estimate regression equation 2 where $statedep_{ds}$ is the percent of revenues coming from state sources in district d and state s in the year 2007.

$$y_{dst} = \gamma_0 + \gamma_1 Statedep_{ds} + \gamma_2 Statedep_{ds} \times Post_t + \gamma_3 \boldsymbol{X}_{dst} + \tau_t + \alpha_s + \varepsilon_{dst} \quad (2)$$

In equation 2, all the variables other than $Statedep_{ds}$ have the same meaning as in equation 1. Here, γ_2 is the differential effect of the GR on districts that were more state dependent compared to districts that were less state dependent on our outcomes of interest. The implicit assumption behind this "dose response" framework is that districts' long-run financial health has a gradient or dose response to higher levels of state dependence. For γ_2 to be the causal effect of the GR due to increasing state dependence, we need an added assumption on top of the parallel trend assumption mentioned above. This "strong" parallel trends assumption postulates that for all the different levels of state dependence (dose), the average change in outcomes over time across all districts, if they had been assigned a given amount of dose, is the same as the average change in outcomes over time for all districts that experienced that dose (See Assumption 5 in Callaway et al. 2021). This assumption is related to but weaker than a treatment effect homogeneity assumption which postulates that each unit would be affected exactly the same way for the same dosage. In other words, there would have to be no selection into particular dose amounts.[6]

Second, we present an alternate specification following Finkelstein (2007) and Miller (2012), where these two studies estimate the causal effect of health insurance on healthcare utilization using pre-period uninsurance rates as a source of identifying variation. Following the empirical specification of

[6] Callaway et al. (2021) characterizes the strong parallel trend assumption the following way – "Assumption 5 is also related to, but weaker than assuming that all dose groups would have experienced the same path of outcomes had they been assigned the same dose (which would rule out any selection into a particular dose) or that ATE(d) = ATT (d|d) (which is a kind of treatment effect homogeneity condition). Compared to this, Assumption 5 allows for some selection into a particular dose but requires that, on average across all doses, there is no selection into a particular dose."

these two studies, we include district fixed effects (α_d) to control for time invariant district specific characteristics.

$$y_{dt} = \lambda_0 + \lambda_1 Treat_{ds} \times Post_t + \lambda_2 \boldsymbol{X}_{dst} + \tau_t + \alpha_d + \varepsilon_{dst} \qquad (3)$$

In equation (3), we drop the independent *Treat* variable and the state fixed effects, both of which are collinear with district fixed effects. all other variables have the same meaning as equation (1). Here, λ_1 captures the causal effect of GR on district financial outcomes under the same identifying assumption as equation 1.

Finally, we conduct a placebo treatment time analysis by confining our analysis to pre-GR time periods only (2004-2006) and assigning 2005 as the placebo treatment year. If our baseline estimation model is accurate, we should not find any effect of this placebo treatment on 2006 financial outcomes.

V. Results

In this section, we report results from estimating models based on equations (1) above that explain a variety of long-term financial outcomes for public school districts. The measures of long-term financial outcomes for districts include four per capita measures of unspent end of year fund balances (total, debt, bond, and "other" where the latter equals total fund balances minus debt and bond fund balances); two measures of end of year per capita debt (long run and short run), and four measures of per capita expenditures (total current spending, instruction spending, support service spending, and capital outlay expenditures). As mentioned above, each of these financial outcomes are adjusted for inflation using the CPI-U and are expressed in 2020 USD on a per capita (per student) basis.

The Relationship Between Per Capita Fund Balances and State Dependence

Table 2 contains results of estimating equation (1) where the dependent variables are per capita total fund balances—and the three components of per capital total fund balances, debt funds, bond funds, and other funds. The independent variable of interest is "*Treat* × *Post*" where "*Treat*" is an indicator variable that equals 1 for districts with above national median share of revenues from state government sources in 2007 and "Post" equals 1 for all academic years after 2008 (2009 through 2020). The initial columns of Table 2 for each dependent variable contain no control variables, while the second columns for each dependent variable—our preferred specifications—contain all control variables.

The estimated coefficient on *Treat* × *Post* indicates to what extent districts with greater state dependence in 2007 (districts with above-median share of revenues from state government sources) had differential changes in their total fund balances per capita due to the onset of GR relative to districts with lower state dependence in 2007 (districts with below-median share of revenues from state government sources).

As shown in the second row of Table 2, districts with higher levels of state dependence (*Treat* = 1) had significantly lower total fund balances compared to districts with lower levels of state dependence (*Treat* = 0) during the pre-GR period (2004 to 2008). In column 2, the specification with all control variables, districts with more state dependence had $1,520 less per student ($p<.05$) in total fund balances during the pre-GR period. Further, the first row of column 2 in Table 2 shows that this disparity widened in the years after the GR (*Post* = 1). Specifically, the disparity in per capita total funds is estimated to have widened by $734 per student ($p<.10$) in the years after the GR and up through 2020. Thus, this first metric of long-term fiscal health has been less favorable for districts with more reliance

on state funds since 2004, and the disparity widened significantly by 48.3 percent (-734/-1,520) after the GR.

The importance of this finding, as noted above, is that districts who receive more of their funding from state government sources tend to be more disadvantaged economically relative to other districts, because state funding formulas for public schools tend to provide more funding for districts with less local property wealth per student.

As shown in Table 2, there are large differences across the three categories of fund balances. Specifically, during the pre-GR period, treated districts (with above median state dependence) had significantly lower per capita bond and other fund balances, but no large or statistically significant differences with respect to per capita debt fund balances (second row of columns 3 through 8 in Table 2). In addition, after the GR, the change in the disparity in per capita bond fund balances (first row of column 4) is small and statistically insignificant, as was the change in per capita debt fund balances (first row of column 6).

There is a different pattern for other fund balances, where other fund balances equal total fund balances minus debt and bond fund balances. The disparity with respect to per capita other fund balances widened significantly after the onset of the GR. Specifically, the estimates in column 8 suggest that the lower average levels of other fund balances in more state dependent districts almost doubled after the GR. That is, prior to the GR more state dependent districts had per capita other fund balances that were $775 lower, but after the GR these unspent funds were over $1,500 lower on a per capita basis ($775 + $746 = $1,521), $746 of which can be interpreted as the causal effect of the GR. This disparity due to the GR is of policy significance given that these other fund balances may be used in the future to cushion the effects of economic downturns, provide more funding for students for remediation given the effects of school closures during the coronavirus pandemic, or other important operational priorities. In

addition, Moulick and Taylor (2017) found that Texas public school districts that had higher fund balances as a percent of annual expenditures had higher student test scores, all else equal, when the negative shock to budgets from GR hit Texas school districts. Table 2 also shows that adding control variables does not have much impact on the estimated coefficients of interest (*Treat* × *Post*).

We also employ an event study approach using a version of equation 1 where the *Treat* variable is interacted with year indicator variables and the reference year is 2008. The event study serves two purposes. First, the pre-GR coefficients give us an indirect test of the identifying assumption for the causal effect of GR, namely, if the GR did not take place in 2008, then conditional on the covariates in equation 1, the low and high state dependence district's unspent fund balance would experience similar change over time. So, ideally, we want to see smaller and insignificant coefficients for the pre-GR period between 2004 and 2007, which would mean that the unspent fund balances trended similarly for high and low state dependence districts before the GR. Second, the event study gives us a tool to separately identify the year-by-year effect of the GR on fund balances.

The results from the event study approach are reported in Table 3, as well as Appendix Figure 1. As was done above, we use 2008, the academic year in which the GR officially started, as the omitted year, so all coefficients for "year × Treat" are relative to 2008. In Table 3, two of the 16 pre-GR coefficient estimates are statistically significant ($p<.10$), and 14 out of 16 of these estimated coefficients are small in absolute value and statistically insignificant, which gives credence to our identifying assumption of parallel pre-trends. Appendix Figure 1 shows the same result in a visual way. It shows that for the pre-2008 years, the coefficients are close to 0 and the 95 percent confidence interval includes zero. So, we cannot reject the null that the GR had no effect on pre-GR fund balances.

Focusing on the post-GR numbers in both Table 3 and Appendix Figure 1, we find that the disparity in total and other fund balances per capita between the high and the low state dependence

districts really widened after the expiration of federal ARRA funding in September 2011 (which is early in academic year 2012). Specifically, the gap in these fund balances between districts with low and high state dependence began to widen statistically significantly in 2013 for total fund balances and 2012 for other fund balances, and these disparities tended to get larger as time went by and districts were further away from the GR. For instance, in both 2019 and 2020, the disparity between more and less state dependent districts in total fund balances was over $1,100 larger per capita relative to 2008—and the disparity in both those years for other fund balances was over $900 per capita larger than 2008.

Although fund balances increased significantly in magnitude between 2004 and 2020 on average (see figure 1), an important indicator of improved long-term fiscal health for American public school districts, the estimates in Tables 2 and 3 provide evidence that the disparities in total and other fund balances between districts that are more and less state dependent widened to a large degree in the decade of national economic recovery following the end of the GR. Thus, the long-term effects of the GR on school district finances were heterogenous with respect of end of year unspent fund balances, as less state dependent districts were more successful at increasing other fund balances per student as compared to more state dependent districts. The next subsection considers another measure of long-term fiscal health of public school districts: debt per capita.

The Relationship Between Per Capita Debt and State Dependence

Table 4 provides estimates from two regressions consistent with equation (1), where the dependent variables are, respectively, per capita long-term debt and per capita short-term debt outstanding at the end of the academic year. Contrary to the results in the prior subsection, there was no increase in disparities in either per capita long-term or short-term debt in the years following the GR as the estimates of the coefficient on *Treat* × *Post* are small and statistically insignificant.

Interestingly, districts with more state dependence (*Treat* = 1) had a lot less long-term debt per capita relative to districts with below median state dependence ($2,108 less per student, column 1 of Table 4, p<.01), but there are no detectable differences in per capita short-term debt with respect to state dependence.

An event study approach confirms the results in Table 4, and the estimates from this latter approach are reported in Appendix Table 1 and Appendix Figure 2. All interactions between the indicator variable for *Treat* and the year indicator variables are statistically insignificant for all years prior to the GR. Unlike in Table 3 with respect to fund balances, the coefficients on these interactions are statistically insignificant even after the GR. Appendix Figure 2 shows the same results visually. For both long run and short run debt, the 95 percent confidence interval includes zero, which implies, by these debt metrics, the GR did not appear to have a heterogenous impact on districts more reliant on state funding relative to districts less reliant on state funding.

The Relationship Between Per Capita Annual Expenditures and State Dependence

Previous research has shown that in the years immediately following the GR, districts more dependent on state revenue sources experienced less robust increases in per capita expenditures as compared to districts with less reliance on state funding. In this subsection, we extend this prior literature by taking the analysis out to 2020. As shown in Tables 5 below, prior to the GR, districts more reliant on state funding (*Treat* = 1 in the second row of the tables) spent less per capita overall, less on instruction and support services per capita, and less on capital outlay per capita expenditures relative to districts that were less state dependent. More importantly, as shown in the first row of Table 5, due to the GR, total current spending, spending for instruction, and spending for support services decreased in

high state dependence districts relative to low state dependence districts. The GR did not have statistically significant effect on capital outlay expenditure.

According to Table 5, during the pre-GR period (2004 to 2007), districts with above median state dependence (*Treat* = 1) had significantly less total current spending per capita ($1,093, second row in column 1). However, post-GR, this disparity increased by $795, a 73 percent increase (first row in column 1). During the pre-GR period, more state dependent districts spent on average $478 less per capita on instruction and $562 less per capita on support services.[7] After the GR, these disparities increased by $558 for per capita instruction spending (column 2) and $257 for per capita support service spending (column 3). Column 4 of Table 5 shows that treated districts spent $300+ less per capita for capital outlay during the pre-GR period, and this disparity was largely unchanged in the years following the GR.

The event study results are reported in Table 6 and Appendix Figure 3 below and show that disparities in per capita total current, instruction, and support service spending generally widened after 2009 and up to 2020, but that the disparity in per capita capital outlay expenditures was largely unchanged after the GR. For example, the disparity in per capital total current spending widened by over $900 per student in both 2019 and 2020, relative to 2008. All the treatment/year interaction terms are statistically insignificant and quantitatively small for years prior to the GR, giving us confidence in our identification strategy.

Results from alternate specifications and robustness checks

In this subsection we present three alternative specifications as robustness checks of our empirical approaches that were described above. First, following equation 2, we repeat our analysis

[7] Total current spending equals the sum of instruction spending, support service spending, and "other" current spending. "Other" current spending averaged less than $660 per student during the time period under study and is not considered separately in Tables 5 and 6.

using a continuous treatment variable where *Treat* is replaced with the continuous variable $Statedep_{ds}$, which is the percent of revenues coming from state sources in district d of state s in the year 2007. Table 7 is analogous to Tables 2 and 5, and the only difference is that the treatment variable (*Statedep*) is continuous in the latter tables, while the treatment variable (*Treat*) was dichotomous in the previous analysis. All of the main findings in these two versions are qualitatively similar.

For example, the mean of the percent of revenues that comes from state sources is 48.7 and the standard deviation is 18.6 (Table 1). Using the results column 4 in Table 7, before the GR, a district with one standard deviation higher state dependence (18.6) than another district, all else equal, is estimated to have $1,053 less other fund balances per capita (-56.625 x 18.6 = $1,053, where the -56.625 estimate is from the second row of column 4). Due to the GR, the estimates in Table 7 suggest this disparity increased by $453 per capita (-24.350 x 18.6 = $453 for a district with mean state dependence, where the -24.350 estimate is from the first row of column 4). The GR did not have any statistically significant differential effect on per capita debt and bond fund balances according to this specification. These results are consistent with the results in Table 2.

Likewise, similar to the results in Table 5, using the continuous treatment variable (*Statedep*), Table 7 shows that higher state dependence leads to statistically significantly lower relative per capita total current spending, per capita total current spending for instruction, and per capita total current spending for support services in the years after the GR, relative to less state dependent districts.

Similar to Table 4, Appendix Table 2, which uses continuous treatment effects, shows that the GR did not have any differential effect on more and less state dependent districts when it comes to per capita long run and short run debt outstanding.

Comparing the event study results between the binary and continuous treatment analysis (Appendix Tables 3, 4, and 5 against Table 3, Appendix Table 1, and Table 6) lead to the same

inferences—disparities in terms of per capita funds balances and expenditure between more- and less-state dependent districts widened after the GR even through 2020, more than a decade after the GR ended. For example, in Appendix Tables 3 and 5, the results indicate that as time went by, districts that were more state dependent for their revenues experienced larger disparities in their long-term fiscal health, relative to less state dependent districts. Also, none of the estimated coefficients on the interactions between year and percent of revenues from the state (*Statedep*) are quantitatively large or statistically significant for years prior to the GR, which suggests we have parallel trends in the pre-GR period between districts with more and districts with less state dependence.

As the second robustness check, following Finkelstein (2007) and Miller (2012), we estimate an empirical model with district fixed effects to control for district specific time invariant characteristics as shown in equation 3. Table 8 shows similar results to our main unspent fund balance results in Table 2 and expenditure results in Table 5.

As the third robustness check, we do a placebo treatment time analyses and present the results in Table 9. Here, we confine our sample to the pre-GR period only (2004-2006), define 2005 as the year of treatment, 2006 as the *post* year, and the districts with more than median level of state dependence in 2004 (i.e., more than 52% of the district budget coming from state sources) as treated districts. We find no effect of a placebo treatment in 2005 on funds and expenditure. That is, the estimated coefficients on Treat × Post are small and statistically insignificant in all specifications in Table 9. That these estimates are small and statistically insignificant gives us further confidence in our identification strategy.[8]

[8] We also conducted three additional analyses to see if there were contextual effects from the entirety of state government budgets that may have led to different impacts of the state dependence of school district long-term fiscal health. We thank Cora Wigger, Melissa (Mimi) Lyon, and Tom Downes for these interesting suggestions. Specifically, we analyzed three separate overall state budgets contexts to see if they impacted more state-dependent school districts:

- Were more state dependent districts impacted differentially if the total state government budget in their states experienced a larger drop between 2001 and 2002, during the economic recession that was just prior to the GR?

VI. Conclusions and Next Steps

Our results extend the previous literature and show that even 11 years after the official end of the Great Recession (GR), public school districts that were more dependent on state sources of funding were disadvantaged with respect to an array of long-term fiscal outcomes, including real expenditures per student and fund balances per student. While the national trend with respect to expenditures and fund balances was higher in real terms and on a per student basis starting a few years after the GR ended, the disparities in these financial outcomes were larger in recent years (up through 2020) as a result of the GR. Specifically, our results:

- Suggest that this disparate impact of the GR on public school districts more dependent on their state governments for their revenues was longer lasting than previously understood.

- Indicate that this disparate impact on more state-dependent districts was also worse than previously understood as in the 11 years after the official end of the GR, more state-dependent districts were less successful at increasing their unspent end-of-year fund balances relative to less state-dependent districts. Fund balances, especially "other" fund balances that are not earmarked for debt or bonds, permit school districts to better maintain their funding levels in future economic recessions, and more state dependent districts were less able to increase these fiscal cushions relative to other districts. Prior research focused on expenditures and did not consider the effects of the GR on fund balances.

- Lend support to the main policy recommendations from Knight, et al. (2022) that in future economic recessions states should avoid across the board reductions in general formula funding because these cuts disproportionately impact disadvantaged students and that states should instead cut categorial funding programs that accrue more to wealthier school districts.

- Were more state dependent districts impacted differentially if the total state government budget showed more volatility in the 1999 to the 2003 time period? The year 1999 is two years prior and 2003 is two years after the onset of the economic recession immediately preceding the GR.

- Were more state dependent districts impacted differentially if the K-12 public school share of the total state government budget was larger in 2007?

We can detect no evidence that the first two (volatility) measures impact the relationship between state dependence and the effect of the GR on the long-term fiscal outcomes analyzed in our paper. However, we do find some evidence that more state-dependent districts that reside in states that devote larger shares of their total state budgets to K-12 public education were more impacted by the GR relative to other districts—from interacting share of the state budget in 2007 devoted to K-12 education with our treatment variable. Given that prior research showed that revenue from state sources were more adversely affected due to the GR compared to local revenue, it makes sense that more state dependent districts in states where the K-12 system is a bigger part of state budget were especially adverse affected by the GR. Future work should seek to analyze these contextual effects in greater depth.

The fact that more state-dependent public school districts saw larger disparities with respect to expenditures and fund balances per student as compared to less state-dependent districts is problematic from the standpoint that more state-dependent districts tend to have higher proportions of disadvantaged students. These findings can inform federal, state, and local policymakers with respect to funding in future economic crises and how they impact school districts differently, in both the short and long terms.

References

Arapis, T., & Reitano, V. (2018). A Glimmer of Optimism in Government Savings Accumulation? An Empirical Examination of Municipal Unassigned Fund Balance in Florida. *Public Finance Review*, *46*(3), 389–420. https://doi.org/10.1177/1091142116643386

Barrett, N., Fowles, J., Jones, P., & Reitano, V. (2019). Forecast Bias and Fiscal Slack Accumulation in School Districts. *The American Review of Public Administration*, *49*(5), 601 613. https://doi.org/10.1177/0275074018804671

Bhalla, Ravi, Chakrabarti, Rajashri, and Max Livingston. 2017. A Tale of Two States: The Recession's Impact on N.Y. and N.J. School Finances. Available https://www.newyorkfed.org/medialibrary/media/research/epr/2017/epr_2017_school-funding-nynj_chakrabarti.pdf?la=en

Callaway, B., Goodman-Bacon, A., & Sant'Anna, P. H. (2021). Difference-in-differences with a continuous treatment. *arXiv preprint arXiv:2107.02637*.

Chakrabarti, Rajashri, and Max Livingston. 2013a. The long road to recovery: New York schools in the aftermath of the Great Recession.
Available https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr631.pdf.

Chakrabarti, Rajashri, and Max Livingston. 2013b. Still not out of the woods? New Jersey schools during the recession and beyond.
Available https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr632.pdf.

Chakrabarti, Rajashri, and Max Livingston. 2021. Tough Choices: New Jersey Schools during the Great Recession and Beyond. Available https://www.newyorkfed.org/medialibrary/media/research/epr/2021/epr_2021_tough-choices_chakrabarti.pdf .

Chakrabarti, Rajashri, and Sarah Sutherland. 2013. Precarious slopes? The Great Recession, federal stimulus, and New Jersey schools. Economic Policy Review 19(2): 41–65.

Chakrabarti, Rajashri, Max Livingston, and Elizabeth Setren. 2015. The Great Recession's impact on school district finances in New York state. Economic Policy Review 21(1): 45–66.

Chakrabarti, Rajashri, Max Livingston, and Joydeep Roy. 2014. Did cuts in state aid during the Great Recession lead to changes in local property taxes? Education Finance and Policy 9(4): 383–416.

David S. Knight, Nail Hassairi, Christopher A. Candelaria, Min Sun, Margaret L. Plecki; Prioritizing School Finance Equity during an Economic Downturn: Recommendations for State Policy Makers. *Education Finance and Policy* 2022;17 (1): 188–199.doi: https://doi.org/10.1162/edfp_a_00356

Diallo, Amadou; School Districts are Going into Debt to Keep Up with Technology. The Hechinger Report. April 22, 2019. https://hechingerreport.org/school-districts-are-going-into-debt-to-keep-up-with-technology/

Earl D. Benson and Barry R. Marks; ‘‘Robin Hood’’ and Texas School District Borrowing Costs. *Public Budgeting & Finance* 2005; 25 (2): 84-105.

Richmond, Emily; When school districts fall into debt and can’t get out. The Hechinger Report. April 22, 2019. https://hechingerreport.org/when-school-districts-fall-into-debt-and-cant-get-out/

Evans, W. N., Schwab, R. M., & Wagner, K. L. (2019). The Great Recession and public education. *Education Finance and Policy*, *14*(2), 298-326.

Finkelstein, Amy. (2007). The aggregate effects of health insurance: Evidence from the introduction of Medicare. *The quarterly journal of economics*, *122*(1), 1-37.

Jackson, C. Kirabo, Cora Wigger, and Heyu Xiong. 2021. "Do School Spending Cuts Matter? Evidence from the Great Recession." *American Economic Journal: Economic Policy*, 13 (2): 304-35.

Lyon, M. A., Bleiberg, J., & Schueler, B. E. (2022). Does Centralization Promote Fiscal Health? The Effect of State Takeover of Local School Districts on Education Finance.

Miller, S. (2012). The effect of insurance on emergency room visits: an analysis of the 2006 Massachusetts health reform. *Journal of public Economics*, *96*(11-12), 893-908.

Moulick, Abhisekh Ghosh & Lori L. Taylor (2017) Fiscal slack, budget shocks, and performance in public organizations: evidence from public schools, Public Management Review, 19:7, 990-1005, DOI: 10.1080/14719037.2016.1243813

Niskanen, W. A. 1971. Bureaucracy and Representative Government. Chicago, IL: Aldine-Atherton Press.

Rowand, C. (1999). How old are America’s public schools. *Education Statistics Quarterly*, *1*(1), 53-56.

U.S. Census Burau (2019). *Annual Survey of School System Finances Public Elementary-Secondary Education Finance Data Technical Documentation (2019)*. Retrieved from https://www.census.gov/programs-surveys/school-finances/technical-documentation/complete.2019.html

Table 1: Summary Statistics

	Mean	Standard Deviation
Enrollment	3440.8	11936.3
Percent of total revenue from state sources	48.7	18.6
Unspent funds, held at end of fiscal year		
Per capita total fund balance	6697.9	17465.0
Per capita debt service fund balance	414.9	1297.1
Per capita bond fund balance	1243.3	12879.0
Per capita other fund balance	5039.7	10698.1
Spending		
Per capita total current spending	13371.1	7213.3
Per capita total current spending for instruction	7962.5	3967.5
Per capita total current spending for support	4750.8	3499.4
Per capita total capital outlay expenditure	1420.3	3302.7
Debt		
Per capita long-run debt outstanding at the end of year	7817.4	10490.0
Per capita short-run debt outstanding at the end of year	248.2	1244.0
Demographics		
District share of FRM students	43.3	23.6
District share of female students	48.2	4.7
District share of Non-White students	26.8	27.1
N (Number of district-years)	204,349	

Notes: These are summary statistics for 12,023 school districts during the 17-year period from 2004 to 2020. The analytic sample includes only districts that are (a) categorized "Regular school district" (CCD agency type: 1-Regular local school district that is NOT a component of a supervisory union) or "Local school district" (2-Local school district that is a component of a supervisory union) in 2004, 2020, and more than 7 out of the 15 years between 2004 and 2020, and (b) districts that had at least 1 student each year from 2004 to 2020. All dollar amounts are in real 2020 USD equivalent. The data sources for this table are the Annual Survey of School System Finances and the Common Core of Data (CCD) from the National Center for Education Statistics from the years 2003-2004 to 2019-2020.

Table 2: The Relationship Between Per Capita (PC) Debt, Bond, and Other Fund Balances and Districts' State Dependence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	PC Total Fund	PC Total Fund	PC debt fund	PC debt fund	PC bond fund	PC bond fund	PC other fund	PC other fund
Treat × Post	-749.733*	-733.564*	-83.349	-80.936	81.741	93.043	-748.125***	-745.671***
	(401.407)	(406.703)	(60.352)	(60.865)	(252.043)	(250.399)	(243.546)	(244.541)
Treat	-1,979.001***	-1,519.801**	-120.185	-85.081	-863.179***	-659.562***	-995.637**	-775.158*
	(568.293)	(613.748)	(73.368)	(69.131)	(250.558)	(231.312)	(400.765)	(455.728)
Enrollment		-49.257***		0.001		0.000		-0.050***
		(17.285)		(0.001)		(0.003)		(0.015)
FRM share		130.008		-3.097***		-19.213***		-26.946*
		(103.507)		(1.138)		(5.716)		(15.680)
Female share		15.123		0.349		95.385		34.274
		(11.205)		(1.198)		(95.072)		(36.460)
Non-White share		-0.049***		1.251		8.505***		5.367
		(0.016)		(1.050)		(2.392)		(11.718)
Constant	3,241.389***	-964.821	323.986***	375.440***	1,582.108***	-2,319.295	1,335.294***	979.033
	(502.413)	(4,365.858)	(55.118)	(74.904)	(227.026)	(4,103.613)	(327.572)	(1,497.606)
Observations	204,349	204,349	204,349	204,349	204,349	204,349	204,349	204,349
R-squared	0.033	0.037	0.074	0.076	0.005	0.006	0.060	0.064

Notes: All models include state and year fixed effects. The year 2009 and later are considered "post" years in "Treat × Post". Districts with more than median level of state dependence in 2007, i.e., more than 51.8% of the district budget coming from state sources, are considered to be treated. Standard errors clustered at state level in parentheses. All dollar amounts are in real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Table 3: Event Study Showing Relationship Between Per Capita (PC) Fund Balances and Districts' State Dependence

	(1)	(2)	(3)	(4)
VARIABLES	PC Total Fund	PC Debt Fund	PC Bond Fund	PC Other Fund
Treat	-1,490.536*	-75.551	-575.365*	-839.620
	(769.468)	(77.611)	(330.009)	(508.434)
2004 × Treat	62.191	-52.284	-135.840	250.315
	(456.862)	(47.038)	(331.363)	(186.881)
2005 × Treat	144.149	-3.692	-108.826	256.667
	(421.955)	(20.596)	(286.010)	(174.022)
2006 × Treat	80.721	-19.154	-78.691	178.567*
	(309.561)	(17.490)	(234.347)	(105.998)
2007 × Treat	-428.491**	28.288	-95.610	-361.168
	(207.901)	(36.488)	(136.004)	(260.269)
2009 × Treat	28.846	-21.356	358.398**	-308.196**
	(186.690)	(28.021)	(170.118)	(143.711)
2010 × Treat	608.686	-23.523	281.326	350.884
	(753.285)	(33.414)	(248.419)	(692.605)
2011 × Treat	-93.343	-43.363	210.155	-260.134
	(389.816)	(55.137)	(246.514)	(239.692)
2012 × Treat	-517.352	-83.734	292.759	-726.377***
	(382.089)	(65.182)	(213.379)	(250.428)
2013 × Treat	-637.765*	-75.282	330.925*	-893.408***
	(353.578)	(54.368)	(188.679)	(205.874)
2014 × Treat	-1,063.815**	-142.494	-95.320	-826.002***
	(488.776)	(89.996)	(378.934)	(224.307)
2015 × Treat	-1,374.526**	-98.063	-295.022	-981.441***
	(593.415)	(72.737)	(429.241)	(281.694)
2016 × Treat	-1,171.928	-78.974	-406.480	-686.474**
	(719.156)	(49.716)	(569.826)	(295.901)
2017 × Treat	-1,625.546*	-92.057	-543.148	-990.342***
	(844.600)	(60.519)	(707.112)	(332.141)
2018 × Treat	-954.633*	-128.603	170.015	-996.045***
	(487.290)	(91.497)	(244.111)	(328.452)
2019 × Treat	-1,195.391***	-153.400	-95.676	-946.314***
	(395.472)	(105.102)	(251.137)	(299.823)
2020 × Treat	-1,146.380***	-142.766	-97.263	-906.351***
	(422.311)	(112.710)	(282.617)	(330.364)
Constant	-1,012.676	396.189***	-2,295.465	886.601
	(4,391.205)	(73.584)	(4,094.866)	(1,506.704)
Observations	204,349	204,349	204,349	204,349
R-squared	0.037	0.076	0.007	0.065
Enrollment	Yes	Yes	Yes	Yes
FRM share	yes	yes	yes	yes
Female share	Yes	Yes	Yes	Yes
Non-White Share	Yes	Yes	Yes	Yes

Notes: All models include state and year fixed effects. Districts with more than median level of state dependence in 2007, i.e., more than 51.8% of the district budget coming from state sources, are considered to be treated. Reference year is 2008. Standard errors clustered at state level in parentheses. All dollar amounts are real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Table 4: The Relationship Between Per Capita (PC) Long Run (LR) and Short Run (SR) Debt and Districts' State Dependence

	(1)	(2)
VARIABLES	PC LR debt outstanding	PC SR debt outstanding
Treat × Post	-23.133	16.212
	(456.748)	(61.869)
Treat	-2,107.701***	4.610
	(656.602)	(48.157)
Enrollment	0.026***	0.000
	(0.007)	(0.000)
FRM share	-71.757***	1.558
	(15.032)	(1.883)
Female share	-14.167	-1.761
	(16.850)	(1.142)
Non-White share	38.089***	-1.110
	(13.611)	(1.526)
Constant	8,364.063***	91.928
	(1,217.865)	(72.986)
Observations	204,349	204,349
R-squared	0.146	0.131

Notes: All models include state and year fixed effects. The year 2009 and later are considered "post" years in "Treat × Post". Districts with more than median level of state dependence in 2007, i.e., more than 51.8% of the district budget coming from state sources, are considered to be treated. Standard errors clustered at state level in parentheses. All dollar amounts are in real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Table 5: Relationship Between Per Capita (PC) Expenditure and Districts' State Dependence

VARIABLES	(1) PC Total Current Spending	(2) PC Current Spending for Instruction	(3) PC Current Spending for Support Services	(4) PC Capital Outlay Expenditure
Treat × Post	-795.494***	-558.338***	-257.453***	23.579
	(214.228)	(133.156)	(88.768)	(142.969)
Treat	-1,092.628***	-477.707**	-562.132***	-309.254***
	(379.881)	(221.376)	(160.995)	(112.623)
Enrollment	-0.032***	-0.015***	-0.016***	-0.003*
	(0.011)	(0.005)	(0.005)	(0.002)
FRM share	3.632	-2.831	1.611	-6.041***
	(9.234)	(4.690)	(4.722)	(2.222)
Female share	-0.486	-5.068	5.000	-3.745
	(27.016)	(13.437)	(14.770)	(3.310)
Non-White share	20.373**	11.879**	7.953*	2.816*
	(9.870)	(5.615)	(4.478)	(1.501)
Constant	9,295.052***	5,664.766***	2,968.640***	1,491.808***
	(1,231.667)	(624.769)	(682.432)	(151.506)
Observations	204,349	204,349	204,349	204,349
R-squared	0.250	0.349	0.146	0.027

Notes: All models include state and year fixed effects. The years 2009 and later are considered "post" years in "Treat × Post". Districts with more than median level of state dependence in 2007, i.e., more than 51.8% of the district budget coming from state sources, are considered to be treated. Standard errors clustered at state level in parentheses. All dollar amounts are in real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Table 6: Event Study Showing the Relationship Between Per Capita (PC) Expenditure and Districts' State Dependence

VARIABLES	(1) PC Total Current Spending	(2) PC Current Spending for Instruction	(3) PC Current Spending for Support Services	(4) PC Capital Outlay Expenditure
Treat	-1,189.768***	-536.821**	-594.222***	-356.401*
	(420.586)	(240.690)	(180.071)	(177.467)
2004 × Treat	179.165	101.604	64.868	75.730
	(184.684)	(102.221)	(82.453)	(174.773)
2005 × Treat	138.825	82.914	48.056	74.939
	(127.564)	(75.594)	(59.888)	(142.108)
2006 × Treat	53.351	55.991	11.821	27.435
	(102.077)	(59.419)	(48.692)	(137.101)
2007 × Treat	116.048*	56.141	36.140	57.311
	(65.937)	(36.763)	(29.304)	(106.321)
2009 × Treat	-37.106	-23.830	-55.651**	6.900
	(82.444)	(57.165)	(21.486)	(109.336)
2010 × Treat	-338.995***	-240.854***	-139.684***	67.600
	(118.919)	(72.482)	(40.639)	(140.664)
2011 × Treat	-569.534***	-392.680***	-214.805**	132.378
	(191.439)	(99.865)	(82.861)	(179.324)
2012 × Treat	-462.672***	-353.118***	-128.454**	149.631
	(161.814)	(109.402)	(63.636)	(184.035)
2013 × Treat	-664.893***	-496.054***	-190.344**	231.672
	(173.683)	(118.754)	(72.625)	(196.590)
2014 × Treat	-708.284***	-540.954***	-176.661**	131.751
	(207.570)	(131.182)	(83.229)	(145.851)
2015 × Treat	-848.677***	-636.887***	-287.115***	72.887
	(237.688)	(144.887)	(102.154)	(171.451)
2016 × Treat	-838.107***	-638.310***	-205.206*	-42.724
	(278.210)	(166.004)	(117.407)	(167.972)
2017 × Treat	-1,041.879***	-734.833***	-314.846**	21.065
	(325.192)	(207.739)	(127.312)	(172.785)
2018 × Treat	-1,005.782***	-673.880***	-326.327**	33.825
	(335.275)	(208.982)	(132.870)	(160.614)
2019 × Treat	-931.736***	-602.409***	-350.349**	106.013
	(344.274)	(210.654)	(140.643)	(159.766)
2020 × Treat	-929.270**	-654.766***	-314.144**	-63.297
	(345.897)	(213.041)	(141.217)	(161.339)
Constant	9,251.793***	5,641.515***	2,952.002***	1,478.040***
	(1,197.306)	(608.513)	(669.884)	(147.465)
Observations	204,349	204,349	204,349	204,349
R-squared	0.250	0.349	0.146	0.027
Enrollment	Yes	Yes	Yes	Yes
FRM share	Yes	Yes	Yes	Yes
Female share	Yes	Yes	Yes	Yes
Non-White Share	Yes	Yes	Yes	Yes

Notes: All models include state and year fixed effects. Districts with more than median level of state dependence in 2007, i.e., more than 51.8% of the district budget coming from state sources, are considered to be treated. Reference year is 2008. Standard errors clustered at state level in parentheses. All dollar amounts are real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Table 7: Continuous Treatment - The Relationship of Per Capita (PC) Fund Balances and Expenditure with Districts' State Dependence

VARIABLES	(1) PC Total Fund	(2) PC debt fund	(3) PC bond fund	(4) PC other fund	(5) PC Total Current Spending	(6) PC Current Spending for Instruction	(7) PC Current Spending for Support Services	(8) PC Capital Outlay Expenditure
Statedep × Post	-27.922	-2.628	-0.945	-24.350**	-28.190***	-19.103***	-9.595***	2.008
	(18.885)	(1.765)	(12.791)	(10.354)	(7.483)	(4.741)	(2.962)	(4.845)
Statedep	-95.340***	-4.650**	-34.066***	-56.625**	-63.065***	-29.945***	-31.084***	-15.500***
	(25.552)	(1.980)	(9.672)	(21.369)	(17.710)	(10.170)	(7.563)	(3.549)
Enrollment	-0.048***	0.001	0.000	-0.049***	-0.031***	-0.015**	-0.016***	-0.003*
	(0.016)	(0.001)	(0.003)	(0.015)	(0.011)	(0.006)	(0.005)	(0.002)
FRM share	-28.124	-2.071**	-12.719***	-13.335	17.726**	4.526	8.099*	-3.759*
	(19.527)	(0.975)	(4.373)	(17.337)	(8.173)	(3.833)	(4.395)	(2.065)
Female share	128.745	0.267	95.096	33.381	-1.478	-5.639	4.587	-3.832
	(104.544)	(1.145)	(95.198)	(36.922)	(26.796)	(13.168)	(14.766)	(3.158)
Non-White share	5.237	0.758	5.481*	-1.002	13.689*	8.379*	4.888	1.753
	(10.732)	(0.990)	(2.932)	(10.893)	(7.424)	(4.156)	(3.541)	(1.478)
Constant	2,910.625	554.116***	-988.498	3,345.007*	11,781.670***	6,863.070***	4,185.886***	2,083.508***
	(4,152.022)	(116.948)	(3,872.987)	(1,676.765)	(1,455.912)	(732.548)	(783.791)	(212.978)
Observations	204,349	204,349	204,349	204,349	204,349	204,349	204,349	204,349
R-squared	0.043	0.079	0.008	0.072	0.268	0.365	0.162	0.029

Notes: This is a continuous treatment time version of tables 2 and 5. All models include state and year fixed effects. "Statedep" is the percent of revenue coming from state sources in a district in 2007. The years 2009 and later are considered "Post" in "Statedep × Post". Standard errors clustered at state level in parentheses. All dollar amounts are in real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Table 8: Model with District Fixed Effect - The Relationship of Per Capita (PC) Fund Balances and Expenditure with Districts' State Dependence

VARIABLES	(1) PC Total Fund	(2) PC debt fund	(3) PC bond fund	(4) PC other fund	(5) PC Total Current Spending	(6) PC Current Spending for Instruction	(7) PC Current Spending for Support Services	(8) PC Capital Outlay Expenditure
Treat × Post	-754.610*	-87.910	82.350	-749.050***	-793.775***	-553.772***	-260.355***	6.126
	(424.866)	(62.968)	(255.052)	(257.155)	(213.653)	(130.921)	(90.379)	(147.016)
Enrollment	-0.136***	-0.014*	-0.035*	-0.088***	-0.154***	-0.087**	-0.061***	-0.036**
	(0.042)	(0.007)	(0.018)	(0.027)	(0.054)	(0.033)	(0.022)	(0.014)
FRM share	-18.541**	0.175	-5.252*	-13.465*	1.156	0.910	-0.390	-2.142
	(8.775)	(0.454)	(3.067)	(7.183)	(5.381)	(3.213)	(2.225)	(1.918)
Female share	82.019	-1.751	49.182	34.589	18.181	5.976	11.646	-5.846*
	(70.121)	(1.200)	(48.750)	(41.640)	(26.893)	(10.537)	(17.939)	(3.222)
Non-White share	17.168	-1.601	5.222	13.546	37.445	23.738	12.917	-4.642
	(20.319)	(1.470)	(9.487)	(15.157)	(28.219)	(16.752)	(11.403)	(2.933)
Constant	-1,781.310	564.198***	-1,522.189	-823.319	6,664.586***	4,060.648***	1,841.623**	2,082.414***
	(3,367.650)	(106.501)	(2,362.195)	(2,137.439)	(1,252.416)	(475.080)	(890.881)	(199.109)
Observations	204,349	204,349	204,349	204,349	204,349	204,349	204,349	204,349
R-squared	0.383	0.337	0.228	0.546	0.610	0.646	0.573	0.145

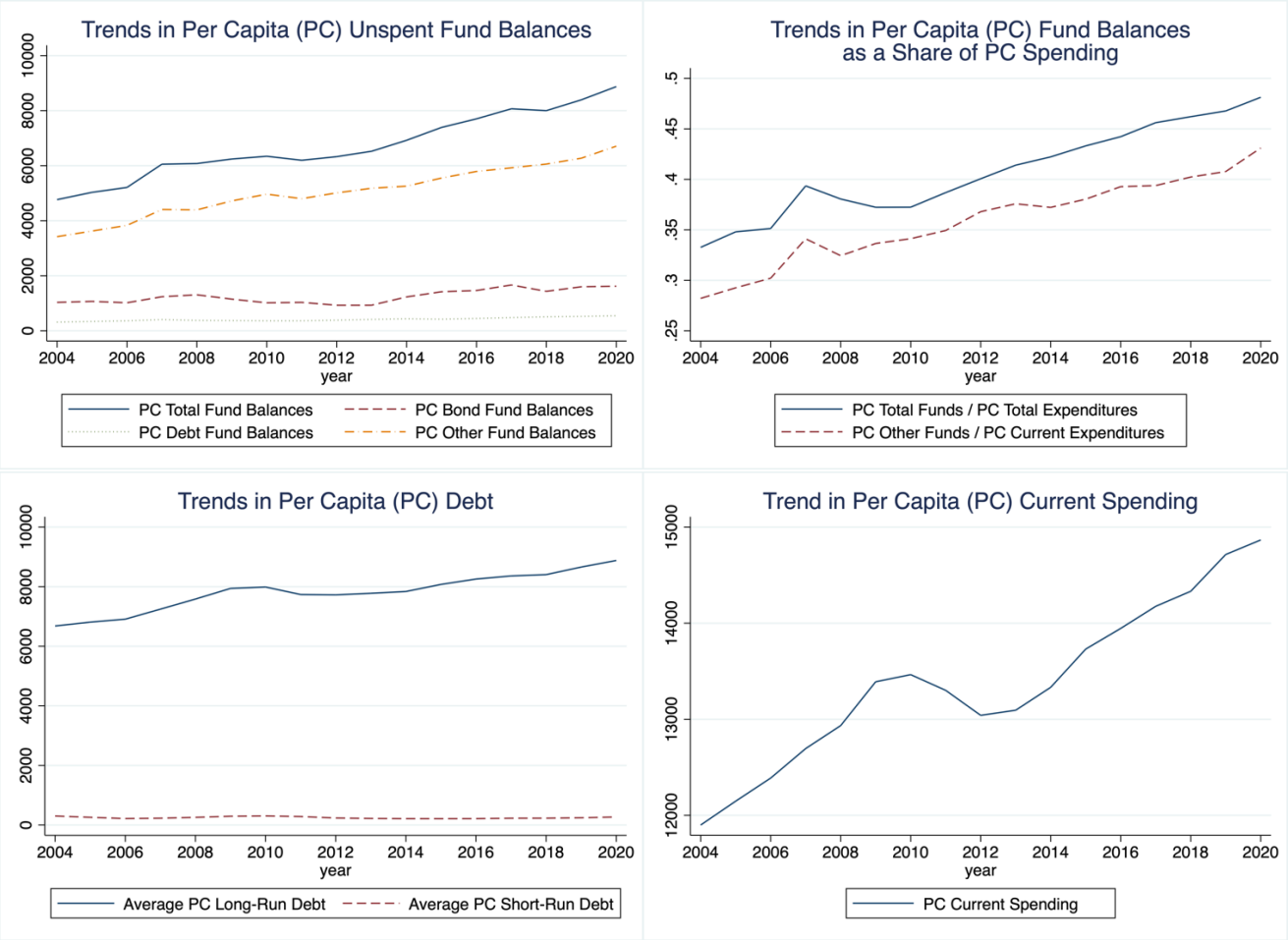
Notes: All models include state and year fixed effects. The year 2009 and later are considered "post" years in "Treat × Post". Districts with more than median level of state dependence in 2007, i.e., more than 51.8% of the district budget coming from state sources, are considered to be treated. Standard errors clustered at state level in parentheses. All dollar amounts are in real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Table 9: Placebo treatment time - The Relationship of Per Capita (PC) Fund Balances and Expenditure with Districts' State Dependence

VARIABLES	(1) PC Total Fund	(2) PC debt fund	(3) PC bond fund	(4) PC other fund	(5) PC Total Current Spending	(6) PC Current Spending for Instruction	(7) PC Current Spending for Support Services	(8) PC Capital Outlay Expenditure
Treat × Post	31.043	19.777	72.182	-60.916	-102.407	-33.632	-51.748	-80.221
	(140.266)	(24.630)	(68.972)	(97.047)	(83.448)	(39.237)	(43.394)	(51.744)
Treat	-1,422.740***	-120.308***	-337.244***	-965.188***	-1,483.178***	-745.286***	-682.750***	-71.421
	(376.533)	(44.002)	(123.956)	(319.005)	(326.279)	(197.337)	(133.171)	(113.587)
Enrollment	-0.021***	0.001**	0.007**	-0.029***	-0.023**	-0.012**	-0.010**	0.001
	(0.007)	(0.001)	(0.002)	(0.010)	(0.009)	(0.005)	(0.004)	(0.001)
FRM share	-25.460***	-3.224**	-12.834***	-9.402	17.645***	5.743*	6.993**	-8.847***
	(9.193)	(1.223)	(2.807)	(8.825)	(6.046)	(3.035)	(3.126)	(1.677)
Female share	35.561*	0.470	4.671	30.420	3.138	2.859	0.751	1.918
	(19.501)	(0.761)	(3.187)	(20.272)	(10.565)	(5.588)	(5.019)	(2.403)
Non-White share	8.936	0.836	5.420**	2.680	17.176**	9.476*	6.978*	4.803***
	(7.170)	(0.887)	(2.320)	(7.326)	(8.327)	(4.696)	(3.596)	(1.402)
Constant	2,987.779***	303.024***	1,321.667***	1,363.087*	8,963.738***	5,363.646***	2,947.291***	1,194.069***
	(783.081)	(52.054)	(211.713)	(802.474)	(513.063)	(302.446)	(221.454)	(194.146)
Observations	36,068	36,068	36,068	36,068	36,068	36,068	36,068	36,068
R-squared	0.075	0.132	0.052	0.086	0.367	0.456	0.242	0.037

Notes: This is a placebo treatment time version of Tables 2 and 5. All models include state and year fixed effects. The year 2006 is considered "post" year in "Treat X Post". Districts with more than median level of state dependence in 2004, i.e., more than 52% of the district budget coming from state sources, are considered to be treated. Standard errors clustered at state level in parentheses. All dollar amounts are in real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Figure 1 – Inflation-Adjusted Changes in Per Capita Measures of School District Fiscal Health



Notes: The top left panel shows the per capita debt funds, bond funds, other funds, and the total funds trends during 2004 to 2020. The top right panel shows the trend of per capita total funds as a share of per capita total expenditure and per capita other funds as a share of per capita total current spending during 2004 to 2020. The bottom left panel shows the trend of per capita long run and short run debt outstanding at the end of the year during 2004 to 2020. The bottom right panel shows the trend of per capita total current spending during 2004 to 2020. In all the graphs other than the top right panel, the numbers in the vertical axis are in 2020 equivalent USD.

Appendix Table 1: Event Study Showing the Relationship Between Per Capita (PC) Long Run (LR) and Short Run (SR) Debt and Districts' State Dependence

	(1)	(2)
VARIABLES	PC LR debt outstanding	PC SR debt outstanding
treat	-2,249.085***	20.033
	(698.202)	(70.549)
2004 × Treat	106.752	-10.549
	(455.039)	(35.561)
2005 × Treat	287.189	-14.045
	(381.952)	(49.052)
2006 × Treat	260.766	-32.890
	(309.501)	(57.424)
2007 × Treat	52.914	-19.210
	(169.366)	(24.545)
2009 × Treat	-7.309	10.964
	(139.662)	(42.717)
2010 × Treat	-64.681	77.834
	(166.885)	(90.782)
2011 × Treat	-125.267	104.730
	(253.125)	(89.331)
2012 × Treat	-99.524	53.072
	(342.516)	(48.915)
2013 × Treat	290.823	14.211
	(306.698)	(35.778)
2014 × Treat	290.715	-5.847
	(372.560)	(28.950)
2015 × Treat	160.024	-25.775
	(438.108)	(28.167)
2016 × Treat	488.423	-25.882
	(504.633)	(35.405)
2017 × Treat	97.843	-36.289
	(517.821)	(34.740)
2018 × Treat	211.118	-66.957*
	(544.195)	(36.160)
2019 × Treat	2.679	-44.934
	(569.143)	(39.894)
2020 × Treat	176.059	-44.723
	(620.513)	(43.955)
Constant	8,380.312***	89.798
	(1,192.325)	(74.182)
Observations	204,349	204,349
R-squared	0.146	0.131
Enrollment	Yes	Yes
FRM share	Yes	Yes
Female share	Yes	Yes
Non-White Share	Yes	Yes

Notes: All models include state and year fixed effects. Districts with more than median level of state dependence in 2007, i.e., more than 51.8% of the district budget coming from state sources, are considered to be treated. Reference year is 2008. Standard errors clustered at state level in parentheses. All dollar amounts are real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Appendix Table 2: Continuous Treatment - The Relationship Between Per Capita (PC) Short Run (SR) and Long Run (LR) Debt and Districts' State Dependence

	(1)	(2)
VARIABLES	PC LR debt outstanding	PC SR debt outstanding
Statedep × Post	2.585	0.232
	(18.940)	(2.179)
Statedep	-104.598***	-0.099
	(24.348)	(2.446)
Enrollment	0.027***	0.000
	(0.007)	(0.000)
FRM share	-54.953***	1.641
	(13.789)	(1.445)
Female share	-14.940	-1.758
	(15.015)	(1.126)
Non-White share	30.212**	-1.144
	(12.913)	(1.330)
Constant	12,343.947***	101.703
	(1,659.855)	(160.560)
Observations	204,349	204,349
R-squared	0.158	0.130

Notes: All models include state and year fixed effects. "Statedep" is the percent of revenue coming from state sources in a district in 2007. The years 2009 and later are considered "Post" in "Statedep × Post". Standard errors clustered at state level in parentheses. All dollar amounts are in real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Appendix Table 3: Continuous Treatment Event Study - The Relationship Between Per Capita (PC) Fund Balances and Districts' State Dependence

VARIABLES	(1) PC Total Fund	(2) PC Debt Fund	(3) PC Bond Fund	(4) PC Other Fund
Statedep	-96.522***	-4.815**	-33.385**	-58.321**
	(34.117)	(2.101)	(14.417)	(24.622)
2004 × Statedep	8.619	-0.904	-2.233	11.756
	(20.279)	(1.132)	(13.817)	(8.886)
2005 × Statedep	9.355	0.690	0.730	7.935
	(18.658)	(0.598)	(12.048)	(8.193)
2006 × Statedep	6.383	0.173	1.422	4.788
	(14.163)	(0.414)	(10.161)	(5.278)
2007 × Statedep	-18.286**	0.895	-3.228	-15.953
	(8.306)	(0.945)	(6.398)	(10.299)
2009 × Statedep	5.662	-0.438	14.994***	-8.894*
	(4.986)	(0.663)	(5.370)	(4.615)
2010 × Statedep	30.688	-0.677	14.508*	16.857
	(28.761)	(0.744)	(7.488)	(26.676)
2011 × Statedep	0.295	-1.151	10.978	-9.532
	(13.917)	(1.341)	(7.229)	(8.764)
2012 × Statedep	-10.093	-2.268	15.331**	-23.156**
	(13.635)	(1.571)	(6.625)	(8.853)
2013 × Statedep	-23.425	-1.787	15.608**	-37.245***
	(14.852)	(1.292)	(6.261)	(10.184)
2014 × Statedep	-42.961	-4.063*	-11.058	-27.840***
	(28.972)	(2.329)	(24.135)	(9.572)
2015 × Statedep	-61.119*	-2.241	-21.989	-36.889**
	(34.634)	(1.748)	(27.893)	(13.744)
2016 × Statedep	-54.724	-1.461	-30.617	-22.646*
	(45.358)	(1.284)	(38.883)	(12.596)
2017 × Statedep	-72.833	-2.081	-36.194	-34.558**
	(53.008)	(1.564)	(46.166)	(15.192)
2018 × Statedep	-29.737	-3.846	9.231	-35.122**
	(20.312)	(2.575)	(8.970)	(13.756)
2019 × Statedep	-31.712**	-4.726	-0.728	-26.257**
	(14.954)	(3.123)	(9.158)	(11.495)
2020 × Statedep	-30.636**	-4.744	0.618	-26.511**
	(13.472)	(3.882)	(9.623)	(10.640)
Constant	2,553.278	606.250***	-912.802	2,859.830*
	(4,186.364)	(118.177)	(3,836.621)	(1,618.139)
Observations	204,349	204,349	204,349	204,349
R-squared	0.044	0.079	0.008	0.072
Enrollment	Yes	Yes	Yes	Yes
FRM share	Yes	Yes	Yes	Yes
Female share	Yes	Yes	Yes	Yes
Non-White Share	Yes	Yes	Yes	Yes

Notes: All models include state and year fixed effects. 2008 is the reference year. "Statedep" is the percent of revenue coming from state sources in a district in 2007. Standard errors clustered at state level in parentheses. All dollar amounts are real 2020 USD equivalent. Statistical significance at 1,5, and 10 percent levels is denoted by ***, **, and *, respectively.

Appendix Table 4: Continuous Treatment Event Study - The Relationship Between Per Capita (PC) Short Run (SR) and Long Run (LR) Debt and Districts' State Dependence

VARIABLES	(1) PC LR debt outstanding	(2) PC SR debt outstanding
Statedep	-112.868***	0.333
	(25.447)	(3.337)
2004 × Statedep	14.903	-0.398
	(15.760)	(1.442)
2005 × Statedep	13.991	-0.114
	(14.140)	(1.640)
2006 × Statedep	11.410	-0.835
	(12.437)	(1.788)
2007 × Statedep	0.875	-0.798
	(6.340)	(0.984)
2009 × Statedep	2.045	-0.114
	(4.345)	(0.924)
2010 × Statedep	-0.034	1.795
	(4.631)	(1.886)
2011 × Statedep	-2.224	2.823
	(7.095)	(2.429)
2012 × Statedep	2.462	1.654
	(9.541)	(1.674)
2013 × Statedep	13.372	0.791
	(9.655)	(1.466)
2014 × Statedep	15.471	-0.324
	(12.331)	(1.188)
2015 × Statedep	12.534	-0.668
	(14.743)	(1.251)
2016 × Statedep	24.828	-1.117
	(17.371)	(1.414)
2017 × Statedep	15.683	-0.972
	(17.397)	(1.495)
2018 × Statedep	17.931	-2.144
	(19.018)	(1.569)
2019 × Statedep	11.126	-1.829
	(19.447)	(1.588)
2020 × Statedep	16.635	-2.263
	(20.019)	(1.628)
Constant	12,016.779***	101.136
	(1,623.152)	(153.247)
Observations	204,349	204,349
R-squared	0.158	0.131
Enrollment	Yes	Yes
FRM share	Yes	Yes
Female share	Yes	Yes
Non-White Share	Yes	Yes

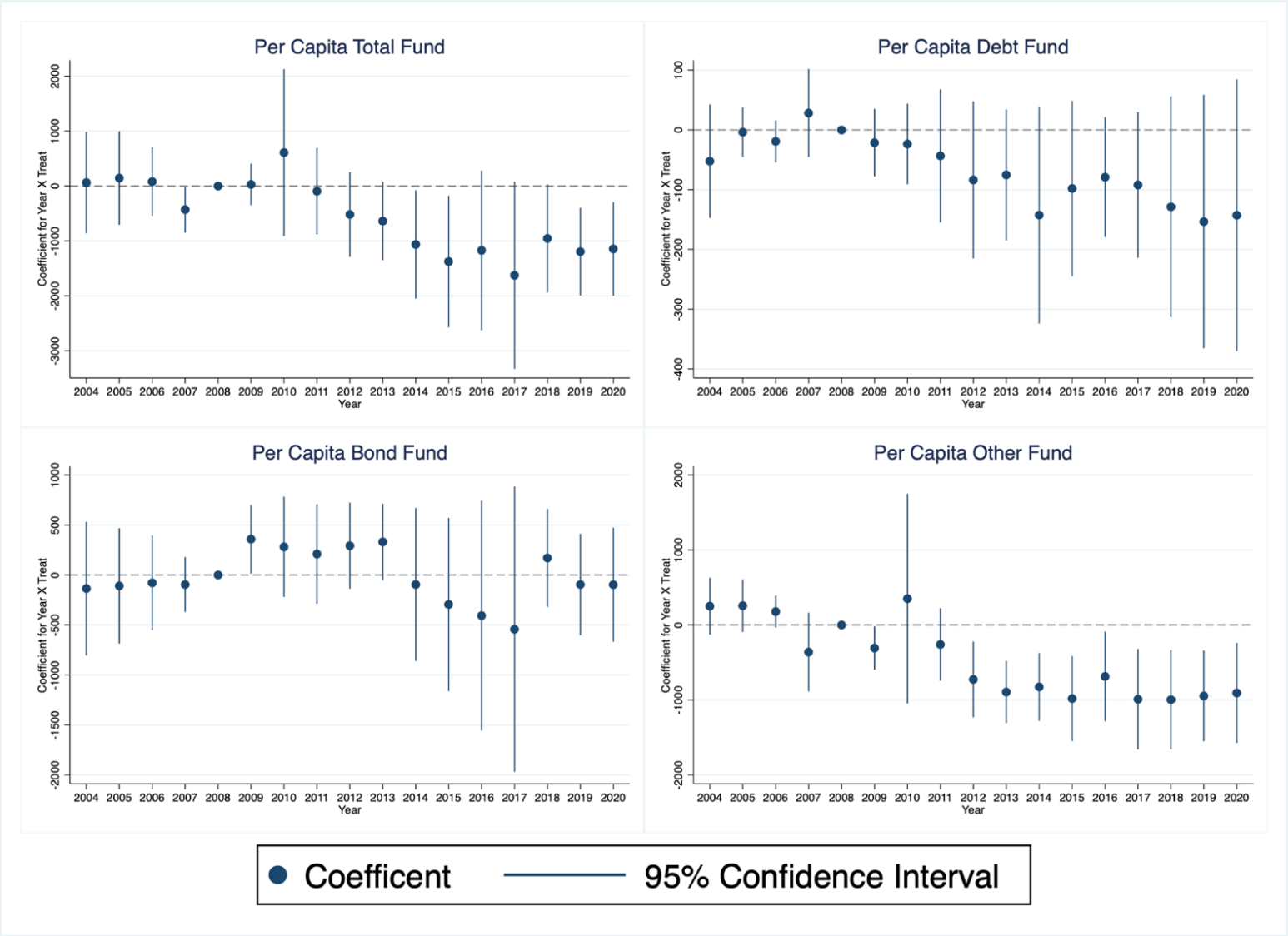
Notes: All models include state and year fixed effects. 2008 is the reference year. "Statedep" is the percent of revenue coming from state sources in a district in 2007. Standard errors clustered at state level in parentheses. All dollar amounts are real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Appendix Table 5: Continuous Treatment Event Study - The Relationship Between Per Capita (PC) Expenditure and Districts' State Dependence

VARIABLES	(1) PC Total Current Spending	(2) PC Current Spending for Instruction	(3) PC Current Spending for Support Services	(4) PC Capital Outlay Expenditure
Statedep	-66.509***	-32.057***	-32.068***	-18.443***
	(19.618)	(11.173)	(8.424)	(6.125)
2004 × Statedep	7.742	4.432	2.841	2.632
	(7.075)	(3.934)	(3.140)	(6.666)
2005 × Statedep	4.685	2.768	1.595	3.342
	(4.603)	(2.688)	(2.121)	(5.794)
2006 × Statedep	2.143	2.100	-0.041	3.266
	(3.990)	(2.304)	(2.006)	(5.175)
2007 × Statedep	2.743	1.306	0.554	5.460
	(2.313)	(1.436)	(0.909)	(3.751)
2009 × Statedep	-0.533	-0.339	-1.764**	0.555
	(2.741)	(1.855)	(0.682)	(5.139)
2010 × Statedep	-12.228***	-8.867***	-4.880***	2.808
	(4.370)	(2.689)	(1.357)	(4.738)
2011 × Statedep	-20.270***	-13.515***	-8.111***	7.801*
	(6.023)	(3.022)	(2.541)	(3.997)
2012 × Statedep	-16.715***	-11.732***	-5.533**	8.577*
	(6.118)	(4.021)	(2.409)	(4.626)
2013 × Statedep	-24.679***	-16.851***	-8.706***	9.031
	(6.483)	(4.079)	(3.175)	(5.594)
2014 × Statedep	-23.571***	-17.296***	-6.680**	7.405*
	(7.483)	(4.745)	(2.880)	(4.149)
2015 × Statedep	-30.132***	-21.477***	-11.317**	6.695
	(9.367)	(5.301)	(4.509)	(4.817)
2016 × Statedep	-28.620***	-21.506***	-7.284*	1.549
	(10.123)	(6.110)	(4.100)	(4.945)
2017 × Statedep	-37.618***	-25.236***	-12.470**	3.504
	(12.187)	(7.496)	(5.271)	(5.115)
2018 × Statedep	-37.748***	-23.546***	-13.669**	5.670
	(12.232)	(7.512)	(5.127)	(5.192)
2019 × Statedep	-32.402**	-20.679***	-12.288**	6.049
	(12.081)	(7.529)	(4.739)	(5.259)
2020 × Statedep	-32.267***	-22.766***	-10.576**	-0.280
	(11.932)	(7.491)	(4.608)	(5.106)
Constant	11,573.837***	6,750.452***	4,096.316***	2,099.800***
	(1,304.445)	(663.963)	(719.934)	(228.858)
Observations	204,349	204,349	204,349	204,349
R-squared	0.269	0.366	0.162	0.030
Enrollment	Yes	Yes	Yes	Yes
FRM share	Yes	Yes	Yes	Yes
Female share	Yes	Yes	Yes	Yes
Non-White Share	Yes	Yes	Yes	Yes

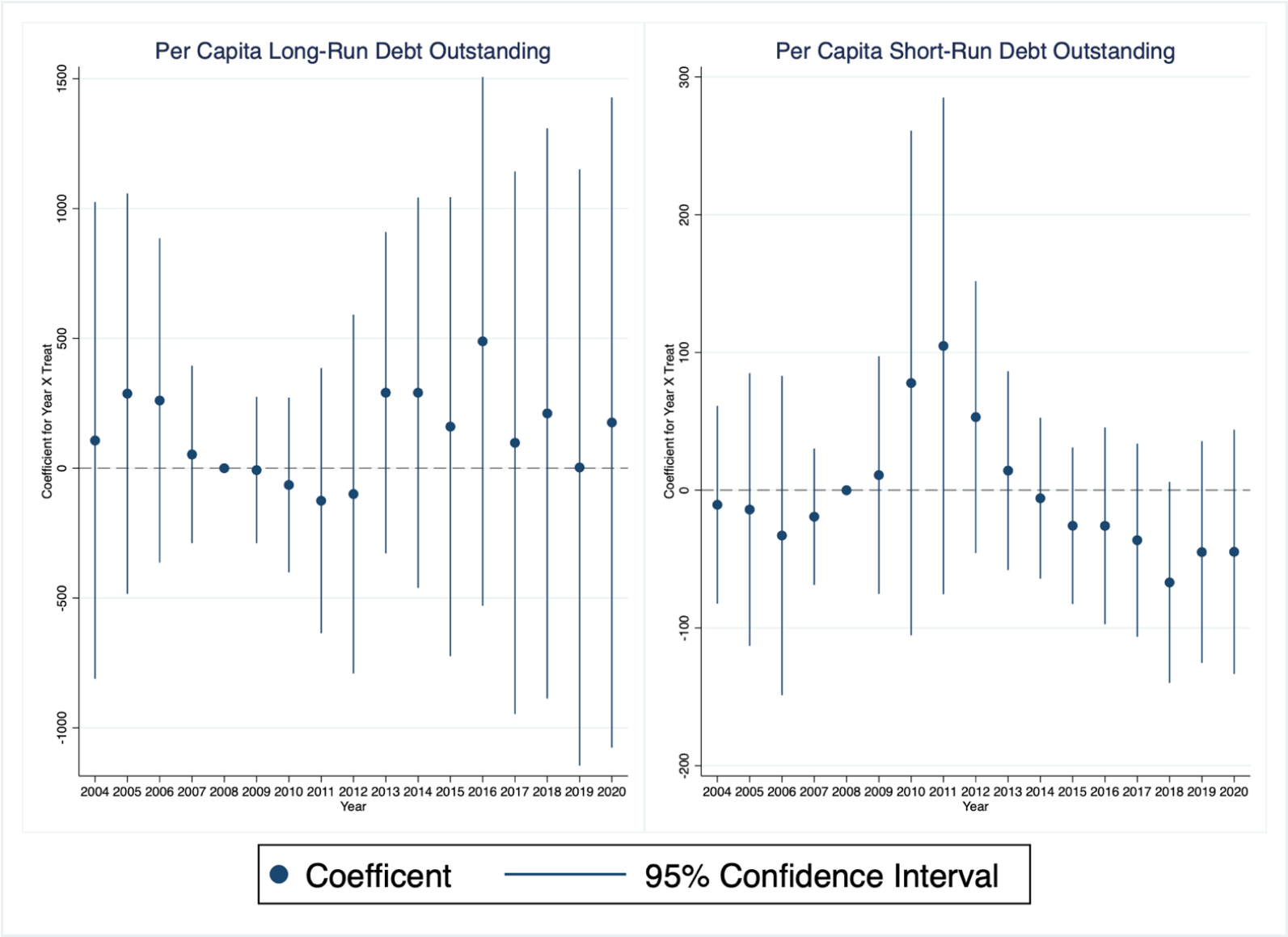
Notes: All models include state and year fixed effects. 2008 is the reference year. "Statedep" is the percent of revenue coming from state sources in a district in 2007. Standard errors clustered at state level in parentheses. All dollar amounts are real 2020 USD equivalent. Statistical significance at 1, 5, and 10 percent levels is denoted by ***, **, and *, respectively.

Appendix Figure 1



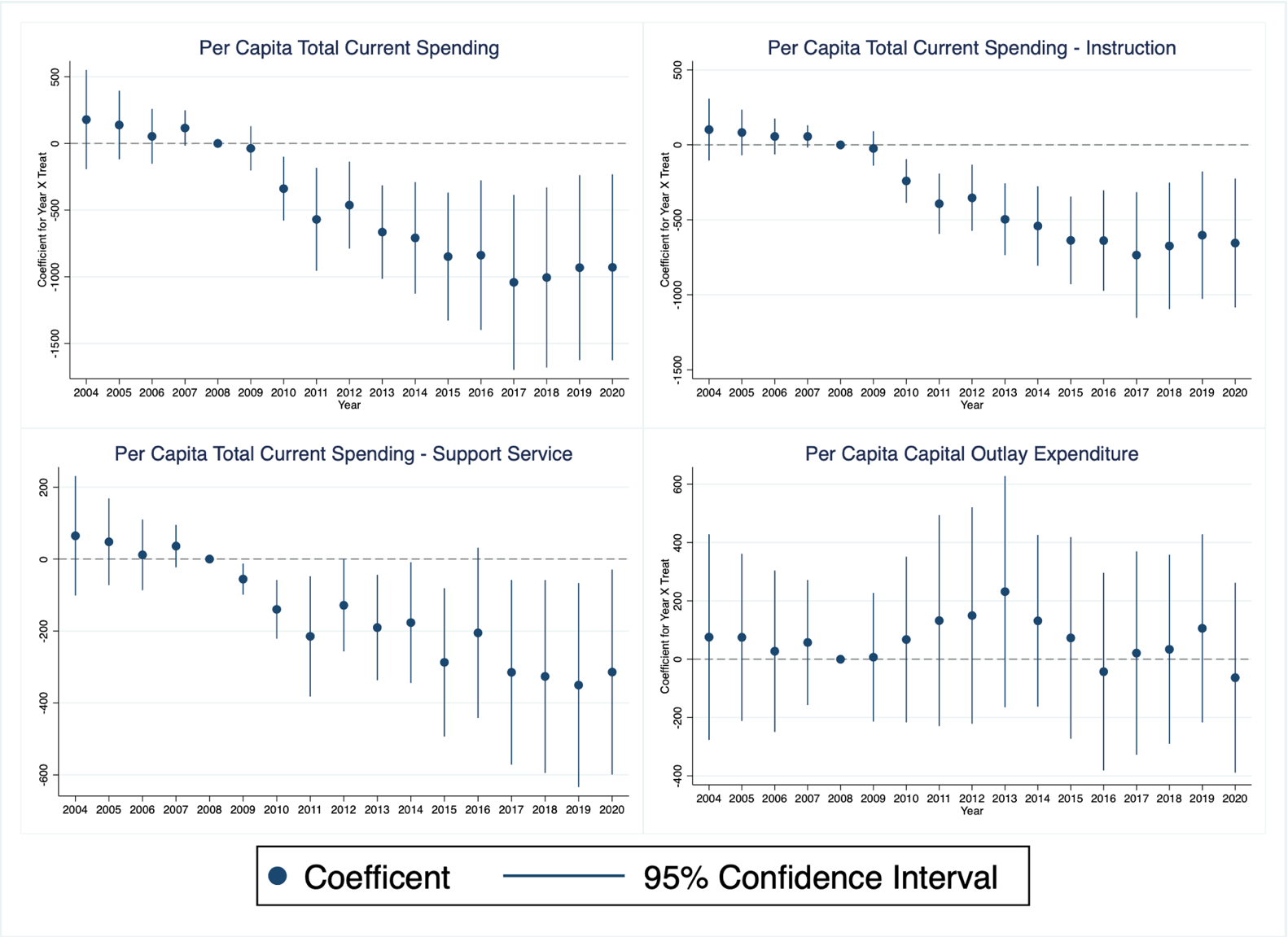
Notes: These are event study graphs with the per capita funds as the dependent variables. The treatment variable, an indicator that assumes value of 1 if the district's pre-GR state dependence was more than median (51.8%), is interacted with a full set of year dummies from 2004 to 2020. Omitted base year is 2008. All models include the full set of controls of our preferred specification including state and year fixed effects. Standard errors clustered at state and all dollar amounts are real 2020 USD equivalent.

Appendix Figure 2



Notes: These are event study graphs with the per capita long run and short run debt outstanding as dependent variables. The treatment variable, an indicator that assumes value of 1 if the district's pre-GR state dependence was more than median (51.8%), is interacted with a full set of year dummies from 2004 to 2020. Omitted base year is 2008. All models include the full set of controls of our preferred specification including state and year fixed effects. Standard errors clustered at state and all dollar amounts are real 2020 USD equivalent.

Appendix Figure 3



Notes: These are event study graphs with the per capita spending and expenditure as dependent variables. The treatment variable, an indicator that assumes value of 1 if the district's pre-GR state dependence was more than median (51.8%), is interacted with a full set of year dummies from 2004 to 2020. Omitted base year is 2008. All models include the full set of controls of our preferred specification including state and year fixed effects. Standard errors clustered at state and all dollar amounts are real 2020 USD equivalent.