The Real Effects of Debt Relief: Evidence from Independent School Districts in Texas*

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U.S. school districts face pressing needs for facility improvements. Furthermore, limited debt capacity disproportionately hampers heavily indebted districts from raising adequate levels of capital spending. In this paper, I study how debt assistance affects capital investment and student outcomes. Using a set of debt assistance programs in Texas, I find that debt relief leads to an 11% increase in capital spending in the short run, 0.02~0.04 σ in test scores, and 0.6 p.p. in high school graduation rates in the long run. The findings suggest that debt relief can effectively address existing education inequalities by revitalizing previously abandoned high-impact projects.

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Deteriorating school facility conditions in the U.S. pose a major threat to the quality of public education. The poor infrastructure creates unsafe learning environments and limits students' access to technology essential for digital-age learning. In 2012, the total deferred maintenance reached $200B (Alexander and Lewis (2014)), which has nearly tripled over the last decade (Filardo (2021)). Moreover, significant disparities exist in the district's ability to modernize and renovate facilities, as 80% of funding for capital investment comes from local sources.[1] Such disparities distort the distribution of human capital, contributing to the widening education gap and rising income inequality.[2]

This paper examines the effects of alleviating disparities in a district's capacity to maintain adequate facilities through a quasi-natural experiment in which a state government subsidizes a district's debt payment. I find that treated school districts increase capital spending immediately. A 10 percentage point reduction in the local share of debt payment leads to roughly 11% more cumulative capital spending over the next five years. I then document that state-sponsored investment translates into significant improvements in long-term educational outcomes such as higher test scores and completion rates. A back-of-the-envelope calculation suggests that a $1,000 increase in per-pupil capital spending is comparable to a class size reduction experiment in Tennessee. (Chetty et al. (2011)). The findings strongly support the positive and sizable effects of relieving the school district's debt burden on education quality through increased capital spending.

I exploit a quasi-natural experiment in which state intervention lowered the local share of debt servicing costs in Texas in 1998. The state began paying off a portion of debt payments for existing and new bonds, with the contribution increasing based on the level of indebtedness. Over 57% of independent school districts in Texas received these subsidies during the first biennium, and the state has allocated around $84B to the debt assistance program as of 2022. The cross-sectional variation in school districts' pre-policy

[1] Filardo (2016) and Filardo (2021) find that state and federal funding account for around 20% of total capital outlay.

[2] For example, see Card et al. (2022); Chetty et al. (2014); Huggett et al. (2011)

debt burdens and the random timing of the intervention generate plausibly exogenous variation in the local share of debt payments. This measure strongly predicts the extent of debt assistance in post-policy periods and ensures that the findings are not driven by other confounding factors such as local economic growth, demographic shifts, or concurrent policy changes.

Using this shock, I find that school districts increase capital spending upon receiving debt support. For example, a drop in the local share of debt servicing costs from 100% to 90% induces school districts to increase capital spending by roughly 11% over the first four years. The results suggest that debt support successfully induces debt-laden school districts to undertake capital projects by creating room for additional debt.

Debt relief enables infrastructure projects that significantly enhance educational outcomes for treated school districts several years later. Academic achievement, as measured by standardized 8th-grade reading and math scores, increases by 0.02 and 0.04 standard deviations on average, respectively, around five years after an increase of 10 percentage points in the state's share of debt service. The magnitude of the effect in this study is large compared to existing studies which rely on close bond elections for identification. In this paper, the marginal capital projects create greater impacts because the state intervention allows the debt-laden districts to start projects with significant potential for educational improvements that were previously infeasible. These findings highlight debt assistance's positive and long-lasting effects as value-adding capital projects become affordable for school districts.

Similarly, debt relief yields long-lasting positive outcomes beyond standardized tests. The effects on high school completion rates, college entrance exam participation rates, and college enrollment rates are generally positive. The estimates suggest that a 10 percentage point decrease in the local share of debt servicing costs leads to an average 0.6 percentage point improvement in graduation rates after five years. The same reduction in the local debt servicing costs causes a 0.3 percentage point increase in college entrance exam participation rates and college enrollment rates, although the coefficient estimates are statistically insignificant. These findings imply that easing local debt burdens can generate substantial returns for students across multiple dimensions.

To ensure the internal validity of the results, I take several steps to address any remaining endogeneity concerns. First, I eliminate any time-invariant district characteristics along unobservable dimensions by adding school district fixed effects. Next, I rerun the empirical tests without a subset of school districts that are heavily affected by concurrent events around the debt assistance programs. These events include the legislative changes that incentivized wealthy districts to issue debt and the fracking booms that enhanced the local tax base. I also examine relationships between several measures of local economic growth and school district indebtedness to guarantee that the results are less likely to be driven by other confounding factors. The main findings hold up across a battery of robustness tests, suggesting that the results are not driven by specific district characteristics or confounding events unrelated to the debt assistance program.

Overall, the findings strongly support the positive and sizable effects of relieving the school district's debt burden on education quality through increased capital spending. By focusing on the liability side of school financing, this paper sheds light on the effects of marginal and value-adding projects that were previously infeasible without federal or state support. Given the hazardous infrastructure conditions students face, these findings highlight the critical role of local debt financing in safeguarding student well-being.

1. Related Literature

This paper adds to several strands of the literature. First, a growing body of literature in Finance examines the real effects of financing constraints on local and state governments. Adelino et al. (2017) show that increases in credit supply due to the credit rating recalibration positively affect government expenditures and private-sector employment. Exploiting the small issuer cutoff, Dagostino (2018) finds that an exogenous increase in the cutoff leads to increases in issuance volume, employment, and wages at the county level. Agrawal and Kim (2022) indicate that the cross-sectional variation in water quality stems from the deterioration in bond credit rating following the demise of monoline insurers. Posenau (2022) examines the bond covenant and finds that the violation of covenants induces utility districts to charge higher prices and lower water system expenses. Yi (2021) uses a change in the baking regulation to document that issuers significantly reduce issuance amount when the demand from banks declines.

I contribute to this literature by identifying the real effects of lowering local governments' debt financing costs in the context of school districts, which offer a more focused setting with standardized outcomes. School districts primarily serve students and maintain quality public education. Concentrating on a narrow target population with well-defined outcomes, such as test scores and graduation rates, helps capture the overall impacts on public goods provision. In contrast, cities or counties, which are often the focus of the existing literature, provide a wide range of public services across multiple sectors. This makes it empirically challenging to assess changes in the quality of public goods because any effect can be diffused across various sectors in which these governments operate, even with measurable outcomes. As a result, studying school districts provides an ideal setting to understand how lowering debt burdens translates into tangible benefits for their students.

This paper also relates to literature that investigates the marginal effect of additional capital spending on the quality of education. Several studies examine the relationship between capital spending and student outcomes through close bond elections.[3] Cellini et al. (2010) is the first paper that exploits close school bond elections to identify the causal impact of capital spending. They find that school districts that pass the bond measures exhibit improvements in test scores and growth in housing prices in the long run. Other researchers utilize a similar setting, but their results are mixed. Martorell et al. (2016) use

[3] Papers that do not rely on the discontinuity in bond elections include, for example, Conlin and Thompson (2017), Goncalves (2015), Lafortune and Schönholzer (2022), and Neilson and Zimmerman (2014).

the same TEA data to show modest facility improvement after the school district passes bond elections. However, they do not find any significant effect on test scores. Baron (2022) shows similar results using close bond elections in Wisconsin that capital spending does not affect test scores, dropout rates, and college enrollment rates. On the other hand, some papers provide evidence in support of the positive effects of capital spending. Rauscher (2020) focus on California school districts and show that the effect mainly comes from low-socioeconomic-status (SES) students, suggesting heterogeneous effects depending on district characteristics. In a similar vein, Biasi et al. (2023) document that potential benefits of additional capital expenditures can differ across the type of spending across the U.S. Major instructional facilities renovation and construction lead to an increase in test scores whereas spending on non-instructional facilities such as football stadiums does not.

In contrast to these studies that utilize close bond elections for identification, this paper provides a complementary view to analyze the efficiency of capital spending. The debt assistance programs cover school districts that cannot even resort to bond elections due to their overwhelming outstanding debt burdens. Hence, focusing on debt relief directs attention to the relevant margin, where marginal spending can be allocated to high-impact projects that were previously infeasible without federal or state support.

2. Institutional Details

2.1. Financing Capital Investment

In 2020, U.S. public school districts spent over $870B to provide an adequate level of public education to students. More than 10% of the total expenditure was spent on capital outlays. Capital spending is a crucial part of school district expenditures as it is typically used to construct new facilities, renovate existing buildings, and/or purchase educational equipment such as school buses. Given the scale of the infrastructure projects, a combination of local taxes or state support allocated to facilities maintenance each year is insufficient to cover the associated costs.[4] As a result, school districts almost always rely on debt financing.

The most common type of municipal bonds issued by school districts is called general obligation (GO) bonds.[5] GO bonds are backed by the taxing power of the issuer. School districts often pledge ad valorem taxes, or property taxes, to repay bondholders. In addition to the exemption from federal income tax, this feature allows school districts to borrow at relatively low interest rates compared to other types of financing. Hence, school districts typically use GO bonds and increase property tax rates to cover the debt service payments.

However, some school districts remain underfunded without federal or state intervention since they differ vastly in their ability to raise property tax rates for many reasons.[6] For example, the issuance of GO bonds requires the issuer to receive voter approval. School districts with tax-sensitive voters may not be able to increase property tax rates if they cannot pass bond measures. Furthermore, high property taxes can lead to an increase in net out-migration which can erode the tax base(Tiebout (1956)). State governments often impose debt restrictions on school districts as well to maintain the financial health of local governments.

[4]Plant maintenance and operation spending explains around 9% of current spending among independent school districts in Texas. However, it cannot be used to, for example, build another campus for the following reasons. The usage of maintenance expenditures is limited to daily maintenance and operation of facilities, which often excludes major improvements. Even if those funds can be spent at the district's own discretion, it would require absurdly high property tax rates to raise enough capital funding. In addition, some districts may find maintenance expenditures insufficient for the regular upkeep of existing buildings if most of their buildings are severely outdated.

[5]Some school districts issue other types such as revenue bonds. Local governments issue revenue bonds to finance a specific project. They pay debt service on the bonds using the cash flows generated from the project. However, school districts rarely use revenue bonds as most of instructional facilities do not generate revenues.

[6]States and federal government pay less than a quarter of the capital outlay and debt service, and 11 states do not provide any funding to school districts.

2.2. State Debt Assistance Programs in Texas

Until the 1990s, Texas school districts already under a large debt burden found it challenging to raise additional debt from local sources in the absence of state or federal support for capital spending. Such concerns directed attention toward the equalization of facilities funding, which led the state of Texas to pass the Instructional Facilities Assistance (IFA) program in 1998.[7]

The IFA was the first state-level intervention in Texas to provide continuing support to school districts. By sharing the debt service of the newly issued bonds throughout their life, the state intended to boost capital investment by school districts. The program provides a guaranteed yield of $35 per average daily attendance (ADA) for each penny of Interest and Sinking (I&S) tax effort.[8] For example, the state would support 60% of annual debt service for qualifying bonds if an independent school district has $140,000 of taxable wealth per ADA.[9] Figure A2 presents the potential IFA assistance as a function of local taxable value per pupil.[10]

The IFA significantly lowered the local share of the debt burden. Around 30% of school districts received the funding during the first 4 rounds. They were able to borrow approximately $5.6 billion with state support, only paying 42% of debt service for the qualifying bonds on average. A total of $620 million was appropriated to help school districts pay for the first annual debt service on eligible debts across 11 funding rounds. The state continues

[7] Edgewood Independent School District and other school districts filed a series of school finance lawsuits since 1984, now known as the *Edgewood* cases. The Texas Supreme Court sided with the plaintiff, finding that the prevailing school finance system in Texas unconstitutional. Policymakers responded to the decision by revising the state funding formula and redistributing the excess revenues from wealthy districts to property-poor districts. However, the state's attempt at school finance equalization was limited to the current spending which covers all expenditures to run day-to-day school operations.

[8] Texas school districts charge two types of property tax rates. The school district uses I&S taxes to service debt and Maintenance and Operations (M&O) taxes to fund daily operations.

[9] In this example, the state pays 60%(=1-$140,000÷$350,000) of the district's debt service payments on the approved bonds because the district can raise 40%(=$140,000÷$350,000) under the current assessed property valuation.

[10] The IFA assistance is not zero for some districts with taxable property wealth above the guaranteed yield ($350,000) due to some additional factors. School districts with less than 400 ADA were treated as if they had 400 students. Taxable wealth was adjusted downwards if the district experienced high enrollment growth over the past 5 years or was denied IFA assistance during the prior biennium.

to provide debt subsidies for the approved bonds, although no funding has been allocated to the IFA since 2017.

To be eligible for IFA assistance, the district has to meet several requirements. First, districts must apply for the funding as the IFA assistance is not automatically granted. The state funding was secured for the life of the eligible debt, so districts do not have to reapply for the funding in the following years. Also, the usage of bond proceeds is strictly limited to the instructional facilities. Next, districts must have sufficient authorized issuance amounts from the previous bond elections.

While the IFA made substantial progress toward capital spending equalization, there were some limitations. The funding rounds were competitive as the funding fell short of the growing demand for modernizing school facilities. The state prioritized low-property wealth districts when the total amount of assistance requested exceeded the available funding at each round. In addition, the state only supported the newly issued debt. Bonds issued before 1998 were not eligible for debt assistance, meaning that the issuers of these bonds unfortunately had to manage their debt on their own. Lastly, a concurrent legislative change partially negated the state's equalization effort. Both types of property tax rates (M&O and I&S) were initially subject to the recapture in 1993. However, districts have been allowed to retain excess revenues from I&S rates since 1997. This provision effectively induced property-rich districts to issue more debt, aggravating the inequalities in facilities spending.

The state of Texas subsequently launched the Existing Debt Allotment (EDA) program in 2000 to reduce the local share of the debt service on the existing debt. The EDA covered most of the new money bonds that did not qualify for IFA assistance, but non-GO bonds such as revenue bonds were excluded.[11] The EDA also operated under a guaranteed-yield approach, where the state guarantees the same $35 per ADA for each penny of I&S tax

[11] Revenue bonds are another commonly issued municipal bonds. Issuers of revenue bonds typically pledge future cash flows from a specific project. Since most facilities in school districts do not generate cash flows, revenue bonds were rarely issued by districts.

effort up to \$0.29 per \$100 of assessed property valuation.[12] Unlike the IFA, districts are automatically eligible for EDA assistance as long as their taxable property value per pupil is below the threshold. Figure 1 presents the time-series of I&S tax rates during 1994-2006. Since the EDA came into effect in 2000, school districts almost halved I&S tax rates.

Figure 2 shows the proportion of state debt subsidy relative to the district's annual debt service costs. The increase in debt subsidies is modest in the first two years of the IFA as the state only subsidized newly issued debt. However, the state's share of debt service has jumped to roughly 30% since the EDA was introduced. Over 57% of independent school districts in Texas benefited from the EDA during the first biennium, and the state continues to share the debt burden with more than 80% of them as of 2022.

Figure 5 illustrates how the debt program helps alleviate the local debt burden. Suppose a hypothetical school district in Texas levies a 0.4% I&S tax rate and has a taxable property value of \$175,000 per pupil. Before the EDA is implemented, the school district can raise the I&S tax rate up to 0.5%, which is a statutory limit. The current per-pupil taxable wealth implies that the state shares 50% of the incremental local debt burden and the maximum I&S tax rate on the outstanding debt. Assuming no debt issuance following the debt program for simplicity, the state covers 36.25% of the debt service costs under the EDA funding limit (i.e. $0.29\% \times 50\% \div 0.4\% = 36.25\%$). While the I&S tax rate cap is still at 0.5%, the program effectively raises the tax rate slack from 0.1% to 0.245%. The example is also applicable to the case of the newly issued debt. The initial I&S rate can be thought of as the incremental tax rate due to the new debt. Hence, the IFA lowers the incremental tax rate that the school district is responsible for. Note that the state support relative to the incremental tax rate in the absence of the debt program is greater in this case ($\approx 50\%$) since the upper bound for the IFA support is higher than that of the EDA.

In sum, both the IFA and EDA provided substantial debt relief to the highly indebted

[12] In fact, the I&S tax rate eligible for the EDA funding is limited to the smaller of the three rates: the actual I&S rate during the second year of the preceding biennium, the I&S rate sufficient to pay the annual debt servicing costs on the EDA eligible bonds, and the statutory limit 0.29%.

school districts, expanding their debt capacity. The IFA reduced the marginal debt financing costs as it allowed the district to issue new debt with smaller increases in property tax rates than before. On the other hand, the EDA lowered the servicing costs of the existing debt. which in turn created more room for taking on additional debt.[13]

3. Data and Summary Statistics

3.1. Data

The estimation sample comes from four main sources. First, data on the student-level outcomes come from the Texas Education Agency (TEA), which covers all public K-12 students in Texas since 1993. The TEA records contain granular information on the student demographics, curricular activities, and educational outcomes. Individuals are anonymized with the identifier, which allows researchers to observe any public K-12 students in Texas throughout their school years. However, the TEA stops to track students moving out of the state. Following the literature, I assume those students dropped out of school and exclude them from the estimation sample (e.g. Cabral et al. (2021)).

I obtain administrative data on all public post-secondary institutions in Texas from the Texas Higher Education Coordinating Board (THECB). The THECB provides individual-level information on student enrollment, admissions, and graduation since 2004. As it shares the same individual identifier as the TEA records, the THECB is a useful source for observing whether students pursue a higher degree. Similar to the TEA data, the THECB does not report students who attend out-of-state higher education institutions. I assume the students in the TEA but not in the THECB do not pursue post-secondary degrees.

I use district financials from the merged dataset consisting of the TEA district income statement data and the Common Core of Data (CCD) hosted by the National Center for Education Statistics (NCES). The merged dataset covers the universe of Texas school dis-

[13]See Clark (2001) and Plummer (2006) for more detailed descriptions of both programs.

tricts and includes information on revenues and expenditures as well as outstanding bond principals. Most of the school district financial characteristics date back to 1987, but detailed bond issuance information becomes available in 1993. All financial variables are converted to 2000 dollars using the historical CPI for all urban consumers.

Lastly, I collect other district characteristics from the Academic Excellence Indicator System (AEIS) provided by the TEA. The AEIS mainly publishes student performance at the district level, but it also provides information on district demographics and tax collection data in the 1994-2011 school years.

To understand the effect of debt relief on the average student in the district I construct 5 district-level student outcomes from the resulting merged dataset. First, I define capital spending per pupil as the total capital outlays divided by the number of total enrolled students.[14] To measure student academic achievement, I standardize statewide 8th-grade reading and math individual test scores each year and aggregate these measures across all students in the same district-year group. I also define the graduation rates as the fraction of 12th-grade students graduating within the district-year group. College entrance exam participation rates are defined as the fraction of 12th-grade students who took either the SAT or ACT. Lastly, I construct college enrollment rates, defined as the fraction of 12th-grade students who enroll in any 2-year or 4-year institutions within 3 years of graduation.

The estimation sample includes all independent school districts in Texas between 1994 and 2004. I exclude any district with an average per-pupil taxable property value over $250,000 before 1998. Most of these districts were property-rich enough to benefit from the removal of the I&S tax recapture described earlier.[15] This leaves around 790 unique districts in the estimation sample, which covers roughly 80% of all Texas public school districts.

[14] In the main analyses, I subtract the direct state subsidy to capital expenditures to mitigate the effects of state assistance prior to the IFA and EDA.

[15] Increasing the threshold to $350,000, which was the wealth cutoff for both the IFA and EDA, does not change the results qualitatively.

3.2. Summary Statistics

Table 1 describes the district characteristics between 1994 and 2004. All variables are winsorized at 1% and 99% to minimize the influence of outliers. The average district has a 20% higher net outstanding debt relative to its property tax levy between 1987 and 1991, where the net outstanding debt is computed as the long-term bond principal subtracted by the debt service fund balance. A large standard deviation relative to its mean indicates that there are substantial variations in the local debt burden. Capital spending is a large part of total expenditures as it alone represents around 10.9% of total expenditures per pupil. The average district spends around $879 per pupil on large-scale facilities improvement projects every year. Also, capital expenditures tend to be lumpy and concentrated around the bond issuance. Figure 3 plots the average per-pupil spending around the bond issuance year. School districts typically allocate a significant portion of the bond proceeds within a few years after issuance, as indicated by the relatively lower levels of capital spending outside of those years. This is consistent with the nature of infrastructure projects, which often require a lump sum payment at the beginning.

4. Empirical Specification

This paper attempts to understand to what extent debt subsidies can improve education quality in the long run. To this end, a naive OLS approach would be to regress the realized debt relief on educational outcomes h period later. However, the regression fails to establish causality if unobservable district characteristics drive both the actual debt assistance and measures of educational improvement. For example, school districts with better economic conditions can offer more educational resources to their students. On the other hand, these school districts are responsible for a higher portion of debt servicing costs as the debt programs provide debt relief inversely proportional to the per-pupil taxable property value. They would still exhibit considerable enhancement in academic performance in the absence of debt support, which would lead to the underestimation of the OLS coefficients.

I take several steps to alleviate the endogeneity concerns. School district and year fixed effects are included to capture time-invariant school district characteristics and aggregate shocks. Importantly, school district fixed effects eliminate any level differences in school district economic conditions, which limits the sources of the endogeneity to time-varying conditions. To control for the remaining time-varying local economic conditions, I also add various observable district characteristics. I include an enrollment size quartile dummy to proxy for the school district size, which could be correlated with the growth in local economic activities. I add a log of per-pupil current expenditures as wealthy school districts spend more on instructional spending. I use cash holdings scaled by current expenditures in the regression as districts can utilize unrestricted cash holdings at their discretion to boost educational spending. Finally, I control for the local share of total revenue per pupil to factor in the district's dependence on state funding.

To strengthen the causal interpretation of the results, I employ an instrumental variable (IV) approach. I exploit plausibly exogenous variation in debt relief that can be attributed to the school district's varying exposure to the introduction of state debt assistance programs in Texas. To measure the exposure, I divide school districts into two groups by the median value of the average outstanding net long-term debt-to-property tax levy ratio in the 1987-1991 period, well ahead of the first debt programs in 1998. I use this ratio as the debt programs created greater incentives to apply for the IFA funding and larger debt relief for highly indebted school districts. The ratio, similar to the leverage ratio in the context of corporates, measures the outstanding debt position of school districts relative to cash flows from property tax revenues at least 7 to 10 years before the first debt relief rounds. I interact the group indicator variable with the indicator variable set equal to 1 in the years following 1998 to construct the instrument.

The instrument allows me to isolate the variations in debt relief orthogonal to local economic conditions. Note that school districts are divided into two groups based on the ratio measured long before the debt assistance programs. Hence, as long as local economic conditions in the late 1980s are not highly persistent over 10 or more years, the predicted debt support from the instrument does not reflect the cross-sectional distribution of economic conditions around 1998 and onwards.

Using this instrument, I analyze the impact of debt support on capital investment and student outcomes by estimating the following two-stage least squares (2SLS) regression model:

$$FTD_{i,t} = \pi(DTL\ High_i \times Post_t) + \Pi C_{i,t} + \alpha_i + \alpha_t + \epsilon_{i,t} \tag{1}$$

$$\bar{Y}_{i,t} = \beta \widehat{FTD}_{i,t} + \Gamma C_{i,t} + \delta_i + \delta_t + u_{i,t}, \tag{2}$$

where i denotes district, t denotes year, and $\bar{Y}_{i,t}$ represents the average of Y over a specified period. In what follows, I focus on the average from t to $t+4$, which I refer to as short-term, and the average from $t+5$ to $t+9$ as long-term.

In the first stage, I instrument the endogenous variable, *FTD*, using *DTL High* × *Post*. *FTD* is the percentage of annual debt service payments supported by the state, defined as the total state debt funding including both the IFA and EDA divided by the sum of interest and principal payment, net of the effect from refunding bond issuance.[16] I subtract the difference between the refunding issuance amount and the annual change in the sinking fund balance from the denominator to account for the refinancing of the outstanding debt. *DTL High* takes a value of 1 if the district's average ratio of outstanding net long-term debt to property tax revenues between 1987 and 1991 is higher than the median. Intuitively, it proxies for the district's indebtedness scaled by cash flows from its property tax base.

[16]Due to the data collection issue, the data on the IFA support in 1998, 1999, and 2003 are missing. I use the state revenue for capital outlays and/or debt service payments (C11) from CCD to replace missing values. Cross-checking using non-missing years of the IFA and EDA reveals the difference between the actual funding and C11 is extremely small. The results hold if I completely replace the debt assistance with C11.

Post is an indicator denoting if t is greater than or equal to 1998. I choose 1998 as a cutoff because it is when the initial IFA funding round took place. Finally, *DTL High* × *Post*, the interaction between *DTL High* and *Post*, is the instrument throughout the analysis.

$C_{i,t}$ is a vector of control variables including the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t denote district and year fixed effects, respectively. Standard errors are clustered at the district level.

In the second stage, I estimate the impact of debt funding on various district-level outcomes, $\bar{Y}_{i,t}$. The parameter of interest is β, representing the average cumulative improvement in outcome variables in the short or long run. The first part of the results focuses on school district financing behaviors, where the dependent variable is capital spending per pupil. The second part examines the effects on student outcomes. Here the dependent variables are standardized 8th-grade reading and math scores, graduation rates, college entrance exam participation rates, and college enrollment rates. These outcomes capture the overall impacts of debt subsidies on students.

The causal interpretations from the IV approach crucially depend on the two conditions: relevance and exclusion restriction. I first show that the instrument is highly correlated with the endogenous variable. School districts with higher bonded indebtedness around the late 1980s (i.e., *DTL High*=1) continue to bear sizeable debt service costs as their prior debt obligations extend into subsequent years, leading them to be more responsive to both types of the debt programs. As the average maturity of newly issued bonds is roughly 10 years since the 1980s (Cortes et al. (2022)), a local government's debt burden is often highly persistent. This allows *DTL High*, which is the district-level indebtedness measured during the pre-sample period, to be highly predictive of the level of debt burden around the introduction of the debt programs in 1998. Consequently, distressed districts are unable to undertake positive net present value capital projects and, thus, seek debt support more actively than less constrained districts. Figure 4 shows a percentage of the IFA funding recipients within each group defined by *DTL High* from 1998 to 2018. The figure reveals a clear trend that highly indebted districts were more likely to receive the IFA funding. In addition, their existing debt burden made them automatically qualified for a larger amount of debt subsidies based on the EDA allocation formula.

A formal test of this condition in the regression framework confirms a statistically significant and positive relation between the instrument and the endogenous variable. Table 2 presents the estimation results of the first stage in equation 1. The results show that school districts with previously high indebtedness receive greater debt assistance than those with low indebtedness. For example, in Column 2, the debt assistance programs reduce the highly indebted school district's debt service costs by 15.5 percentage points more than less levered school districts. Importantly, high F-statistics in excess of 10 ensure that the instrument strongly predicts the endogenous variable.

Figure 6 visualizes how the IFA and EDA are implemented in time-series by plotting the yearly estimates of equation 1.[17] The reduction in debt financing costs is positive but small as the IFA only subsidized the new issuance costs. Subsequently, the EDA became effective in 2000 and substantially lowered the local share of average debt servicing costs. The gradual decline in the magnitude since 2002 is largely due to the stale taxable wealth threshold, which hasn't changed much since 1998.

Despite the strong first-stage results, the instrument is not valid if two groups of school districts diverge in outcome variables even without the debt relief programs. In particular, the identifying assumption fails if the instrument can predict local economic conditions around 1998 and onwards. Anecdotal evidence suggests that debt financing decisions do not reflect the economic outlook 7 to 10 years ahead. In general, Texas restricts school districts from excessively relying on projected future property taxes when they demonstrate their ability to pay off the bonds. Texas Education Code, Section 45.0031 allows school districts to

[17] Clustered standard errors yield extremely precise estimates during the pre-policy period because all school districts were not receiving debt subsidies, though the coefficient estimates are mechanically near zero. To be conservative, I plot heteroskedasticity-consistent standard errors(HC SE) in addition to clustered standard errors(Clustered SE).

use projected property tax revenues anticipated for the earlier of the tax year five years after the current tax year or the tax year in which the final payment is due for the bonds. This effectively limits school districts from incorporating the information on future property tax bases more than 5 years ahead. Therefore, debt financing decisions made prior to 1991 may not reflect the economic outlook at least 7 years ahead, which supports the validity of the instrument.

While the instrument conditional on various controls including school district fixed effects can handle most of the time-invariant unobservable district characteristics or relatively short-lived economic growth, there may still exist some endogeneity concerns. To further examine the exclusion restriction, I test if school districts with high *DTL* exhibit higher growth in several proxies of local economic conditions: a log of per capita income, a log of median household income, a log of total labor force, and unemployment rates. Due to a lack of school district-level measures during the sample period, I rely on the 1990 and 2000 Decennial Census. This approach effectively leaves a single observation for each school district around the first debt assistance program in 1998.

Table 3 indicates that most of the local economic conditions are not strongly predicted by the instrument. Income measures and unemployment rates show no statistically significant relationship with the instrument, whereas the total employment growth is strongly correlated with *DTL High*. This may not come as a surprise given that high *DTL* school districts are often located next to or within metropolitan areas. Figure 10 shows the geographical distribution of school districts by indebtedness, with districts shaded in dark blue concentrated around some of the most populous cities in Texas. In this respect, column 4 of Table 3 raises a reasonable concern that the instrument may affect outcome variables through changes in local employment rather than debt subsidies. I take several steps to address this concern. First, I show that parametrically controlling for the population size does not alter the results in this paper. I rerun the main analysis after incorporating the interaction term between the log of employment in 1990 and linear trends. The results remain robust to the inclusion of the interaction terms (Table A1-A3). In addition, I include the log of enrollment size, which is available at an annual frequency and highly correlated with the total employment in the regression equation (Table A4-A6). This approach also does not change the results. Finally, I show that the results are robust to dropping the school districts in the top enrollment size quartile as of 1997 and reassigning *DTL High* among the remaining school districts (Table A7-A9). Since fast-growing districts are around metropolitan areas and tend to exhibit a larger number of enrolled students, this exercise ensures that the results are not driven by the school districts with high employment growth.

Concurrent events around the policy implementation might influence the outcome variables as well. A couple of notable changes coincided with the debt assistance programs, including the exclusion of I&S tax rates from the recapture and fracking booms. Changes to recapture rules were made, where excess revenues from I&S rates were retained since 1997, potentially incentivizing highly wealthy districts previously subject to recapture to issue debt. This change implies that highly wealthy districts previously subject to recapture may become more incentivized to issue debt, perhaps to offset the recaptured surplus from M&O taxes. To mitigate the confounding effects from such concurrent events, I eliminate districts that are wealthier than $250,000 per pupil in the pre-policy period.[18] Furthermore, the significant fracking booms in the early 2000s, affecting available school resources and local labor market conditions, especially around districts with large shale oil and gas reserves, are considered. The extraction booms had impacts on students from those areas as well, resulting in lower graduation rates (Kovalenko (2023)). Results are robust to excluding districts with high exposure to the oil and gas industries, proxied by the percentage of taxable property values derived from oil and gas production sites (Table A10-A12).

School districts with below- and above-median debt-to-property tax levy ratios might

[18]While $350,000 per pupil was the cutoff for the IFA and EDA, dropping highly wealthy districts(>$250,000) still leaves around 80% of all school districts in Texas.

also be different along unobservable dimensions. If this is the case, I may observe the same results in the absence of the debt relief programs. For example, one might be concerned that highly indebted school districts have already spent a substantial sum of money on ongoing or recently finished capital projects before the sample period, possibly showing improvements in educational outcomes in the following years.

Measuring the school district's indebtedness relative to property tax levies before 1991 alleviates this concern. The typical facilities improvement projects take around 3 years to complete. Figure A1 presents a recent construction schedule from the Austin ISD's bond proposal. As shown in Figure A1, most constructions are planned to take less than 5 years. At the beginning of the pre-policy period, 1994, it is plausible that most of the projects funded by the pre-1991 debt were already finished. Given that it may take several years for enhanced facilities conditions to pay off, one would be able to observe the effects of those projects by 1998. To the extent that these effects stabilize over time, district fixed effects should capture the permanent increase in outcomes due to the previous projects.

Furthermore, it is unlikely that school districts keep the proceeds over an extended period to spend on capital projects in the distant future. Rather, they tend to use bond proceeds within a few years. Note that the IRS prohibits tax arbitrage where districts borrow at the tax-exempt yield and invest at the taxable interest rate. The maximum yield the bond proceeds can earn is often much lower than the prevailing interest rate for that reason. Since most school bonds are tax-exempt, saving the bond proceeds in the investment account for a long time may result in negative returns or negative tax arbitrage.

5. Results

5.1. District Capital Investment

Upon receiving debt support, school districts increase their capital investment in the short run.[19] Table 4 reports the estimation results of equation 2, where the dependent variable is the log of per-pupil capital spending. The coefficient estimate on short-term capital expenditure in column 1 is positive and statistically significant.[20] The economic magnitude is sizable. A 10 percentage point increase in the percentage of subsidized debt service payments increases per-pupil capital spending by around 11% on average during the first four years (i.e. $0.1 \times 1.103 = 11.03(\%)$).

However, the effects of debt support on capital investment do not persist over time. Figure 7 graphically illustrates these short-lived effects. The coefficient estimates become close to zero or negative around three years after state support. A couple of reasons can explain the short-term surge in capital spending. First, facilities improvement projects require a significant amount of money at the outset. Since capital outlays cover all associated costs such as acquiring land and construction, the majority of capital spending is allocated in the initial years. The tax status of bonds also incentivizes school districts to use most of the bond proceeds within the first few years. School districts typically issue tax-exempt municipal bonds to raise money to take advantage of low tax-exempt yields. Due to this tax benefit, the IRS prohibits them from investing at the taxable interest rate. Hence, it becomes costly for school districts to hold onto the bond proceeds in the fund balance.

[19] In untabulated tests, operational spending does not increase in response to the debt assistance programs. Municipalities often operate under the balanced budget requirements. This implies that municipalities cannot arbitrarily redirect the savings from reduced local debt servicing costs to non-capital activities. This also explains why bond issuance is a particularly important source of financing, as school districts cannot raise substantially more revenues than expenditures.

[20] The results are consistent with Plummer (2006), who also finds positive impacts of the same debt assistance programs in this paper on capital outlays. However, the sample period in Plummer (2006) ends in 2001 whereas my sample period is much longer to capture multiple IFA funding rounds until mid-2000s.

These results suggest that the two debt relief programs successfully assisted school districts constrained by their existing debt capacity by lowering their debt financing costs. As school districts share debt servicing costs with the state, they are able to lower the debt service costs per dollar borrowed. This effectively boosts their debt-bearing capacity, allowing them to take on additional debt for worthwhile infrastructure projects that would have been infeasible without state intervention.

5.2. District Educational Outcomes

The results in the previous section document that an increase in state debt support leads to a substantial rise in the school district's capital expenditures, which are often used to fund large-scale infrastructure improvement projects. To measure potential gains from the reduction in debt financing costs, I next investigate how the quality of public goods changes after receiving debt relief.

5.2.1. Academic Achievement

I first examine the effects of debt relief on standardized 8th-grade reading and math test scores from the statewide assessment. To the extent that debt relief brings material benefits to students in the treated school districts, test scores can be used to measure improvements in the average student's academic performance.

I find that debt relief leads to long-term improvement in academic performance. Table 5 presents the estimation results of equation 2 using 8th-grade standardized reading and math test scores as dependent variables. In columns 1 and 2, debt relief increases average reading scores in the long run, while there is no short-term effect. The coefficient estimate in column 2 is both economically and statistically significant. The estimate implies that a 10 percentage point increase in the fraction of state-subsidized debt service payments results in roughly a 0.02 standard deviation increase in reading scores on average 5 years later (i.e., $0.1 \times 0.211 = 0.02$).

Debt relief increases average math scores as well. Columns 3 and 4 in Table 5 present the estimation results using 8th-grade standardized math test scores as dependent variables. The results for math scores also exhibit long-lasting improvements. The estimates imply that a 10 percentage point increase in the fraction of state-subsidized debt service payments leads to approximately a 0.037 standard deviation increase in math scores on average 5 years later (i.e., $0.1 \times 0.370 = 0.037$).

Graphical representation of the coefficient estimates briefly summarizes the results, characterized by long-term improvements in test scores following the initial dip. Each panel in Figure 8 graphically depicts the estimates from the dynamic version of equation 2 , where I rerun equation 2 using $Y_{i,t+h}$ for each $h = 0, 1, \ldots, 9$ instead of the average. The evolution of the estimates is in line with prior studies documenting the positive effects of capital spending on educational outcomes(e.g. Cellini et al. (2010)). Test scores are negatively affected by debt assistance during the initial periods as a major renovation of the existing facilities or construction of new buildings may disrupt student learning. For example, loud noise from the construction sites or temporary portable classrooms due to facilities upgrades can adversely impact students' motivation and result in muted or even negative effects during the first few years. Several years after receiving debt relief, the coefficient estimates gradually increase and stabilize. This is consistent with the benefits of school infrastructure improvements which can take years to materialize(Jackson and Mackevicius (2021)).

The magnitude of the effect in this study is large compared to existing studies on the impact of capital spending on academic achievement. To put the estimates in context, I convert the effect into an increase of $1,000 in capital spending per pupil. A back-of-the-envelope calculation implies that a $1,000 increase in per-pupil state debt subsidies would lead to an increase of roughly 0.042 standard deviations in reading scores and 0.074 standard deviations in math scores over the long term, assuming a linear relationship between capital spending and test scores.[21] For example, Cellini et al. (2010) find that bond measures that are narrowly passed result in a capital spending increase of about $5,000 per pupil over the next 5 years, raising the year-six test scores by 0.16 standard deviations. Their findings imply that the effect is 0.03 standard deviations per $1,000 per-pupil capital spending (i.e., 0.16 ÷ 5 = 0.03), which represents around 40% to 71% of the effect size found in this paper.

The difference in magnitudes between this paper and existing studies can be attributed to the type of marginal infrastructure projects considered. A significant portion of the literature exploits close bond elections as the main identification strategy (e.g., Biasi et al. (2023), Boyson and Liu (2022), Martorell et al. (2016)). While the random bond passage provides a clean setting to establish causality, the randomness may come at the expense of focusing on a limited set of capital projects that are narrowly passed or failed. To the extent that individual voting decisions depend on evaluating a proposed project's potential gains, the marginal capital projects in close bond elections might have minimal or negligible expected returns. Furthermore, this setting excludes school districts that cannot even make it to the bond election. Most likely, candidates are those with a substantial amount of outstanding debt burdens as these districts cannot issue more debt for various reasons[22]. Their proposed projects may create much greater impacts if these districts are relieved of their debt burdens, allowing them to undertake projects with significant potential for educational improvements. As a result, studies using narrowly passed bond elections may find smaller or no effects compared to this paper, as they miss the significant gains that could be achieved by addressing the constraints faced by heavily indebted districts.

In contrast, treated school districts in this paper are unable to undertake additional

[21] From the previous results, a 10 percentage point increase in debt relief leads to an 11% increase in cumulative capital spending over the first five years (year 0 - 4) including year 0. Since the average capital spending is around $915, school districts increase capital spending by roughly $503 per pupil (i.e., $915×5×0.11). Hence, a $1,000 of per-pupil capital spending raises reading scores by around 0.042 standard deviations and math scores by 0.074 standard deviations.

[22] State-imposed debt ceiling can limit them from participating in bond elections. Alternatively, they may not attempt elections at all if they believe residents would not approve bond measures due to high current property tax rates.

projects due to the debt burden. This might be a huge loss to those school districts if these projects can generate substantial educational gains. Hence, reducing the debt burden generates much larger gains than narrowly winning the bond election. This is because alleviating the debt burden enables school districts to initiate projects that may have significant educational returns, thus maximizing the potential benefits of infrastructure investments. By focusing on reducing debt constraints, this study highlights the importance of financial flexibility in allowing districts to pursue projects that can meaningfully enhance student outcomes.

The effect on test scores is also comparable to findings in the literature regarding the impacts of operational spending on student outcomes. For instance, the Tennessee Student/Teacher Achievement Ratio experiment (STAR) reduced the number of students per class by roughly 30% to 40% and improved standardized test scores by 0.15 standard deviations (e.g. Chetty et al. (2011), Schanzenbach (2006)). Since STAR cost roughly 47% of operating expenditures, this estimate implies that $1,000 spent on the class size reduction leads to a 0.051 standard deviation increase in test scores.[23] As the literature often finds the impact of non-capital spending on educational outcomes exceeds that of capital spending(Jackson and Mackevicius (2021)), the estimates in this section suggest that debt assistance generates substantial returns to educational achievement.

The results for both academic achievement measures consistently suggest the positive and long-lasting effects of debt assistance occur as value-adding capital projects become affordable for school districts. The results in this paper confirm that incremental capital spending from lower debt financing costs yields long-term positive gains for students.

5.2.2. Non-Test Outcomes

While debt assistance leads to long-term improvements in academic outcomes, test scores alone do not fully capture its benefits to student learning. For example, students on the

[23] Since the average current spending per pupil is $6,280, this approximately results in an effect of 0.051 standard deviations in test scores per $1,000 operating spending per pupil(i.e. 0.152÷($6,280×0.47÷$1,000)=0.051).

margin can complete public education and pursue higher degrees if they can stay comfortable during hot weather thanks to the updated air-conditioning system. To evaluate the overall impact of debt relief on students, I examine a set of non-test outcomes.

Non-test outcomes improve after receiving debt support, consistent with the previous results on academic achievement. Table 6 estimates equation 2 with graduation rates, college entrance exam participation rates, and college enrollment rates as dependent variables. In columns 1 and 2, the coefficient estimates point to evidence supporting the positive effects of debt assistance in the long run. The coefficient estimate is statistically and economically significant only in column 2. The results imply that a 10 percentage point increase in debt assistance as a fraction of debt servicing costs leads to a roughly 0.6 percentage point increase in graduation rates after 5 years. Similar to the previous results for the test scores, the pattern observed in columns 1 and 2 assures that the effects come from improvements in school facilities; graduation rates show muted or negative effects in the short term, but they go up after 5 years.

Panel A in Figure 9 visualizes the results. In particular, it shows that the long-lasting effect of debt subsidies on high school completion rates. In the short run, the coefficient estimates remain close to zero, but they jump around 6 years later and stay elevated until the 9th year.

I also show that students become more motivated to pursue higher degrees, although the estimates exhibit marginally positive responses. Columns 3 through 6 of Table 6 report the estimation results using college entrance exam participation rates and college enrollment rates as dependent variables, respectively. Both results suggest that debt relief influences students by motivating them to take college entrance exams such as the SAT and attend post-secondary institutions. A 10 percentage point increase in debt relief raises college exam participation rates by roughly 0.5 percentage points after five years. The effects on college enrollment rates are positive as well. The results imply that a 10 percentage point increase in debt assistance leads to a roughly 0.3 percentage point increase in college enrollment rates after five years. Although most of the estimates are insignificant at a 10% significance level, the general pattern across the two results resembles the previous results. Again, lasting positive effects are followed by downturns during the first few years potentially due to the temporary distraction from capital projects.

Several factors can explain relatively weak responses on non-test outcomes. First, both college entrance exam participation rates and college enrollment rates could be imprecisely measured. For example, if better educational facilities increase the likelihood of pursuing higher education throughout one's life, these measures fail to identify individuals who change their minds about attending college after working for a few years. In addition, the TEA and THECB do not report students who leave the state before they graduate and attend higher education institutions elsewhere. This could either bias the coefficient estimates toward zero due to measurement errors or downward if the attrition rate is systematically higher among the treated school districts.

Overall, the findings on both test and non-test measures confirm that debt support brings long-lasting benefits to students. Across various educational improvement measures, this paper documents positive and persistent impacts several years after receiving state debt assistance. In line with debt relief allowing school districts to pursue value-adding projects that they could not before, I show that the effects are insignificant or even negative during the initial period, turning positive and persistent over the next years.

6. Conclusion

As the school district's debt capacity is tightly linked to its property tax base, some districts find it much harder to raise funding to improve the outdated educational facilities. Overwhelmed by the outstanding debt position, students in highly indebted districts are forced to learn in a disadvantaged environment without external debt support.

In this paper, I investigate the relationship between debt relief and educational outcomes in the context of independent school districts in Texas. Using the introduction of a series of state-level debt assistance programs, I first find that additional debt support allows heavily indebted school districts to take on more debt to increase capital spending. The state intervention has substantial impacts on capital investment as an additional 10 pp in state debt subsidy leads to a 11% increase in capital spending over the first two years.

I also document that students benefit in the long run from additional infrastructure projects with the debt assistance program. Despite an initial drop, standardized reading and math scores reveal that improved building conditions have long-term positive impacts on students. The magnitude vastly exceeds what the existing studies relying on close bond elections find and corresponds with what has been observed from the well-known results on current spending. In a similar vein, students in more distressed districts exhibit higher graduation rates and a greater likelihood of taking college entrance exams and entering college.

The findings of this study shed light on how lowering the local debt burden can contribute to narrowing the education gap due to poor educational infrastructure. The examples of the IFA and EDA in Texas illustrate how strategic policy interventions can enable highly indebted districts to overcome previous borrowing limitations, resulting in enhanced educational facilities and improved student outcomes. Importantly, this has broader implications beyond school district financing as public goods provision by other types of local governments also hinges on their debt positions. This study underscores the significance of municipal finance policies in shaping residents' well-being and local communities' sustainability.

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FIGURE 1. Average I&S Tax Rates in the 1994-2006 period.
This figure plots the average I&S tax rates, a part of property tax rates dedicated to debt service, from 1994 to 2006.

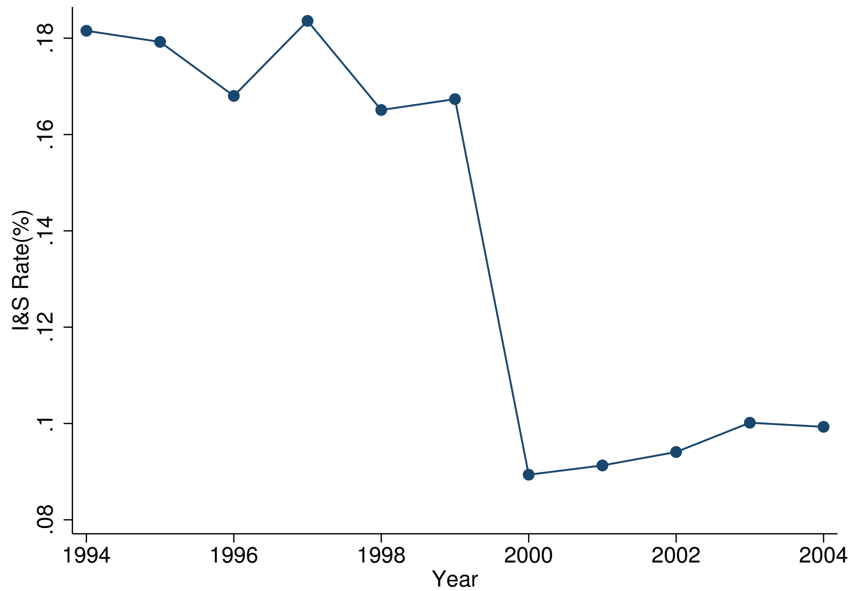


FIGURE 2. Average State Debt Assistance in the 1996-2004 period.
This figure plots the average state debt assistance as a fraction of annual debt service payments between 1996 and 2004. Debt assistance includes debt subsidies from both IFA and EDA. Annual debt service payments are defined as the sum of the amount of long-term debt retired and interest payments, subtracted by the changes in the sinking fund balance.

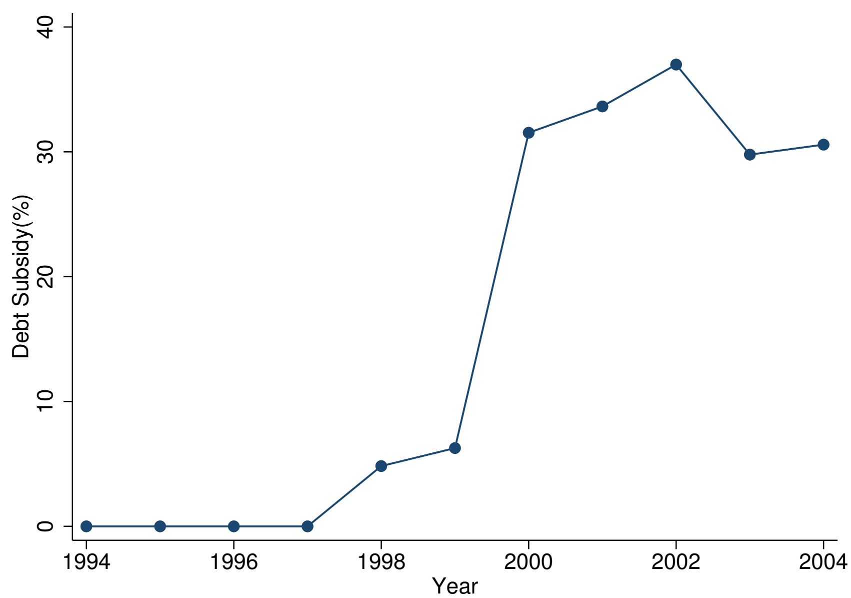


FIGURE 3. Average Per-Pupil Capital Spending Relative to Issuance Year.
This figure shows the average per-pupil capital spending relative to the issuance year. Year 0 represents the year of bond issuance.

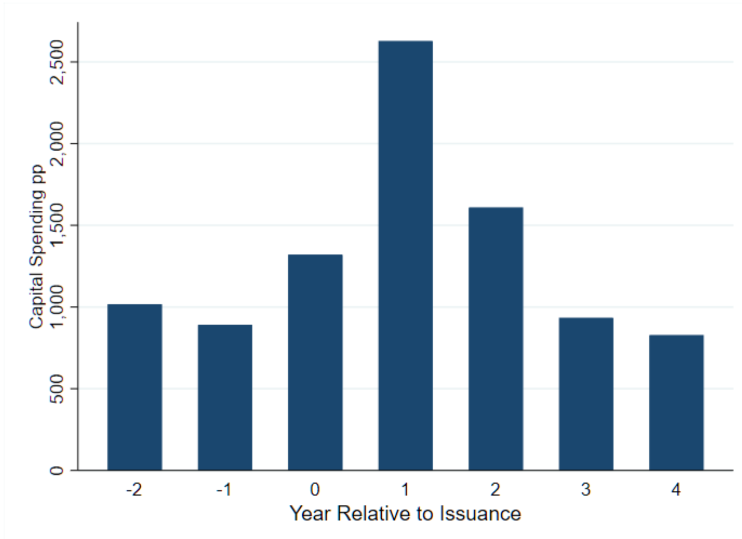


FIGURE 4. IFA Funding Recipients in the 1996-2006 period.
This figure plots the districts receiving IFA assistance as a fraction of the total number of school districts in each group defined by *DTL* $High_i$ between 1996 and 2006. The blue line indicates the average percentage of IFA funding approval among districts with low ex-ante borrowing constraints (*DTL* $High_i = 0$). The red line indicates the average percentage of IFA funding approval among districts with high ex-ante borrowing constraints (*DTL* $High_i = 1$).

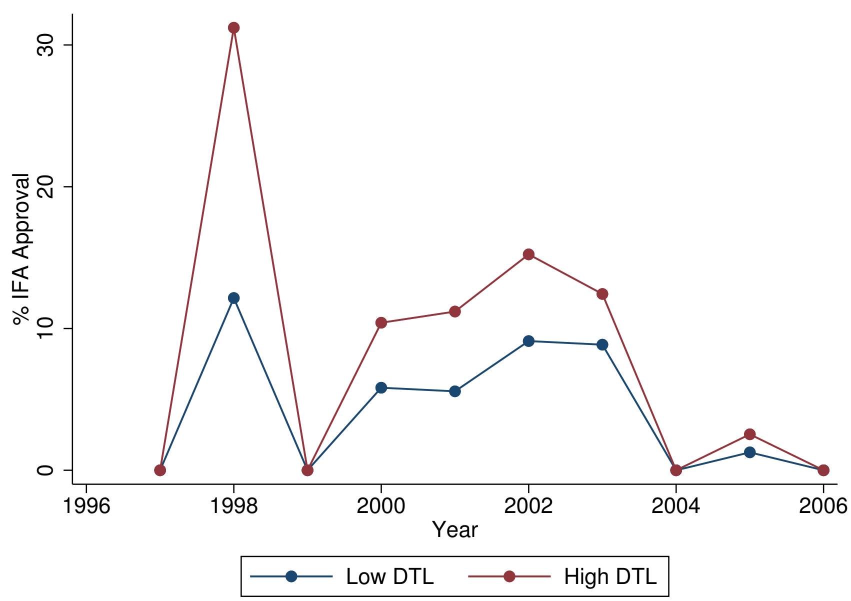


FIGURE 5. Example of I&S Tax Rates around IFA/EDA.
This figure illustrates how the IFA or EDA program shifts the Interest & Sinking (I&S) tax rate for a hypothetical school district. The district is assumed to levy a tax rate of 0.4% prior to the implementation of the program and to be eligible for 50% of the existing debt up to 0.29% of the original rate. The burnt orange block represents the tax rate levied by the school district, while the blue block represents the portion covered by the state. The vertical arrows indicate the distance between the tax rate cap and the rate charged by the school district.

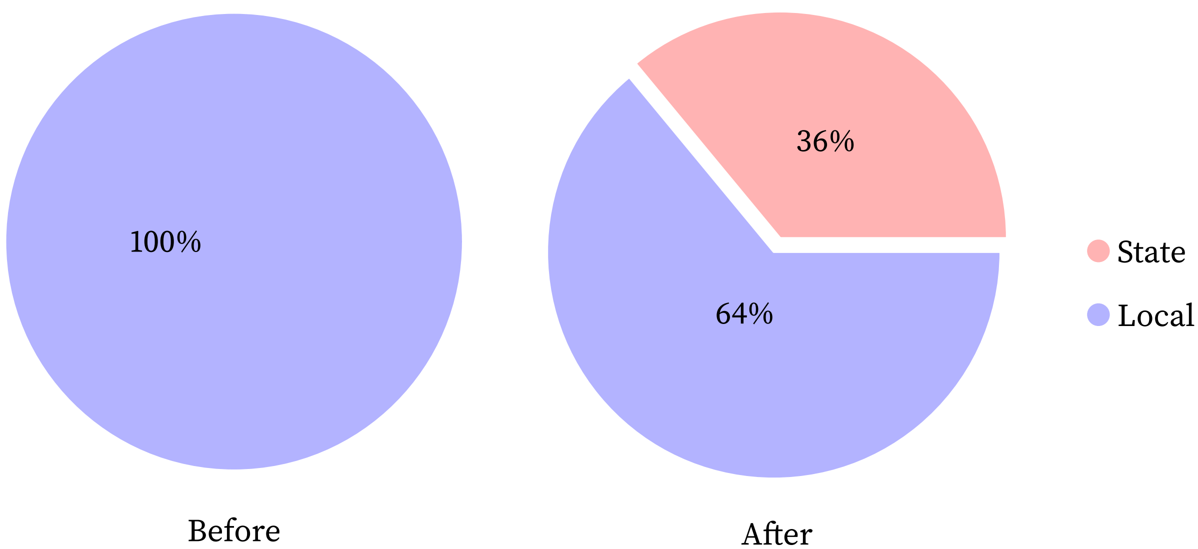


FIGURE 6. First Stage Estimation Results.
This figure plots coefficient estimates and 95% confidence intervals from the following first stage of the IV approach: $FTD_{i,t} = \sum_{j \neq 1997} \pi_j (DTL\ High_i \times \mathbf{1}_{t=j}) + \Pi C_{i,t} + \alpha_i + \alpha_t + \epsilon_{i,t}$. The dependent variable is the percentage of annual debt service payments supported by the state. The coefficient estimate is allowed to vary by year where the reference point is the year 1997. $DTL\ High_i$ takes a value of 1 if the district has an average outstanding net long-term debt-to-property tax levy ratio in the 1987-1991 period that is above the median and 0 otherwise. Control variables in $C_{i,t}$ include the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures, district dummies, and year dummies. Diamond plots indicate that heteroskedasticity-consistent standard errors are used. Square plots indicate that standard errors are clustered at the school district level. All variables are winsorized at the 1st and 99th percentile.

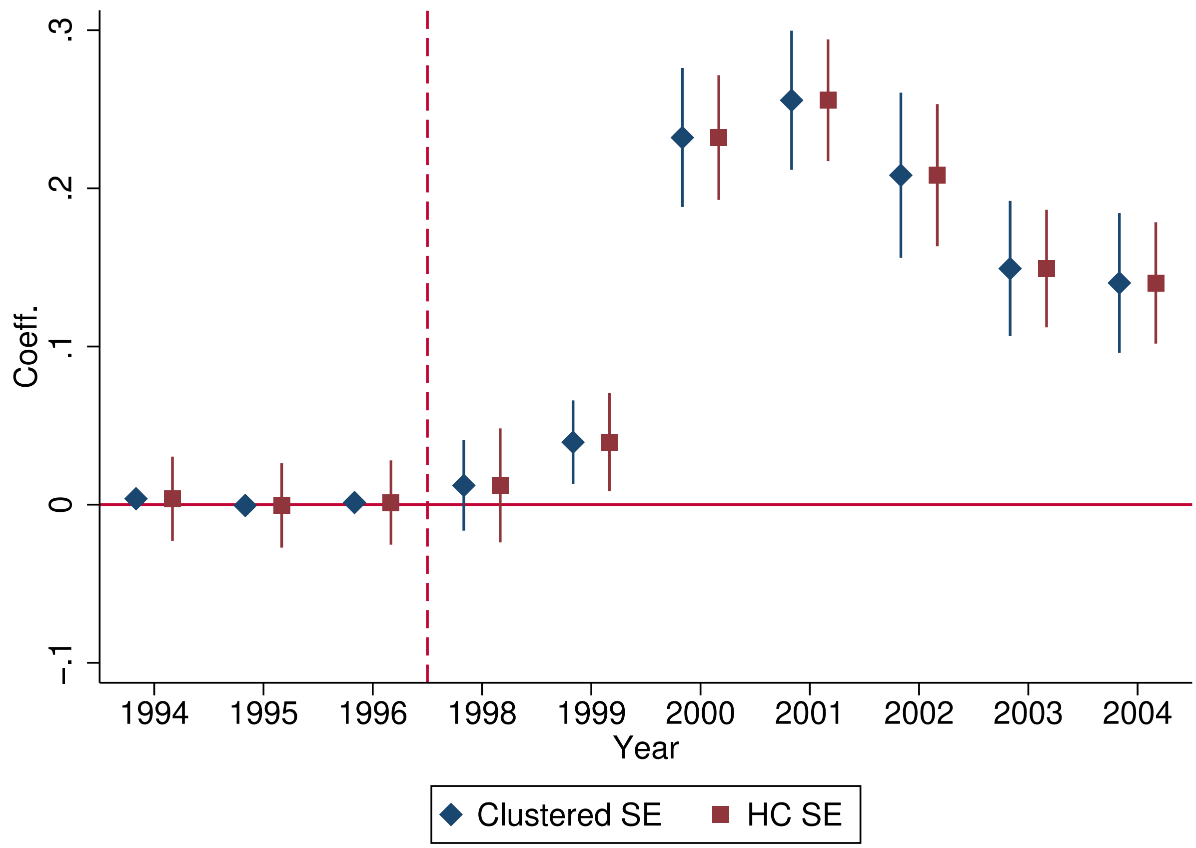


FIGURE 7. Effect of Debt Relief on Capital Investment.
This figure plots coefficient estimates and 95% confidence intervals from the following second stage of the IV approach: $Y_{i,t+h} = \beta^h \widehat{FTD_{i,t}} + \Gamma^h C_{i,t} + \delta_i^h + \delta_t^h + u_{i,t+h}$, for h=0,1,...,9. The dependent variable is a log of capital spending per pupil. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures, district dummies, and year dummies. Each plot represents the coefficient estimate from the regressions of h-period ahead outcome variables. For example, the first plot presents the concurrent effect(h=0).

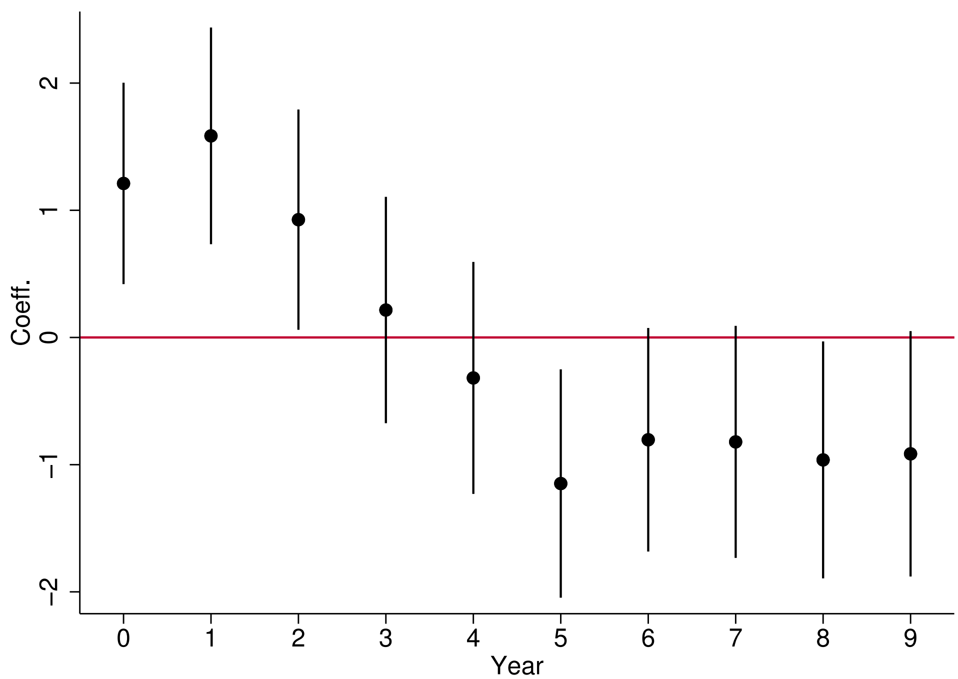
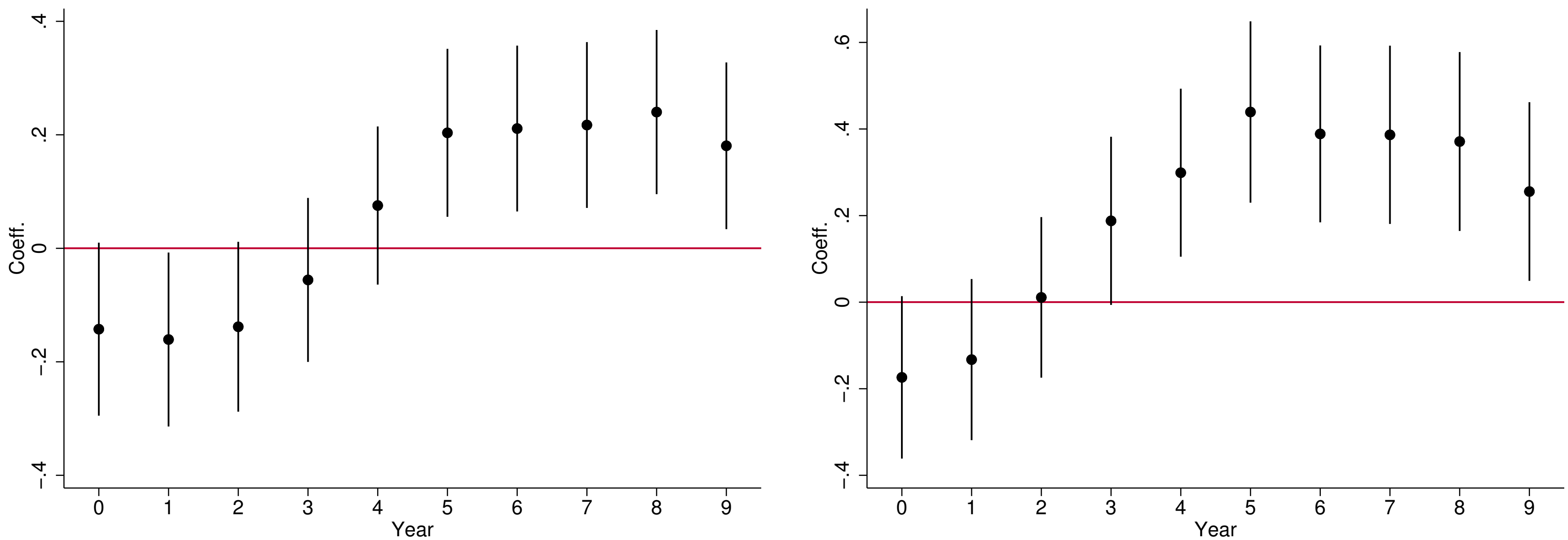


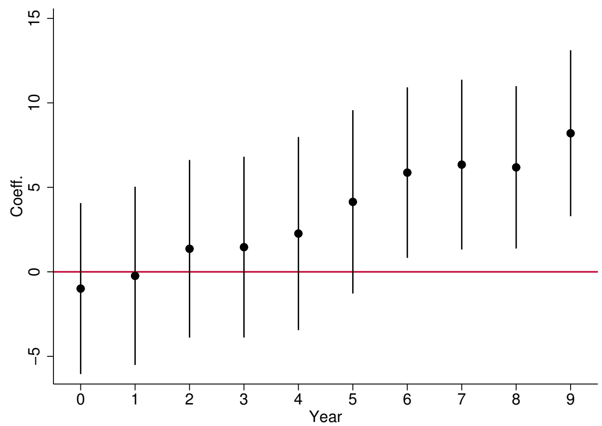
FIGURE 8. Effect of Debt Relief on Standardized Test Scores.
This figure plots coefficient estimates and 95% confidence intervals from the following second stage of the IV approach: $Y_{i,t+h} = \beta^h \widehat{FTD_{i,t}} + \Gamma^h C_{i,t} + \delta_i^h + \delta_t^h + u_{i,t+h}$, for h=0,1,...,9. The dependent variables are standardized 8th-grade reading scores in panel A and standardized 8th-grad math scores in panel B. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures, district dummies, and year dummies. Each plot represents the coefficient estimate from the regressions of h-period ahead outcome variables. For example, the first plot presents the concurrent effect(h=0).



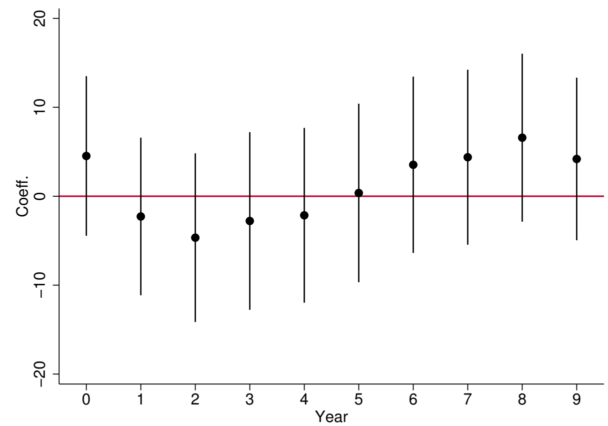
a. Reading Scores

b. Math Scores

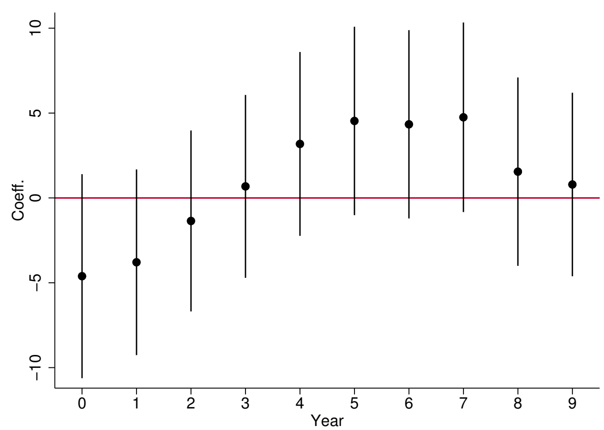
FIGURE 9. Effect of Debt Relief on Non-Test Outcomes.
This figure plots coefficient estimates and 95% confidence intervals from the following second stage of the IV approach: $Y_{i,t+h} = \beta^h \widehat{FTD_{i,t}} + \Gamma^h C_{i,t} + \delta_i^h + \delta_t^h + u_{i,t+h}$, for h=0,1,...,9. The dependent variables are graduation rates in panel A college entrance exam participation rates in panel B, and college enrollment rates in panel C. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures, district dummies, and year dummies. Each plot represents the coefficient estimate from the regressions of h-period ahead outcome variables. For example, the first plot presents the concurrent effect(h=0).



a. Graduation (%)



b. College Exam Tested (%)



c. College Enroll (%)

FIGURE 10. Geographical Distribution of School Districts by Indebtedness.
This figure shows the geographical distribution of school districts by *DTL High*, which takes a value of 1 if the district has an average outstanding net long-term debt-to-property tax levy ratio in the 1987-1991 period that is above the median and 0 otherwise.

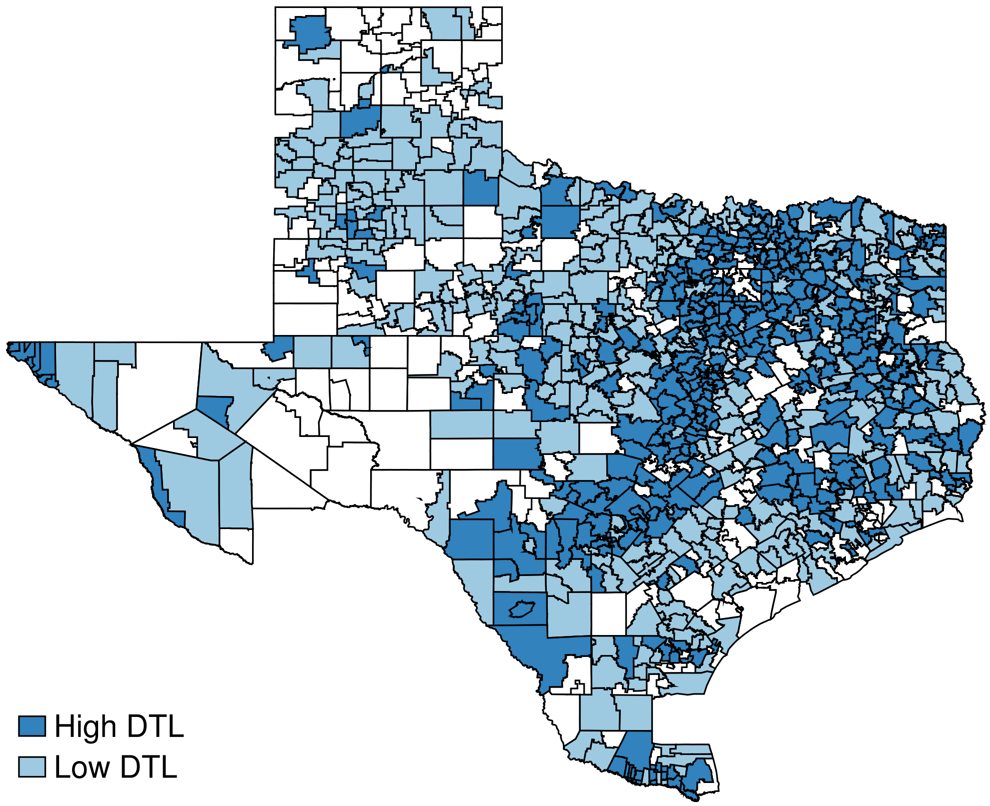


TABLE 1. Summary Statistics

This table provides descriptive statistics at the district-year level. The sample consists of independent school districts in Texas from 1994 to 2004. *Debt-to-prop tax rev* is the ratio of the outstanding long-term debt to property tax revenues. *Debt-to-prop tax rev pre* is defined as the average *Debt-to-prop tax rev* in the 1987-1991 period. *Subsidy-to-Debt Payment* is calculated as the sum of state debt funding divided by the annual debt service payment. *Local* and *State* are local and state revenues as a fraction of total revenues, respectively. *Capital Outlays* and *Current* are capital and current spending as a fraction of total expenditures, respectively. *Enrollment* is the number of students enrolled at the beginning of the fiscal year. *Std. Reading* and *Std. Math* are the district average of standardized 8th-grade reading and math scores, respectively. *% Hispanic* is the percentage of Hispanic student population in the district. *% Econ Disadv* is the percentage of students eligible for free or reduced-price meals in the district.

	Mean	SD	p25	p50	p75
DTL 1987-1991	1.20	1.3	0.16	0.88	1.89
Subsidy-to-Debt Payment	0.16	0.3	0	0	0.23
Taxable Wth pp ($K)	226.6	292.7	103.8	151.3	236.8
Total Rev pp	8003.0	3633.7	6211.4	7316.5	8561.1
Local Rev (%)	42.2	21.4	26.1	36.4	53.4
Expenditure pp	8069.1	3692.3	6113.9	7333.3	8844.5
Capital Outlays (%)	10.9	10.6	3.53	7.09	14.6
Current Spending (%)	84.9	12.9	79.9	89.6	93.9
Enrollment	4006.2	11753.9	428	978	2802
Reading	0.057	0.3	-0.11	0.086	0.26
Math	0.058	0.3	-0.15	0.078	0.28
Graduation (%)	74.3	12.7	66.7	74.4	82.5
College Enrolled (%)	45.5	12.2	37.5	45	53.1
College Exam Tested (%)	62.5	16.2	52	62.2	73.5
LT Debt pp	3074.8	4061.6	0	1814.4	4618.4
Hispanic (%)	28.4	26.7	7.00	19	42
Econ disadv (%)	48.0	18.9	35.3	47.5	59.4

TABLE 2. First Stage Estimation Results.
This table reports coefficient estimates from the following first stage of the IV approach: $FTD_{i,t} = \pi(DTL\ High_i \times Post_t) + \Pi C_{i,t} + \alpha_i + \alpha_t + \epsilon_{i,t}$. The dependent variable is the percentage of annual debt service payments supported by the state. Columns 1 and 2 estimate the first stage without and with control variables, respectively. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $DTL\ High_i$ takes a value of 1 if the district has an average outstanding net long-term debt-to-property tax levy ratio in the 1987-1991 period that is above the median and 0 otherwise. $Post_t$ is an indicator denoting if t is greater than or equal to 1998. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. α_i and α_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

Dep. Var.: Subsidy-to-Debt Payment	(1)	(2)
DTL High × Post	0.151***	0.155***
	(0.014)	(0.014)
% Local Rev		-0.001**
		(0.001)
Log Current Exp. pp		0.097*
		(0.052)
Cash-to-Current Exp.		-0.040
		(0.027)
Size Quartiles		0.058***
		(0.017)
Controls	No	Yes
District FE	Yes	Yes
Year FE	Yes	Yes
Adj R^2	0.54	0.54
Obs.	8675	8674
F-stats	110	117

TABLE 3. Correlations between Local Economy Growth Measures and Treatment Assignment.

This table reports coefficient estimates from the following cross-sectional regression equation: $\Delta Y_i = \rho \ DTL\ High_i + \Gamma \Delta C_i + \epsilon_i$. The dependent variables are a log of per capita income growth, a log of median household income growth, unemployment rate growth, and a log of total employment growth between 1990 and 2000. $DTL\ High_i$ takes a value of 1 if the district has an average outstanding net long-term debt-to-property tax levy ratio in the 1987-1991 period that is above the median and 0 otherwise. Control variables in $C_{i,t}$ include changes in the enrollment size quartile, growth rates of the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures. Heteroskedasticity-consistent standard errors are presented in parentheses. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

Dep. Var.:	(1) Log Per Capita Income90_00	(2) Log HH Med Income90_00	(3) Unemployment Rate90_00	(4) Log Employment90_00
DTL High	-0.001	0.008	-0.003	0.143***
	(0.011)	(0.009)	(0.002)	(0.014)
Controls	Yes	Yes	Yes	Yes
Adj. R^2	0.01	0.02	0.00	0.19
Obs.	785	786	781	781

TABLE 4. Effect of Debt Relief on Capital Expenditures.
This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta \widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variable is the log of capital spending per pupil. In particular, the dependent variables are the average between t and $t+4$ in column 1, and between $t+5$ and $t+9$ in column 2. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	(1) Yr 0-4	(2) Yr 5-9
Subsidy-to-Debt Payment	1.103***	-0.879**
	(0.365)	(0.396)
Controls	Yes	Yes
District FE	Yes	Yes
Year FE	Yes	Yes
Obs.	8675	8675
F-stat	102.15	102.36

TABLE 5. Effect of Debt Relief on Test Scores.
This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are standardized 8th-grade reading scores in columns 1 and 2 and math scores in columns 3 and 4. In particular, the dependent variables are the average between t and $t+4$ in columns 1 and 3, and between $t+5$ and $t+9$ in columns 2 and 4. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Reading		Math	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	-0.084	0.211***	0.039	0.370***
	(0.059)	(0.062)	(0.078)	(0.089)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	8677	8677	8677	8677
F-stat	102.28	102.28	102.28	102.28

TABLE 6. Effect of Debt Relief on Non-test Outcomes.
This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are graduation rates in columns 1 and 2, college entrance exam participation rates in columns 3 and 4, and college enrollment rates in columns 5 and 6. In particular, the dependent variables are the average between t and $t+4$ in columns 1, 3, and 5, and between $t+5$ and $t+9$ in columns 2, 4, and 6. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Graduation (%)		College Exam Tested (%)		College Enroll (%)	
	(1) Yr 0-4	(2) Yr 5-9	(3) Yr 0-4	(4) Yr 5-9	(5) Yr 0-4	(6) Yr 5-9
Subsidy-to-Debt Payment	0.746	6.174***	-2.140	4.647	-1.194	3.227
	(1.967)	(2.062)	(3.886)	(4.176)	(2.178)	(2.257)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8677	8677	8675	8675	8677	8677
F-stat	102.28	102.28	102.06	102.35	102.28	102.28

FIGURE A1. 2022 AISD Bond Proposal Construction Schedule

This figure is an example of a construction schedule from the Austin ISD's 2022 bond proposal.

BOND PROGRAM AUSTIN ISD 2022

2022 Bond Schedule: Campus Architectural Team Projects

TABLE KEY
ST: Design Start
OP: Estimated School Opening

SCHOOL	PROJECT TYPE	2023				2024				2025				2026				2027				2028			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
COOK ELEMENTARY SCHOOL	OPEN CONCEPT		ST									OP													
OAK HILL ELEMENTARY SCHOOL	OPEN CONCEPT		ST									OP													
ODOM ELEMENTARY SCHOOL	OPEN CONCEPT		ST							OP															
WILLIAMS ELEMENTARY SCHOOL	OPEN CONCEPT		ST									OP													
ALLISON ELEMENTARY SCHOOL	FULL MODERNIZATION		ST											OP											
BURNET MIDDLE SCHOOL	FULL MODERNIZATION		ST															OP							
HARRIS ELEMENTARY SCHOOL	FULL MODERNIZATION		ST											OP											
HOUSTON ELEMENTARY SCHOOL	FULL MODERNIZATION		ST											OP											
LINDER ELEMENTARY SCHOOL	FULL MODERNIZATION		ST											OP											
PECAN SPRINGS ELEMENTARY SCHOOL	FULL MODERNIZATION		ST											OP											
SADLER MEANS YOUNG WOMEN'S LEADERSHIP ACADEMY	FULL MODERNIZATION		ST															OP							
TRAVIS EARLY COLLEGE HIGH SCHOOL	FULL MODERNIZATION		ST																					OP	
WOOTEN ELEMENTARY SCHOOL	FULL MODERNIZATION		ST											OP											
ANDERSON HIGH SCHOOL	PHASED MODERNIZATION			ST										OP											
CROCKETT EARLY COLLEGE HIGH SCHOOL	PHASED MODERNIZATION			ST														OP							
LANGFORD ELEMENTARY SCHOOL	FULL MODERNIZATION			ST												OP									
LBJ EARLY COLLEGE HIGH SCHOOL	PHASED MODERNIZATION			ST																		OP			
MCCALLUM HIGH SCHOOL	PHASED MODERNIZATION			ST														OP							
NORTHEAST EARLY COLLEGE HIGH SCHOOL	PHASED MODERNIZATION			ST																		OP			
BARRINGTON ELEMENTARY SCHOOL	FULL MODERNIZATION				ST											OP									
CLIFTON CAREER DEVELOPMENT SCHOOL	COMPREHENSIVE				ST									OP											
DOBIE MIDDLE SCHOOL	PHASED MODERNIZATION				ST									OP											
MARTIN MIDDLE SCHOOL	PHASED MODERNIZATION				ST															OP					
OAK SPRINGS ELEMENTARY SCHOOL	FULL MODERNIZATION				ST											OP									
NELSON FIELD	COMPREHENSIVE					ST									OP										
AKINS EARLY COLLEGE HIGH SCHOOL	COMPREHENSIVE						ST								OP										
NAVARRO EARLY COLLEGE HIGH SCHOOL	PHASED MODERNIZATION						ST													OP					
WOOLDRIDGE ELEMENTARY SCHOOL	FULL MODERNIZATION						ST											OP							
AUSTIN HIGH SCHOOL	PHASED MODERNIZATION							ST										OP							
YELLOW JACKET STADIUM	COMPREHENSIVE								ST						OP										
ANDREWS ELEMENTARY SCHOOL	FULL MODERNIZATION								ST													OP			
NELSON BUS TERMINAL	COMPREHENSIVE									ST									OP						
O. HENRY MIDDLE SCHOOL	PHASED MODERNIZATION									ST														OP	
HILL ELEMENTARY SCHOOL	PHASED MODERNIZATION										ST											OP			
DELCO ACTIVITY CENTER	COMPREHENSIVE												ST									OP			

Project timelines were determined by prioritizing safety and security, historically underserved communities, construction timelines and cost savings. The design start and estimated open dates are subject to change based on factors such as supply chain, weather, site development permitting, unforeseen construction conditions, etc.

In addition to the projects listed, there are **300+ targeted projects** which will be implemented as part of the 2022 Bond. For more information, visit **AISDFuture.com** and the **FAQ**.

Revised September 2023 - Design start and estimated opening dates are subject to change.

FIGURE A2. Potential IFA Assistance and Taxable Property Value per pupil.
This figure shows the relationship between the potential IFA assistance as a fraction of the debt service payments on the approved bond and the taxable property value per pupil. The sample is the universe of school districts in Texas in the 1998-2003 period.

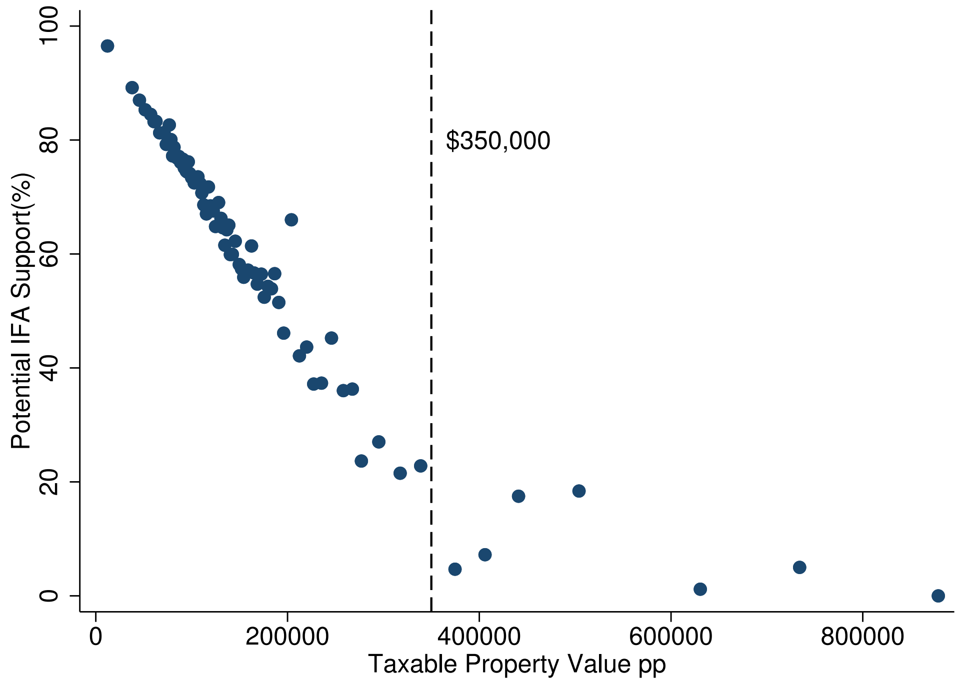


FIGURE A3. Geographical Distribution of School Districts by Oil Property Value per pupil.

This figure shows the geographical distribution of school districts by taxable oil and gas property values per pupil as of 1994.

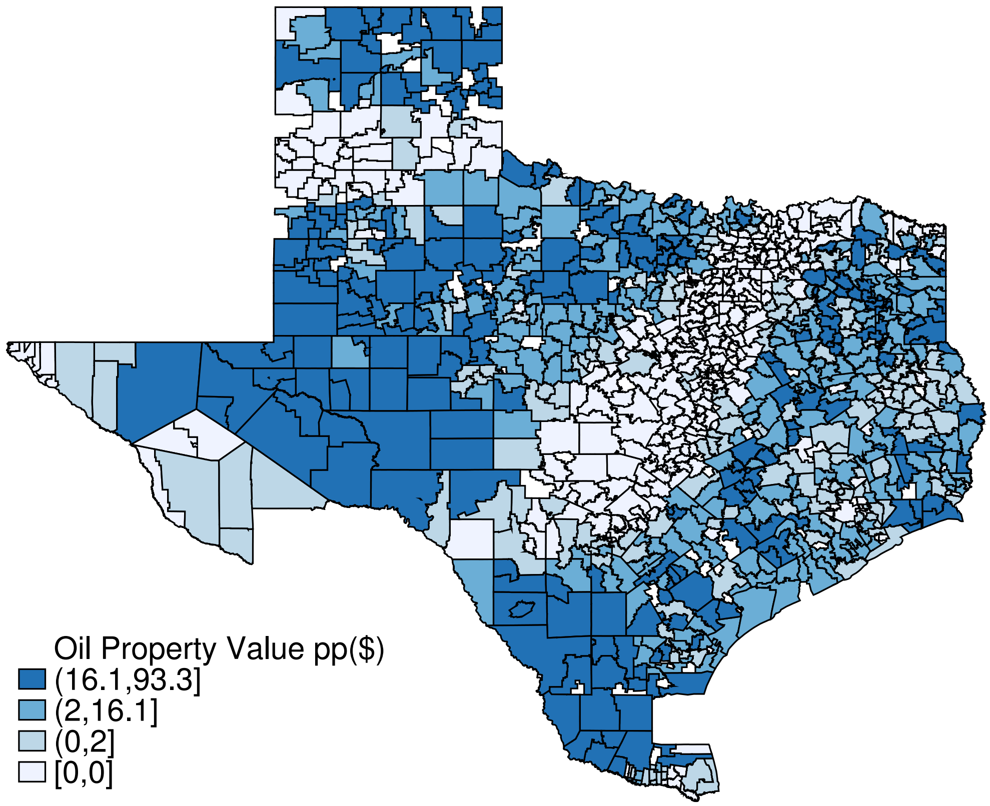


TABLE A1. Effect of Debt Relief on Capital Expenditures - Robustness Checks Controlling for the 1990 Employment × Linear Trends.

This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta \widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variable is the log of capital spending per pupil. In particular, the dependent variables are the average between t and $t+4$ in column 1, and between $t+5$ and $t+9$ in column 2. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures, and the interaction term between the log of 1990 employment and linear trends. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Log Cap pp		Log Current Exp. pp	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	0.988**	-0.579	0.010	-0.015
	(0.426)	(0.471)	(0.031)	(0.034)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	8609	8609	8611	8611
F-stat	76.75	76.83	76.71	76.71

TABLE A2. Effect of Debt Relief on Test Scores - Robustness Checks Controlling for the 1990 Employment × Linear Trends.

This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are standardized 8th-grade reading scores in columns 1 and 2 and math scores in columns 3 and 4. In particular, the dependent variables are the average between t and $t+4$ in columns 1 and 3, and between $t+5$ and $t+9$ in columns 2 and 4. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures, and the interaction term between the log of 1990 employment and linear trends. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Reading		Math	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	-0.097	0.136**	-0.154*	0.247**
	(0.071)	(0.069)	(0.093)	(0.102)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	8611	8611	8611	8611
F-stat	76.71	76.71	76.71	76.71

TABLE A3. Effect of Debt Relief on Non-test Outcomes - Robustness Checks Controlling for the 1990 Employment × Linear Trends.

This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are graduation rates in columns 1 and 2, college entrance exam participation rates in columns 3 and 4, and college enrollment rates in columns 5 and 6. In particular, the dependent variables are the average between t and $t+4$ in columns 1, 3, and 5, and between $t+5$ and $t+9$ in columns 2, 4, and 6. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the local share of total revenue per pupil, a log of current expenditures per pupil, cash holdings scaled by current expenditures, and the interaction term between the log of 1990 employment and linear trends. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Graduation (%)		College Exam Tested (%)		College Enroll (%)	
	(1) Yr 0-4	(2) Yr 5-9	(3) Yr 0-4	(4) Yr 5-9	(5) Yr 0-4	(6) Yr 5-9
Subsidy-to-Debt Payment	-3.590	2.861	-1.698	8.260	-0.827	5.055**
	(2.305)	(2.325)	(4.733)	(5.137)	(2.508)	(2.553)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8611	8611	8609	8609	8611	8611
F-stat	76.71	76.71	76.66	76.79	76.71	76.71

TABLE A4. Effect of Debt Relief on Capital Expenditures - Robustness Checks Controlling for the Enrollment Size Directly.
This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variable is the log of capital spending per pupil. In particular, the dependent variables are the average between t and $t+4$ in column 1, and between $t+5$ and $t+9$ in column 2. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the log of enrollment size, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Log Cap pp		Log Current Exp. pp	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	1.397***	-0.325	0.057*	0.010
	(0.424)	(0.454)	(0.031)	(0.034)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	8675	8675	8677	8677
F-stat	83.05	83.18	83.07	83.07

TABLE A5. Effect of Debt Relief on Test Scores - Robustness Checks Controlling for the Enrollment Size Directly.

This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are standardized 8th-grade reading scores in columns 1 and 2 and math scores in columns 3 and 4. In particular, the dependent variables are the average between t and $t+4$ in columns 1 and 3, and between $t+5$ and $t+9$ in columns 2 and 4. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the log of enrollment size, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Reading		Math	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	-0.122*	0.146**	-0.075	0.284***
	(0.068)	(0.069)	(0.088)	(0.099)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	8677	8677	8677	8677
F-stat	83.07	83.07	83.07	83.07

TABLE A6. Effect of Debt Relief on Non-test Outcomes - Robustness Checks Controlling for the Enrollment Size Directly.
This table reports coefficient estimates from the following second stage of the IV approach: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are graduation rates in columns 1 and 2, college entrance exam participation rates in columns 3 and 4, and college enrollment rates in columns 5 and 6. In particular, the dependent variables are the average between t and $t+4$ in columns 1, 3, and 5, and between $t+5$ and $t+9$ in columns 2, 4, and 6. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the log of enrollment size, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Graduation (%)		College Exam Tested (%)		College Enroll (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	-1.632	4.461*	-3.414	6.143	-3.164	2.025
	(2.270)	(2.305)	(4.621)	(4.928)	(2.562)	(2.541)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8677	8677	8675	8675	8677	8677
F-stat	83.07	83.07	82.87	83.13	83.07	83.07

TABLE A7. Effect of Debt Relief on Capital Expenditures - Robustness Checks Dropping the Top Enrollment Size Quartile.

This table reports coefficient estimates from the following second stage of the IV approach after dropping the school districts in the top enrollment size quartile as of 1997: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variable is the log of capital spending per pupil. In particular, the dependent variables are the average between t and $t+4$ in column 1, and between $t+5$ and $t+9$ in column 2. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Log Cap pp		Log Current Exp. pp	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	0.685*	-0.615	0.066**	0.019
	(0.369)	(0.420)	(0.031)	(0.034)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	6508	6508	6510	6510
F-stat	93.06	93.29	93.20	93.20

TABLE A8. Effect of Debt Relief on Test Scores - Robustness Checks Dropping the Top Enrollment Size Quartile.

This table reports coefficient estimates from the following second stage of the IV approach after dropping the school districts in the top enrollment size quartile as of 1997: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are standardized 8th-grade reading scores in columns 1 and 2 and math scores in columns 3 and 4. In particular, the dependent variables are the average between t and $t+4$ in columns 1 and 3, and between $t+5$ and $t+9$ in columns 2 and 4. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Reading		Math	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	-0.100	0.199***	-0.038	0.390***
	(0.064)	(0.067)	(0.083)	(0.097)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	6510	6510	6510	6510
F-stat	93.20	93.20	93.20	93.20

TABLE A9. Effect of Debt Relief on Non-test Outcomes - Robustness Checks Dropping the Top Enrollment Size Quartile.

This table reports coefficient estimates from the following second stage of the IV approach after dropping the school districts in the top enrollment size quartile as of 1997: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are graduation rates in columns 1 and 2, college entrance exam participation rates in columns 3 and 4, and college enrollment rates in columns 5 and 6. In particular, the dependent variables are the average between t and $t+4$ in columns 1, 3, and 5, and between $t+5$ and $t+9$ in columns 2, 4, and 6. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Graduation (%)		College Exam Tested (%)		College Enroll (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	-2.437	7.105***	0.386	4.150	-1.706	4.520*
	(2.175)	(2.262)	(4.283)	(4.632)	(2.422)	(2.498)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	6510	6510	6509	6510	6510	6510
F-stat	93.20	93.20	93.12	93.20	93.20	93.20

TABLE A10. Effect of Debt Relief on Capital Expenditures - Robustness Checks Dropping the Top Oil Revenue Quartile.
This table reports coefficient estimates from the following second stage of the IV approach after dropping the school districts in the top oil revenue quartile as of 1997:
$\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variable is the log of capital spending per pupil. In particular, the dependent variables are the average between t and $t+4$ in column 1, and between $t+5$ and $t+9$ in column 2. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Log Cap pp		Log Current Exp. pp	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	1.304***	-0.817*	0.069**	0.018
	(0.411)	(0.440)	(0.033)	(0.034)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	6510	6510	6510	6510
F-stat	81.74	81.74	81.74	81.74

TABLE A11. Effect of Debt Relief on Test Scores - Robustness Checks Dropping the Top Oil Revenue Quartile.

This table reports coefficient estimates from the following second stage of the IV approach after dropping the school districts in the top oil revenue quartile as of 1997:
$\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are standardized 8th-grade reading scores in columns 1 and 2 and math scores in columns 3 and 4. In particular, the dependent variables are the average between t and $t+4$ in columns 1 and 3, and between $t+5$ and $t+9$ in columns 2 and 4. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Reading		Math	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	-0.079	0.256***	0.106	0.441***
	(0.065)	(0.069)	(0.087)	(0.101)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	6510	6510	6510	6510
F-stat	81.74	81.74	81.74	81.74

TABLE A12. Effect of Debt Relief on Non-test Outcomes - Robustness Checks Dropping the Top Oil Revenue Quartile.

This table reports coefficient estimates from the following second stage of the IV approach after dropping the school districts in the top oil revenue quartile as of 1997: $\bar{Y}_{i,t} = \beta\widehat{FTD_{i,t}} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are graduation rates in columns 1 and 2, college entrance exam participation rates in columns 3 and 4, and college enrollment rates in columns 5 and 6. In particular, the dependent variables are the average between t and $t+4$ in columns 1, 3, and 5, and between $t+5$ and $t+9$ in columns 2, 4, and 6. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. $\widehat{FTD_{i,t}}$ is the predicted value of $FTD_{i,t}$ from the first stage. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Graduation (%)		College Exam Tested (%)		College Enroll (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	4.126*	4.607**	2.401	0.597	2.418	2.582
	(2.289)	(2.198)	(4.248)	(4.486)	(2.399)	(2.490)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	6510	6510	6508	6508	6510	6510
F-stat	81.74	81.74	81.53	81.83	81.74	81.74

TABLE A13. Effect of Debt Relief on Capital Expenditures - OLS.
This table reports coefficient estimates from the following OLS regression:
$\bar{Y}_{i,t} = \beta FTD_{i,t} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are the log of capital spending per pupil in columns 1 and 2 and current spending in columns 3 and 4. In particular, the dependent variables are the average between t and $t+4$ in column 1, and between $t+5$ and $t+9$ in column 2. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Log Cap pp	
	(1)	(2)
	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	0.006	-0.169***
	(0.048)	(0.055)
Controls	Yes	Yes
District FE	Yes	Yes
Year FE	Yes	Yes
Obs.	8675	8675
Adj. R^2	0.63	0.53

TABLE A14. Effect of Debt Relief on Test Scores - OLS.
This table reports coefficient estimates from the following OLS regression:
$\bar{Y}_{i,t} = \beta FTD_{i,t} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are standardized 8th-grade reading scores in columns 1 and 2 and math scores in columns 3 and 4. In particular, the dependent variables are the average between t and $t+4$ in columns 1 and 3 and between $t+5$ and $t+9$ in columns 2 and 4. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Reading		Math	
	(1)	(2)	(3)	(4)
	Yr 0-4	Yr 5-9	Yr 0-4	Yr 5-9
Subsidy-to-Debt Payment	0.003	0.018**	0.009	0.040***
	(0.008)	(0.008)	(0.010)	(0.012)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	8677	8677	8677	8677
Adj. R^2	0.86	0.85	0.81	0.80

TABLE A15. Effect of Debt Relief on Capital Expenditures - OLS.
This table reports coefficient estimates from the following OLS regression:
$\bar{Y}_{i,t} = \beta FTD_{i,t} + \Gamma C_{i,t} + \delta_i + \delta_t + \bar{u}_{i,t}$, where $\bar{Y}_{i,t}$ denotes the average of Y over a specified period. The dependent variables are graduation rates in columns 1 and 2, college entrance exam participation rates in columns 3 and 4, and college enrollment rates in columns 5 and 6. In particular, the dependent variables are the average between t and $t+4$ in columns 1, 3, and 5, and between $t+5$ and $t+9$ in columns 2, 4, and 6. $FTD_{i,t}$ is the percentage of annual debt service payments supported by the state. Control variables in $C_{i,t}$ include the enrollment size quartile dummies, the local share of total revenue per pupil, a log of current expenditures per pupil, and cash holdings scaled by current expenditures. δ_i and δ_t are district dummies and year dummies, respectively. All variables are winsorized at the 1st and 99th percentile. Standard errors are presented in parentheses and are clustered at the district level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Graduation (%)		College Exam Tested (%)		College Enroll (%)	
	(1) Yr 0-4	(2) Yr 5-9	(3) Yr 0-4	(4) Yr 5-9	(5) Yr 0-4	(6) Yr 5-9
Subsidy-to-Debt Payment	-0.015	0.200	0.742	0.782	0.724**	0.732**
	(0.283)	(0.267)	(0.558)	(0.610)	(0.312)	(0.316)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8677	8677	8675	8675	8677	8677
Adj. R^2	0.85	0.83	0.79	0.78	0.87	0.88