CAP AND GAP: THE FISCAL EFFECTS OF PROPERTY TAX LEVY LIMITS IN NEW YORK

Phuong Nguyen-Hoang
School of Planning and Public Affairs & Public Policy Center
University of Iowa
Iowa City, IA 52242
phuong-nguyen@uiowa.edu

Pengju Zhang
School of Public Affairs and Administration
Rutgers University, Newark
Newark, NJ 07102
pengju.zhang@rutgers.edu

Abstract

This is the first study to examine the fiscal effects of the New York property tax levy limit, using variation from the degree of fiscal stringency across school districts and over time in its first five years of implementation. Based on a difference-in-differences estimator, coupled with an event study specification, we find that the tax limit has imposed a real cap on many school districts; that is, at-limit districts' total current expenditures per pupil are significantly lower than what they would have spent absent the limit. For those affected school districts, this expenditure gap does not come from spending on teacher salaries or fringe benefits but rather from other instructional salaries/expenses, central administration, transportation, interfund transfers, and undistributed spending. We also find heterogeneity in the constraining effects of the tax limit across different need-based groups of school districts.

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1. INTRODUCTION

Under Chapter 97 of the Laws of 2011, the state of New York (NY) established a property tax levy limit (herein referred to as the tax limit) that affects all local governments with property taxing power, including school districts. Effective in fiscal year 2013, the tax limit basically restricts the annual growth of property tax levies to 2 percent or the rate of inflation, whichever is less. The tax limit has been criticized for limiting NY school districts' ability to raise property taxes—their largest revenue source—for educational services (Yinger 2019). Recent data from the NY State Education Department (NYSED) seem to support this criticism. In fiscal years 2017 and 2018, 369 (55 percent) and 328 (49 percent) of the districts, respectively, proposed to raise taxes by every dollar they could within the limit. A few districts (i.e., 36 districts in 2017) even proposed to override the tax limit. Despite criticisms, the NY State Senate and Assembly recently made permanent the limit, which had been scheduled to expire in 2020 (NYSDTF 2020).

The tax limit in NY is one of the most recent examples of state-imposed tax and expenditure limitations (TELs) that have been adopted in many states in the United States (Downes and Figlio 2015; Lincoln Institute of Land Policy and George Washington Institute of Public Policy 2020).[1] Applied public finance scholars have extensively investigated the intended efficacy and unintended consequences of TELs. The literature demonstrates two contrasting perspectives: The "institutional irrelevance view" holds that fiscal rules can be strategically circumvented by local governments in many ways, whereas the "public choice view" suggests that fiscal rules represent important and effective constraints on the behavior of local political actors (Poterba 1996).

Empirical research on the fiscal impact of TELs on local general-purpose governments basically buttresses the "institutional irrelevance view" by pinning down multiple strategies that localities have used to escape the constraint of TELs (Mullins and Joyce 1996; Shadbegian 1999; Skidmore 1999; Hoene 2004; Cheung 2008; McCubbins and Moule 2010; Sun 2014; Zhang 2018; Eliason and Lutz 2018; Zhang and Hou 2020). However, when it comes to school districts, studies on the fiscal impact of TELs provide mixed findings. Based on seventeen empirical articles, a meta-regression analysis finds that TELs have a complex effect on education financial resources, and recent studies are more inclined to support the "public choice view" when compared to studies conducted in the past (Ballal and Rubenstein 2009).

To provide new evidence on the effect of TELs on school finance, this study focuses on the most recent tax limit in NY and seeks to answer three closely related research questions. Considering that not all TELs are fiscally constraining, the first question is whether the tax limit has a constraining effect, or has put an effective cap, on NY school districts' total current expenditures per pupil. The second research question is whether the tax limit may have differential expenditure-stifling effects on different district groups. Third, this study asks which expenditure categories and subcategories bear the brunt of this constraint; that is, how districts under fiscal constraint make spending cuts across different functions.

1. In 2018, thirty-six states and Washington, DC imposed TELs on local governments' property tax levy, though not all of the TELs apply to school districts (Lincoln Institute of Land Policy and George Washington Institute of Public Policy 2020).

By definition, a property tax levy limit is fiscally constraining or binding when it prevents a school district from reaching the level of total spending desired or preferred by local voters (or determined by the local median voter). This definition suggests that "at-limit" school districts—those that exhaust the limit—are most likely constrained by the tax limit. We adopt a difference-in-differences (DID) estimation approach by exploiting unaffected or far-from-limit districts as comparison districts for at-limit school districts. We also utilize an event study specification to support causal links between the tax limit and changes in school districts' spending behaviors. Based on a data panel of 666 school districts in NY between 2011 and 2017, we find strong evidence to support the public choice view that the tax limit has put an effective cap or constraint on at-limit school districts in the first five years of implementation.

Our study makes three contributions to the literature. First, we investigate both average and heterogeneous fiscal effects of the tax limit, the latter of which has not been adequately explored in the literature. Second, this is the first study to take full advantage of the finely disaggregated expenditure data from NY. Our estimations provide a holistic picture of cutback strategies adopted by different district types in response to the limit-induced constraint. Third, this study evaluates the latest ongoing TEL measure, that is, the tax limit in NY and, therefore, our findings can inform in a timely manner current debates on its extension and potential changes in design.

The remainder of the paper proceeds as follows. The next section provides technical details of the tax limit, followed by a review of the literature. We then present a simple theoretical framework on the effect of the tax limit, discuss empirical challenges, and present our empirical strategies. The next section briefly describes data and provides a descriptive analysis, followed by a discussion of regression results. The last section concludes with policy implications and suggestions for future research.

2. BACKGROUND

The property tax levy limit in NY imposes a percentage limit on total property tax levies set by local governments, not on assessed property values or tax rates. Basically, local governments may not adopt a budget funded by a property tax levy that exceeds the prior year's levy by more than 2 percent or the rate of inflation, whichever is less. The tax limit on school districts does not apply to fiscally dependent large-city school districts (New York City, Buffalo, Rochester, Syracuse, and Yonkers).

Property Tax Limit Formula

To calculate a school district's tax limit, the formula starts with the district's prior-year property tax levy and then adds a prior-year reserve offset, from which the reserve amount (including interest earned) needs to be deducted, as shown in figure 1. It is multiplied by a district-specific tax base growth factor determined by the NY State Department of Taxation and Finance (NYSDTF). Prior-year payments in lieu of taxes (PILOTs) receivable are then added to the resulting product, while the prior-year capital tax levy and tort exclusions are subtracted, leading to an adjusted prior-year tax levy.

The adjusted prior-year tax levy is multiplied with the allowable levy growth factor, which is the lesser of either 2 percent or the inflation rate. The levy growth factor was 2 percent in 2013 and 2014, but fell to 1.46 percent, 1.62 percent, and even 0.12 percent in

$$\left[\left[\text{Prior-year levy} + \text{Prior-year reserve offset} - \text{Reserve amount (including interest earned)}\right] \times \text{Tax base growth factor} + \text{Prior-year PILOTs receivable} - \text{Prior-year capital tax levy exclusion} - \text{Prior-year tort exclusion}\right] \times \text{Allowable levy growth factor} - \text{Current-year PILOTs receivable} + \text{Available carryover, if any} = \text{Tax levy limit}$$

$$\text{Tax levy limit} + \text{Tax levy necessary for expenditures resulting from court orders or judgments for any amount exceeding 5\% of prior-year tax levy} + \text{Current-year capital tax levy} + \text{Tax levy for increases in pension contributions} = \text{Tax levy limit with exclusions}$$

Note: Information on this formula, district-specific annual tax base growth factor, and statewide annual allowable levy growth is available at https://www.osc.state.ny.us/local-government/property-tax-cap/real-property-tax-cap-local-governments. PILOT = payments in lieu of taxes.

Figure 1. Property Tax Limit Formula

2015, 2016, and 2017, respectively. After subtracting PILOTs receivable in the coming year and adding available carryover, a school district will subsequently obtain its tax levy limit for the coming or current fiscal year.

However, the tax levy limit can be higher because of three excludable property tax levies—namely, levies for court orders or judgments exceeding 5 percent of the prior-year tax levy, a levy for an increase of over 2 percentage points in the rate of state-mandated contributions to district pension funds, and the current-year levy for capital projects. In addition, a school district can still legally override the tax levy limit with exclusions when there is 60 percent voter approval.

Property Tax Levy Limit and School District Budgeting Process

To examine whether the tax limit is binding or not, one also needs to understand local budgeting processes in NY. The school districts' fiscal year begins on 1 July. Every year, the NYSDTF calculates a tax base growth factor for each school district, and by 15 February, notifies those with a positive change in the factor. School districts can then incorporate this growth factor, which is part of the tax limit formula, into the coming year's budget. By 1 March, school districts must report their proposed budget (including levy) and data necessary to compute their property tax levy limit (as in figure 1) via the Property Tax Report Card to the state comptroller, the commissioner of education, and the NYSDTF. In this report card, the difference between the tax levy limit and the total proposed tax levy is calculated. If the proposed levy is higher than the tax levy limit, the budget, as explained above, must be approved by 60 percent or more of local voters to override the limit (whereas regular budgets only need a 50 percent majority). In late April, districts must transmit the report card to the NYSED and to local newspapers for general circulation. Shortly after a public hearing, districts will mail budget notices to eligible voters who cast their vote on the proposed budget sometime in May.[2]

A school district's budget is not always successfully passed. The failure of budget passage is not uncommon, especially before the enactment of the tax limit. In NY, if a school district's initial override budget is defeated, it has only one additional chance to gain voter approval. In the second vote, the school board has three budget vote options:

2. A timeline of annual budget votes and school board elections since 2008 can be found on the Web site of NY State School Boards Association at nyssba.org/news-media/school-budget-votes/.

the original failed budget; a revised budget that is lower than the original but still higher than the levy limit and therefore requires 60 percent approval; and finally, a revised budget that is lower than or equal to the levy limit and needs only 50 percent voter approval. Given that the school year commences on 1 July for school districts, budget revote activities must be completed in June.

If a second budget vote is again defeated, the district must operate under a contingency budget no greater than its prior-year levy. (Alternately, the district can adopt the contingency budget right after the first budget defeat.) Voting records show that defeated budgets have dramatically decreased to less than 5 percent since 2013, and the number of cases adopting contingency budgets has become extremely rare—only a single district adopted a contingency budget in two of the post-tax limit years.

3. LITERATURE REVIEW

Because the tax limit under investigation is imposed by the state on local governments, this review focuses on state-imposed TELs.[3] The effect of state-imposed TELs has been extensively studied by public finance scholars (Rose 2010). An empirical consensus in the literature is that state-imposed TELs have little effect on the overall size of local general-purpose government budgets (Mullins and Joyce 1996; Shadbegian 1999; Sun 2014; Eliason and Lutz 2018). Localities subjected to property tax limitations, both in the United States and in some European countries, are found to tap into other unconstrained revenue sources (other taxes and fees), establish special districts or homeowners' associations, and issue more nonguaranteed debt (Shadbegian 1999; Skidmore 1999; Hoene 2004; Cheung 2008; McCubbins and Moule 2010; Blom-Hansen, Houlberg, and Serritzlew 2014; Zhang 2018; Kioko and Zhang 2019).

School districts differ from other local, general-purpose governments, possibly leading to a different impact of TELs on school districts' fiscal behaviors. First, school districts are not authorized to create special districts through enabling legislations. Second, property taxes constitute the lion's share of own-source revenue for most school districts in the United States. Therefore, when confronted with a constraining limit on property taxes, they are less able to raise adequate, other own-source revenues to offset the shortfall, as confirmed by the historical analysis in Downes and Killeen (2014). Also, the constraining effects of TELs on school districts may become stronger over time (Dye, McGuire, and McMillen 2005). Ballal and Rubenstein (2009) argue that studies with more recent data tend to consistently find a negative association between TELs and local spending on education, although empirical findings are more inconsistent across studies analyzing older data. Extant studies also explore whether state governments may help fill the gap when local revenues decline. Shadbegian (2003), Blankenau and Skidmore (2004), and Shadbegian and Jones (2005) all find that TELs result in increased state aid, suggesting the reduction of local spending is, to some extent, offset by the growth of state fiscal transfers.

Two studies examine previous TELs in New York. Ebdon (1997) analyzes the impact of constitutional property tax levy limits on small city school districts in NY and finds the limit reduced spending in small city school districts by 2 percent from 1984 to 1986.

3. Kioko (2011) and Brooks, Halberstam, and Phillips (2016) provide reviews on state-level TELs and city-level self-imposed TELs, respectively.

Nguyen-Hoang (2013) examines the effects of the 1986 repeal of these constitutional limits and finds that the repeal had no effect on school operating expenditures in NY during 1980 through 1994. However, the repealed constitutional tax levy limit differs from the tax limit in our study for two major reasons. First, a constitutional limit is harder to change than a statutory one, like the tax limit. Second, the 2013 tax limit starts with the prior-year levy, and the constitutional limit restricts school operating levies to a maximum 2 percent of a five-year average of the full value of taxable property.

In addition to the effects of TELs on school funding sources and total expenditures, some studies also examine whether school districts respond to TELs by changing their expenditure structure or reallocating educational inputs. Dye and McGuire (1997) find that the property tax cap enacted in 1991 in the Chicago metropolitan area decreased operating expenditures but had no effect on instructional expenditures in the short run. Downes and Figlio (2015) suggest that the protection of instructional spending at the expense of noninstructional spending found in Dye and McGuire (1997) is probably related to Tiebout's (1956) theory of competition through which unaffected districts could put competitive pressure on affected districts. Dye, McGuire, and McMillen (2005), however, find that, in the long run, growth rates in both operating and instructional expenditures are slower in districts subject to the same Chicago tax cap. Figlio (1998) also finds the reduction of school district resources caused by Measure 5 in Oregon was borne more heavily by instruction than by administration. In addition, Figlio's (1997) study on school-level data from forty-nine states finds schools subject to property tax levy limitations did not reduce administrative costs but lowered instructional services. As an explanation for the stronger expenditure effects of TELs on instruction than administration, Downes and Figlio (1999, 2015) argue that a larger cut in instructional spending is consistent with administrative rents (defined as use of resources to benefit those in control of resources) and with TEL provisions' lack of incentives for administrators to improve efficiency. All in all, the literature seems to reveal mixed evidence that TELs reduce resources for instruction or administration.[4] Also, none of the existing studies explores whether or how fiscally constrained school districts, in response to a TEL, cut subcategories of instructional expenditures and other spending categories beyond instruction and administration—a literature gap that our study seeks to fill.

The current study also supplements the education finance literature on how school districts respond to the fiscal impacts of a major economic bust. The Great Recession, which started in 2007, induced most states to cut education aid (Oliff and Leachman 2011) and shrank their property tax base (Collins and Propheter 2013). Without a property tax levy limit, school districts could raise property taxes (by levying higher tax rates on their smaller tax base) to buffer the impact of decreased state aid (Chakrabarti, Livingston, and Roy 2014; Evans, Schwab, and Wagner 2019). However, had a property tax levy limit similar to NY's current limit been in place during the Great Recession

4. Another strand of relevant research examines the effects of TELs on educational outcomes. Figlio (1997) finds that TELs are associated with lower student performance, which is partly explained by the findings that tax limits systematically reduce the quality of new teacher hires (Figlio and Rueben 2001), whereas Downes, Dye, and McGuire (1998) find only limited evidence that student performance declines in districts subject to TELs. Thus, the literature does not provide clear guidance on the relationship between TELs and student performance, either. A recent literature review on this can be found in Downes and Figlio (2015).

years, school districts' ability to stabilize their budgets via raises in property taxes would have been seriously undermined. A recent official report sounded a grim warning of the ongoing COVID-19 pandemic's implications for NY schools. The state's pandemic response includes substantial cuts to state aid; coupled with school districts' tax cap-induced inability to shore up local revenue, the reduction in state aid could have dramatic effects on NY school districts' resources (Office of the New York State Comptroller 2020). This study's findings give credence to that warning.

4. THEORETICAL FRAMEWORK

This section presents a conceptual framework for how the tax limit may exert fiscal constraint on school districts. Districts are constrained when the tax limit prevents them from achieving the spending level desired, or determined, by the majority of local voters (or by the median voter). As such, constrained districts refer to the those who spend less than what they would have spent absent the tax limit.

The first cause for the possible constraining effect of the tax limit is associated with the important role that property taxes play in funding school districts' operations. As with most school districts in the United States, NY school districts rely primarily on two major revenue sources: property taxes and state aid. In the three-year period before 2013, the percentage share of state aid in total revenue sources experienced a slight decline, from 37.9 percent in 2010 to 37.5 percent in 2012, whereas property taxes on average accounted for an increasingly large share of all school district revenues (from 41.5 percent in 2010 to 44.2 percent in 2012). Given the important role of property taxes, a limit on this revenue source may translate into fiscal constraint on some districts.

The constraint may be felt particularly strongly by districts that rely heavily on property taxes. Statewide averages mask substantial variation in districts' reliance on property taxes. To present this variation clearly, we rely on the state official classification of school districts based on the need/resource capacity (NRC) index: low NRC, average NRC, urban–suburban high NRC, and rural high-NRC districts.[5] Given that the NRC index—a ratio of a school district's standardized poverty percentage to its combined wealth ratio—indicates the district's ability to meet the needs of students through local resources, these groups are, for ease of presentation, hereinafter referred to as low-need, average-need, urban high-need, and rural high-need districts. Column 2 of table 1 shows that 85 percent of low-need districts' total revenue comes from property tax levy, followed by average-need districts (55 percent). Logically, these two groups of districts with higher reliance on property taxes are more likely to be constrained by the tax limit. By contrast, rural high-need districts with relatively much lower reliance on property taxes (31 percent) are less likely to be constrained.

Beyond the degree of reliance on property taxes, the fiscal impact of the tax limit may be offset by how much state aid and federal aid a district receives during the limit

5. A measure for need used in the NRC index is the share of eligible free or reduced-priced lunch students, and capacity is measured partly by full property valuation. While table A.1 (available in a separate online appendix that can be accessed on *Education Finance and Policy*'s Web site at https://doi.org/10.1162/edfp_a_00327) provides more information on how each group is officially defined, columns 3 and 4 of table 1 show that low-need districts have only 11 percent of economically disadvantaged students (with $3.8 million full property value per pupil), whereas urban high-need districts are relatively property-poor ($434,669 full property value per pupil), with a much higher share of economically disadvantaged students (64 percent). Our data also show that districts retained their NRC-based classification during our sample period.

Table 1. Basic Information on Four District Groups

District Groups	Average Total Current Expenditure per Pupil ($) (1)	Average Share of Property Tax Levy to Total Revenue (%) (2)	Average Share of Free or Reduced-Priced Lunch Students (%) (3)	Average Total Full District Valuation per Pupil ($) (4)
Low-need	30,264	84.8	11.2	3,808,624
Average-need	20,388	54.7	34.7	760,233
Urban high-need	20,373	41.3	64.1	434,669
Rural high-need	21,005	31.0	52.2	538,832

Note: The averages come from our sample period between 2011 and 2017.

years.[6] A district that has been hit hard by the limit may receive more intergovernmental aid, which offsets the shortfall of property taxes. Because the amount of intergovernmental aid that a district receives is usually outside its control, we allow aid to fully play this offsetting role by leaving out aid variables in our empirical models. Thus, we compare the results from models with and without aid variables to diagnose the size of the offsetting effects of intergovernmental aid, if any.

A district may attempt to escape limit-induced constraints by overriding the limit, as mentioned before. However, for two reasons, overriding the limit successfully is neither easy nor tantamount to permission for the district to spend at the level desired absent the limit. First, the required 60 percent voter approval for overriding is a more difficult hurdle to overcome than a 50 percent majority for regular budgets. Second, a levy limit serves as a reference levy. According to the theory on reference-dependent preferences (Ashworth and Heyndels 1999), when voters are more readily able to compare the difference between a proposed levy and the levy limit, they are more likely to reject the override. The combination of the supermajority threshold and reference-dependent preference enhances the likelihood of failed budgets. The consequence of two consecutive failed proposed budgets is the adoption of a contingency budget (which, again, will be no greater than the prior-year levy). This consequence may induce the district to be more conservative in its proposed overriding amount, which suggests, absent the limit, this district could still have spent more than the overriding level.

Finally, one can expect that constrained districts do not cut spending equally across all categories; some categories receive fewer resources or get cut whereas resources for other categories remain intact. Expenses that school districts are legally and contractually bound to incur may be hard to reduce or cut. Examples of these expenses are teacher salaries and benefits, including retirement, that result from union agreements. School districts are, however, more likely to spend less on expenditure items that are non-core to their operations (e.g., support staff, paraprofessionals, undistributed funds, interfund transfers) or less contractually binding (e.g., school supplies, materials). We use the detailed expenditure data to provide by far the most nuanced picture of how at-limit districts across district groups change their spending patterns in response to the tax limit.

6. Other revenue sources for NY school districts include user charges, and sales and use taxes. But our data show that school districts received less than 2 percent of total revenue from those two sources in 2013.

5. EMPIRICAL CHALLENGES AND STRATEGIES

A Measure of the Fiscal Stringency of Property Tax Limit

Multiple measures can be used to capture TELs. The most common approach is to use a dichotomous indicator to identify the existence of a TEL law (e.g., Shadbegian 1999). The indicator approach makes sense when the event of interest is simply the occurrence of a TEL law with little consideration of heterogeneity in TEL law designs. A second approach is to construct a continuous index of TEL degrees of stringency by assigning weights to different components in each TEL law (e.g., Deller, Stallmann, and Amiel 2012). This approach quantifies TEL laws and allows for engaging more advanced econometric tools in TEL analysis.

Our measure deviates from those two approaches for two reasons. First, both approaches are more appropriate for cross-state analyses. As the tax limit formula in NY applies identically to all districts, adopting either of those two measures would lead to zero cross-district variation for our study. Second, of our interest is not whether NY adopts a limit, but rather whether the tax limit really exerts binding constraints on some districts, and how the tax limit changes the spending behaviors of those constrained or affected districts. In other words, we need a working measure of fiscal stringency for the tax limit in NY.

Conceptually, a district's limit-induced fiscal constraint can be measured by distance to limit (DL), defined as the percentage gap between the maximum property levy legally allowed by the limit (or levy limit, LL) and the district's proposed property tax levy (PL). That is,

$$DL = (LL - PL)/LL. \tag{1}$$

By definition, DL in equation 1 is continuous, and a large positive DL indicates that a district does not have to tap all available property tax levy allowed—an indication of nonconstraint. By contrast, a district is more likely to be fiscally constrained when it overrides the limit ($DL < 0$), exhausts the limit ($DL = 0$), or raises almost every property tax dollar it can under the limit ($0 < DL \leq \varepsilon$, where ε is a very small positive number). All districts with $DL \leq \varepsilon$ are referred to in this study as at-limit districts.[7]

Note that DL is not a sound direct measure of fiscal constraint. A unit increase in DL does not necessarily indicate a unit decrease in the degree of constraint; that is, DL is not linearly correlated with the degree of constraint. Additionally, what really concerns us is not the limit-induced fiscal behaviors of the average-DL district, but of constrained districts. Thus, instead of using DL directly, we use DL to develop a dichotomous variable of being at limit, D. D is coded 1 for at-limit districts with $DL \leq \varepsilon$, where ε is a numeric positive benchmark, and 0 otherwise. As indicated, ε must be very small. For instance, Bradbury, Mayer, and Case (2001) consider a school district to be at limit in a year when its proposed levy is within 0.1 percent of its levy limit in that year, that is, when ε is 0.1 percent. This small value of ε is consistent with our definition of an at-limit district and we therefore adopt this ε, 0.1 percent, as our preferred benchmark as well.

7. At-limit districts may be theoretically unconstrained when their maximum levy limits happen to equal exactly the amount needed to fund their desired spending levels. We suspect that, in practice, the probability at-limit districts are not constrained is very low.

Admittedly, this chosen value of ε may not be perfect. For instance, a district that is actually constrained by the tax limit could be classified as a control unit in our research design when its DL is just slightly larger than ε, leading to an attenuation of estimated tax limit effects on at-limit districts. This attenuation suggests that our estimated effects are conservative, and the true effects could be even stronger when at-limit districts are perfectly identified.

It may not be a good idea to choose a relatively larger ε. With a relatively larger ε, an at-limit district would have considerable untapped property taxes. This is logically self-contradictory because an at-limit district would not have much excessive revenue slack if they were really at limit or constrained. Regardless, we start with $\varepsilon = 0.1$ percent and increase ε to 1 percent and 2 percent to test the robustness of our measure.

Empirical Models

Difference-in-Differences Estimator

To examine whether and how the tax limit affects the fiscal behaviors of at-limit school districts in NY, we start with a DID framework and estimate a model of the following form:

$$\ln E_{it} = \tau_t + \mu_i + \alpha D_{it} + \epsilon_{it}, \qquad (2)$$

where E stands for total current expenditures per pupil, i and t index school districts and years, and τ and μ are year- and school district–fixed effects, respectively.[8] As discussed earlier, D in equation 2 is coded as 1 for at-limit school districts with $DL \leq 0.1$ percent—districts that are most likely constrained by the tax limit—and 0 otherwise. The coefficient of this variable, α, indicates how much more or less spending (in percentage terms) would, on average, have changed for at-limit school districts.

A key identifying assumption underlying a DID estimator is that the pre-limit trend in total current expenditures per pupil of at-limit school districts parallels that of counterfactual school districts. Similar to Lafortune, Rothstein, and Schanzenbach (2018), school districts not at limit in a particular year serve as the counterfactual for at-limit school districts in that year. To test the common pre-trend assumption, we add the linear pre-trend variable (P), as shown in equation 3, to capture differences in E between at-limit and counterfactual districts during the years before a district is first at limit (in year t^*). Of note, not all school districts are at limit immediately in 2013 when the tax limit comes into effect. Therefore, the initial at-limit year, t^*, varies from one district to another. P equals $(t - t_0)$ before t^* (where t_0 is the baseline year that immediately precedes t^*, or $t_0 = t^* - 1$), and 0 otherwise. A small insignificant coefficient of P, β, is expected, should the common pre-trend assumption hold.

$$\ln E_{it} = \tau_t + \mu_i + \alpha D_{it} + \beta P_{it} + \delta T_{it} + \beta W_{it} + \epsilon_{it}. \qquad (3)$$

According to the tax limit formula, a school district's current levy will factor into the calculation of the proposed levy in the following year, suggesting a dynamic effect of

8. The tax limit may affect capital spending. However, capital investment tends to be lumpy (i.e., not spreading evenly across the years). Therefore, a valid investigation of a policy or intervention's effect on capital spending usually requires a long data panel and a different methodological approach than that used to investigate current expenditures (Wang, Duncombe, and Yinger 2011).

the tax limit during its post-initial ($t > t^*$) period. To capture this post-initial effect, we include the post-trend variable (T) in equation 3. Specifically, T captures whether, over time, the expenditure change associated with D stays constant (δ is insignificant), dissipates (δ is significantly positive), or increases (δ is significantly negative). Therefore, T equals $(t - t^*)$ for at-limit districts when $t > t^*$, and 0 otherwise. For school districts that are never at limit, P and T are set to zeros during the entire sample period.[9]

Following the education cost-function literature (Duncombe and Yinger 2011), equation 3 also includes a series of control variables (W), such as student characteristics (i.e., logged enrollment as well as the percentages of English Language Learner students, special education students, economically disadvantaged students, and African American students), and factors influencing efficiency and demand for school expenditures (i.e., logged median household income, logged median tax share, logged state and federal aid per pupil, the percentages of owner-occupied housing units, and population aged 25 years and over with a four-year college education). The median tax share is derived as the ratio of a district's median housing value to its total taxable property value per pupil.

We also estimate equation 3 separately with $\varepsilon = 2$ percent and $\varepsilon = 1$ percent. As discussed earlier, a larger ε is more likely to produce nonnegative and insignificant effects of the limit because more far-from-limit and plausibly unconstrained districts are treated as at-limit constrained districts in those scenarios.

Event Study Specification

A major empirical challenge of equation 3 is that even with school district and year fixed effects, as well as all controls in W, the key variable D is still potentially biased, as are its derived variables P and T. The more a school district would like to spend, the more likely it is to be at limit, leading to a reverse causation or a positive bias in the estimate of α. That is, the negative coefficient of D is likely to be attenuated toward zero. One way to address this endogeneity is to use instrumental variables. However, it is hard to find three or more instrumental variables that are time-varying (because of district fixed effects), exogenous of equation 3, and strongly correlated with D, P, and T.

Another way to diagnose and reduce the bias is to use nonparametric event-study models. The use of event-study specifications is also warranted when there is variation in treatment timing (Goodman-Bacon 2021), as in the current study. An event occurs in a year when a district is at limit ($DL \leq 0.1$ percent). We estimate models of the following form:

$$\ln E_{it} = \tau_t + \mu_i + \sum_{k=-4}^{5} \theta_k T_{k,it} + \beta W_{it} + \epsilon_{it}, \tag{4}$$

where τ, μ, and W are defined as in equation 3; T_k equals 1 for at-limit districts when $t = t_0 + k$, where k represents the number of years before ($k < 0$) or after ($k > 0$) the baseline year, t_0. While year 5 is the farthest year after t_0 in our dataset, -4 represents four or more years before t_0. Also, t_0 is excluded and serves as the reference year. When

9. Year fixed effects obviate the need for a general trend variable (coded 1 for 2011, 2 for 2012, and so on) for all school districts. Including such a general trend variable would require a drop of a year dummy while the results stay unchanged.

$k > 0$, the coefficient for a T_k, θ_k, indicates the effect of an event in t_0 on outcomes k years later. Compared to parametric estimations, the θ coefficients with $k > 0$ capture dynamic effects of the tax limit on at-limit districts. Similar to the DID design, an event-study design requires, for a causal interpretation, a common pre-trend of treatment (at-limit) and comparison (not-at-limit) districts. This assumption is statistically supported when the series of lead indicators (θ_{-4} to θ_{-1}) are not significant.

There are two important issues related to equation 4. First, as explained earlier, an at-limit school district may receive federal and state aid to meet their desired spending level. Therefore, in addition to the models with aid variables, our preferred specification is one without these variables so that intergovernmental aid is allowed to offset property tax shortfall. Second, as with the standard event-study design, equation 4 accounts only for the first event of being at limit. However, a school district may experience subsequent events, in subsequent years, after the first. There is no established econometric method to account for multiple events. Following Lafortune, Rothstein, and Schanzenbach (2018), we replicate the data for school districts with multiple events; for example, a district with three at-limit events has three copies (or cohorts). We then stack all replicated cohorts with no-event districts. Each cohort of the same multiple-event district now has only one event in this stacked dataset. The coding method for T_k in equation 4 is the same as before, and μ now represents district-cohort fixed effects.

Additional Analyses

To explore the second research question, which concerns the differential effects of the tax limit, we estimate equation 4 using four NRC-based district groups: low-need, average-need, and urban and rural high-need districts. Specifically, we allow each district group, g, to have a separate series of T_k for the five-year limit period (i.e., $\sum_{g=1}^{4} \sum_{k=1}^{5} \theta_{kg} T_{kg}$), where T_{kg} captures the average within-g effect of an event in t_0 on outcomes k years later.[10] This flexibility allows us to see how districts in four groups respond differently to the limit. Finally, for the third research question on cutback strategies, we use equation 4 with T_{kg} for disaggregated expenditure categories and subcategories as dependent variables.

6. DATA AND DESCRIPTIVE ANALYSIS

Data

The data panel consists of all school districts, except for Buffalo, New York City, Rochester, Syracuse, and Yonkers.[11] The sample period is between 2011 and 2017.[12] Most of our data come from NYSED. We also take some data from the American Community Surveys, namely, median house value (to calculate tax share), median homeowner

10. As shown in table 3, the number of comparison districts that are never at limit is quite small (only six low-need and nine urban high-need districts). Therefore, all district groups have the same pre-trend variables, or $\sum_{k=-4}^{-1} \theta_k T_k$, to maximize pre-trend variation.
11. These five large city school districts, called the "Big Five," are not subject to the tax limit. Education budgets for these fiscally dependent school districts are included in their respective municipal budgets. In addition, each city, including the Big Five cities, is subject to an individual constitutional tax limit; education in each city is funded within that set limit (New York State Office of the State Comptroller 2018). Constitutional tax limits do not apply to the independent school districts that comprise our sample.
12. We do not extend the data further back beyond 2011 to head off potential effects of the Great Recession years on school districts' resources.

Table 2. Summary Statistics

Variables	Mean	SD	Minimum	Maximum	Data Source
Key variables					
Total current expenditures per pupil, $	22,247	9,246	11,368	279,812	1
D (= 1 if DL ≤ 0.1 and 0 otherwise)	0.4	0.5	0	1	1, 3
Control variables					
Enrollment	2,267	2,306	16	19,457	1
Percent of free or reduced-price lunch students	35.9	18.9	0	100	1
Percent of special education students	13.9	3.0	4.1	32.3	1
Percent of ELL students	2.2	4.3	0	37.1	1
Percent of black students	4.9	8.9	0	79.7	1
Median homeowner income	78,794	30,856	37,930	250,000	2
Tax share	0.33	0.15	0.004	1.04	1, 2, 3
Percent of adults with college education	29.2	15.0	6.1	89.1	2
Percent of owner-occupied housing units	77.2	12.3	5.0	100	2
Intergovernmental aid					
Staid aid per pupil	9,018	4,711	816	47,613	1
Federal aid per pupil	779	606	0	13,082	1

Notes: There are 4,630 observations. This table summarizes fiscal, economic, and demographic information for 666 New York school districts between 2011 and 2017. SD = standard deviation; ELL = English language learner.

income, and district-level information on percent of college-educated population and owner-occupied housing units. Table 2 provides summary statistics and sources of the variables used in our estimations. We follow the NYSED categorization of current expenditure categories and subcategories, and table 4 provides the definitions of all categories and subcategories we use for our estimations.

Descriptive Analysis

New York state's property tax limit law's primary objective is to combat the growth of property tax revenue. In figure 2, we delineate the trends of the average annual growth rates of property tax levy by four district groups. Basically, all district groups exhibit a similar declining pattern in the growth rate of property tax levy. Of note, urban high-need districts had the highest levy growth rate before 2013, experienced the fastest declining trend, and had the lowest levy growth rate five years after the limit enactment.

Figure 3 presents the number of at-limit districts as a share of total districts by different values of ε. When ε is set at 2 percent, 551 districts (or 83 percent of all) would be counted as at-limit districts in 2013, and this number increases to 614 (or 92 percent) in 2017. When using $\varepsilon = 1$ percent, the number of at-limit districts increases from 474 (or 71 percent) in 2013 to 566 (or 85 percent) in 2017. Finally, with $\varepsilon = 0.1$ percent (our preferred benchmark), at-limit districts number 284 (42 percent) in 2013 and 445 (67 percent) in 2017.

Figure 3 provides two takeaways. First, the annual number of at-limit districts in NY increases substantially with larger ε. Starting with $\varepsilon = 0.1$ percent, the number of at-limit districts in 2013 expands by 67 percent with $\varepsilon = 1$ percent and by 94 percent with $\varepsilon = 2$ percent. Second, all ε options illustrate the substantial temporal upward trend in the frequency of at-limit districts. This trend is consistent with findings in other states.

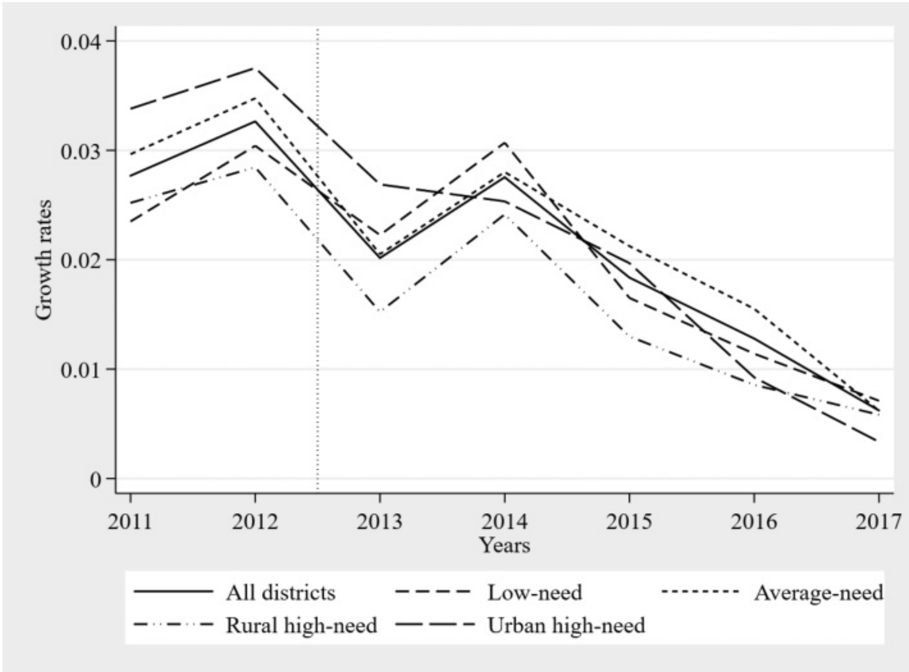
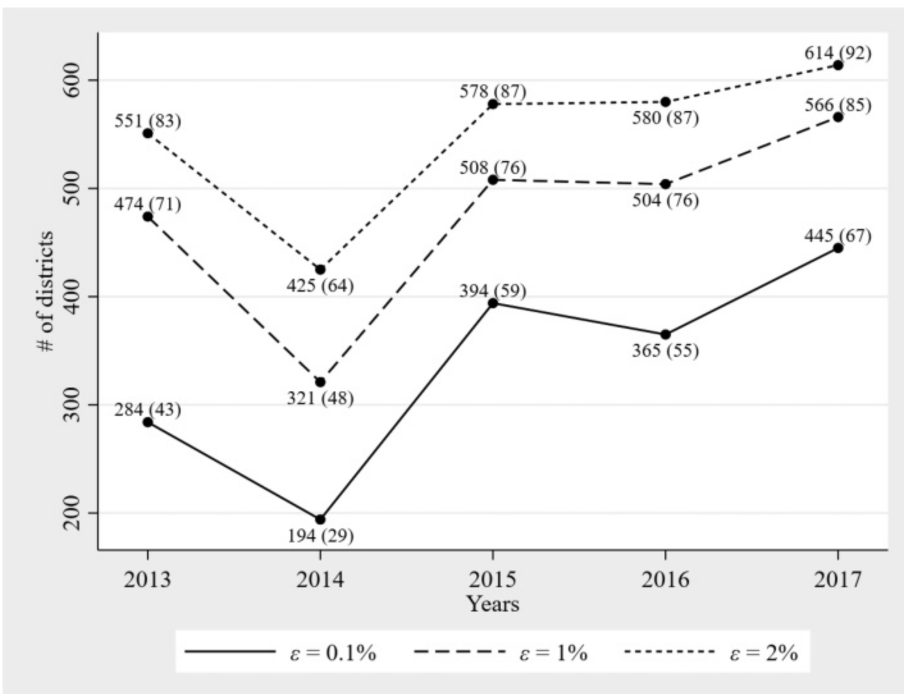


Figure 2. The Average Annual Growth Rates of Total Property Tax Levy by District Groups



Note: The numbers in parentheses indicate the percentage shares of total school districts.

Figure 3. The Numbers and Shares of At-Limit School Districts Over Time by Different Values of ε

Table 3. Distribution of School Districts by the Number of Times Being at Limit (with $\varepsilon = 0.1\%$) and by Need Groups

Number of Times at Limit	Low-Need	Average-Need	Urban High-Need	Rural High-Need	All Districts
0	6 (5)	29 (9)	9 (20)	33 (22)	77 (12)
1	12 (9)	59 (18)	8 (18)	35 (23)	114 (17)
2	30 (23)	66 (20)	7 (16)	33 (22)	136 (20)
3	21 (16)	90 (27)	11 (25)	26 (17)	148 (22)
4	45 (34)	55 (16)	5 (11)	19 (12)	124 (19)
5	19 (14)	37 (11)	4 (9)	7 (5)	67 (10)
Total	133	336	44	153	666

Note: The numbers in parentheses indicate at-limit districts as a percent of all districts within a group.

For example, Dye, McGuire, and McMillen (2005) find the binding effect of the tax limit in Illinois becomes stronger over time.

Table 3 shows the distribution of at-limit districts by instances of being at limit and by type of need. Of all districts, 77 (12 percent) are never at limit and the number of these districts is sufficiently large to serve as a comparison group. Being at limit three times during the five-year limit duration, as occurs for 148 districts, is the mode. Three instances of being at limit is also the mode for average-need and urban high-need groups. As many as 67 (10 percent) districts are at limit in all five years. Table 3 indicates substantial within- and across-district variation for our estimations. Our data show that only 8.9 percent of all at-limit cases needed budget overrides (i.e., $DL < 0$). Finally, in over two thirds of no-override at-limit cases, the proposed limit exactly equals levy limit ($DL = 0$).

The primary dependent variables are total current expenditures per pupil defined as ([total district expenditures − debt service]/enrollment).[13] Table 2 shows the mean current expenditure per pupil is $22,247 with a standard deviation of nearly $9,246. The last four columns of table 4 also show three spending patterns from the group-based shares of each expenditure category in their total current expenditures, and the group-based shares of each subcategory in their respective category. First, the two largest categories are instruction and benefits, while the smallest expenditure categories are, in ascending order, interfund transfers, undistributed, administration, and transportation. These categories represent only 0.5 percent to 5.6 percent of total current expenditures, far less than the second highest category of benefits (23 percent to 25 percent). Of note, the share of administration in total current expenditures is lower than that of transportation.

Second, one expenditure subcategory dominates across instruction, benefits, and administration. Teacher salary constitutes the largest shares of districts' instructional budget, 54 percent to 60 percent, followed by other instructional expenses (24 percent to 35 percent), and other instructional salaries (13.3 percent to 15.4 percent). Central administration and other fringes account for at least 76 percent of total administration and benefits, respectively. Finally, there is some expenditure variation in both categories and subcategories across district groups. There is a six percentage point difference between

13. Once logged enrollment is controlled for on the right-hand side, the results with either logged expenditures or logged expenditures per pupil are the same.

Table 4. Definitions and Shares of Expenditure Categories and Subcategories

Categories	Subcategories	Definitions	Low-Need	Average-Need	Rural High-Need	Urban High-Need
Instruction	Teacher salary	Salaries paid to K–12 teachers	[60.3]	[57.2]	[51.9]	[53.8]
	Other instructional salaries	Salaries paid to school counselors, psychologists, social workers, nurses, prekindergarten teachers, librarians, paraprofessionals, teacher aids, and other support staff	[15.4]	[14.0]	[13.5]	[13.3]
	Other instructional expenses	Curriculum development and supervision, Boards of Cooperative Educational Services (BOCES) instructional services, interdistrict tuitions, and nonsalary instructional expenditures (e.g., supplies, materials, equipment, curricular activities)	[24.3]	[28.8]	[34.6]	[32.9]
	Total instruction		(59)	(56.4)	(55.3)	(61.5)
Administration	Board of education	Board of education; district meeting; auditing and legal services; the offices of district clerk, treasurer, and tax collector	[22.8]	[20.4]	[17.8]	[22.9]
	Central administration	Chief school officer; the offices of business, purchasing, personnel, records management, public information, and services; fees for fiscal agents	[77.2]	[79.6]	[82.2]	[77.1]
	Total administration		(3.1)	(3.1)	(3.8)	(2.4)
Transportation	Not available	Transportation services including school buses and garage building (excluding capital expenses)	(4.7)	(5.6)	(5.5)	(4.8)
Undistributed	Not available	Central storeroom, printing, mailing, data processing, school association dues	(1.9)	(2.4)	(3.1)	(2.2)
Interfund transfers	Not available	Transfer to school food service and capital funds	(1.4)	(1.3)	(1.4)	(0.5)
Benefits	Teacher retirement	Payments for individuals in teacher retirement system	[23.7]	[19.8]	[17.5]	[21]
	Other fringes	Medical and dental coverage for employees, other employee benefits	[76.3]	[80.2]	[82.5]	[79]
	Total benefits		(23)	(24.8)	(24.7)	(22.8)

Notes: The definitions are based on New York State Education Department (NYSED 2019). The numbers in parentheses indicate the percent shares of expenditure categories in total current expenditures within each district group during the sample period. The numbers in brackets indicate the percent shares of expenditure subcategories in expenditure categories within each district group. NYSED uses a consistent formula for all expenditure categories and subcategories during the sample period. For parsimony, less than 7 percent of total current expenditures from two expenditure categories (namely, operation and maintenance, and community service) are not reported in the table because the tax limit is not shown to have any effect on them.

Table 5. Parametric Results

	$\varepsilon = 2\%$	$\varepsilon = 1\%$	$\varepsilon = 0.1\%$			
	Current Expenditure		Current Expenditure		Current Expenditure with Benefits Excluded	
Key variables	(1)	(2)	(3)	(4)	(5)	(6)
D (= 1 if $DL \leq \varepsilon$ and 0 otherwise)	0.0029	−0.0017	−0.0026	−0.0023	−0.0053*	−0.0050*
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Pre-trend (P)	0.0026	0.0011	−0.0020	−0.0018	−0.0030	−0.0028
	(0.005)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Post-trend (T)	0.0033	0.0010	−0.0041*	−0.0038*	−0.0070**	−0.0068**
	(0.005)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
With aid	Yes	Yes	Yes	No	Yes	No

Notes: There are 4,630 observations. The dependent variables are the logged total current expenditures per pupil in columns 1 to 4 and non-benefit current expenditures (total current expenditures − benefits defined in table 4) per pupil in columns 5 and 6. Estimates are obtained with year and district fixed effects as well as all control variables in table 2. Robust standard errors clustered at the school district level are reported in parentheses.

*$p < 0.05$; **$p < 0.01$.

the groups with the highest and lowest instructional shares of total current expenditures: urban high-need at 61.5 percent versus rural high-need at 55.3 percent. Another difference of similar size comes from the shares of teacher salary in instruction: 60.3 percent for low-need districts versus 53.8 percent for urban high-need districts.

7. REGRESSION RESULTS

Table 5 reports the DID regression results for the first research question. The results in columns 1 through 3 are obtained with state and federal aid per pupil and with different values on ε. Column 1 shows that when at-limit districts are defined as those with $\varepsilon =$ 2 percent, the coefficient on D is positive but not statistically significant. When $\varepsilon = 1$ percent, D is still not statistically significant, but it becomes negative (column 2). Also, the post-trend variable, T, is not significant with these values of ε. Columns 3 through 6 report results when our preferred value of ε is 0.1 percent, or a proposed levy within 0.1 percent of the limit is used to define at-limit districts. In columns 3 and 4, while the negative coefficients of D remain insignificant, T becomes negative and significant. Its coefficient in column 3 indicates that an at-limit district spends 0.4 percent less each year in the wake of first exhausting their limit than what they would have spent absent the tax limit.

Districts may find it hard to reduce spending on benefits, the major contractually binding category. With non-benefit current expenditures per pupil as the dependent variable, both D and T are significant in columns 5 and 6. The coefficients of D indicate that absent the limit, at-limit districts would have annually spent approximately 0.5 percent more on non-benefit current categories. Columns 4 and 6 show that state and federal aid have a negligibly offsetting effect on the property tax shortfall among at-limit districts, evidenced by slightly smaller (in absolute value) coefficients of D and T relative to those in columns 3 and 5, respectively. Finally, the insignificance of the pre-trend variable, P, provides statistical evidence that the common trend assumption holds for all six columns.

Table 6. Nonparametric Results with the Event-Study Design

	$\varepsilon = 0.1\%$				$\varepsilon = 1\%$
	Current Expenditure	Current Expenditure	Current Expenditure with Benefits Excluded	Current Expenditure with Stacked Data	Current Expenditure
Key Variables	(1)	(2)	(3)	(4)	(5)
Four or more years before t_0 (T_{-4})	0.0082 (0.009)	0.0068 (0.009)	0.0096 (0.010)	0.0090 (0.006)	−0.0098 (0.016)
Three years before t_0 (T_{-3})	0.0036 (0.006)	0.0031 (0.006)	0.0070 (0.007)	0.0057 (0.005)	−0.0013 (0.012)
Two years before t_0 (T_{-2})	0.0006 (0.004)	0.0001 (0.004)	0.0031 (0.005)	0.0033 (0.003)	−0.0044 (0.008)
One year before t_0 (T_{-1})	−0.0017 (0.002)	−0.0019 (0.002)	−0.0003 (0.003)	0.0018 (0.002)	−0.0066 (0.004)
One year after t_0 (T_1)	−0.0066* (0.003)	−0.0062* (0.003)	−0.0096** (0.003)	−0.0042* (0.002)	−0.0041 (0.004)
Two years after t_0 (T_2)	−0.0080* (0.004)	−0.0073 (0.004)	−0.0124** (0.005)	−0.0060 (0.003)	−0.0033 (0.007)
Three years after t_0 (T_3)	−0.0122* (0.005)	−0.0112* (0.005)	−0.0198** (0.007)	−0.0089 (0.005)	−0.0003 (0.011)
Four years after t_0 (T_4)	−0.0135* (0.007)	−0.0121 (0.007)	−0.0233** (0.008)	−0.0110 (0.006)	−0.0014 (0.014)
Five years after t_0 (T_5)	−0.0245** (0.009)	−0.0234* (0.009)	−0.0376** (0.011)	−0.0174* (0.008)	−0.0010 (0.017)
With aid	Yes	No	No	No	No
Observations	4,630	4,630	4,630	12,121	4,630

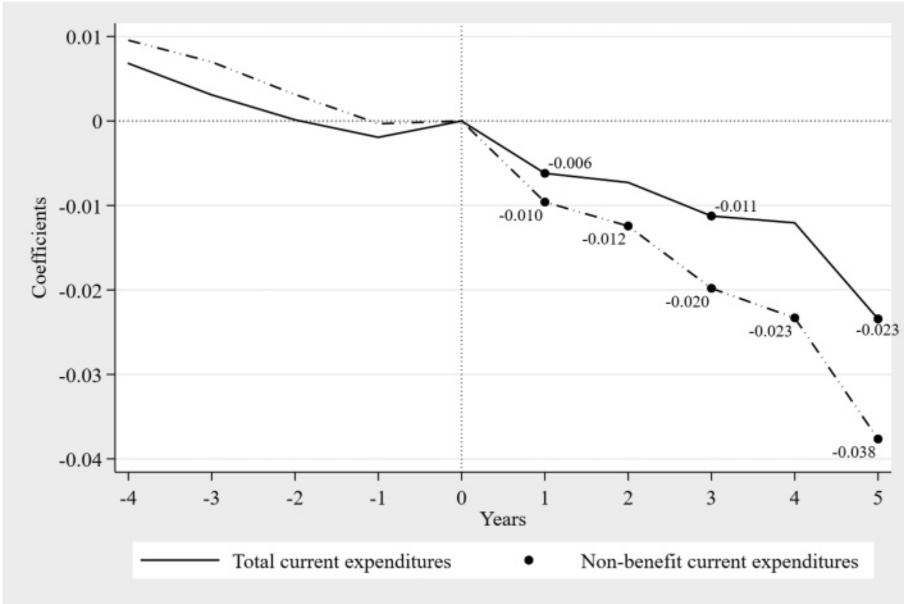
Notes: The dependent variable is the logged total current expenditures per pupil for all columns, except for column 3, where the dependent variable is non-benefit current expenditures per pupil. An event is defined as when a district's property tax levy is at limit with $\varepsilon = 0.1$ percent. Estimates are obtained with year and district fixed effects as well as all other control variables in table 2. Robust standard errors clustered at the district-cohort level for column 4 and at the school district level for other columns are reported in parentheses.

$^{*}p < 0.05$; $^{**}p < 0.01$.

As discussed earlier, the DID regression results in table 5 are likely to be biased by endogeneity. Table 6 shows event-study results to address the endogeneity. With $\varepsilon =$ 0.1 percent, similar to the results in table 5, columns 1 and 2 in table 6 report little difference in the coefficients estimated with or without intergovernmental aid. A major reason for such a minor difference could be the current state education aid formula enacted in 2007 does not factor in potential fiscal effects of a state-imposed TEL measure on school districts.[14] Column 2 (without aid) shows that at-limit districts' total current expenditures are reduced by 0.6 percent in the first event year and the reduction increases in size over the next four years. By year 5, the tax cap results in a cumulative reduction of 2.3 percent in at-limit districts' expenditures.[15] Column 3, where the dependent variable is non-benefit current expenditures per pupil, shows a similar declining trend but with larger reductions. Figure 4 visualizes the increasingly constraining effects of the tax limit on total current expenditures and non-benefit expenditures over the years.

14. In fact, during the period of 2013–17, the average annual change in state aid per pupil for at-limit districts in year $t > t_0$ is \$477, which is even lower than that for never-at-limit districts and at-limit districts in year $t \leq t_0$ (\$496). This difference is not statistically significant, though.

15. We also test whether the tax cap has differential effects on school districts that were at limit in all five years (2013–17) and on those that were at limit less than five years. The coefficients of T_1 to T_5 in this test are similar in size and significance both for these two at-limit district groups and to those in column 2 of table 6.



Notes: This graph visualizes the effects of the tax limit on school districts' total current expenditures and non-benefit current expenditures per pupil, reported in columns 2 and 3 of table 6. A black circle indicates a significance level of at least 5 percent.

Figure 4. The Effects of the Tax Limit on Total Current Expenditures and Non-Benefit Current Expenditures

We conduct two additional robustness tests by using stacked data and $\varepsilon = 1$ percent. The results prove to be robust to a certain degree when within-district multiple events are taken into account with stacked data. Compared with column 2, the coefficients of T_1 through T_5 in column 5 of table 6 are slightly smaller in absolute value, and those of T_2 through T_4 are significant only at 10 percent (although not indicated by any asterisk). Given $\varepsilon = 1$ percent, none of the coefficients is significant (column 5 of table 6), providing evidence that the 1 percent distance to limit is so large as to include many unconstrained districts. In all columns, the pre-trend variables (T_{-4} to T_{-1}) are not significant, providing statistical evidence to support the common pre-trend assumption.

Table 7 reports empirical results for the second and third research questions. Column 1 shows the differential effects of the tax limit on the total current expenditures of four district groups. Of the four groups, only rural high-need districts are not affected by the tax limit. This finding makes sense given these districts rely the least on property tax levy (31 percent of their total revenue, as shown in column 2 of table 1). By contrast, the tax limit has expenditure-stifling effects on the other three district groups. Absent the tax limit, at-limit average-need districts' annual total current expenditures would have been from 1.1 percent to 2.3 percent higher in all five limit years. The tax limit, however, reduces total current expenditures for at-limit low-need and urban high-need districts in only three of the years. The left panel of figure 5 clearly depicts the declining trends for the three limit-affected district groups.

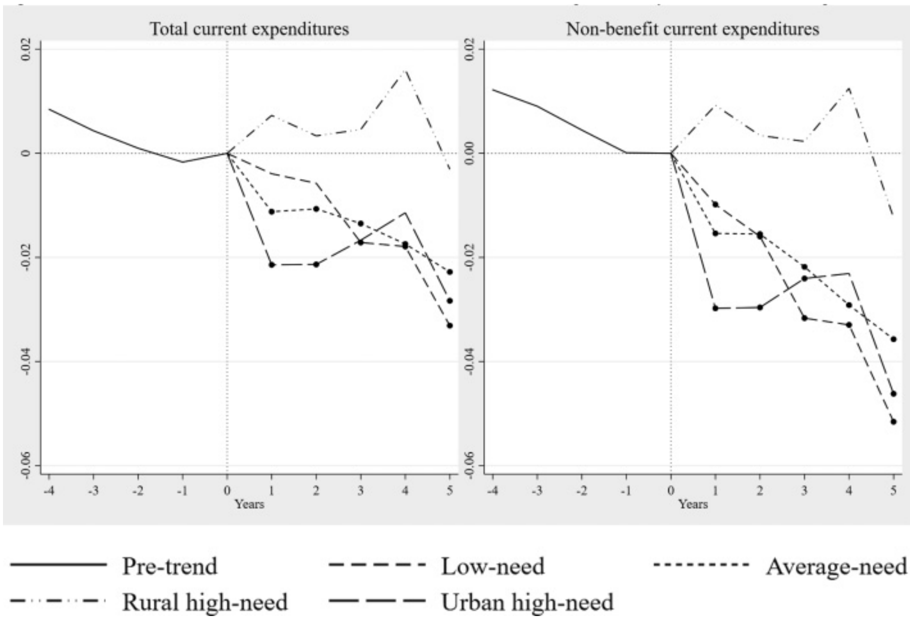
Column 2 of table 7, which is visually represented in the right panel of figure 5, shows the size and significance of the effects of the tax limit on non-benefit current expenditures are stronger for the three top-panel groups. In the first two years, urban

Table 7. Cutback Strategies by Different Groups of At-Limit Districts ($\varepsilon = 0.1\%$)

District Groups	Key Variables	Total Current (1)	Non-ben. Current (2)	Teacher Salary (3)	Other Instr. Salary (4)	Other Instr. Expenses (5)	Central Admin. (6)	Transport. (7)	Undistributed (8)	Interfund Transfers (9)	Other Fringes (10)
Low-need	T_1	−0.004	−0.010*	0.006	−0.005	−0.009	−0.025*	−0.034**	−0.018	−0.839	0.019**
	T_2	−0.006	−0.016**	0.007	−0.014	−0.022*	−0.035*	−0.034*	−0.024	−1.020	0.026**
	T_3	−0.017**	−0.032**	0.006	−0.022	−0.037*	−0.036*	−0.042*	−0.045	−2.157**	0.029**
	T_4	−0.018*	−0.033**	0.009	−0.034	−0.044*	−0.052*	−0.042	−0.086*	−2.264**	0.036**
	T_5	−0.033**	−0.052**	0.009	−0.050*	−0.043	−0.070*	−0.051	−0.121**	−2.728**	0.046**
Average-need	T_1	−0.011**	−0.015**	−0.001	−0.027**	−0.002	−0.012	−0.024**	−0.020	−0.287	0.001
	T_2	−0.011*	−0.016**	0.000	−0.030**	0.004	−0.019	−0.029**	−0.019	−1.028*	0.003
	T_3	−0.013*	−0.022**	0.003	−0.042**	0.006	−0.030	−0.035*	−0.032	−0.965	0.012
	T_4	−0.017*	−0.029**	0.002	−0.045**	0.007	−0.047*	−0.042*	−0.062*	−0.866	0.023*
	T_5	−0.023*	−0.036**	0.000	−0.053*	−0.005	−0.041	−0.043	−0.034	−1.223	0.021
Urban high-need	T_1	−0.021**	−0.030**	−0.016*	−0.027*	−0.031	−0.021	−0.032	0.010	−1.342*	0.015
	T_2	−0.021*	−0.030**	−0.020	−0.020	−0.014	−0.057	−0.028	0.034	−1.663	0.011
	T_3	−0.017	−0.024*	−0.017	−0.016	−0.004	−0.056	0.037	−0.032	−0.329	0.012
	T_4	−0.011	−0.023	−0.019	−0.023	0.019	−0.081*	0.054	−0.049	0.324	0.039*
	T_5	−0.028*	−0.046**	−0.021	−0.006	0.000	−0.135**	0.063	0.027	0.289	0.045*
Rural high-need	T_1	0.007	0.009	−0.000	−0.001	0.029**	0.014	0.024	0.039	−0.094	0.002
	T_2	0.003	0.003	−0.001	−0.010	0.035*	0.008	0.034	0.015	−0.058	0.006
	T_3	0.005	0.002	0.002	−0.016	0.034	−0.000	0.016	0.025	−0.744	0.017
	T_4	0.016	0.012	0.003	−0.034	0.048	−0.017	0.039	0.062	−0.362	0.030
	T_5	−0.003	−0.012	0.002	−0.022	0.008	−0.008	0.030	0.081	−1.608	0.025
Pre-trend variables	T_{-1}	−0.002	0.000	−0.002	0.002	−0.004	0.002	−0.001	0.007	0.085	−0.009**
	T_{-2}	0.001	0.004	−0.008	0.006	−0.008	0.015	−0.001	0.001	0.554	−0.012*
	T_{-3}	0.004	0.009	−0.006	0.003	−0.006	0.003	−0.002	0.021	0.591	−0.013
	T_{-4}	0.008	0.012	−0.005	0.003	−0.020	0.012	−0.024	0.005	1.068	−0.003
Observations		4,630	4,630	4,630	4,630	4,630	4,630	4,630	4,630	4,624	4,630

Notes: Estimates are obtained without intergovernmental aid, but with year and district fixed effects as well as all other control variables in table 2. Robust standard errors clustered at the school district level are reported in parentheses.

* $p < 0.05$; ** $p < 0.01$.



Notes: This graph visualizes the regression results of columns 1 and 2 in table 7. A black circle indicates a significance level of at least 5 percent.

Figure 5. The Effects of the Tax Limit on Total Current and Non-Benefit Current Expenditures by At-Limit District Groups

high-need at-limit districts are most fiscally constrained, with a 3 percent reduction. In year 5, the non-benefit current expenditures are reduced by 5.2 percent, 3.6 percent, and 4.6 percent for at-limit low-need, average-need, and urban high-need districts, respectively. The results in column 2 suggest benefits dilute the effects of the tax limit on total current expenditures in column 1.

Columns 3 through 5 report whether at-limit school districts cut any of the three instructional subcategories (figure A.1 in the online appendix visualizes these columns). School districts mostly do not cut spending on teacher salary; only T_1 for urban high-need districts is significant.[16] Teacher salary may enjoy union protection and NY is among the states with the strongest teacher union strength (Winkler, Scull, and Zeehandelaar 2012). At-limit average-need districts reduce other instructional salaries by 2.7 percent to 5.3 percent annually in five limit years, whereas at-limit low-need districts cut other instructional expenses in three limit years.

We find that at-limit districts in all four groups do not cut expenses incurred on their board of education and therefore for parsimony we do not present these results in table 7. However, three small expenditure (sub)categories, namely, central administration, undistributed, and interfund transfers, experience some reduction, made by at-limit low-need districts and by at-limit average-need districts (columns 6 through 8 of table 8 and figure A.2 in the online appendix). Throughout the five limit years, at-limit low-need districts cut central administration annually by between 2.5 percent and

16. In an estimate with the logged number of full-time-equivalent (FTE) teachers as the dependent variable, we also find similar results to teacher salary: Only T_1 for urban high-need districts is significant. Specifically, the tax limit induces urban high-need districts to reduce the number of FTE teachers by 1.6 percent in the first limit year.

7 percent. They also cut transportation in years 1 through 3 and undistributed expenses in years 4 through 5. At-limit average-need districts reduced transportation in years 1 through 4, and central administration and undistributed funds only in year 4. At-limit urban high-need districts substantially cut spending on central administration in years 4 and 5, by 8.1 percent and 13.5 percent, respectively.

Column 9 of table 7 also shows that at-limit low-need districts make substantial annual cuts in interfund transfers, between 216 percent to 273 percent in the last three years. At-limit average-need and urban high-need districts also cut this item substantially by 103 percent and 134 percent, respectively, in a limit year. Despite the substantiality of these cuts in terms of percentages, the actual dollar amount cut is relatively small because interfund transfers take a tiny share in total current expenditures (0.5 percent to 1.4 percent, table 4). Interfund transfers refer to transfers from a school district's general fund to its food service fund and/or capital fund. A plausible reason for these decreases in interfund transfers is that, as indicated in figure 1, current-year property tax levy for capital spending is added to the calculation of the property tax limit. This addition may incentivize school districts to increase their capital tax levy while reducing cash flows from general funds to capital funds. Finally, we find at-limit districts in all groups do not cut teacher retirement (and we therefore do not present these results in table 7). As with teacher salary, teacher retirement benefits are most likely protected by teacher union agreements. The last column of table 7 for other fringe benefits shows a counterintuitive finding that all key limit variables, T_1 through T_5, are positive and many of them are even statistically significant, especially for low-need districts. However, the coefficients of two pre-trend variables, T_{-1} and T_{-2}, for other fringes are statistically significant; we therefore refrain from making a causal interpretation of this finding.

8. CONCLUSIONS

The literature on the fiscal impact of TELs on school districts has been substantial since the 1970s, but a consensus on whether and how TELs change districts' fiscal behaviors has yet to be achieved. To shed additional light on the relationship between TELs and school finance, we analyze the property tax levy limit in NY, which is one of the most recent tax revolts in the United States. This study provides the most comprehensive picture thus far of how constrained, or at-limit, school districts adopt cutback strategies differentially across need-based groups and across operational functions or categories. In this study, we perform descriptive analyses on the distribution of at-limit districts across district groups and their spending patterns across expenditure categories. Also, we conduct empirical estimations on the effects of the tax limit on at-limit districts using a DID model supplemented with an event-study design—our preferred specification.

The New York tax limit is popularly referred to as the "tax cap." Overall, we find that, consistent with this popular name, the tax limit does put an effective cap on school districts' spending. At-limit school districts on average reduce total current expenditures, and the reductions or gaps increase in size over the years from 0.6 percent in year 1 to 2.3 percent in year 5. Proponents of the public choice view have identified TELs as a way to counter tax-maximizing governments (Brennan and Buchanan 1980), and our primary findings support this view of TELs' efficacy.

The tax limit's constraining effects vary across at-limit district groups. On the one hand, rural high-need districts do not show limit-induced constraint on all expenditure categories and subcategories. This makes sense to us because, of all district types, rural high-need districts rely the least on property taxes in their annual budget. On the other hand, school districts with a heavier reliance on property tax revenue may find it difficult to escape from the fiscal pressure. Indeed, the tax limit does negatively affect total current expenditures for at-limit districts in the other three district groups in our analysis. Variation manifests even among these three groups; at-limit average-need districts' total current expenditures are constrained in all limit years, which is not the case for at-limit low-need and urban high-need districts. When all districts are considered together, a district's given revenue structure seems to be quite relevant to whether it is heavily constrained by the tax limit.

We also find that at-limit school districts in the three affected groups do not make equal or similar cuts across current functions. Consistent with Downes and Figlio's (2015) explanation of union rents, the two largest union-protected items (teacher salary and benefits), which account for 53 percent to 58 percent of total current expenditures, appear to remain unscathed across at-limit districts. We find that reductions are made in other instructional salaries/expenses, central administration, transportation, interfund transfers, and undistributed categories, all of which—taken together—represent approximately one fifth of the three affected groups' total current expenditures. Finally, contrary to earlier findings that increased state aid might compensate for declines in local own-source revenue (Shadbegian 2003), we find that intergovernmental aid provides little help in offsetting expenditure gaps imposed by the tax limit.

Although we cannot rule out that our estimates may be biased, a number of pieces of evidence lend credibility to a causal interpretation that the tax cap does create a fiscal gap between what at-limit school districts spend and what they would otherwise have spent. First, except for column 10 of table 7, all pre-trend variables are small and insignificant, thereby satisfying the common trend assumption. Second, the negative effects of the tax limit consistently manifest themselves across different DID and event-study specifications, including the use of stacked data and the exclusion of intergovernmental aid variables.

Our focus on the tax limit in a single state warrants a caveat—our empirical findings should not be externalized to other state-imposed TEL provisions with different designs or rules. In addition, this study looks only at the tax limit's fiscal effects in its first five years and leaves several issues unanswered. For example, how will school districts fiscally cope with this tax limit over the long term? Do the limit-induced expenditure gaps found in this study lead to gaps in student performance? Does the property tax cap also have any constraining effect on capital spending? Most importantly, while the ongoing COVID-19 pandemic's full impact on the state economy remains to be seen, how will the tax limit compound the fiscal constraint on school districts' local resources caused by the COVID-19 pandemic? All of these questions warrant future research.

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