

# Local public goods and retrospective voting: How smart are voters when evaluating incumbents?

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## **Abstract**

The literature on retrospective voting and electoral accountability has to date focused on federal and state elections. Given the problem to assess government production at higher levels of aggregation, the composition and quality of public goods have been mostly ignored. Departing from this tradition, the paper looks at local elections and takes the quality of government services explicitly into account. The evidence is based on US special purpose districts and points to a strong impact of performance on incumbents' electoral success and a striking ability of voters to filter out information that cannot plausibly be related to incumbents' actions.

*Keywords:* Elections, retrospective voting, accountability, public schools

*JEL Classification:* H11, H20

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## **1 Introduction**

Standard principal-agent theory suggests that if it is too costly for a principal to evaluate directly the agent's actions, the principal should compensate the agent on the basis of some ex post measure of performance. Applying this

argument to the case with voters as principals and elected representatives as agents, an extensive literature investigates the link between the electoral fate of incumbents and various performance measures. Most contributions come to the conclusion that voters reward incumbents for good performance. But how much information do voters actually use when making inference on incumbent performance? In a series of influential studies on voting behavior in US federal and state elections, Peltzman (1987, 1990, 1992) showed that in gubernatorial elections, voters behave as if they understand that their income is affected by national rather than state policies, that voters penalize federal and state expenditure growth, and that the voting market seems to be efficient in the sense that it rewards incumbents for permanent rather than temporary effects of policy and ignores information that is irrelevant to assessing incumbent performance. Other empirical studies have confirmed and extended these findings (e.g., see Besley and Case 1995, Grier and McGarrity 1998, Wolfers 2006)<sup>1</sup>.

While the literature in general is broad and the rationality of voters in retrospective voting seems well established, there are two features of the empirical literature that stand out. Firstly, studies dealing with presidential, congressional and gubernatorial elections make up a disproportionate share of the literature, while local elections are mostly neglected. Secondly, the literature is dominated by the analysis of income growth, unemployment, inflation and, occasionally, tax rates and expenditures as performance measures. While the welfare of the average voter is certainly strongly affected by these measures, the link between these measures and incumbent performance seems to be quite weak. As macroeconomic variables, income, unemployment and inflation are strongly affected by forces beyond the control of incumbents even at the national level, not to speak of the states and local jurisdictions. The link between incumbents' actions and tax rates or expenditures is much closer, but the notorious difficulty to properly account for the quality of publicly provided goods

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<sup>1</sup>For a survey on the earlier literature, see Monroe (1979).

and services has, basically, remained unresolved.

To summarize the various problems of finding adequate performance indicators, note that (1) the direct impact of the quality of publicly provided goods and services on the well-being of voters and on incumbents' electoral success has been ignored almost completely; (2) the fact that in most cases the policy that is relevant for voters is multidimensional is often not even addressed. Empirical analyses of the responsiveness of voting behavior that fail to take into account that the space of relevant policies is multi-dimensional are prone to omitting variables that affect electoral outcomes and that are correlated with performance measures included in the econometric model. This casts doubt on the consistency of estimates of the coefficient of interest; (3) in many contributions to the literature on electoral accountability the selection of performance measures is made ad hoc.

The aim of this paper is to offer empirical evidence on voters' response to incumbent behavior that is not affected by the major problems of the literature on retrospective voting and electoral accountability discussed above. The strategy of the paper in solving these problems is simple: Firstly, to avoid the problem of measuring performance in the presence of a multi-dimensional policy space and to avoid an ad-hoc choice of a performance measure, the paper deals with elections in special purpose jurisdictions. Essentially, special purpose jurisdictions offer the opportunity to study the relation between incumbent performance and election outcomes in terms of a one-dimensional policy space. Without any degree of freedom in selecting the relevant policy, the problem of ad-hoc definitions of performance is resolved. Secondly, the analysis is concerned with a case where it is relatively easy for voters (and the econometrician) to evaluate the quality of government services: the provision of public schooling with the jurisdiction's average standardized test score as performance measure.<sup>2</sup>

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<sup>2</sup>The only empirical study making use of single function elections to identify the effect of performance on incumbent candidates' electoral success that I am aware of is Berry and

The jurisdictions that are going to be analyzed are the California local school districts. With almost 1,000 of these local authorities, the California public school system offers outstanding opportunities for an empirical investigation as outlined above. With few exceptions, the school districts are governed by elected school boards. The units of observation in the econometric analysis are incumbent candidates in school board elections between 2000 and 2004.

The empirical analysis is concerned with the performance of the local public school system and its effect on the electoral fate of incumbent candidates. Do voters make use of readily available information on students' academic achievement when selecting the members of the local school boards? If yes, how much information do they use? In answering these questions, I focus on incumbent school board members probability of reelection as the dependent variable. In various specifications, a strong impact of public school performance on the reelection probability of incumbents is found. Moreover, the results point to a striking ability of voters to filter out conditions that cannot plausibly be related to the actions of incumbents when evaluating the performance of their local public schools. The paper thus adds to the relatively scarce evidence on how much information voters use when evaluating elected representatives. The results suggest that the voting market is efficient in the sense that voters extract valuable information on incumbent performance from noisy signals and reward more successful incumbents with a significantly increased reelection probability.

The remainder of the paper proceeds as follows. Section 2 provides background information on the California school districts. In Section 3, the estimation strategy is delineated. The results are presented in Section 4, and Section 5 concludes.

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Howell (2006). However, with only 67 incumbents in 39 districts and a single cross-section, the results should be interpreted with caution.

## 2 Background

The local school districts are the institutional backbone of the US public school system. School districts are special-purpose districts which serve only to operate the local public primary and secondary schools. There is no additional responsibility of school districts as local jurisdictions. The school board is the governing body of the school district and has the ultimate responsibility for the operation of the local public schools. It employs the superintendent who manages the district's day-to-day operations, adopts the curriculum and the district's budget and sets policies for hiring personnel. Depending on district size, boards consist of three, five or seven members. Service at the school board is mostly unpaid.

The vast majority of school board members in California are locally elected. Only in a few cases, the county board of supervisors appoints members of district school boards. School boards are non-partisan. Board members serve for terms of four years. There are no general term limits, and school board members are elected individually. The terms are usually staggered, so in a typical district there will be openings every two years. Most elections are held in November. In even-numbered years, they take place together with general elections to either federal and/or state office. In some districts, school board members are elected at large, meaning that candidates are elected by all voters residing in the district. If elections are held at large, there will be only one electoral race per district, with an open number of candidates for a fixed number of seats. In at-large elections, the candidate with the highest vote shares will be elected. A second electoral rule that is frequently being used is elections by trustee area. In trustee-area elections, there is one position per trustee area, and candidates must live in the trustee area to be eligible for being elected a school board member representing the trustee area's residents.<sup>3</sup> Note that in districts with elections by trustee area, there may be

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<sup>3</sup>There are districts with two types of electoral rules for elections by trustee area: In

various electoral races in a single district.

The measure for the performance of school districts used in this study is the Academic Performance Index (API), the cornerstone of California’s Public Schools Accountability Act of 1999. It is a standardized test score that measures the academic performance and growth of schools on a variety of academic measures. Students in all school districts are tested in spring, and the API results are published in August.

### 3 Estimation strategy and data

The aim of the empirical analysis is the identification of the effect of student achievement as the measure for the performance of the local public school system on the reelection probability of incumbents in the local school board elections. The units of observation are the individual incumbents. The equation for incumbents’ electoral success is

$$y_{ijkt} = X_{1,jkt}\alpha + X_{2,kt}\beta + \tau_t + c_k + u_{ijkt}, \quad (1)$$

where incumbents are indexed by  $i$ , electoral races by  $j$ , school districts by  $k$ , and time periods by  $t$ . The dependent variable,  $y$ , is an indicator taking value one if the incumbent is reelected and zero otherwise.  $X_1$  is (generally) a vector of characteristics of the electoral race. In the specifications shown below I include only the degree of electoral competition as a characteristic of electoral races, so  $X_1$  effectively represents a single explanatory variable.  $X_2$  is a vector of district characteristics, including the change of the API score between  $t$  and  $t - 1$  as the key explanatory variable. Furthermore, Equation (1) accounts for district-specific fixed effects ( $c_k$ ) and period effects ( $\tau_t$ ).<sup>4</sup>

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some districts, candidates are elected only by the voters in their trustee area. In others, elections are district-wide, but candidates must reside within the trustee area where they are running for office.

<sup>4</sup>Note that it is not possible to include fixed effects at the level of electoral races because the performance measure varies by district and not by electoral race. Incumbent-specific

In order to be able to exploit the panel structure of the data (repeated observation of elections in each district) and to account for district-specific unobserved effects, the analysis follows the literature and treats the dichotomous dependent variable as a continuous variable. Estimation of  $\alpha$  and  $\beta$  can then proceed by standard techniques for systems of linear equations.

When estimating the effect of performance on incumbent candidates' electoral success based on Equation (1), two identification problems have to be taken into account: sample selection and endogeneity of explanatory variables due to simultaneity.

Sample selection is an issue because we do not observe election outcomes for a random sample (or the whole population) of incumbents, but only for those incumbents who run for reelection. If incumbents who anticipate being defeated in coming elections (possibly due to bad past performance) decide not to run, an empirical investigation based on the actual sample may lead to inconsistent estimates and misleading conclusions on the effect of performance on election outcomes. This study deals with self-selection as follows. In a first step, the effect of performance on incumbent candidates' electoral success is estimated based on the selected sample under the assumption that selection is based on exogenous explanatory variables. Under this assumption, selection will not affect the consistency of the estimates and can safely be ignored. In a second step, the results obtained in the first step are compared to the results from the estimation of the same model when all incumbent who did not run are coded as not elected and treated as ordinary observations. This procedure will give consistent estimates under the assumption that all incumbents who did not run anticipated being defeated, and that the voters would have voted them out of office if they had appeared on the ballot. If the results from both approaches are sufficiently 'similar', it is unlikely that selection of incumbents has a strong impact on the estimation.

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fixed effects are ruled out because the vast majority of incumbents is observed only once within the time period for which data on election outcomes and academic achievement is available.

The strategy to account for the potential self-selection of incumbent candidates described above extends the approach taken by, e.g., Besley and Case (1995) and Wolfers (2006). Note that the standard approach for estimation in the presence of sample selection following Heckman (1979) is difficult to implement in the present case because it requires instruments that strongly affect selection, but are unrelated to the dependent variable in the structural equation. In our case, an instrument would be a variable that strongly affects the decision of incumbents to run but can validly be excluded when estimating the effect of performance on electoral success. Unfortunately, I am not aware of such an instrument.

The potential endogeneity of explanatory variables is particularly important with regard to the degree of electoral competition faced by incumbents. Note that most related contributions deal with elections in two-party systems with two candidates per race in most cases. The degree of electoral competition is thus more or less constant across races and can be ignored. In our case, however, electoral competition has to be taken into account because the number of candidates per seat shows substantial variation. While some incumbents run uncontested, others compete with numerous challengers. The number of challengers per seat should be treated as an endogenous explanatory variable due to simultaneity: The decision of challengers to enter the race may depend on unobserved characteristics of the incumbent that also affect his electoral success. This will induce correlation between the residual in Equation (1) and the number of candidates per seat as a straightforward measure for the degree of electoral competition. The estimations shown below account for endogeneity by instrumenting electoral competition by the number of students per seat and the same ratio squared.

Technically, the estimation of the coefficients in Equation (1) is achieved as follows. In a first step, the unobserved district-specific effects,  $c_k$ , are removed by a within-transformation. In a second step, an initial consistent estimator is obtained from running two-stage least squares on the transformed system.

The third step consists of deriving the asymptotically optimal GMM estimator, where the weighting matrix is based on the instruments and the residual vectors from the second stage regression. Finally, robust standard errors are obtained in the usual way.<sup>5</sup>

The data on school district election outcomes are from the California Elections Data Archive provided by the Sacramento State Center for California Studies.<sup>6</sup> Data on API scores as well as demographic characteristics of the school districts' student body are obtained from the California Basic Educational Data System (CBEDS) and the Accountability Progress Reporting (APR) system of the California Department of Education.<sup>7</sup> Finally, financial data and information on the number of full-time equivalent teachers is provided by the Common Core of Data (CCD) data base of the Center Center for Education Statistics.<sup>8</sup>

From the sources mentioned above, a complete set of data on election outcomes, student achievement and district characteristics can be obtained for the cross-sections 2000-2004. However, the literature has pointed to the fact that vote turnout in school district elections is low in elections that are not held together with general elections. Moe (2006) reports findings that suggest a disproportionate influence of teachers and other school district employees in selecting school board members when turnout is low. To avoid problems that might arise from using outcomes of low-turnout elections, the empirical analysis will be based only on observations from school district elections that are held together with general elections. Essentially, this reduces the sample to incumbent candidates who stand for reelection in 2000, '02 and '04.

Table 1 presents summary statistics for the elections in even numbered years, with all candidates included. About 36 percent of all candidates are incum-

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<sup>5</sup>For details on the estimation procedure, see Wooldridge (2002, p. 188-194, 307-315).

<sup>6</sup>Available online at [http://www.csus.edu/calst/cal\\_studies/CEDA.html](http://www.csus.edu/calst/cal_studies/CEDA.html).

<sup>7</sup>To access the CBEDS data, visit <http://www.cde.ca.gov/ds/sd/cb>. The API scores can be downloaded from <http://www.cde.ca.gov/ta>.

<sup>8</sup>Available online at <http://nces.ed.gov/ccd>.

bents. Table 2 displays statistics for these observations separately. Incumbent candidates are reelected with an overall probability of 0.77. On average, an incumbent runs in an electoral race with about 2.4 seats to be filled (and 4.5 candidates on the ballot). Table 3 completes the description of the election data, showing that 71 percent of all incumbents run for reelection.<sup>9</sup>

Descriptive statistics for the explanatory variables are shown in Table 4. The change of the average test score between  $t$  and  $t - 1$  is available in the API data for 2003 and '04. For years prior to 2003, the average has been computed from the corresponding school level data, weighted by the number of students tested. The anticipated test score change is the fitted value from a linear regression of the actual test score change on the change in the share of minority students, the change in the share of students eligible for free or reduced price lunch, and a series of indicators for school district types (elementary and high school districts, with unified school districts being the reference) and urbanicity (large city, mid-size city, urban fringe of large city, urban fringe of mid-size city, large town, small town, rural outside core based statistical area, with rural inside core based statistical area being the reference). In the analysis, it will account for changes in the test score that a rational voter taking into account the above-mentioned exogenous conditions when making inference on the performance of the local schools. The unanticipated test score change is the residual from the linear regression of the actual test score change on the vector of exogenous characteristics.

Some of the minimum (maximum) values displayed in Table 4 seem to be unreasonable small (large). A closer inspection of the data reveals that they are associated to very small school districts with only a few dozens of students. Note that the estimation results are generally unaffected if very small districts are excluded.

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<sup>9</sup>Since incumbents who do not run for reelection cannot be identified from the elections data in all cases, I have used the number of seats that had to be filled in the elections in 2000, '02 and '04 to calculate the number of incumbents per district. This should be equal to the true number of incumbents in almost all cases.

## 4 Results

Table 5 displays the first set of estimation results. The columns represent different specifications of the linear model explaining the probability of reelection. As outlined in Section 3, all estimations account for fixed school district effects and period effects and instrument the number of candidates per seat as a measure for electoral competition by enrollment per seat and the same ratio squared.

Column (1) shows the results for a base specification that includes only the change in expenditures and electoral competition as additional explanatory variables. The change in the API test score from period  $t - 1$  to  $t$  is positive and highly significant. The estimated coefficient suggests that an increase in the test score change by one standard deviation (which is equivalent to 25 points on the API test score scale) will increase the reelection probability of the average incumbent by about 0.05. Column (2) shows that the effect of API improvements on the electoral success of incumbents is robust to the inclusion of regressors. All of the additional explanatory variables are insignificant, suggesting that the voters in California school district elections do not blame school boards for higher expenditure growth or a stronger growth in long term debt that comes along with constant improvement of the local public schools in terms of API scores. This may have to do with the fact that the school finance scheme in California rests heavily on state funds being distributed across school districts on a per-pupil basis, taking account of district characteristics such as, for instance, the types of school served and the number of students receiving special education.

A condition for efficiency of the voting market for school board members is that voters as principals should base their inference on the performance of school district officials on factors that are affected by the agents' actions. In contrast, rational voters will not take into account conditions that affect the

ex-post performance measure but should plausibly be treated as exogenous. Columns (3) and (4) test the hypothesis that voters are able to make the distinction between test score changes that are due to variation in exogenous conditions and test score changes that cannot be explained by such conditions. Column (3) shows the result of an estimation that duplicates specification (2) apart from the fact that the actual test score change has been replaced by the unanticipated test score change. As mentioned in Section 3, the unanticipated test score change is the residual from a linear regression of the actual test score change on a vector of exogenous characteristics, including changes in demographic variables and a vector of time constant indicators for district types and urbanicity. The estimated coefficient of the unanticipated test score change is almost identical to the coefficient of the actual test score change in columns (1) and (2). The last column in Table 5 lends further support to this finding. It shows that, if both the anticipated and the unanticipated change in the API score are included as separate regressors, the unanticipated change in performance is estimated to have an impact on the reelection probability that is close to exactly matching the one derived from the previous specifications. At the same time, the null that the anticipated change in the API score does not affect the electoral fate of incumbents cannot be rejected at any reasonable level of significance.

To summarize the results obtained so far, voters in California school district elections seem to strongly react to changes in standardized test scores as the best and most objective ex-post measure that is available for evaluating the performance of the local public school system. Moreover, their voting decisions reflect a striking ability to distinguish between test score changes that are driven by exogenous conditions and changes in the performance measure that cannot reasonably be attributed to such conditions. While the reelection probability of incumbents is (on average) unaffected by that part of a test score change that can be explained by changes in exogenous conditions, the unanticipated variation in performance is used by voters to make inference on

the true performance of their agents.

So far the analysis has ignored the selection problem. As discussed in Section 3, the robustness of the estimation results is checked by coding incumbents who do not run for reelection as defeated and to re-estimate the model on the augmented sample.<sup>10</sup> Table 6 reports the results for the same specifications as before. Again, the coefficient for the test score change is stable across specifications, although it is now somewhat smaller than when estimation was based on the selected sample. Taken together, the estimations presented in Tables 5 and 6 suggest that for an analysis focusing on the effect of performance on electoral success, the selection problem is of little importance.

The literature on electoral accountability is inconclusive with regard to the time horizon of voters when evaluating incumbents. While most studies report results suggesting that voters suffer from a short memory and tend to ignore information from the early years of an incumbent's term, Peltzman (1992) finds that voters evaluate performance over all periods that are relevant for a given electoral decision. The results discussed so far rest on the assumption that voters base their inference only on test score changes from period  $t - 1$  to  $t$ . This assumption can be tested, which is done in an estimation reported in Table 7. The model now includes changes in the API score, expenditures and outstanding debt from  $t - 1$  to  $t$  and three additional lags of these differences and is based on the selected sample. The inclusion of the lag structure reduces the data that is available for estimation to a single cross-section for 2004. Estimation now proceeds by two-stage least squares. The results confirm that voters in the California school district elections base their evaluation of school board members on the change in academic achievement between the previous

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<sup>10</sup>For some observations, the assumption that incumbents' decision not run reflects anticipation of defeat may not hold. This is particularly likely in districts with a very large increase in the API score. To account for this possibility, I have eliminated from the sample those observations with a disproportionate impact on the estimated coefficient for the change in the test score based on the procedure suggested by Belsley, Kuh, and Welsch (1980). This removes between 35 (specification (4)) and 48 (1) observations from the sample. As expected, among the incumbents who do not run the procedure identifies as influential primarily those with above-average performance.

and the current year. The null that performance changes in earlier periods are ignored cannot be rejected.<sup>11</sup>

## 5 Conclusion

Public service provision in local jurisdictions is rarely taken into account by the literature on retrospective voting and electoral accountability. Most of the evidence on elections as a device of voters as principals to reward agents who performed well and to punish those who have achieved unsatisfactory results is instead based on measures that are only loosely related to the actions of incumbents. This study is an effort to add to the literature by explicitly dealing with performance in terms of a local policy that (i) is known to be closely monitored by voters, (ii) allows for the measurement of the quality of public service provision, and (iii) that is one-dimensional. I have argued that the US public school districts offer outstanding opportunities for such research.

Using panel data on California school districts, the paper has shown that voters strongly react to the performance of local representatives. In a district with a test score increase that is one standard deviation above that of an otherwise identical reference district incumbents will have, on average, a reelection probability that is between 0.035 and 0.05 higher than the reelection probability in the reference community. The estimated impact of performance on the fate of incumbents has been shown to be highly robust across various specifications. Moreover, the evidence points to a striking ability of voters to distinguish between performance which is driven by factors that cannot be affected by incumbents (such as changes in demographic characteristics of the student body) and performance that contains information once exogenous

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<sup>11</sup>Somewhat curiously, the change in expenditure between  $t - 4$  and  $t - 3$  is significant at the 10 percent level.

conditions have been netted out.

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Table 1:

Descriptive statistics for school district elections:  
Candidate level, ALL CANDIDATES (years '00, '02, '04)

VARIABLE	NOB	MEAN	STD.DEV.	MIN	MAX
ELECTED	4594	0.507	0.500	0	1
# CANDIDATES	4594	4.929	2.173	2	13
# SEATS	4594	2.315	0.786	1	5
INCUMBENT	4594	0.363	0.481	0	1

Note:

- Incumbents who run uncontested have been dropped.

Table 2:

Descriptive statistics for school district elections:  
Candidate level, INCUMBENT CANDIDATES (years '00, '02, '04)

VARIABLE	NOB	MEAN	STD.DEV.	MIN	MAX
ELECTED	1669	0.770	0.421	0	1
# CANDIDATES	1669	4.543	1.878	2	13
# SEATS	1669	2.372	0.755	1	4

Note:

- Incumbents who run uncontested have been dropped.

Table 3:

Descriptive statistics for school district elections:  
ALL INCUMBENTS (years '00, '02, '04)

VARIABLE	NOB	MEAN	STD.DEV.	MIN	MAX
RUN	2367	0.705	0.456	0	1

Note:

- Incumbents who run uncontested have been dropped.

Table 4:

Descriptive statistics for school district characteristics:  
 district level, only districts with school district elections  
 and at least one incumbent candidate (years '00, '02, '04)

VARIABLE	NOB	MEAN	STD.DEV.	MIN	MAX
TEST SCORE CHANGE	827	10.92	24.70	-65	125.7
UNANTICIPATED TEST SCORE CHANGE	824	0.221	20.51	-91.82	118.1
ANTICIPATED TEST SCORE CHANGE	824	10.69	13.46	-12.01	45.60
EXPENDITURE PER STUDENT CHANGE	859	102.9	439.1	-6243	4377
DEBT PER STUDENT CHANGE	859	273.3	2434	-8038	61430
STUDENT TEACHER RATIO CHANGE	862	0.084	1.340	-14.63	9
CANDIDATES/SEAT	864	1.999	0.668	1.25	6

## Notes:

- EXPENDITURE PER STUDENT CHANGE is change in expenditure for instruction compared to previous year (1999 real dollars).
- DEBT PER STUDENT CHANGE is change in long term debt compared to previous year (1999 real dollars).
- UNANTICIPATED TEST SCORE CHANGE is actual test score change minus test score change predicted by a linear regression of the actual test score change on %minority students (change), %students eligible for free or reduced price lunch (change), indicators for elementary and high school districts, and seven urbanicity indicators (large city, mid-size city, urban fringe large city, urban fringe mid-size city, large town, small town, rural outside core based statistical area). ANTICIPATED TEST SCORE CHANGE is fitted value from that regression.

Table 5:  
Fixed effects IV estimation of linear probability model for incumbent candidates' electoral success (years '00, '02, '04)

MODEL	(1)	(2)	(3)	(4)
TEST SCORE CHANGE	0.00201*** (2.70)	0.00191** (2.50)	-	-
UNANTICIPATED TEST SCORE CHANGE	-	-	0.00187** (2.48)	0.00189** (2.48)
ANTICIPATED TEST SCORE CHANGE	-	-	-	0.00359 (0.45)
EXPENDITURE PER STUDENT CHANGE	0.00004 (0.52)	0.00000 (0.03)	-0.00000 (0.00)	0.00000 (0.08)
DEBT PER STUDENT CHANGE	-	-0.00000 (-0.15)	-0.00000 (-0.13)	-0.00000 (-0.19)
STUDENT TEACHER RATIO CHANGE	-	-0.01788 (-0.86)	-0.01840 (-0.88)	-0.01748 (-0.83)
CANDIDATES/SEAT	-0.11853 (-0.62)	-0.13663 (-0.71)	-0.13560 (-0.71)	-0.13151 (-0.68)
NOB	1,595	1,592	1,592	1,592

Notes:

- Numbers in parentheses are t-statistics based on standard errors that are robust to heteroscedasticity and clustering on districts.
- All estimations account for district-specific fixed effects and years effects.
- Estimators derived from GMM with asymptotically optimal weighting matrix after within-transformation. See text for details.
- CANDIDATES/SEAT instrumented by ENROLLMENT/SEAT and (ENROLLMENT/SEAT)^2.
- UNANTICIPATED TEST SCORE CHANGE is actual test score change minus test score change predicted by a linear regression of the actual test score change on %minority students (change), %students eligible for free or reduced price lunch (change), indicators for elementary and high school districts, and seven urbanicity indicators (large city, mid-size city, urban fringe large city, urban fringe mid-size city, large town, small town, rural outside core based statistical area). ANTICIPATED TEST SCORE CHANGE is fitted value from that regression.

Table 6:  
Fixed effects IV estimation of linear probability model for incumbents'  
electoral success (years '00, '02, '04)

MODEL	(1)	(2)	(3)	(4)
TEST SCORE CHANGE	0.00142** (2.00)	0.00146** (2.06)	-	-
UNANTICIPATED TEST SCORE CHANGE	-	-	0.00139* (1.95)	0.00149** (2.06)
ANTICIPATED TEST SCORE CHANGE	-	-	-	0.00641 (0.99)
EXPENDITURE PER STUDENT CHANGE	0.00002 (0.40)	0.00000 (0.04)	0.00002 (0.28)	0.00002 (0.31)
DEBT PER STUDENT CHANGE	-	-0.00000 (-0.48)	-0.00000 (-0.47)	-0.00000 (-0.58)
STUDENT TEACHER RATIO CHANGE	-	-0.00877 (-0.62)	-0.00740 (-0.53)	-0.00838 (-0.59)
CANDIDATES/SEAT	-0.13802 (-1.27)	-0.14311 (-1.32)	-0.14292 (-1.32)	-0.14355 (-1.31)
NOB	2,206	2,212	2,213	2,215

Notes:

- Incumbents who did not run coded as defeated.
- Numbers in parentheses are t-statistics based on standard errors that are robust to heteroscedasticity and clustering on districts.
- All estimations account for district-specific fixed effects and years effects.
- Estimators derived from GMM with asymptotically optimal weighting matrix after within-transformation. See text for details.
- CANDIDATES/SEAT instrumented by ENROLLMENT/SEAT and (ENROLLMENT/SEAT)^2.
- UNANTICIPATED TEST SCORE CHANGE is actual test score change minus test score change predicted by a linear regression of the actual test score change on %minority students (change), %students eligible for free or reduced price lunch (change), indicators for elementary and high school districts, and seven urbanicity indicators (large city, mid-size city, urban fringe large city, urban fringe mid-size city, large town, small town, rural outside core based statistical area). ANTICIPATED TEST SCORE CHANGE is fitted value from that regression.

Table 7:

Cross-sectional 2SLS estimation of linear probability model for incumbents' electoral success (year '04)

DEPENDENT VARIABLE: ELECTED	COEFFICIENT	t-STATISTIC
TEST SCORE CHANGE t/t-1	0.00226**	2.19
TEST SCORE CHANGE t-1/t-2	0.00151	1.24
TEST SCORE CHANGE t-2/t-3	-0.00118	-1.13
TEST SCORE CHANGE t-3/t-4	-0.00100	-1.11
EXPENDITURE PER STUDENT CHANGE t/t-1	-0.00002	-0.38
EXPENDITURE PER STUDENT CHANGE t-1/t-2	-0.00003	-0.70
EXPENDITURE PER STUDENT CHANGE t-2/t-3	-0.00004	-0.59
EXPENDITURE PER STUDENT CHANGE t-3/t-4	-0.00014*	-1.82
DEBT PER STUDENT CHANGE t/t-1	-0.00002**	-2.17
DEBT PER STUDENT CHANGE t-1/t-2	-0.00001	-0.86
DEBT PER STUDENT CHANGE t-2/t-3	-0.00001	-1.36
DEBT PER STUDENT CHANGE t-3/t-4	-0.00000	-0.23
ELEMENTARY SCHOOL DISTRICT	0.07877*	1.74
HIGH SCHOOL DISTRICT	0.08056	1.39
CITY	0.09124*	1.80
SUBURB	0.08445*	1.92
CANDIDATES/SEAT	-0.10533*	-1.90
NOB		509

## Notes:

- t-statistics based on standard errors that are robust to heteroscedasticity and clustering on districts.
- CANDIDATES/SEAT instrumented by ENROLLMENT/SEAT and (ENROLLMENT/SEAT)^2.