FISCAL DECENTRALIZATION

AND LAND POLICIES

Edited by Gregory K. Ingram and Yu-Hung Hong

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CONTENTS

6

School Finance Reforms and Property Tax Limitation Measures

Daniel P. McMillen and Larry D. Singell Jr.

*T*he U.S. federalist system has historically placed responsibility for educational funding on local governments that have used property tax revenues as a primary source of support for both elementary and secondary education (de Bartolome 1997; Shapiro, Puryear, and Ross 1979). The property tax revolts that began in California in the 1970s, however, have rippled through the contiguous United States such that 43 of these 48 states had placed explicit limits on property taxation by 2005 (Anderson 2006). These property tax limitation measures have worked in concert with legal challenges to educational finance systems and legislative school finance reform that have occurred in more than two-thirds of the states over this same time period in an attempt to limit, centralize, and equalize funding across districts (Figlio, Husted, and Kenny 2004). There is now growing evidence that this triumvirate of school finance limitations has adversely affected educational outcomes including school expenditures, class sizes, student test scores, and teacher quality and that these effects differ across school districts (Downes, Dye, and McGuire 1998; Figlio 1998; Matsusaka 1995; Murray, Evans, and Schwab 1998; Silva and Sonstelie 1995).

This chapter extends this literature by using the Common Core of Data (CCD) for school districts and a kernel density approach to examine the effects of tax limits and educational finance reform across the entire distribution of educational outcomes in 1990 and 2000. In particular, the analysis exploits the differences in the timing and type of state limitations on educational spending to compare the per-pupil expenditure and class-size distributions before and after the adoption of tax limitations or educational finance reforms and relative to states that did not initiate such changes. The results show that these joint tax and reform measures yield systematic distributional effects that differ from

separately adopting either a tax limitation or finance reform measure and relative to states that adopt neither. These results provide unique insights into apparent differences across states in the extent to which tax limits, litigation, and school finance reform have affected district-level school outcomes (Sokolow 1998).

Studies using voter survey data consistently indicate that tax limitation initiatives passed as a result of a consensus view that imposing fiscal constraints on governments would not result in a reduction in services (Citrin 1979; O'Sullivan, Sexton, and Sheffrin 1995; Shapiro, Puryear, and Ross 1979). Early studies of tax limitation measures during the 1970s and 1980s found mixed evidence regarding their adverse effects on student outcomes. For example, Downes (1992) compared performance on the California Assessment Program test before and after Proposition 13 was instituted and found no long-run reduction in student performance at any point on the performance distribution. On the other hand, Downes and Figlio (1998) used the National Longitudinal Data of 1972 (NLS72) and the National Educational Longitudinal Data (NELS) and found that, on a statewide basis, the imposition of tax or expenditure limits on local government reduced student performance on standardized tests in mathematics and that this deterioration was relatively greater in economically disadvantaged areas.

The difficulty of isolating the effect of tax limitation measures is partly because more recent measures differ from their earlier predecessors. Specifically, Figlio (1998) shows that the 1990s-era tax revolts differed from those of the 1970s and early 1980s in that they were less likely to offer significant state replacement of lost funds to local school districts and tended to combine tax rate limits with limits on tax assessments as opposed to placing general limits on expenditures or revenues. Moreover, Evans, Murray, and Schwab (1997) and Downes and Figlio (1999) show that states have implemented major school finance reforms close in time to the passage of tax limits such that the effect of tax limits can only be isolated by looking across the states or by examining the long-run experience in a state in which a limit was passed and no major changes in the school finance system had occurred.

Manwaring and Sheffrin (1997) document that 32 states experienced legal challenges to their educational finance systems between 1971 and 1995 and that these challenges, even when unsuccessful, initiated legislative education finance reforms in the state to preempt further future legal remedies. The general tenet of these reform movements was to transfer funding responsibility from the local to the state level in an attempt to equalize educational spending across districts. Nonetheless, they found significant heterogeneity in the effects of these equalization measures across states. For example, Washington's move to a centralized system in the 1980s was found to significantly reduce per-pupil expenditures, whereas Wisconsin's reforms—which initiated reforms directed at spending more on lower-income districts but not restricting upper-end districts—led to greater overall spending on education.

Overall, education finance reform studies suggest that school finance equalization programs often imposed different tax prices across districts and states for

spending an additional dollar on local school spending. For example, Hoxby (1998), using Census of Government and Census of Population and Housing school-district summary files for 1972, 1982, and 1992, shows that poor districts typically enjoy relatively higher spending under most equalization schemes but can actually lose spending under the most restrictive schemes in states such as California and New Mexico. Similarly, Figlio and Rueben (2001) exploit detailed individual level data in the NLS72, the High School and Beyond, and the NELS to show that United States Supreme Court rulings in a state reduce significantly per-pupil school revenue inequality. Alternatively, Card and Payne (2002) use data from the 1977 and 1992 Census of Government merged with district characteristics from the 1980 and 1990 Census of Population and Housing to estimate how the relationship between median family income and state aid per student (total spending per student) in a school district changes in response to school finance reform. Their results indicate that, in the aftermath of negative court decisions, states tended to increase the relative funding available to lower-income districts, but with only modest effects regarding equalization on SAT scores across income categories.

Overall, prior work suggests that property tax limitation measures, particularly post-1990 initiatives, tended to lower average educational outcomes, but also affected the distribution of expenditures; whereas legal and legislative educational finance reforms frequently raised the relative spending of poorer districts, but yielded ambiguous effects on the absolute level of spending. Thus, tax limitation measures and school reform both tended to centralize school funding either by implicitly preventing locally high-demand districts from spending at desired levels in the case of statewide tax limits or by explicitly ceding funding responsibility from local to state government in the case of legal reform. On the other hand, these findings also suggest that the tax limitation or spending equalization measures occurring in close succession may well yield different effects than either occurring in isolation and that there may well be both level and distributional effects on school outcomes.

A kernel density of per-pupil expenditures and class size is used here to examine how this distribution varies before versus after a state experiences a property tax limitation, a legal or legislative reform, or both and relative to a similar comparison made for states that did not experience either a property tax limitation or an educational finance reform. These distributional comparisons mimic the difference-in-difference approach adopted in prior regression analyses that exploit the natural experiment arising from the adoption of property tax limitations and educational reforms (Figlio 1998).

In the subsequent section, we define the school finance regimes and provide descriptive evidence regarding how school service levels differ across regimes in the CCD that are used to calculate the various kernel densities. The empirical approach and the kernel density results for the population of school districts in the continental United States in 1990 and 2000 are described, followed by discussions of the difference in the density differences by school finance regime for expenditures per student and class size.

The Data

The data source for the empirical analysis is the CCD, the Department of Education's primary database on public elementary and secondary education in the United States. The CCD, first published in 1987, is a comprehensive, annual, national database that includes both administrative and financial data for every U.S. school district. Our analysis uses school-district data for 1990 and 2000 that, respectively, follow the first wave of tax revolts and educational finance reforms that largely occurred in the decade prior to 1990 or that follow a second wave that largely occurred in the early to mid-1990s. Specifically, in comparison with a base group of school districts that reside in states that never passed a substantive tax limitation measure and did not enforce a court-mandated or legislative educational finance reform, there are four distinct local finance regimes faced by school districts that operate in states that (1) passed tax limits prior to 1990; (2) passed tax limits and adopted educational finance reform prior to 1990; (3) passed tax limits prior to 2000; and (4) passed tax limits and adopted educational finance reform prior to 2000. In other words, in each of the four categories, we compare the district-level resource distributions for a period when there is a change in the local educational finance regime to (1) a prior period when there is no change; and (2) a base group of districts that made no explicit or substantial change in local financing in either period.

These four local finance regimes offer a natural division of states into groupings with potentially different and changing educational service-level distributions. Specifically, Figlio and Rueben (2001) note that reform frequently follows closely with the passage of tax limitation measures such that there are no states that enacted a binding tax limit without adopting a legislative or legal reform over the same period, either prior to 1990, or between 1990 and 2000. On the other hand, we distinguish between states that jointly pass tax limitations and educational finance reforms and those that simply enacted reforms because prior work shows that this distinction is essential in isolating the effect of such fiscal restrictions on average educational service levels (e.g., Downes and Figlio 1999; Evans, Murray, and Schwab 1997). At the same time, we distinguish between the 1980-era versus 1990-era tax limitation measures because prior work indicates that the latter reform measures are generally more fiscally restrictive than their earlier counterparts (e.g., Figlio 1998).[1]

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1. Findings of previous work are used to help determine the placement of the states into the various school finance regimes, which inevitably involves some value judgments. For example, Indiana is included in our base category because, although it adopted a tax limit in 1974, Sokolow (1998) indicates that this limit was effectively nonbinding. Alternatively, Manwaring and Sheffrin (1997) identify many states that adopted only weak legislative finance reforms to head off further litigation after a failed court case. For example, Idaho is included in the control states because it adopted a weak legislative reform in 1978 after an unsuccessful court case in 1975 that was later repealed in 1992. The broad conclusions are not sensitive to the necessary judgment calls regarding the school finance regimes.

The principal variables used to measure school service levels in the analysis are district-level measures of average class size and per-pupil expenditures, which have previously been used as measures of school-district resources (e.g., Figlio 1998). Although the evidence linking measures of school quality and student outcomes, such as test scores or post-school earnings, are mixed, parents, business leaders, and policy analysts have focused explicitly on class size and per-pupil expenditures as key metrics in the evaluation of the public provision of education (e.g., Betts 1995). Thus, because public perception of the quality of local schools is so closely linked to both class size and per-pupil expenditures, these measures capture the tradeoff (real or perceived) between school performance and tax limitation measures or legal reform.

As seen in table 6.1, the expenditure values suggest that tax limits and finance reforms typically occurred in states that have relatively high per-student expenditures.[2] In particular, the base group of districts that were not subject to tax limits or reform had lower per-student expenditures in 1990 than those that experience either a tax limit or a reform over the period of study. This pattern continued in 2000, with the base category having lower per-student expenditures in all regimes with the exception of districts that reside in states that enacted reform and tax limits in the 1990s. On the other hand, average class size yields a far less consistent pattern across the local expenditure regime categories, suggesting that tax limits and finance reforms relate more to controlling noninstructional expenditures.[3]

To focus on distributional change comparisons in service levels that are independent of initial service-level differences, the empirical analysis will focus on the average class size and per-pupil expenditures normalized by their 1990 levels. Normalization is necessary because states differ systematically in their levels of expenditures and class sizes. For example, as can be seen in table 6.1, Tennessee's school districts had the lowest average expenditure per pupil in 1990 at $3,356. Although the average increased to $5,032 in 2000, Tennessee's average expenditure per pupil remained well below the national average of $6,712. Similarly, although California's average class size fell from 22.5 in 1990 to 20.2, it

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2. The U.S. city average consumer price index (all items) was used to express all expenditures in terms of 1990 dollars.

3. Table 6.1 also indicates heterogeneity in the number (and thus size) of the districts across the control and four treatment groups. Although heterogeneity in size does not necessarily create direct empirical problems, that control states, on average, have fewer districts than the treatment states may suggest that tax revolts and legal reform may more naturally arise when there are many districts in a state such that there is the possibility of greater heterogeneity in school financing. Unlike standard regression procedures, a single large district (such as New York City) has little effect on kernel density estimates, which are designed to characterize the entire distribution of outcomes; it also means, however, that New York City is given no more weight than small districts when estimating the densities. Each district is given equal weight in estimation regardless of size.

Table 6.1
Average Service Level by Tax and Reform Regime

State	Tax and Reform Regime	Number of Districts	Revenue 1990 ($)	Revenue 2000 ($)	Avg. Class Size 1990	Avg. Class Size 2000
Alabama	No reform or tax limits	127	3,807.43	5,489.40	19.05	15.11
Delaware	No reform or tax limits	16	5,637.67	7,685.76	17.18	15.70
Idaho	No reform or tax limits	102	4,005.19	5,542.55	18.03	16.04
Indiana	No reform or tax limits	291	4,897.93	6,615.82	17.96	17.25
Mississippi	No reform or tax limits	148	3,403.95	5,001.14	18.09	16.11
Nevada	No reform or tax limits	16	6,710.15	6,947.12	17.66	15.62
North Carolina	No reform or tax limits	117	4,859.22	6,107.27	16.01	15.12
North Dakota	No reform or tax limits	157	5,151.11	6,072.86	14.83	12.36
Pennsylvania	No reform or tax limits	498	6,209.94	7,238.35	16.38	16.40
Rhode Island	No reform or tax limits	31	6,399.85	7,554.93	14.58	13.66
Mean		**150**	**5,108.24**	**6,425.52**	**16.98**	**15.34**
Arkansas	Reform and no tax limits before 1990	307	3,540.32	4,819.79	14.11	12.99
Connecticut	Reform and no tax limits before 1990	123	8,507.07	8,275.58	14.08	13.93
Georgia	Reform and no tax limits before 1990	172	4,415.31	5,879.20	16.35	15.58
Illinois	Reform and no tax limits before 1990	488	4,399.77	6,315.00	16.71	15.06
Kentucky	Reform and no tax limits before 1990	171	3,360.18	5,659.29	17.32	14.82
Louisiana	Reform and no tax limits before 1990	66	4,196.72	5,143.66	16.38	14.77
Maine	Reform and no tax limits before 1990	116	5,869.10	7,275.61	14.88	12.39
Maryland	Reform and no tax limits before 1990	24	6,088.38	6,707.54	17.41	16.40
Missouri	Reform and no tax limits before 1990	448	4,341.05	5,593.65	14.90	13.19
New Jersey	Reform and no tax limits before 1990	255	8,112.40	9,604.83	14.41	13.57
Oklahoma	Reform and no tax limits before 1990	416	4,030.19	5,028.87	14.20	13.93
South Carolina	Reform and no tax limits before 1990	84	4,667.73	6,205.46	16.90	14.77
South Dakota	Reform and no tax limits before 1990	158	4,723.72	6,092.16	12.73	12.36

Table 6.1
(*continued*)

State	Tax and Reform Regime	Number of Districts	Revenue 1990 ($)	Revenue 2000 ($)	Avg. Class Size 1990	Avg. Class Size 2000
Texas	Reform and no tax limits before 1990	962	5,186.47	7,018.52	14.28	12.69
Utah	Reform and no tax limits before 1990	40	4,000.43	5,075.85	21.85	19.58
Virginia	Reform and no tax limits before 1990	131	5,312.69	6,424.65	15.36	13.52
Washington	Reform and no tax limits before 1990	246	6,258.35	6,696.69	18.63	18.27
West Virginia	Reform and no tax limits before 1990	55	4, 039.81	6,279.23	15.31	13.84
Wisconsin	Reform and no tax limits before 1990	377	5,913.41	7,734.94	15.29	14.26
Wyoming	Reform and no tax limits before 1990	46	7,385.05	7,734.58	12.62	12.19
Mean		**234**	**5,217.41**	**6,478.25**	**15.68**	**14.41**
Arizona	Reform and tax limits before 1990	99	5,695.56	6,108.99	17.65	16.99
California	Reform and tax limits before 1990	377	5,330.72	6,172.30	22.50	20.21
Colorado	Reform and tax limits before 1990	171	5,986.47	7,043.22	14.16	13.86
Iowa	Reform and tax limits before 1990	341	4,740.24	6,318.77	14.53	14.13
Massachusetts	Reform and tax limits before 1990	224	6,341.29	7,604.11	16.94	13.08
Minnesota	Reform and tax limits before 1990	288	5,667.58	6,950.24	16.70	14.78
New Mexico	Reform and tax limits before 1990	88	5,722.27	7,213.84	16.60	14.74
Ohio	Reform and tax limits before 1990	610	4,504.18	5,983.23	19.40	17.18
Mean		**275**	**5,498.54**	**6,674.34**	**17.31**	**15.62**
Kansas	Reform and no tax limits after 1990	297	5,577.06	6,262.14	13.44	13.13
New Hampshire	Reform and no tax limits after 1990	71	6,299.34	6,723.52	15.28	14.12

Table 6.1
(*continued*)

State	Tax and Reform Regime	Number of Districts	Revenue 1990 ($)	Revenue 2000 ($)	Avg. Class Size 1990	Avg. Class Size 2000
New York	Reform and no tax limits after 1990	623	8,866.38	10,002.03	13.82	13.16
Tennessee	Reform and no tax limits after 1990	118	3,356.55	5,032.17	19.01	15.67
Vermont	Reform and no tax limits after 1990	61	7,088.43	8,454.86	16.78	12.49
Mean		**234**	**6,237.55**	**7,294.94**	**15.67**	**13.71**
Florida	Reform and tax limits after 1990	67	5,952.06	6,089.71	16.86	17.83
Michigan	Reform and tax limits after 1990	524	5,112.89	6,955.22	15.18	17.63
Montana	Reform and tax limits after 1990	165	6,583.02	6,871.40	12.31	12.38
Nebraska	Reform and tax limits after 1990	234	5,663.63	6,349.54	12.49	12.43
Oregon	Reform and tax limits after 1990	165	5,842.19	6,630.55	16.50	17.03
Mean		**231**	**5,830.76**	**6,579.28**	**14.67**	**15.46**

Sources: Common Core of Data and authors' calculations.

had the highest average class size among the 48 contiguous states in both years.[4] It follows that if the data are not normalized, these changes would be observed only as a slight change at the extremes of the national distribution.

Table 6.2 shows that, by normalizing, average class size and real expenditures per pupil always have an average for 1990 of 1.00 across each state's jurisdictions. The 1990 data thus measure how a jurisdiction's average class size or expenditure differs from the statewide average. The 2000 data are also normalized by the 1990 statewide mean. Thus, if a jurisdiction's value for the (normalized) average class size rose from 1.00 to 1.20 between 1990 and 2000, then its average class size began the decade at the state average but rose to a level 20 percent higher than the 1990 average. The normalization allows us to pool

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4. These figures are calculated as the simple average of the values from each jurisdiction in the state.

Table 6.2
Normalized Service Levels by Local Expenditure Regime

Variables	Base Group: No Reform or Tax Limits	Reform, but No Tax Limits, Before 1990	Reform and Tax Limits, Before 1990	Reform, but No Tax Limits, in 1990s	Reform and Tax Limits in 1990s
Normalized expenditures in 1990 by 1990	1.00 (0.22)	1.00 (0.28)	1.00 (0.20)	1.00 (0.27)	1.00 (0.24)
Normalized expenditures in 2000 by 1990	1.26 (0.28)	1.31 (0.37)	1.23 (0.34)	1.22 (0.39)	1.25 (0.36)
Normalized class size in 1990 by 1990	1.00 (0.15)	1.00 (0.15)	1.00 (0.17)	1.00 (0.14)	1.00 (0.20)
Normalized class size in 2000 by 1990	0.93 (0.14)	0.92 (0.14)	0.93 (0.15)	0.90 (0.15)	1.05 (0.20)
Number of observations	1,722	4,120	1,177	2,230	1,462

Note: Standard errors are in parentheses.
Sources: Common Core of Data and authors' calculations.

data across states while maintaining the ability to determine whether the overall distributions have shifted to the right or left over time.

Although the normalization yields a mean level of service of one in each of the five categories for 1990 in table 6.2, the mean values of the real per-student expenditures in 2000 are larger than 1.00 for each regime, indicating a general rise in real expenditures between 1990 and 2000. Alternatively, the normalized value of class size is less than 1.00 in 2000 for all categories except those districts that reside in states that passed tax limits and adopted reform during the 1990s, suggesting that the general trend of smaller classes did not occur in the later period when school districts faced the most comprehensive state-level restrictions on the local finance of education. Interestingly, the standard errors of both normalized expenditures and class size tend to be larger in reform states than in the base category, suggesting that legal and political pressure may be driven by relative district-level inequality in the state. The empirical analysis compares the 1990 and 2000 revenue and class-size distributions for each of the four school finance regimes relative to the same comparison made for the base category of states that imposed no property tax limits or school finance reforms on their local school districts.

Empirical Approach and Results for the Population of School Districts

The objectives here are to analyze changes in the distributions of per-student expenditures and average class sizes between 1990 and 2000 and to determine

whether the changes in the distributions differ for states with tax reforms and property tax limitation measures. The basic tool for this descriptive analysis is a nonparametric estimator of the underlying density function. Using x_{90} to represent either the normalized average class size or expenditure per capita in 1990, the kernel density function estimate at a target value x is

$$(1) \qquad \hat{f}_{90}(x) = \frac{1}{nh} \sum_{i=1}^{n} K\left(\frac{x_{90i} - x}{h}\right).$$

where n is the number of observations and h is a parameter (the "bandwidth") that controls the degree of smoothing. Similarly, the density at the target value x for 2000 is

$$(2) \qquad \hat{f}_{00}(x) = \frac{1}{nh} \sum_{i=1}^{n} K\left(\frac{x_{00i} - x}{h}\right).$$

The change in the density between 1990 and 2000 is simply

$$(3) \qquad \Delta(x) = \hat{f}_{00}(x) - \hat{f}_{90}(x).$$

We use an Epanechnikov kernel for all calculations: $K(u) = .75(1 - u^2)$ if $|u| \leq 1$ and $K(u) = 0$ otherwise. For both average class size and expenditure per student, we calculate the density functions at 400 equally spaced alternative values of x and then use graphs to summarize the results.

The kernel density function is the same conceptually as a smoothed histogram. The degree of smoothing is controlled by the bandwidth, h. Following Silverman (1986), we use a simple rule of thumb to determine the bandwidths: $h_{90} = 1.06 \text{ var}(x_{90})n^{-.20}$ and $h_{00} = 1.06 \text{ var}(x_{00})n^{-.20}$. Experimentation with alternative bandwidths produced only minor variation in the appearance of the estimated density functions, with wider bandwidths tending to yield a higher degree of monotonicity and smoother distributions.

Figure 6.1a presents the estimated density functions for real expenditure per student for 1990 and 2000 for the full sample of school districts in the 48 contiguous states. Our normalization procedure produces a 1990 density function that is centered on a value close to 1.0. The 1990 function is skewed to the right: although expenditures are clustered near the state average for most school districts, many districts have quite high levels of expenditures per student. Although expenditures are in real rather than nominal terms, the density function shifts markedly to the right in 2000 as districts increased their spending levels.

Figure 6.1
Estimated Density Functions for Real Expenditure per Student: All School Districts

(a) Density of Real Expenditure per Student, All States

(b) Difference Between 1990 and 2000 Densities, All States
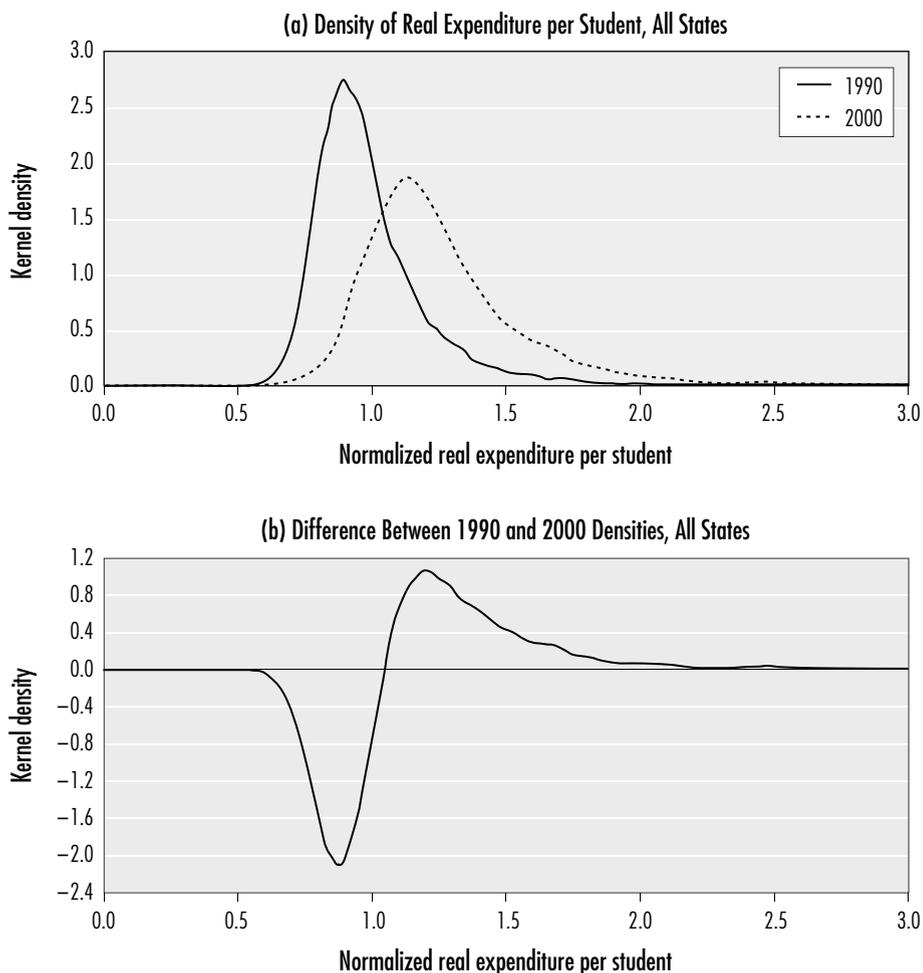
The 1990 function also exhibits a higher variance. Figure 6.1b presents the same information in a different light by showing the *change* in the estimated density functions from 1990 to 2000. The estimated densities decline at low levels of expenditures per student, with a corresponding increase at high levels. Both figures imply that expenditures per student increased over time for the full sample of school districts. Figure 6.2 presents the estimated density functions and the change in densities for average class sizes for the full sample of school districts.

Figure 6.2
Estimated Density Functions for Average Class Size: All School Districts
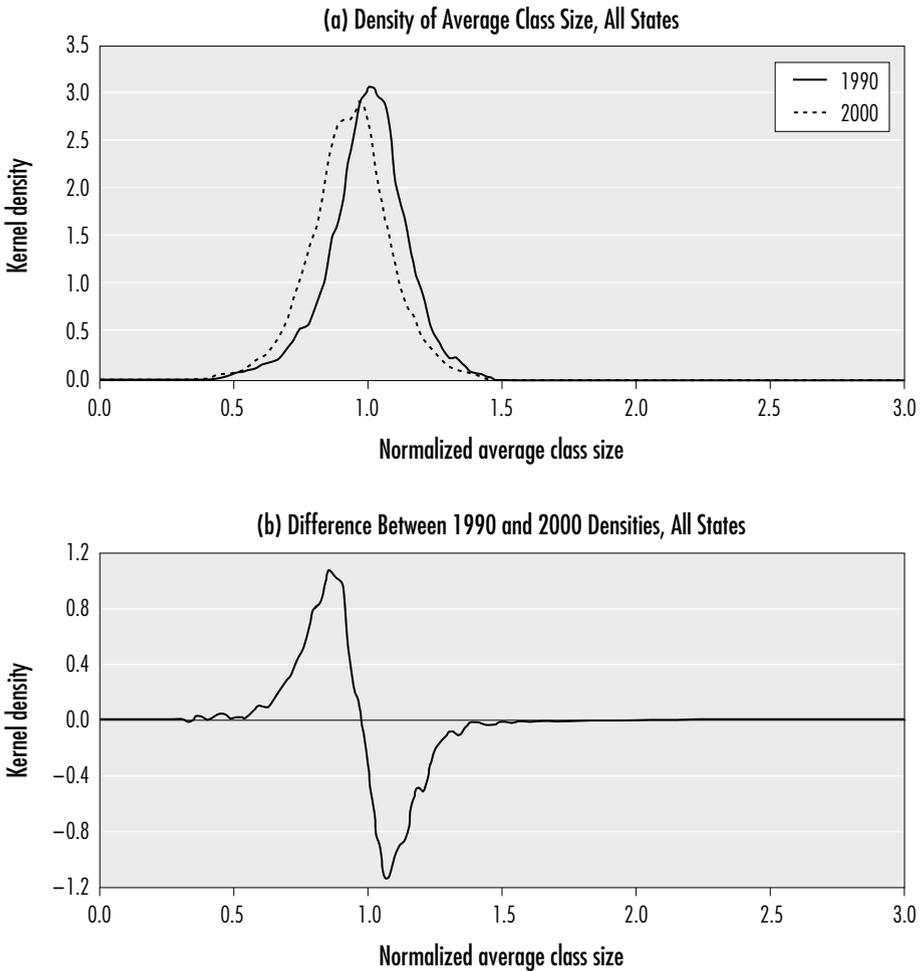
The distribution shifted to the left between 1990 and 2000 as the number of school districts with high average class sizes declines.

Difference in Density Differences by Regime: Expenditure per Student

For the full sample of school districts, expenditure per student increased and average class size fell between 1990 and 2000. In this section, we use a difference-

in-differences approach to determining whether the change in the densities differs across five state groupings by school finance regime: (1) a base group with no binding finance reforms or tax limits; (2) states that adopted binding reforms prior to 1990; (3) states that adopted binding reforms and tax limits prior to 1990; (4) states that adopted binding reforms in the 1990s; and (5) states that adopted reforms and tax limits in the 1990s.

Figure 6.3 shows the estimated density functions for real expenditure per student in 1990 and 2000 for the base group of states (figure 6.3a), along with the change in the estimated densities (figure 6.3b). The graphs, which look very similar to their comparable graphs in figure 6.1 for the full sample of districts, again show that real expenditure per student increased substantially over time. Indeed, the estimated densities look sufficiently similar across the five groups that we save space by omitting these base density-function estimates and their differences for the other groups of states.

Interesting results emerge when we compare the change in densities between 1990 and 2000 across groups. Figure 6.4 shows changes relative to the base group, that is, $\Delta_1(x) - \Delta_0(x)$, where the function $\Delta(x)$ is given in equation (3), the base group is denoted by 0, and 1 denotes any of the four alternative groups. Figure 6.4a shows that compared with the base group, the number of school districts with expenditures per pupil in the middle of the distribution increased markedly for states that adopted reforms prior to the 1990s. This push toward the middle of the distribution can be interpreted as a form of egalitarianism: compared with the base group, states adopting reforms prior to 1990 closed the 1990s with fewer districts with low per-student expenditures, but also fewer districts with high levels of expenditure per student. Together, the results in parts (a) and (b) of figure 6.4 suggest that policies adopted before 1990 reduced the variance of per-student expenditures relative to the base group. The variance was reduced both by reducing the number of low-expenditure districts and by reducing the number of districts with high levels of per-student expenditures.

Parts (c) and (d) of figure 6.4 show comparable density differences for districts in states that adopted reforms in the 1990s and states that adopted tax limits in the 1990s. In both cases, the effect of the policy changes was to increase (relative to the base states) the number of districts in the middle of the per-student distribution and to decrease the number of districts in either tail. Thus, 1990s-era reforms and tax limits followed the same trend as earlier policies in leading to greater equality. Again, this apparent egalitarianism was achieved by increasing the number of low-expenditure districts and by reducing the number of high-expenditure districts.

Figure 6.5 alters the comparison group to consider differences in policies that were adopted around the same time. Figure 6.5a shows that, when compared with states that had only reforms prior to 1990, districts in states that also adopted tax limits were much less likely to have high levels of per-student expenditures. In contrast, figure 6.5b shows that 1990s-era limits led to a higher number of districts in both tails of the distribution. The reforms of the 1990s

Figure 6.3
Base Group: No Reforms or Tax Limits

(a) Density of Real Expenditure per Student, Base

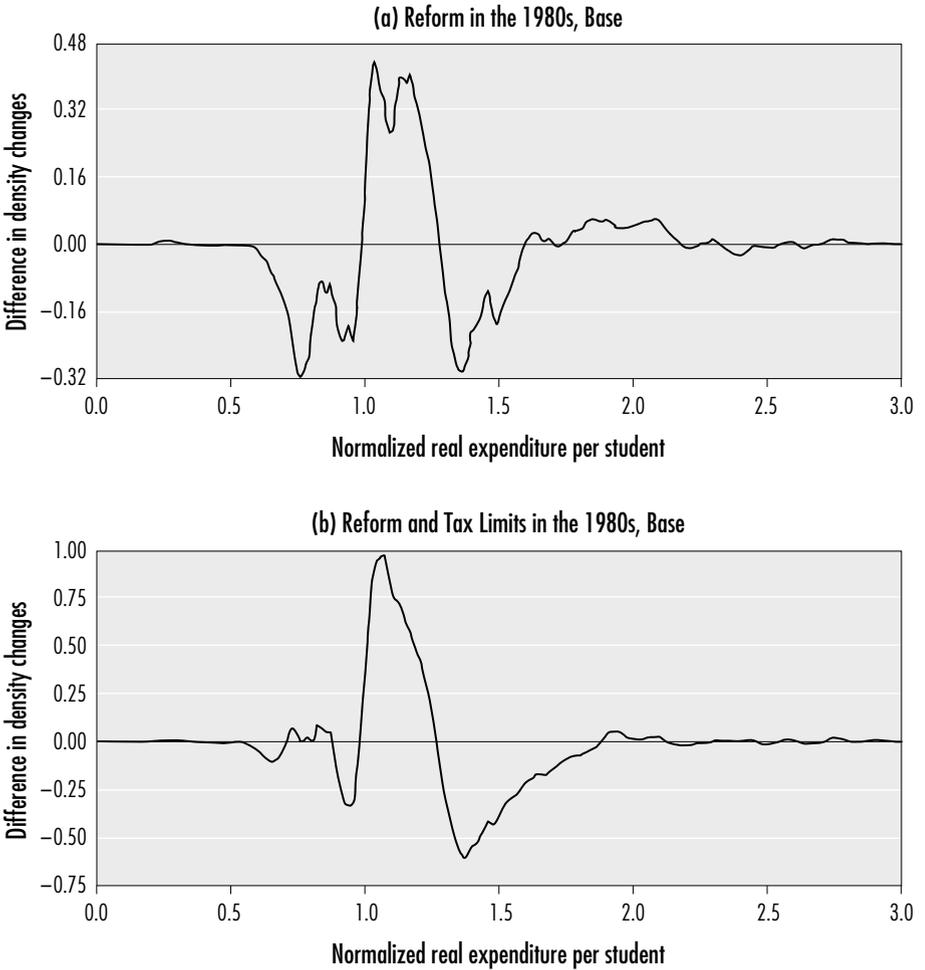### (b) Difference Between 1990 and 2000 Densities, Base
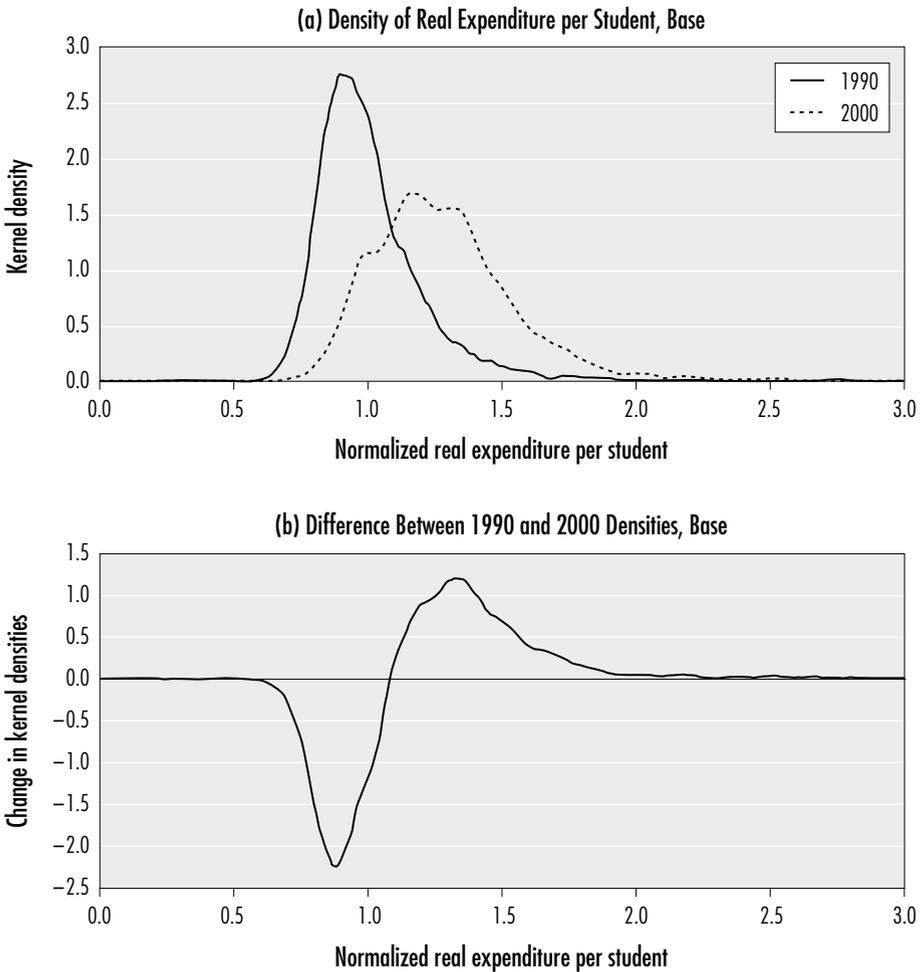
appear to have been motivated by a greater degree of egalitarianism than tax limits from the same era. Pre-1990s tax limits continued to hold down per-student expenditure levels in the 1990s.

Figure 6.6 shows the results for additional combinations of comparison groups. Figure 6.6a provides further evidence that 1990s-era reforms reduced the number of high- and low-expenditure districts: relative to states adopting reforms prior to 1990, the number of districts in the middle of the distribution is much higher for states that adopted reforms in the 1990s. Figure 6.6b suggests that 1990s-era tax limits reduced the number of districts with high levels of per-student

Figure 6.4

Difference Between Estimated Densities for Expenditure per Student: Various Categories Versus Base Group

(a) Reform in the 1980s, Base

Difference in density changes

Normalized real expenditure per student

(b) Reform and Tax Limits in the 1980s, Base

Difference in density changes

Normalized real expenditure per student

(continued)

expenditure compared with districts that adopted reforms earlier. Figure 6.6c suggests that 1990s-era reforms led to a higher degree of egalitarianism than the combination of reforms and tax limits prior to 1990. Similarly, figure 6.6d suggests that 1990s-era tax limits produced a more equal distribution of per-student expenditures than the combination of reforms and tax limits from before 1990.
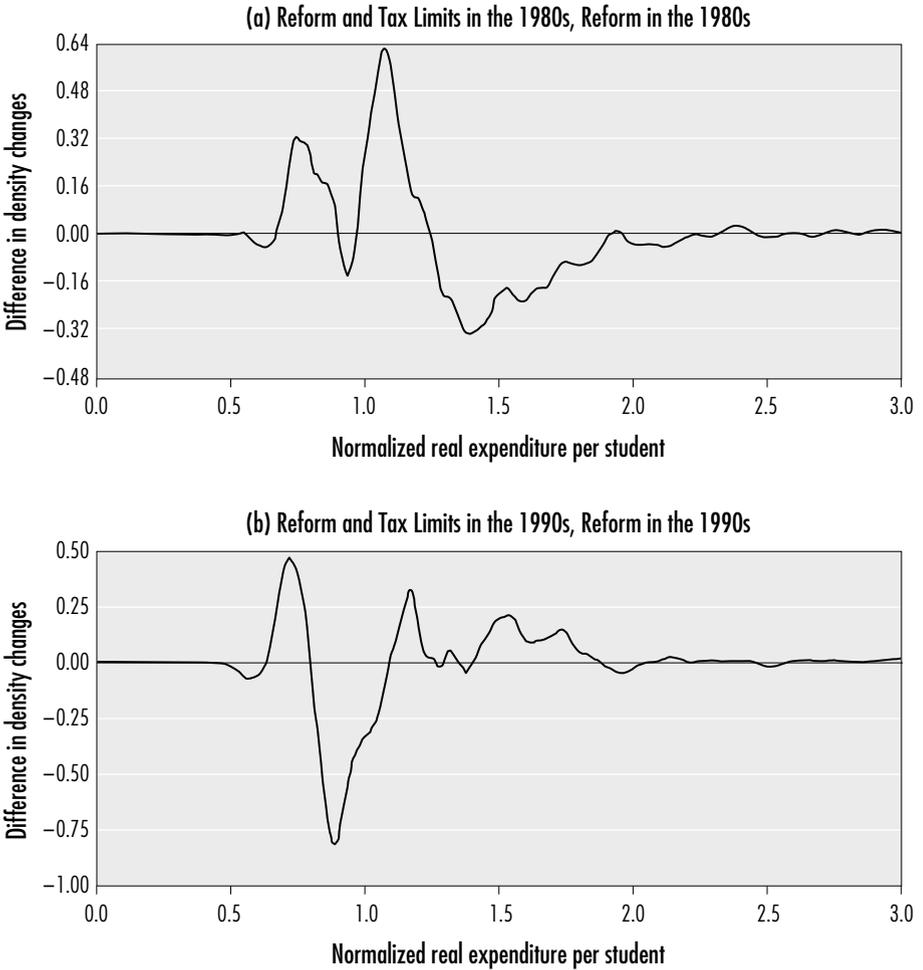
Overall, figures 6.4, 6.5, and 6.6 suggest that both reforms and tax limits do indeed influence the distribution of per-student expenditures. Whether adopted

Figure 6.4
(*continued*)

(c) Reform in the 1990s, Base

(d) Reform and Tax Limits in the 1990s, Base
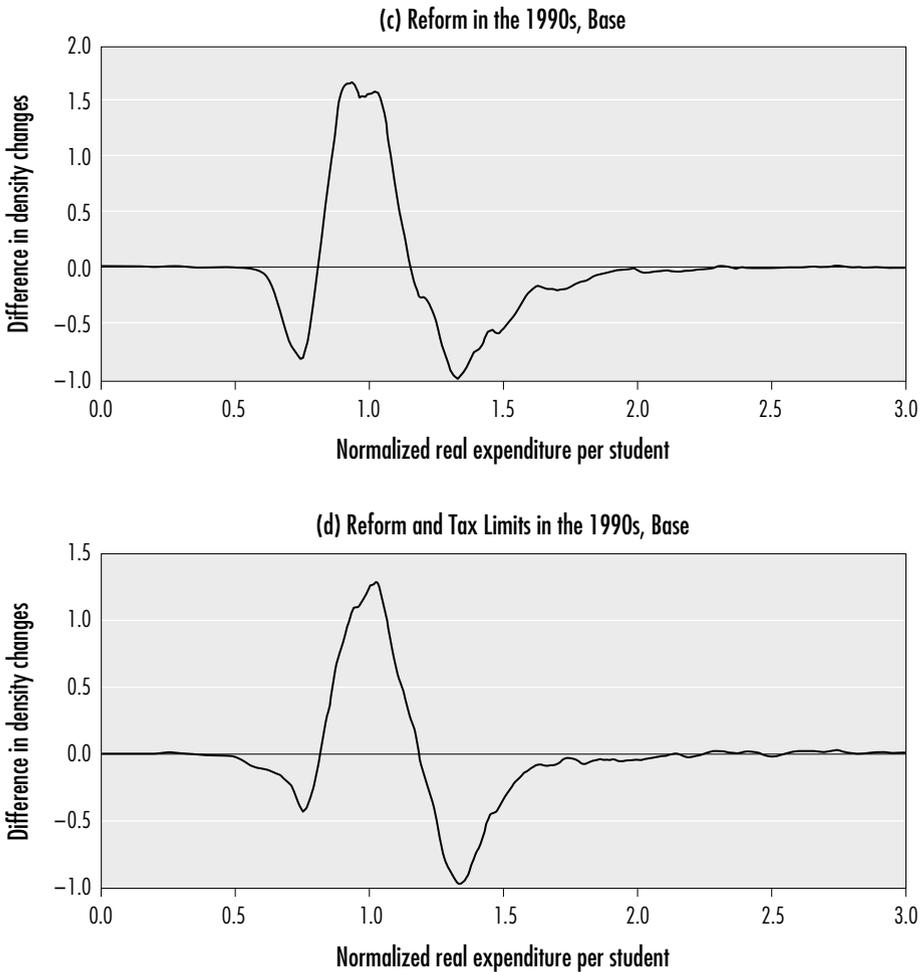
during the 1990s or before, both reforms and tax limits tended to produce a more equal distribution of per-student expenditure over the 1990s by reducing the number of districts with unusually high and unusually low expenditures, as compared with the base group of states. Tax limitation measures tended to increase the number of districts with low levels of per-student expenditures. Whether they were adopted before 1990 or after, reforms tended to lead to a more equal distribution of per-student expenditures over the 1990s by reducing the number of districts in the tails of the distribution. The 1990s-era reforms appear to have been particularly effective at narrowing the distribution of per-student expenditures.
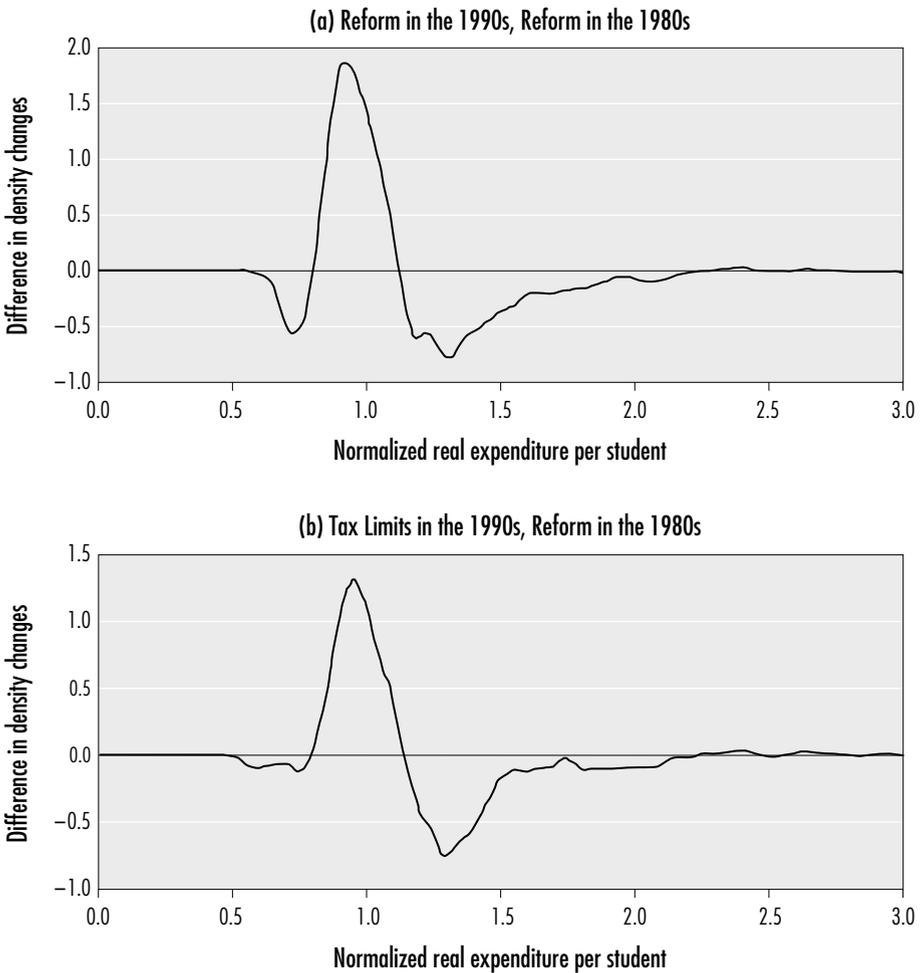
Figure 6.5
Expenditures: Comparison of Density Changes by Policy Within Decade of Enactment

(a) Reform and Tax Limits in the 1980s, Reform in the 1980s

(b) Reform and Tax Limits in the 1990s, Reform in the 1990s

Difference in Density Differences by Regime: Average Class Size

A series of graphs can show the difference-in-difference density function esti-mates for average class size. As was the case for per-student expenditures, the base density function estimates for 1990 and 2000 look similar across the five state groupings by school finance regime. The distribution of average class sizes shifted to the left between 1990 and 2000 for all five categories; that is, average
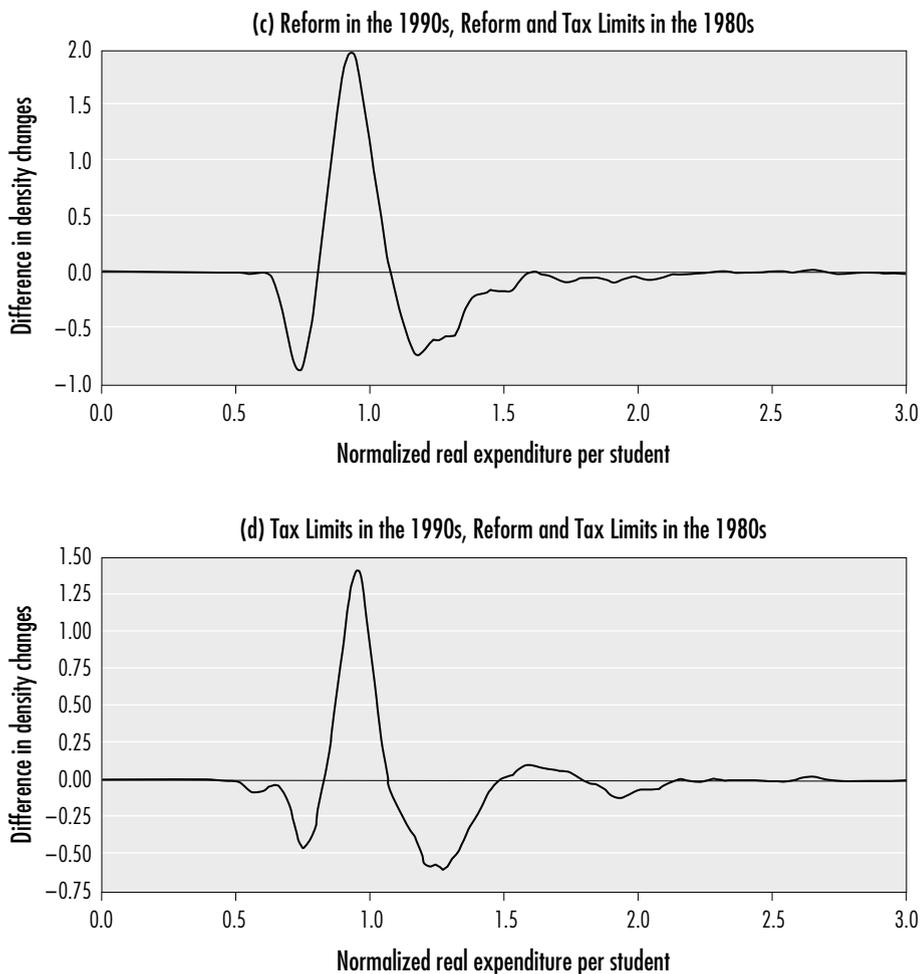
Figure 6.6
Expenditures: Comparison of Density Changes Across Decades

class sizes decreased. Because the national data shown in figure 6.2 are representative of each category, we do not present the density functions for each category. Instead, we concentrate on the differences across regimes in the density function changes.

Figure 6.7 shows the difference in the density function differences relative to the base group of states. Although the results are noisy for states adopting reforms prior to 1990, the overall pattern in both parts (a) and (b) suggests that both reforms and tax limits adopted before 1990 lead to fewer districts with high average class sizes and more districts with low class sizes. Parts (c) and (d)
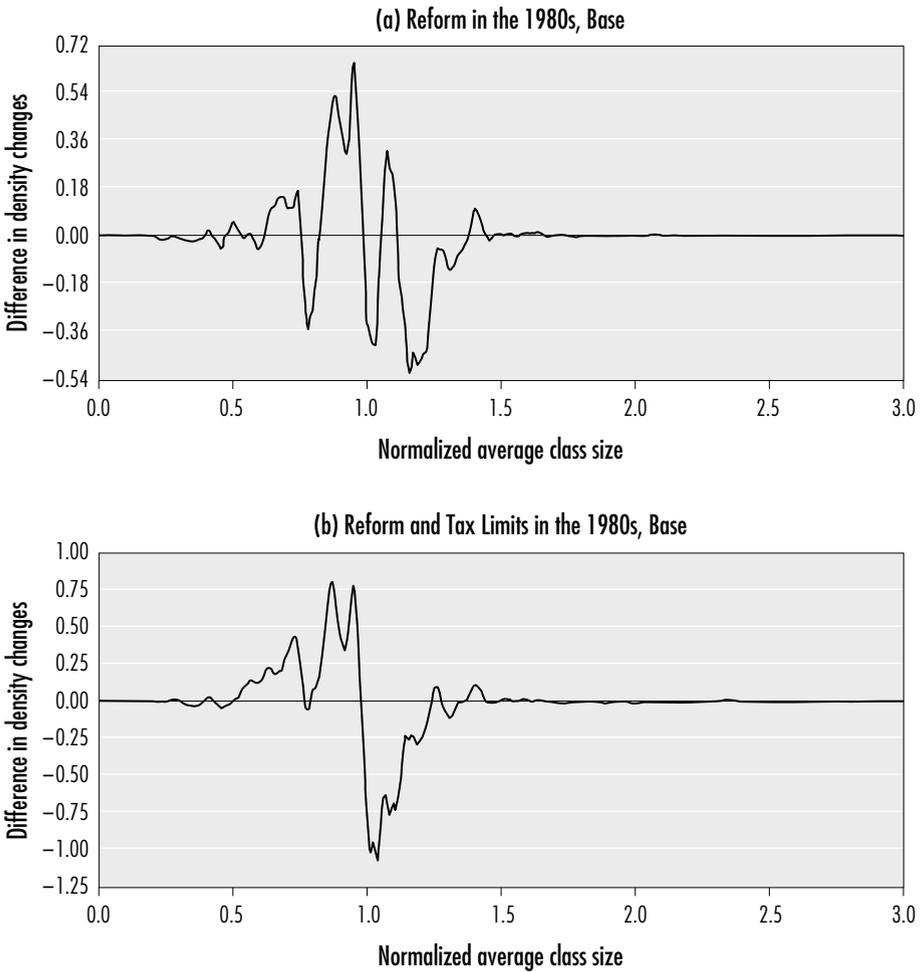
Figure 6.6
(*continued*)

(c) Reform in the 1990s, Reform and Tax Limits in the 1980s

(d) Tax Limits in the 1990s, Reform and Tax Limits in the 1980s

suggest that 1990s-era policies led to much different results. Compared with the base group, 1990s-era reforms led to a greater clustering of districts at average class sizes slightly higher than their 1990s-era mean values. In contrast, 1990s-era tax limits led to a large increase in the number of districts with high average class sizes.

Figure 6.8 shows differences in policies that were adopted around the same time. Figure 6.8a implies that by the end of the 1990s states with pre-1990s-era reforms had many more districts with average class sizes slightly higher than the 1990 mean when compared with states with both reforms and tax limits. In

Figure 6.7
Difference Between Estimated Densities for Average Class Size: Various Categories Versus Base Group

(a) Reform in the 1980s, Base

(b) Reform and Tax Limits in the 1980s, Base

other words, reforms led to a more equal distribution of average class sizes than reforms combined with tax limits. Figure 6.8b shows that tax limits adopted in the 1990s produced a higher number of districts with average class sizes during the 1990s than was the case for states that adopted reforms in the 1990s. Figure 6.9 shows the results for additional combinations of comparison groups. The results are consistent across all four panels: 1990s-era policy led to more districts with high average class sizes as compared with either pre-1990s policy.
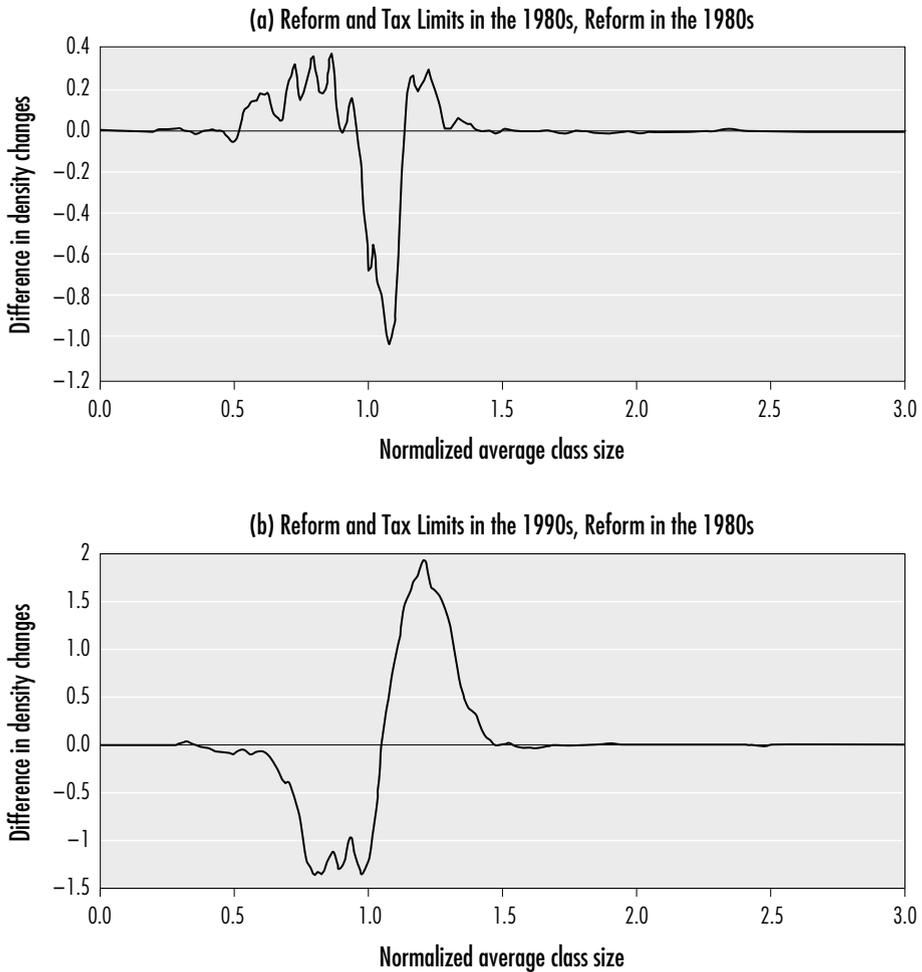
Figure 6.7
(*continued*)

(c) Reform in the 1990s, Base

(d) Reform and Tax Limits in the 1990s, Base
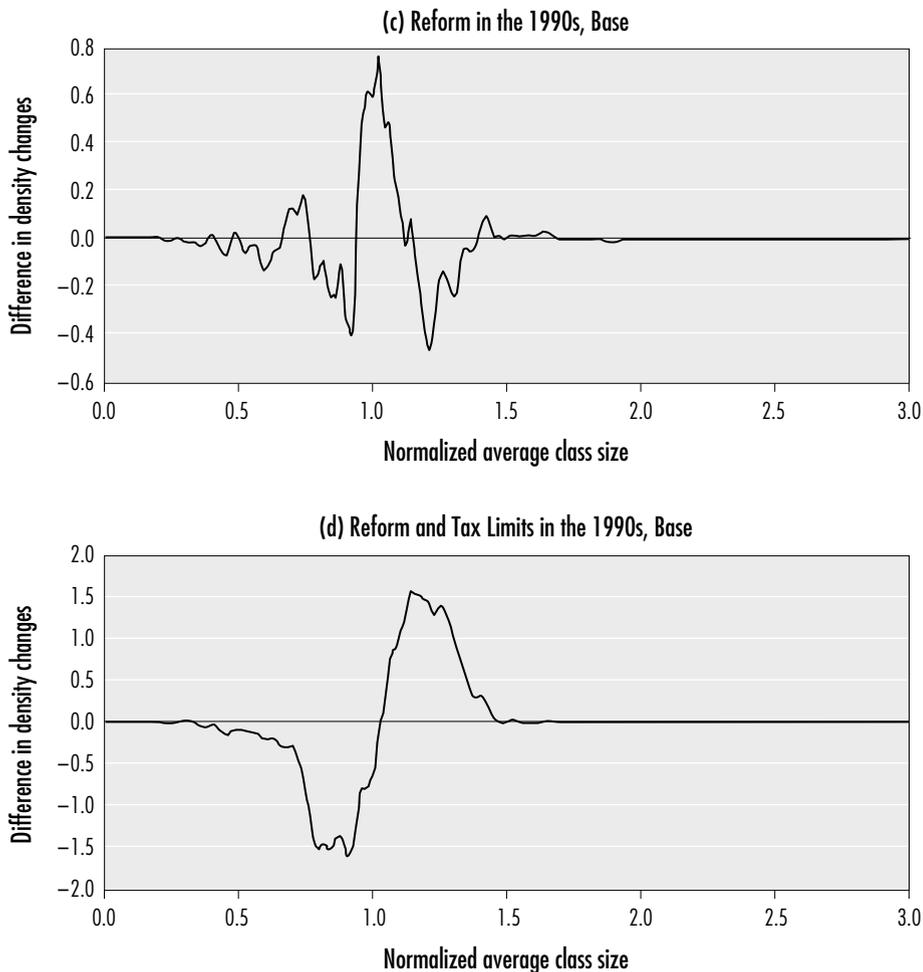
Conclusions

Prior work has found that property tax limits and school finance reforms, on average, tend to reduce school service levels and student-level performance, but that such initiatives can also lessen the inequality across school districts and yield improvements in relative resources of economically disadvantaged districts (e.g., Card and Payne 2002). This analysis builds on prior work by using the CCD and nonparametric kernel density techniques to compare how changes in

Figure 6.8
Average Class Size: Comparison of Density Changes by Policy Within Decade of Enactment

(a) Reform and Tax Limits in the 1980s, Reform in the 1980s

(b) Reform and Tax Limits in the 1990s, Reform in the 1980s

school finance regimes (i.e., tax limits and school finance reforms) affect school-district level real expenditures per student and class sizes across the whole distribution and in comparison to districts that did not adopt tax limits or school finance reforms. The results provide compelling evidence that both tax limitation measures and school finance reforms affect the full distribution of school service levels relative to districts that do not adopt such initiatives. On the other hand, the results also show that the joint effect of tax limits and school finance reforms is different than that of reform on its own and that, whereas earlier era

Figure 6.9
Average Class Size: Comparison of Density Changes Across Decades

(a) Reform in the 1990s, Reform in the 1980s

Difference in density changes

Normalized average class size

(b) Reform and Tax Limits in the 1990s, Reform in the 1990s

Difference in density changes

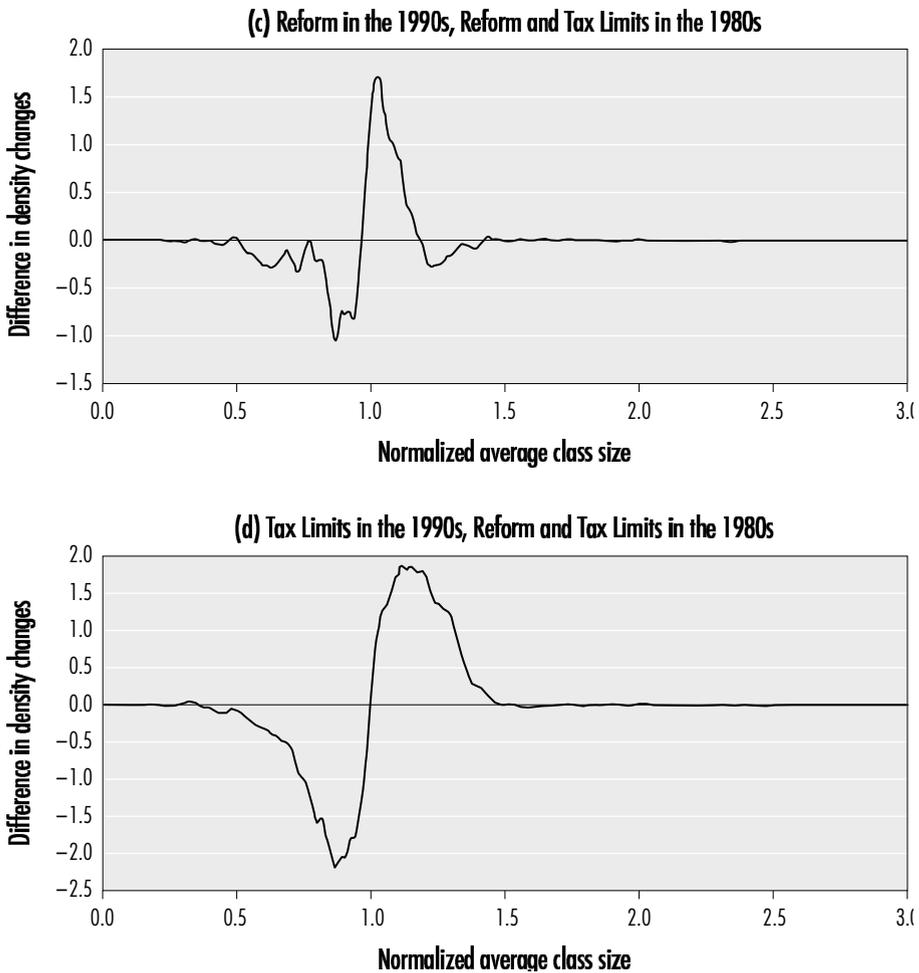Normalized average class size
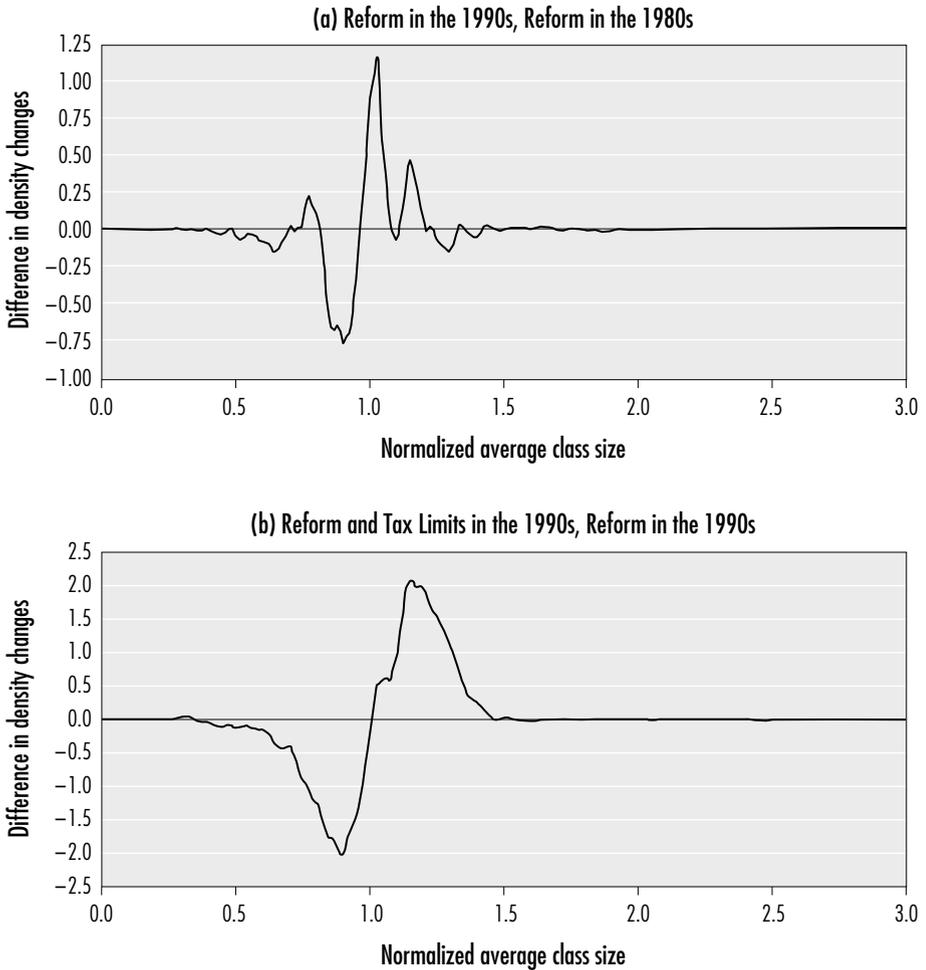
(continued)

reforms in the 1970s and 1980s yield effects over several decades, 1990s-era policies generally had more pronounced distributional effects.

For real expenditures per student, the results suggest that whether adopted during the 1990s or before, both reforms and tax limits tended to yield greater equality of expenditures by reducing the number of districts in the tails of the distribution. Tax limitation measures, however, tended to yield a greater number of low-expenditure districts, whereas expenditure reform measures lead to more

Figure 6.9
(*continued*)

(c) Reform in the 1990s, Reform and Tax Limits in the 1980s

(d) Tax Limits in the 1990s, Reform and Tax Limits in the 1980s

equalization around the mean. These findings are similar for pre- and post-1990s-era school finance regimes, but are particularly pronounced in the later era.

At the same time, although class sizes uniformly declined between 1990 and 2000 across all school finance regimes, the results suggested that pre-1990s-era tax and reform policies tend to lead to fewer districts with high average class sizes and more districts with low class sizes such that there was a general movement toward greater equality across school districts. In contrast, the 1990s-era tax limits led to large increases in the number of districts with high average class sizes, whereas the 1990s-era reforms led to greater clustering of districts around

the average. The difference in the differenced density functions for class size yield a far more noisy set of diagrams than for expenditures, however, suggesting that tax limits and school finance reforms can regulate the general level of expenditures at the local level but that school districts exercise greater control on whether the funds are spent on instruction versus alternative school services.

Overall, the results provide strong evidence that the fiscal federalism movement that began in California with Proposition 13, although reducing the overall level of school services, did not cause a general race to the bottom; rather, it tended to equalize resources across districts. The general narrowing of the school service distribution does not necessarily imply an overall improvement in social welfare because the differences in the distribution are likely to reflect genuine differences in preferences regarding the value placed on school resources. Moreover, this equalization in public spending with regard to education may yield private responses to educational spending that may undo this public policy. Thus, further work needs to be done to understand the general equilibrium effects of tax limitation and educational reform policies.

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