DID SERRANO CAUSE A DECLINE IN SCHOOL SPENDING?
FABIO SILVA* &
JON SONSTELIE*

Abstract - Compared to the national average, California's public school spending per pupil fell by 23 percent from 1970 to 1990. We find that about half of the decline can be attributed to Serrano v. Priest, the 1971 California Supreme Court ruling that required equal spending per pupil across school districts in the state. The remainder can be attributed to the rapid enrollment growth in California during the 1980s.

In 1970, California ranked 11th among states in public school spending per pupil, 13 percent above the average of all other states. By 1990, it had fallen to 30th, ten percent below that average. To observers of California's fiscal politics, the decline was surely due to Proposition 13. By limiting property tax rates and rolling back assessed valuations, the initiative curtailed the main source of local revenue for public schools. According to Oakland (1979), Proposition 13 reduced property tax revenues in California by 57 percent.

However, Proposition 13 was an endogenous outcome of California's political system, not an exogenous event. As a consequence, it cannot be the ultimate explanation for the decline in school spending. Furthermore, it was an outcome of the same political system that determined school spending in the 1960s and 1970s. Perhaps it was the instrument for reversing those spending decisions, but then what caused Proposition 13?

Fischel (1988, 1993) has proposed an answer to that question. In his view, Proposition 13 was caused by the ruling of California's Supreme Court in Serrano v. Priest. In 1971, the Court ruled that, because school districts have unequal property values, the local property tax is an unconstitutional method for funding public schools. In 1976, the Court decreed that a method would be constitutional if it were to result in approximate equality in spending per pupil across districts. While equality in spending was not the sole criterion specified by the Court, equality soon became the standard.

According to Fischel, that standard upset the political equilibrium underlying California's public schools. Before Serrano,
California resembled the model described by Tiebout (1956) and Hamilton (1975). To protect their tax bases, communities practiced fiscal zoning, which turned the property tax into an efficient price for local public goods. Given this price, families sorted themselves out among communities according to their demands for public goods, particularly public education. As a consequence, high-income families resided in school districts with high spending per pupil.

Serrano ended this system and would have inevitably redistributed property tax revenue from high-spending districts to low-spending districts. In Fischel's view, voters saw Proposition 13 as a way to short circuit that redistribution. Leyden (1988) has reinforced this argument by showing how intergovernmental grants such as those required by this redistribution may lead voters to impose statewide ceilings on local tax rates.

As Fischel further points out, Serrano was a court ruling, not the outcome of a democratic vote. Unlike Proposition 13, it was exogenous to California's political system. It therefore qualifies as a possible explanation for the passage of Proposition 13 and thus of the decline in California's school spending.

The last step in this argument is not as obvious as it initially appears to be, however. Proposition 13 did reduce property tax revenue, but why did not the state simply replace the revenue with sales or income tax revenue? One possible answer is that the Gann spending limit prevented the state from doing so. However, as we point out in the next section, the limit was not binding for school spending. Consequently, in our view, 1990 school spending in California ought to be regarded as a choice that was not constrained by institutional rigidities. This view leads us directly to the following question: Is there something about equalization itself that could cause a decrease in average spending per pupil?

The second section addresses this question, using a standard model of local public finance. We find that equalization may have two effects: an income effect, which acts to decrease school spending; and a price effect, which can act in the opposite direction. Consequently, the net effect of equalization cannot be determined on purely theoretical grounds.

We then estimate the magnitude of the two effects. Each effect depends on unknown parameters, so we used data from states other than California to estimate those parameters and then applied those parameters to California. Both the income and price effect are substantial for California, and each works in an opposite direction. The income effect dominates, however, so the net effect of equalization was to decrease spending per pupil. Equalization explains about half of California's decline in school spending.

Finally, we consider an alternative explanation for this decline. During the 1980s, public school enrollments rose by 21 percent in California while falling by four percent in the rest of the nation. If expenditures are slow to adjust to enrollment changes, an increase in enrollments would lead to a decrease in spending per pupil. We find that California's enrollment growth during the 1980s also contributed to its relative decline in school spending.

DID TAX AND SPENDING LIMITS CONSTRAIN SCHOOL SPENDING?

In the late 1970s, the voters of California approved two constraints on government spending: Proposition 13, approved in 1978, and the Gann Initiative, approved one year later. Not only did
Proposition 13 reduce local property tax revenue, it also required a two-thirds majority of the state legislature for an increase in state taxes, thereby limiting the state’s ability to replace this lost revenue. The Gann Initiative limited each state and local government entity to a spending growth rate that was not to exceed its population growth rate plus the minimum of either the inflation rate or the growth rate in personal income.

We have argued that Proposition 13 cannot be an explanation for the decline in school spending because it was endogenous to the political system. The same argument applies to the Gann Initiative. Nevertheless, many have argued that the two initiatives represent a fundamental shift in voter attitudes. According to that view, the two initiatives are exogenous events. In this section, we argue that, even if one holds that view, the initiatives cannot explain the decline in school spending because they did not actually limit school spending in the 1980s.¹

Both initiatives had a direct effect on the state legislature's response to Serrano. In the period before the two initiatives, the legislature had devised a two-part response. First, it increased foundation aid for schools, thus pushing up the low-spending districts. Second, it introduced revenue limits, which imposed a ceiling on the expenditure growth rate of each school district. High-spending districts were given lower limits than low-spending districts, thus pulling down the high-spending districts.

Proposition 13 upset this scheme just as it was being implemented. In reality, however, the Proposition strengthened the state’s control over school spending. In the wake of Proposition 13, the state legislature established a formula for allocating property tax revenue among school districts, cities, counties, and special districts. Using its huge surplus, estimated by Oakland (1979) to be $10.1 billion in 1979–80, the state also supplemented the property tax revenue with its own funds. In the case of schools, the legislature allocated enough property tax revenue and state aid to bring each district’s expenditures within about 90 percent of its revenue limit.

This arrangement made the revenue limits a more effective tool for equalization. The state no longer had to depend on low-spending districts to bring their expenditures up to their revenue limits; the state itself determined their expenditures. According to the California Commission on State Finance (1986), by 1985–6, 91 percent of California’s public school students attended schools that were within $100 of the statewide average in expenditures per pupil. A few districts remained above this band because their property tax revenue exceeded their revenue limits and they were not required to return the excess to the state. No districts were below the band. As Downes (1992) notes, this equalization in spending did not result in an equalization in student performance. Nevertheless, it satisfied the court.

The state’s program to equalize expenditures per pupil was at odds with the Gann Initiative, however. The Initiative required each government entity to limit the growth rate of its real spending to the growth rate of its population. In the case of school districts, population was interpreted to mean the district’s enrollment. Thus, taken literally, the Initiative would have limited each school district to its 1978–9 level of real expenditures per pupil. Under this constraint, equalization could only be achieved by bringing spending per pupil in every school district down to the level of the lowest spending district. Faced with this conflict between Serrano and the Gann Initiative, the state legislature chose to ignore
Gann. In Senate Bill 1352, enacted in 1980, it exempted school districts from the Gann limits.

The exemption created an avenue for state revenues to escape the Gann limits. Under the Gann Initiative, state subventions to local government count as local spending, not state spending. If the state had tax revenue that would put it over its Gann limit, it could transfer the revenue to school districts that were not required to abide by the Gann limit.

In fact, the state almost used this device in 1987. The Tax Reform Act of 1986 broadened the base of the federal income tax, which California uses as a base for its own tax, and created a revenue windfall for the state. Ladd (1993) estimated this windfall to be nearly $2 billion per year. As a consequence, in the 1986–7 fiscal year, the state had a surplus of $1.7 billion. At the time, the state was approximately $600 million under its Gann limit, so the surplus put the state over by $1.1 billion. As described by Sweeney (1987), some legislators argued that the excess ought to be transferred to the local schools, but the legislature voted to reduce income tax rates instead.

We conclude that neither tax nor spending limits were effective constraints on school spending in the 1980s. The state was always free to increase school spending. State aid to schools did not count as a state expenditure, and school districts were exempt from the Gann limit. The restrictions on tax increases embodied in Proposition 13 could have been a constraint on government spending, but the state actually decreased tax rates in 1987.

Though tax and spending limits were not a binding constraint in the 1980s, California's state and local governments did reduce expenditures relative to other states. Figure 1 compares California and the United States in state and local expenditures per capita. In 1969–70, California spent about $650 more per capita than the rest of the country. The gap narrowed to a minimum of $336 in 1983–4 and then widened again to $455 in 1989–90. At the end of the 1980s the gap was about $200 less than in 1969–70.

Figure 2 shows real, current expenditures per capita on public schools. As the figure indicates, about half of California's $200 per capita decline in total expenditures is due to its relative decline in school spending. California spent about $100 more per capita on public schools than did the nation in 1969–70. That gap persisted until 1977–8 and then declined steadily toward the national average. It fell slightly below that average in 1983–4 and remained at approximately that level for the rest of the decade.

The relative decline in school spending per capita led to an even greater relative decline in spending per pupil. In 1969–70, there were 0.88 public school pupils per family in California and 0.87 pupils per family in the rest of the country. By 1989–90, pupils per family had fallen to 0.68 in California and 0.60 in the rest of the country. Spending per pupil in California thus fell from 13 percent above the national average in 1969–70 to ten percent below the average in 1989–90. This brings us back to our basic question: Why did Californians choose to spend relatively less on their public schools? Throughout the 1980s, California continued to have high state and local government spending. The gap between California and the rest of the nation narrowed somewhat, but about half of that decline is due to a relative decrease in school spending. Why was school spending the target? Is equalization an explanation?
FIGURE 1. Real State and Local Government Expenditure per Capita (Direct, General, Current Expenditures in 1990 Dollars)


DOES EQUALIZATION LOWER THE AVERAGE?

Before Serrano, each local school district chose its own level of spending, and families chose among districts. After Serrano, all districts were required to spend the same amount per pupil, and the state legislature chose that level. It was as if all school districts were to merge into one, statewide district. Such a merger would have increased spending in some districts and decreased it in others. Our question is: What would happen on average?

We address that question in the context of a standard model of local public finance. All families have the same demand function for spending per pupil,

\[ q = \beta_0 + \beta_p p + \beta_y y \]

where \( q \) is a family's demand for spending per pupil, \( p \) is its tax price for spending per pupil, \( y \) is its income, and the \( \beta \)'s are parameters. A family's tax price is the increase in its taxes resulting from a one-dollar increase in spending per pupil. The price depends on the average number of pupils per family. To make matters simple, we assume that all families have the same number of school children, a number we denote by \( s \).

Now consider a family's options in the environment described by Tiebout (1956) and Hamilton (1975). There are many school districts, and each finances its schools through a property tax. To protect its tax base, each district establishes a minimum zoning requirement, which turns the property tax into a head tax. As a consequence, each family pays an equal share of district taxes, an amount equal to \( sq \). The tax price is therefore \( s \), the number of pupils per family. The tax
price is the same across districts, but districts spend different amounts per pupil.

Families may deduct property taxes from state and federal taxable income. For family \( i \), let \( \lambda_i \) be the cost of one dollar of property taxes, net of this deduction. The family then faces a net tax price of \( \lambda_i \).

Given its tax price, each family determines its demand for spending per pupil and then chooses a school district that supplies the level of spending that it demands. The average level of spending in the state is therefore the average of these demands. This average is

\[
\bar{q} = \beta_0 + \beta_p \bar{\lambda} + \beta_y \bar{y}
\]

where \( \bar{\lambda} \) is the average \( \lambda_i \), and \( \bar{y} \) is average family income.

Now suppose that all school districts are merged into one district. Within the district, families have a wide range of incomes and thus may pay quite different taxes. Unlike the Tiebout-Hamilton world, families in the same district may have different tax prices. To analyze this system, we assume that each family pays a certain fraction of total school taxes, a fraction that does not vary with the level of spending. Let \( \theta_i \) be the fraction of taxes paid by family \( i \). The family’s total tax bill is \( \theta_i n s q \), where \( n \) is the total number of families. The family may deduct some of this bill from state and federal taxable income. Let \( \mu_i \) be the net cost to family \( i \) of one dollar of school taxes, incorporating this deductibility. The family’s net tax price is \( \mu_i \theta_i n s \).

Because tax prices and incomes differ among families, their demands for spending per pupil may also differ. The district resolves the difference through
majority rule, which results in the level demanded by the median voter. The median voter is the family with the median income, which is denoted \( \bar{y} \).

Therefore, spending per pupil is

\[
\bar{q} = \beta_0 + \beta_p \bar{m} \bar{n} + \beta_y \bar{y}
\]

where \( \bar{m} \) and \( \bar{n} \) are the values of \( \mu \), and \( \theta \), for the median income family.

Subtracting equation 2 from equation 3 yields the difference in spending per pupil with and without the merger:

\[
\Delta \bar{q} = \beta_p (\bar{m} \bar{n} - \bar{\lambda}) + \beta_y (\bar{y} - \bar{\bar{y}})
\]

The first term in equation 4, \( \beta_p (\bar{m} \bar{n} - \bar{\lambda}) \), is a price effect. The parameter \( \bar{\lambda} \) is the tax share of the median-income family. Because taxes generally increase with income and median income is less than average income, this share is less than the average tax share, \( 1/n \). Thus, \( \bar{\lambda} \) is less than unity. On the other hand, because median income is generally less than mean income, the marginal income tax rate of the median income family will be less than that of the average income family, so \( \bar{\mu} \) is greater than \( \bar{\lambda} \). Furthermore, the percent of school taxes that can be deducted may be less with a Serrano-type school system than with a Tiebout-Hamilton system. With a Serrano system, school spending may be financed, in part, by state income and sales taxes. State income taxes are only deductible at the federal level, and state sales taxes are not deductible at any level. In contrast, with the Tiebout-Hamilton system, schools are financed through a property tax that is deductible at both state and federal levels. We conclude that \((\bar{m} \bar{n} - \bar{\lambda})\) could be positive or negative. If the tax system is quite progressive, however, \( \bar{\lambda} \) is small, and it is likely that \((\bar{m} \bar{n} - \bar{\lambda})\) is negative. In that case, because \( \beta_p \) is also negative, the price effect is positive. This occurs because the merger lowers the tax price of the median voter. Fisher (1979) makes a similar point in his analysis of revenue sharing. If local taxes are less progressive than federal taxes, revenue sharing may decrease the tax price of the median voter and thus increase government spending.

The second term in equation 4, \( \beta_y (\bar{y} - \bar{\bar{y}}) \), is an income effect. When families are sorted by income and each receives the level it demands, the average level of spending per pupil is the average of these demands and is therefore determined by the average level of income. When families are not sorted by income, only the median-income family receives the amount it demands and thus the median income determines the level of spending per pupil. Because median income is less than average income, the income effect decreases the level of spending per pupil.

This conclusion is consistent with the results in Leyden (1992). He considers a model in which there are high-spending districts and low-spending districts. If low-spending districts dominate in the state legislature, as would be the case if median income is less than average income, average spending per pupil is less with one statewide district than with many local districts.

The model thus predicts that a merger may have two opposing effects on spending per pupil. We are left with the empirical task of evaluating the relative strengths of these opposing effects. Before taking up that task, however, let us acknowledge four limitations of our model.

First, in the model without Serrano, we
have assumed that all families within a given school district have the same demand for spending per pupil and thus that the statewide average of spending per pupil is the average demand. In reality, of course, school districts are not that homogeneous, so the statewide average of spending per pupil is the average of the median demand in each school district. Nevertheless, we maintain the homogeneity assumption because it simplifies the analysis and illuminates the fundamental forces at work.

Second, we have ignored the possibility that the public schools in one district may confer external benefits on the residents of neighboring districts. As Rose-Ackerman (1981) has shown, in the face of these beneficial spillovers, voters may approve higher levels of spending at the state level than they would support for their own local district, considered in isolation.

Third, we have assumed that the median voter is in the family with median income and thus implicitly that the income distribution of voters mirrors the income distribution of families. Inman (1978) examined this assumption in his study of the spending decisions of 58 Long Island school districts. He found that he could reject this assumption for at most one-fourth of the districts and that, even for those districts in which the assumption appeared to be violated, the bias in the predicted level of school spending was small. While these findings appear to support the use of median income in determining local school spending, it does not necessarily imply that the same assumption would hold for statewide spending decisions. Nevertheless, our model maintains this assumption.

Fourth, at the state level, school expenditures decisions are part of a multidimensional budget process in which schools compete with welfare, corrections, transportation, and so on. As Arrow (1963) demonstrated, this process may not have a simple, majority-rule equilibrium. In that case, the outcome may be partly due to elements of the legislative structure such as who sets the agenda and who votes on what issues. Craig and Inman (1986) use this concept of a "structure-induced equilibrium" as a basis for an empirical examination of state spending. While this multidimensional model gives a more satisfying account of state politics than the one-dimensional model on which we have relied, it is also much more complicated. In what follows, we ask how much of California's relative decline in school spending can be accounted for by the simple, one-dimensional model. We do not deny that a more sophisticated model might produce a different answer.

WHICH EFFECT DOMINATES?

While our principal concern is to explain California's spending in the 1989--90 school year, we first ask whether its spending in 1969--70 is consistent with that of other states during the same period. According to the model in the previous section, spending per pupil in a state is a linear function of average tax price and average family income. We estimated this function with data from all states except California.

The average tax price is the number of pupils per family multiplied by the average cost of one dollar of property taxes. To determine this cost, we began with each state's income distribution from the 1970 Census. The Census reported the number of families in each of 12 income groups. Using data from the Statistics of Income, we estimated the percentage of families in each group that itemize deductions. For those who do not itemize, the cost of one dollar of property taxes
is one dollar. For those who do itemize, the cost of one dollar of property taxes is \(1 - t\), where \(t\) is the family’s marginal income tax rate.

A family’s marginal income tax rate is a function of both its federal and state marginal income tax rates. For states without an income tax, the rate is the family’s federal marginal tax rate, which we determined for each income group from the 1969 federal tax schedule, taking account of exemptions and the average itemized deduction for each group. For states with an income tax, we also determined each group’s state marginal income tax, using state tax schedules. Some states permit federal taxes to be deducted from state taxable income; in other states, state income tax is just a fraction of a family’s federal income tax. These special features were incorporated to yield a combined state and federal income tax rate for each group in every state.

The combined rates were then averaged across the groups in each state, using the number of families in the groups as weights. The weighted average is the average of the marginal income tax rates of families in the state. The average tax price is one minus this average rate multiplied by the number of pupils per family in the state. These calculations are described in more detail in Appendix B.

Hawaii was treated differently because it has one statewide school district. Following the model of the previous section, school spending in Hawaii ought to be determined by the tax price and income of the median income family. Thus, in the regression, family income for Hawaii is median family income, not average family income as in other states. Hawaii’s tax price was calculated in the following way: For each income group, we estimated the sales and income tax payments of a representative family. These payments were multiplied by the number of families in each group and then added across groups to determine total state taxes. The tax share for each representative family is its tax payment divided by this total. The median tax share, \(\hat{\theta}\), is the tax share of the representative family in the median income group. We assumed that the median-income family itemizes deductions and thus deducts state taxes from its federal taxable income. The parameter \(\hat{\mu}\) is therefore one minus the federal marginal tax rate for the family with median income.

Following equation 3, the tax price for Hawaii is \(\mu \hat{\theta} n\), where \(n\) is the number of families and \(s\) is the number of students per family. Appendix B summarizes these calculations.

Table 1 reports the results from an ordinary least-squares regression of spending per pupil on tax price and income. Both tax price and income coefficients have the hypothesized signs, though the tax-price coefficient is not significantly different from zero. The model explains 70 percent of the cross-state variation in spending per pupil.

Table 2 reports the tax price and average family income for California in the 1969–70 school year. California’s tax price was nearly equal to the average of other states, but California’s average family income was 18 percent higher than the average of other states. Com-
The regression results are in Table 3. As was the case with the 1969–70 regression, the 1989–90 regression explains nearly 70 percent of the cross-state variation in spending per pupil. The tax-price and income coefficients have the anticipated signs, and the income coefficient is significantly different from zero.

We combined the regression coefficients in Table 3 with California's income and tax price listed in Table 4. The model predicts that California should have spent $6,132 per pupil in 1989–90. In fact, it spent $4,391 per pupil, a gap of $1,741.

These calculations ignore the price and income effects of equalization. The income effect of equalization is the income coefficient, $\beta_i$, multiplied by the difference between median family income and average family income. That difference is $-10,639$ in 1989–90, and the estimate of $\beta_i$ is 0.1345, so the income effect of equalization is $-1,431$.

The price effect of equalization works in the opposite direction, however. The price effect is $\beta_p(\bar{a}-\bar{a}_s)$. The first term in the parentheses is the tax price of the median-income voter under the Serrano system, and the second term is the average tax price of families under the Tiebout–Hamilton system. Using the same method described above for Hawaii, we estimated that the Serrano tax price is $0.43$. As noted in Table 4, the
DID SERRANO CAUSE A DECLINE IN SCHOOL SPENDING?

DEMAND VARIABLES:

<table>
<thead>
<tr>
<th></th>
<th>California</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spending per pupil</td>
<td>$4,391</td>
<td>$4,890</td>
<td>$1,306</td>
</tr>
<tr>
<td>Tax price</td>
<td>$0.56</td>
<td>$0.51</td>
<td>$0.09</td>
</tr>
<tr>
<td>Family income</td>
<td>$51,198</td>
<td>$41,128</td>
<td>$7,079</td>
</tr>
</tbody>
</table>

TABLE 4
DEMAND VARIABLES: 1989–90 (VARIABLES EXPRESSED IN 1990 DOLLARS)

Tiebout–Hamilton tax price is $0.56. We estimated \( \beta_p \) to be \(-2,153\), so the price effect of equalization is $278. Consequently, the net effect of equalization is to decrease spending per pupil by $1,153. This is two-thirds of the gap between predicted and actual spending per pupil in California.

According to Theobald and Picus (1991), six other states had court rulings similar to Serrano between 1973 and 1983. Though none of these states appear to have equalized as completely as California, we did estimate the model without those states. There was no significant change in the price and income coefficients and thus no significant change in our estimate of the price and income effects of equalization in California.

POPULATION GROWTH WAS ALSO A FACTOR

Equalization was not the only significant factor affecting California schools in the 1980s. Over the decade, schools were also forced to accommodate a 21 percent increase in enrollments. This rapid growth strained school resources and may therefore be a competing explanation for California’s relative decline in spending per pupil. In this section, we consider this explanation.

The enrollment growth was caused by immigration. During the 1980s, California’s population grew by 25 percent, and the number of families in the state grew by 21 percent. While the population growth increased enrollments and thus the demand for school services, it also increased the tax base and thus the supply of tax revenue. In terms of our model, because the number of families increased at the same rate as the number of students, the tax price of education did not change. In that sense, growth did not affect the demand for spending per pupil.

However, growth may affect spending per pupil through a second channel. If schools are slow to adjust to enrollment changes, an increase in enrollment will lead to a temporary decrease in spending per pupil. A large increase in enrollment requires new classrooms and new teachers. A school district may take some time to build new classrooms, and it will not hire new teachers until the classrooms are completed. During this growth period, class sizes may increase and current spending per pupil may fall. Similarly, a decline in enrollment may lead to a rise in spending per pupil. The decline should lead to teacher layoffs and school closures. But teachers’ unions are often quite effective in opposing layoffs, and neighborhoods usually fight to keep their own schools open. As a result of union and neighborhood resistance, class sizes may fall as enrollment declines, so spending per pupil may rise.

To determine whether enrollment changes affect spending per pupil, we added enrollment growth to the 1989–90 regression. The growth variable is the state’s enrollment growth rate between
1984–5 and 1989–90. The OLS regression results are reported in Table 5.

The coefficient of enrollment growth is negative, as hypothesized, and significantly different from zero. In fact, the size of that coefficient indicates that, over a five-year period, total spending may not change as enrollment changes. According to the estimates, a ten percent decline in enrollments will increase spending per pupil by $592 per pupil, which is 12 percent of the sample average of spending per pupil.

The estimated coefficients from this regression were then applied to California. Without Serrano and with no enrollment growth between 1984–5 and 1989–90, the regression predicts that California should have spent $6,414 per pupil in 1989–90. In fact, California spent $4,391 per pupil, leaving a gap of $2,023.

California's enrollment growth rate was 18 percent from 1984–5 to 1989–90, so the regression predicts its spending per pupil should be $1,066 less on that account. After incorporating enrollment growth, the difference between predicted and actual spending per pupil is narrowed to $957.

Equalization explains the remainder. With the estimated tax-price and income coefficients, the income effect of equalization is $-1,512, the price effect is $158, and the net effect is $-1,354. We conclude that these two factors, equalization and enrollment growth, completely explain the decline in school spending in California. Equalization is slightly more important.

Our estimate ignores the important role that foreign immigration played in California's growth during the 1980s. During the decade, the number of foreign-born persons in California increased by three million, which is approximately half of the increase in California's population during the decade. Many of these immigrants were not yet citizens in 1990, so the immigration of the 1980s may have decreased the percentage of residents who were active voters. Furthermore, according to Johnson (1993), foreign immigrants during the 1980s were poorer on average than California's nonimmigrant population. As a consequence, the gap between the median income of voters in the state and the median income of families probably widened during the 1980s. In predicting the income effect of equalization, we have used the median income of families rather than the median income of voters, so our prediction may be too high. If that is the case, we have attributed too much of the decrease in school spending to Serrano.

Conclusions

In a symposium in the June 1994 edition of this journal, Reschovsky, Oakland, and Ladd and Yinger lay out the pros and cons of fiscal equalization. They also describe possible approaches to equalization. California has taken a radical approach—state control of local school spending. Other states have experimented with less extreme approaches, such as district power equalization. While Rothstein (1992) suggests that district power equalization may also lead to a decline in average school spending per pupil, our analysis does not directly ap-

---

TABLE 5
DEMAND FUNCTION FOR SPENDING PER PUPIL: 1989–90 (VARIABLES EXPRESSED IN 1990 DOLLARS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-183</td>
<td>1179</td>
</tr>
<tr>
<td>Tax price</td>
<td>-1222</td>
<td>1307</td>
</tr>
<tr>
<td>Income</td>
<td>0.1422</td>
<td>0.0164</td>
</tr>
<tr>
<td>Enrollment growth rate</td>
<td>5926</td>
<td>1519</td>
</tr>
</tbody>
</table>

Number of observations 49
$R^2$ 0.76
ply to these moderate approaches.

As Reschovsky notes, however, recent court decisions in Kentucky, New Jersey, and Texas do seem to favor a California-like approach. The recent school finance reform in Michigan, described in Courant, Gramlich, and Loeb (1994), has also resulted in a more centralized system. Will these reforms lead to lower school spending? While California’s experience suggests that they will, one ought to be cautious in extrapolating from that experience. Our model does not predict that centralization always leads to a decline in school spending. In the model, there are two opposing effects, and the outcome depends on the relative strength of the two. In California, the income effect dominates the price effect. In another state with a different income distribution and a different tax system, the price effect could dominate.

This point is reinforced by two recent econometric studies. In a panel data analysis of school spending across states, Manwaring and Sheffrin (1994) find that spending per pupil is actually higher in states in which the school finance system has been successfully challenged in the courts. Downes and Shah (1994) perform a similar analysis but allow the effect of school finance reform to depend on the extent of the reform and the state’s characteristics. They find that extensive reform, such as California’s, has a negative effect on spending in some states and a positive effect in others. This finding is consistent with our model: equalization does not necessarily decrease school spending; the net effect of equalization depends on the state’s characteristics.

APPENDIX A
DATA SOURCES

Spending per Pupil by State


Average Daily Attendance by State

Table 45, p. 59, Digest of Educational Statistics, 1992, National Center of Educational Statistics, U.S. Department of Education.

Average Family Income, Median Family Income, and Number of Families by State


1990: 1990 Census of the Population. Summary Tape File 1C.

Consumer Price Index for All Items, 1970 and 1990


APPENDIX B
CALCULATION OF AVERAGE AND MEDIAN TAX PRICES

Average Tax Prices

The tax price of school spending is $s$, the number of pupils per family. The net tax price takes into account the deductibility of property taxes from state and federal taxable income. For family $i$, the net tax price is $\lambda_i s$, where $\lambda_i$ is the cost of one dollar of property taxes net of any reduction in state and federal income tax that results from deducting this one dollar from state and federal taxable income. The average tax price, which is used in the empirical analysis as the tax price for all states except Hawaii, is $\bar{\lambda} s$, where $\bar{\lambda}$ is the average of the $\lambda_i$ across families within a state. Table B-1 illustrates the calculation of $\bar{\lambda}$. The data is from California in 1969, but the same method is used in other states and for 1989.

Column 1 lists the income groups reported in the 1970 Census. Column 2 lists the percentage of families in each group in California in 1969. Column 3 lists the mean income within each group. This is the average of the upper and lower limits for the first 11 groups. For the top group, the mean income is assumed to be $50,000. The average income for each group was considered to be the income of a representative family for that group. The remainder of the table is concerned with calculating the $\lambda_i$ for each of these 12 groups.

Column 4 lists the percent of each group that itemizes. This number is from the Table 1.6 of Internal
Revenue Service, Statistics of Income—1969, Individual Income Tax Returns. Column 5 lists the average deduction of those who itemize, a number which is also from Statistics of Income—1969. Column 6, taxable income for itemizers, is column 3 less column 5.

Columns 7 and 8 are the federal and state tax rates for individuals with the taxable income of column 6. The state tax rates are from Table 40 of the Advisory Commission on Intergovernmental Relations, State and Local Finances, 1967–70. The table lists tax rates for single individuals. To be consistent, we also used the schedule for single individuals to determine the federal tax rate. In determining these tax rates, we assumed one exemption.

Column 9 lists the combined state and federal income tax rate. It is the increase in the sum of state and federal income taxes resulting from a one dollar increase in taxable income. For states like California that do not allow federal taxes to be deducted from state taxable income, this tax rate is \( t = t_s + t_t - t_t, \) where \( t_t \) is the state marginal tax rate and \( t_t \) is the federal marginal tax rate. For states that do allow the deductibility of federal taxes, the formula is \( t = (t_t + t_t - 2t_t, t_f)/(1 - t_t, t_f) \). Finally, some states determine state taxes as a fraction of federal taxes. In those states, \( t = (1 + \theta) t_t/(1 + t_t, t_f) \).

For those families that do not itemize, \( \lambda_t \), is unity. For those families that do itemize, \( \lambda_t \) is \( 1 - t \). Column 10 lists the average \( \lambda_t \) for each group. It is \( 1 - \pi + \pi(1 - \lambda) \), where \( \pi \) is the percent of families in the group that itemize. The parameter \( \lambda \) is the weighted average of the \( \lambda_t \). It is the sum of column 10 weighted by the percentages in column 2.

This number was 0.81 for California in 1969. The minimum was 0.78 for Alaska, and the maximum was 0.90 for Arkansas and Mississippi.

The calculations for 1989 are basically the same. There are 25 income groups instead of 12. The top group is income greater than $150,000. The average income of this group was assumed to be $200,000. Information on the percent itemizing and the average itemized deduction is from Table 1.2 of Internal Revenue Service, Statistics of Income—1989, Individual Income Tax Returns. The data on state tax rates are from the Advisory Commission on Intergovernmental Relations, Significant Features of Fiscal Federalism: 1990, M-169. For 1989, \( \lambda \) was 0.82 for California. The minimum was 0.81 for Maryland and New Jersey, and the maximum was 0.91 for West Virginia.

**Median Tax Prices**

Under a statewide school system, the tax price of the median voter is \( \mu\theta n s \), where \( \mu \) is the cost to the median income family of one dollar of school taxes net of the deductibility of those taxes from federal taxable income, \( \theta \) is the median voter’s share of school taxes, \( n \) is the number of families, and \( s \) is the number of school children per family. This median tax price is used as the tax price in the regression analysis for Hawaii and to estimate the effect of Serrano in California. Table B-2 illustrates the calculation of \( \theta \) for California in 1989.

Column 1 lists the income groups in the 1990 Census. Column 2 gives the number of families in each group in California in 1989. Column 3 gives the income of a representative family in each group. For
The state income tax was estimated for families that itemize deductions and for those that do not. Column 3 gives the average deduction of those who itemize. This information is also from Statistics of Income—1989. The taxable income of the representative family if it itemizes is its income less this itemized deduction and less the exemption granted by the state tax laws. The family was assumed to take one exemption. Column 7 gives the state income tax for a single taxpayer with that taxable income. The tax schedule and exemption are from the Advisory Commission on Intergovernmental Relations, Significant Features of Fiscal Federalism, 1990. Column 8 gives the state income tax if the representative family were not to itemize. The state standard deduction is from Significant Features of Fiscal Federalism.

The state tax was estimated for families that itemize deductions and for those that do not. Column 5 lists the percent of families that itemize in each group. This information is from Table 1.2 of the Internal Revenue Service, Statistics of Income—1989, Individual Income Tax Returns. Column 6 gives the average deduction of those who itemize. This information is also from Statistics of Income—1989. The taxable income of the representative family if it itemizes is its income less this itemized deduction and less the exemption granted by the state tax laws. The family was assumed to take one exemption. Column 7 gives the state income tax for a single taxpayer with that taxable income. The tax schedule and exemption are from the Advisory Commission on Intergovernmental Relations, Significant Features of Fiscal Federalism, 1990. Column 8 gives the state income tax if the representative family were not to itemize. The state standard deduction is from Significant Features of Fiscal Federalism.

The total state taxes paid by each group is the sales tax multiplied by the number of families in the group plus the income tax of itemizers multiplied by the number of itemizers in the group plus the income tax of nonitemizers multiplied by the number of nonitemizers in each group. These numbers are listed in column 9. A family's tax share is the sum of its sales and income tax divided by the sum of taxes across all groups (the sum of column 9).

The median income family is assumed to be an itemizer. In California in 1989, the median family income was $40,559. According to our estimates, it paid $482 in sales tax plus $1,573 in income taxes.
for a total of $2,055. Its share of taxes multiplied by the total number of families, $n$, was 0.81. The family's state income tax can be deducted from federal taxable income, but its sales tax cannot. Thus, 77 percent of its state taxes can be deducted from federal taxable income. Its federal marginal tax rate was 28 percent. Assuming the fraction of state income and sales taxes remains the same as total state taxes are changed, the net cost to the family of one dollar of state taxes is 0.77(1 − 0.28) + 0.23 = 0.78. This is the parameter $\mu$.

The same procedure was followed for Hawaii in 1969 and 1989.

ENDNOTES

We thank Eric Brunner, William Fischel, Dennis Leyden, Eugenia Toma, and three anonymous referees for valuable comments on a previous draft of this paper.

1 Most of the history of California school finance in this section is based on Picus (1991). We have also benefited from conversations with Paul Goldfinger, School Services of California, and Raymond M. Reinhard, Governor's Office of Child Development and Education, State of California.

REFERENCES


Rothstein, Paul. "The Demand for Education with 'Power Equalizing' Aid: Estimation and Sim-


