Effect of Constraints on Tiebout Competition: Evidence from some School Finance Reforms in the U.S*

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1 Introduction

Local financing of public schools has been one of the distinguishing features of the K-12 educational system in the U.S. A substantial share of the total funds for educational expenditures is raised at the local school district level, primarily by taxes levied on property. The level of the property tax rate is chosen by local residents in an election, just like elections for the local school board.[1] The other sources of school revenue have been state aid and federal aid. State aid has been the more important of the two, with federal aid generally accounting for around 10 percent of the average per pupil spending and has remained more or less unchanged at that level for the last few decades.

This reliance on local tax revenues leads to a bundling of two distinct choices - residential choice and school choice. Parents in the U.S. often choose their residences on the basis of the quality of schools in the locality. Since, as is often argued, demand for (and affordability of) a good education increases with parental income and educational attainment, this often results in a Tiebout type sorting. Families with similar demands congregate together, leading to economic and demographic segregation across school districts within a state. Households voting with their feet have led to the formation of property-rich and property-poor communities, with the result that wealthy school districts have been able to spend more money per student than poor districts.

A school finance reform, loosely interpreted as an equalization of school finances within state boundaries, can in principle weaken this link between residence choice and demand for schooling. Such reforms have mostly been implemented following adverse court decisions, ruling existing financing systems unconstitutional, but have also sometimes initiated by the

[1] For example, in 1999-2000, the share of revenues for public elementary and secondary schools that was raised locally was 43.2% (National Center for Education Statistics, 2003, Table 156). This percentage would have been even greater in earlier years, when most states had not passed school finance reforms.

respective legislatures independently. These typically increase the state share of K-12 revenues, mostly by giving large sums of money to the lowest spending school districts, in an effort to reduce the prevailing disparities in per pupil spending across districts within the state.

One important aspect of many of these school reforms is their effect on local discretion over school spending. In an effort to reduce spending inequalities across districts, several states have implemented school finance reforms that either severely limit or end altogether local discretion. This diminished local control over local government activities – schooling in this case – has significant implications for the provision of public education. The original Tiebout framework highlights the fact that centralization of public services at higher levels may reduce efficiencies associated with providing these services at the local level, possibly undermining the conformity between citizen preferences and the services provided.

We examine school finance reforms in three states,– California, Michigan and Vermont. California was the first state to implement a comprehensive school finance reform in the 1970s, and it is also the state which put the most severe constraints on school spending, abolishing local discretion completely. Michigan is also an interesting case, as the school finance reform it passed in 1994, called Proposal A, also practically ended local control over amount of school spending, though there was not a drastic leveling down as was the case in California. Finally, in Vermont, the Equal Educational Opportunity Act (Act 60), which was implemented in 1997, combined a foundation grant program with a power equalization formula that required property tax rates to vary with local wealth. This scenario affords us the opportunity to study a state which did not abolish local discretion as such but instead changed the incentives, leading to significant differences in the tax price of schooling among various districts, so that the power of local discretion became much more blunt that earlier. Taken together, the differences in the nature and extent of restraints put on educational spending in these three states affords us a

unique opportunity to study the implications for the quality of local public service provision in states that intervene to limit local government control.

The results are intriguing. We find that the school finance reforms in California and Michigan were instrumental in significantly increasing the growth rates of spending in the lowest spending districts, – in both states the reforms overturned trends towards increased disparities in spending evident in the immediate pre-reform period. However, the reforms also constrained the highest-spending districts in each state. These districts had been increasing their per pupil spending at significantly higher rates compared to their counterparts at the time of the reforms. However, the school finance reforms limited their discretionary power over school spending and the subsequent growth rates of spending in these highest-spending districts were much below those for the other districts. (The limits imposed in California were the most stringent, followed by those in Michigan.) We provide suggestive evidence that the restrictions on spending imposed on the highest-spending districts may have affected their subsequent educational outcomes, as measured by student performance in standardized tests administered by the respective states. Interestingly, however, highest-spending districts in Michigan seem to have done worse than their counterparts in California in terms of student performance, even though they were not as constrained in their school spending as the latter. We discuss alternative reasons why this might be so, including differential exodus from the public school system to private schools, differential movements of different demographic/socio-economic groups across districts and differential voluntary contributions across districts.

This paper is most closely related to the strand of literature in public finance and economics of education that deal with the effects of school finance reforms. The empirical studies undertaken so far fall under two broad groups - those that deal cross-sectionally with many school finance reforms and those that study individual states. Among the former, Murray et

al. (1998) conclude that court-mandated finance reforms have had a large positive effect on equalization of school resources. Card and Payne (2002) study not only the relative equalization in spending across districts, but also its consequences for academic performance. They find that reforms that were successful in reducing inter-district disparities in spending, also led to a convergence in SAT [2] scores across family background groups. Corcoran and Evans (2007) look at the effects of the recent court-financed reforms and argue that spending increases due to court mandates increased spending at the 5th, 50th (median) and 95th percentiles by comparable amounts.

Among the case studies of individual states, results from earlier studies looking at the effect of school finance reforms on Michigan, California and Vermont can be summarized as follows. Downes (1992) finds that in California there has been a significant convergence across school districts in per pupil expenditures, though it has not been reflected in academic performance. For Vermont too, Downes (2002) finds that spending has become much more equally distributed,- similar conclusions have been reached by other researchers (see, for example, Schmidt and Scott, 2006). Downes also finds suggestive evidence that there has been a modest convergence in achievement gaps across different groups of districts in Vermont. Roy (forthcoming) finds that the Michigan school finance reform, called Proposal A, was quite successful in reducing inter-district spending disparities, and that there was also a significant positive effect on student performance in the lowest spending districts as measured in state tests. These results are similar to those of Papke (2005), who finds that the increases in spending in Michigan had significant effects on mathematics pass rates, and that the effects were largest for

[2] SAT is the acronym for Scholastic Aptitude Test which, along with ACT, is the most popular college prep test in the U.S.

schools which were initially lagging behind.[3,4] However, none of these studies focus directly on the nature of the incentives faced by the low-spending and the high-spending districts following a school finance reform. This paper tries to shed light on this important but hitherto neglected issue.

This paper is also related to the literature that analyzes the effects of broader tax and spending limits - not only just school finance reforms - on student performance. Figlio (1997) uses detailed school-level data from 49 states to analyze the effects of tax-revolt era property tax limitations - defined as limitations passed during the "local property tax revolt" of the late 1970's and early 1980's - on school services. He finds that limitations are associated with larger student-teacher ratios and lower starting teacher salaries,- moreover, limitations are associated with lower student performance. Downes and Figlio (1997) similarly find that tax or spending limits on local governments lead to a significant decline in average student performance at the state level, though there is considerable heterogeneity across states, particularly in terms of whether the reforms have been mandated by the courts.

The present study differs from both these studies in some fundamental ways. First, the questions posed here are somewhat different. While Figlio (1997) and Downes and Figlio (1997)

[3] Cullen and Loeb (2004) also look at the effect of Proposal A on spending equalization and test scores, but their analysis, while impressive in its broad scope, is much less rigorous on these particular issues. However, their study highlights interesting facts and concerns relating to Proposal A - like disparities in spending before Proposal A, changes in tax burdens as a result of Proposal A and future prospects for Proposal A - which have otherwise been neglected in the literature.

[4] There is also a burgeoning literature looking at the effects of school finance reforms in these states on other indicators. Downes and Schoeman (1998) show that the California school finance reform was responsible for a significant part of the subsequent growth in private school enrollment in that state. Roy (2009) shows that in Michigan Proposal A has been responsible for increases in the value of housing stock in the lowest spending school districts, and for improvements in several socioeconomic indicators in these districts, implying a decline in neighborhood sorting. However, there is continued high demand for residence in the highest spending communities. Downes and Steinman (2007) provide evidence that the extent to which districts in Vermont substituted nontraditional revenues for property tax revenues, through private fund-raising activities, depended significantly on the local tax price and that the wealth of the local community was a big factor in the success of local education foundations.

are interested in the overall effect of the broader tax limitation measures, we are interested in analyzing how school finance reforms, operating in particular through constraints on local discretion, impact outcomes in affected districts. In this exercise, we are particularly interested in how the reforms affected school outcomes in districts at not only the low end of the pre-reform spending distribution but also at the high end, who were most severely constrained. Second, being national-level studies the authors have to classify states into those with limitations and those without limitations. Such a classification is often not unique,- Michigan, for example, is labeled as a state with limitations - due to the Headlee Amendment, approved by voters in 1978 - even though there were persistent disparities in educational spending across Michigan school districts and the wealthiest districts in Michigan had very high levels of per pupil spending prior to the reform in 1994. Third, since both of these studies rely on data from two student-level national surveys conducted by the U.S. Department of Education,[5] the unit of analysis in these studies is a student or a school. However, school finance and budgeting decisions are typically made at the district level and there might be potential bias if districts differentially allocate resources to schools within their jurisdiction based on factors and trends unobservable to the researcher. Last, the analyses in these studies only look at the effects of tax limitation measures in the late 1970's and early 1980's, using data which end in the early 1990's. This paper, on the other hand, also analyzes the effect of the school finance reforms in Michigan and Vermont - states which implemented reforms in the mid and late 1990's - and hence is able to shed light on the effects of more contemporaneous school finance reforms.

In subsequent sections, we describe the basic features of school finance reforms and discuss how districts at different points of the pre-reform spending distribution are likely to be dif-

[5] These surveys are the National Longitudinal Study of the High School Class of 1972 (NLS-72) and the 1992 (senior year) wave of the National Education Longitudinal Study (NELS).

ferentially impacted, in turn affecting their subsequent behavior and schooling outcomes. In particular, the imposition of limits on local discretionary authority over school spending, which are often binding on the highest-spending districts, has important implications in a traditional Tiebout framework on the efficiency and equity of provision of education, a local public good. Further, the diversity of school financing changes in the three states in our analysis allows us to compare their experiences and add to our understanding of how the extent of loss of local discretion - which varied significantly across these three states - can affect local incentives, motivation and behavior.

2 School Finance Reforms

2.1 California

California is perhaps the most canonical case of school finance reform, having completely changed its school finance structure over the last four decades. In 1970, the system was financed locally, with school districts raising more than half of their revenue by taxing local property. School districts levied their own property tax rates, subject to the approval of their voters. The state supplemented that revenue with foundation aid. Basically, the state ensured that each school district had enough revenue to attain a basic level of spending, known as foundation level. Each district was responsible for a share of the foundation level-a share determined by applying a state-specified tax rate to the district's assessed value. The state in turn was responsible for the difference between the foundation level and the local share. However, because the property tax base differed dramatically across school districts, this system resulted in significant disparities in education spending across districts.

These disparities were the cause of a lawsuit filed in 1968 by the Western Center on Law and Poverty, called Serrano v. Priest. The Serrano plaintiffs maintained that the system was

inequitable and thus in violation of the equal protection clause of the Fourteenth Amendment. The California Supreme Court agreed, in a series of decisions during the 1970s (Serrano I and Serrano II), and ruled that the finance system was also in violation of the California constitution. The Court asserted that differences in property tax revenue per pupil across districts could not be related to differences in the property wealth of those districts. This set off a series of legislative and popular initiatives to bring the state into compliance.

The state responded to the Serrano decisions by placing ceilings on the amount districts could spend on their students and by having high-spending districts increase their spending at a lower rate than that of low-spending districts. The lowest-spending districts were permitted to increase their spending at rates of 15 percent, while the highest-spending districts were held to less than 3 percent. This difference in growth rates would cause revenue limits, and hence per pupil spending, to converge over time. Soon after, the passage of Proposition 13, the property tax limitation initiative, in 1978 moved the responsibility for financing public schools from the local to the state level.

The combination of the Serrano rulings and Proposition 13 significantly reduced the differences in spending across districts. By the early 1980s, the state had gained direct control of 90 percent of school district revenue. Benefiting from the court rulings in Serrano, low-wealth districts received the largest increases in state aid. A district with assessed value per pupil of $5,351, the 25th percentile in 1969-70, would have received $378 per pupil under the old formula and $645 per pupil under the new formula, an increase of $267. In comparison, total revenue per pupil in the 25th percentile was $645 per pupil. Districts with high assessed value received very small increases. A district with assessed value per pupil of $28,375, the 95th percentile in 1969-70, would have received basic aid of $125 per pupil under the old formula and $133 per pupil under the new formula, an increase of $8 (Downes, 1992).

Before proposition 13, state aid was determined by a formula, and the revenue limit determined a district's property tax revenue. However, that limit could be overridden by voters in a referendum. After the proposition, the district's property tax revenue was determined by formula, and the revenue limit determined state aid. Proposition 13 also eliminated voter overrides. A district's revenue no longer depended on the decisions its voters made about their tax rate. Instead, the state legislature determined each district's revenue limit as well as its revenues.

2.2 Michigan

The Michigan school finance program was not a response to any adverse court ruling or to a sudden rise in public concern over inequalities.[6,7] Rather, it was a by-product of the prevailing debate over pervasively-high property taxes, whose main purpose was supporting local schools. In 1994, just before the program, Michigan's property tax burden was the seventh highest in the country and it was 4th among US states in the share of school spending financed locally (61%). In March 1994, Michigan voters overwhelmingly ratified Proposal A, which reduced the reliance of school revenues on property taxes, replacing them primarily by an increase in the sales tax from 4 to 6%.[8] This resulted in a large rise in the state share of K-12 spending, and was followed by efforts to make a significant dent in existing inequalities. [9]

Prior to the reform, Michigan had been using a district power equalizing (DPE) formula, where districts are allocated state funds based on their tax efforts. This was intended to make

[6] There were two court cases, Milliken vs. Green in 1973 and East Jackson Public Schools vs. Michigan in 1984, but both had found the existing finance system constitutional.

[7] For more detailed descriptions of the Michigan reform, see Addonizio et al. (1995), Courant et al. (1995) and Courant and Loeb (1997).

[8] Michigan ranked after New Hampshire (86%), Illinois (62%) and Vermont (61%) - subsequently, in 1997, both Illinois and Vermont overhauled their school finance programs.

[9] Taxes on homestead property came down from an average of 34 mills to a uniform statewide rate of 6 mills. The tax on non-homestead property was reduced too, but kept at 24 mills. The share of the state in K-12 spending went up quickly, from 31.3% in 1993 to 77.5% in 1997.

the system wealth-neutral[10], leaving the choice of millage rates (property tax rates) to the local districts, but supplementing revenues in districts with low property tax base per pupil. However, the equalizing power of DPE the had considerably eroded over the years. As Cullen and Loeb (2004) note, there was no limit to the amount of tax effort that the state would match through its guaranteed tax base. The state also did not recapture excess funds from wealthy districts. Also, over time, the guaranteed base did not rise as rapidly as property values, so that the share of off-formula districts rose throughout the 1970s and 1980s. In 1994 about one-third of all districts were too rich to be affected.

The new school spending plan, effective from 1994-95, worked as follows. First, the 1993-94 level of spending in each district was taken as its base, and came to be called the district's Foundation Allowance (FA). Second, future increases in all districts' FA's were governed entirely by the state legislature - the lowest spending districts were allowed to increase spending at much faster rates than their richer counterparts. In theory, over time this would lead to a substantial narrowing of the revenue gap across districts. Further, all districts, however rich, were held harmless. None suffered any absolute decline in per pupil spending.

Local discretion over spending was largely abolished following Proposal A - future increases in spending were dictated solely by the state.[11] This has interesting implications for the effect of the program on the high-spending districts. In these districts, per pupil spending increased barely at the rate of inflation after the reform and by much less than was the case just prior to the reform. For example, Bloomfield School district (a high spending district) could only

[10] The idea behind wealth-neutrality is that high tax wealth in a district should not lead to high revenues except through a higher tax effort. In general, as preference for school spending is a positive function of income, this does not equalize per pupil expenditures across districts, see Feldstein (1975).

[11] For the three years immediately following Proposal A (1995-1997), districts had the option of levying up to three additional mills for operating expenditure. This ended in the 1997-98 school year. A bill was introduced in 2001 calling for a revision to the law that would allow districts to raise up to one mill for school operating costs with voter approval. However, that bill did not pass, due to fears that it might undermine the initial reform itself (Cullen and Loeb, 2004).

increase its nominal spending by about 10% between 1994 and 2001. Since prices went up by about 20% during this period[12], many of these districts suffered a stagnation, if not an actual fall, in their real per pupil spending.

2.3 Vermont

Before 1997, Vermont relied on a traditional foundation formula to determine the state aid a town received. This foundation aid program was established in 1988 to enable each school district to fund a state-defined, minimum quality education, also known as the foundation cost. Towns received state aid equal to the difference between the foundation cost and how much revenue they could raise from local resources at a state-determined property tax rate. The period leading up to 1997 was a period of decline in the state share and an increase in local contributions to maintain adequate education spending. This reliance on local property taxes resulted in unequal education funding and property tax rates. Downes (2002) notes that between 1990 and 1995, districts with high property wealth increased expenditures at an annual rate of 3.8 percent, while districts with low property wealth increased expenditures by only 1.9 percent. This persistent inequity prompted plaintiffs from property-poor towns to challenge the constitutionality of the system in court, leading to Brigham vs. State.[13]

In 1995 a group of plaintiffs which included Amanda Brigham, a student in the Whiting School District, filed suit against the State of Vermont arguing that the existing school finance system deprived students in property-poor school districts of equal educational opportunities and forced taxpayers in these districts to assume a disproportionate burden of the financing of public education. On February 5, 1997, the Vermont Supreme Court ruled in favor of the plaintiffs, concluding that the existing system deprives children of an equal educational

[12] The Consumer Price Index for Midwest Urban went up by 21% between 1994 and 2001.

[13] For a nice description of the pre-reform scenario, and the school finance system itself, see Mathis (1995) and Mathis (2001).

opportunity in violation of the Vermont Constitution. Soon after, Vermont lawmakers enacted the Equal Educational Opportunity Act (known as Act 60), which combined a foundation grant program with a power equalization formula that required property tax rates to vary with local wealth.

Act 60 created a system of school financing that combined elements of foundation and power equalization plans. A statewide property tax was established, with revenues from the tax being used to finance a portion of foundation aid. If in a locality property tax revenues generated by levying the statewide rate exceed the amount needed to finance the foundation level of spending, the excess property tax revenues are recaptured by the state.

Under Act 60, localities are allowed to choose spending levels in excess of the foundation level. However, local spending above the foundation level was funded by a sharing pool, which was funded entirely by local property tax revenues. Towns with high property tax values and/or high spending were required to set local property tax rates that generated revenue in excess of spending, and contribute the excess to the sharing pool. Rates were proportional to local spending, so that a town that raised local spending would also be forced to increase its contribution to the sharing pool. Further, when the voters in a locality choose a nominal property tax rate above the statewide rate, the revenues that will be available for that locality's schools will not be known with certainty until all other localities have made their taxing decisions and the size of the sharing pool is established.

The above financing mechanism created a substantial incentive for wealthy towns to reduce their school spending, and resulted in considerable leveling-down, with several of the wealthiest towns, known in Vermont as gold towns, responding by cutting their spending all the way down to the foundation grant amount to avoid contributing to the sharing pool. Voters in these property-rich towns had little incentive to approve spending above the block grant

because the redistribution of local share revenues cost them more in local taxes than the additional spending they approved. Property-rich towns also sought to escape the high cost of additional local spending in other ways. Many towns financed spending above the block grant privately, through local education foundations: nonprofit organizations with the express purpose of raising resources outside the tax base for education. (Gifts to school districts are exempt from recapture.) Downes and Steinman (2007) noted that foundations in towns with as few as 1,000 residents raised more than $1 million in annual revenue. The Vermont Department of Education reported that in FY03, more than $12.2 million in private donations contributed to school budgets that year.

The school finance reforms under Act 60 were phased in over several years, with the new regime not fully in place until the 2000-2001 academic year. Note also that low wealth towns were not required to maintain local effort; several towns used the Act 60 windfall primarily to reduce nominal property tax rates. As a result, low wealth towns were not necessarily leveled-up.

3 Discussion: Effects of school finance changes on incentives and response of school districts

In this section we discuss the basic intuition behind the effects of a school finance reform on school effort and student performance. In particular, do school finance reforms differtially affect school districts situated at different levels of the pre-program spending distribution? Specifically, are high spending and low spending districts differentially affected? The typical school finance system in the U.S. is a classic example of the Tiebout setup – it is characterized by local discretion and flexibility and school districts have the ability to affect local revenue through their impacts on property values. For example, an increase in school district effort can

plausibly lead to higher public school quality (higher student achievement), which can increase the demand for the respective schools and housing in the neighborhood, in turn increasing property values and local revenue (given the tax rate). In other words, the public school districts have the ability and power to affect local revenue.

School finance reforms lead to a drastic centralization of school finances. The state typically sets the per pupil expenditure levels and the districts virtually have no discretion, unlike earlier. Another important feature is that the low income districts see their per pupil revenue increasing at a very high rate. In contrast, the high end districts barely see their per pupil revenue go up.

How might these changes affect the incentives and responses of public school districts? Since, low income districts face a large increase in per pupil revenue after the school finance reform, they would have an incentive to increase effort to attract students so as to increase revenue. But at the same time, they lose their local discretionary power in the sense that increasing effort to improve school district quality would no longer increase local property tax revenue. This would have an adverse effect on effort, thus rendering the total effect on school district effort ambiguous.

High expenditure districts, in contrast, face a very different situation. High income districts also lose local control/discretion and their revenue and exenditure are determined by the state. Typically, their per pupil revenue go up by very little. Per pupil spending in these districts increase at barely the rate of inflation and by much less than was the case just prior to the reform,–so these districts have less of an incentive to exert effort. So the first incentive above is not present for high income districts. Therefore, one would expect the school finance reform to have an adverse effect on effort in high income districts.

However, as described in the previous section, while districts, in general, lose most of their

discretionary power, there was considerable heterogeneity across states in the extents of loss of local discretion. California saw a complete loss of discretion, followed closely by Michigan. Vermont also saw a loss of discretion, though it was less severe than California and Michigan. Districts facing larger falls in discretion realize that an increase in effort would lead to even smaller increases in revenue. Therefore they would have less of an incentive to exert effort.

4 Data

The Michigan part of the data used here is described in detail and is taken from Roy (forthcoming). Most of the data used here were obtained from the Michigan Department of Education (henceforth, MDE). The revenue and expenditure figures were taken from the Bulletin 1014's, published annually. The measures used here are revenues and expenditures respectively. The data on ethnic and gender compositions and free lunch eligibility came from the Pupil Headcount Files and the Food and Nutrition Files of the MDE K-12 database. Some of the data on ethnicity and free lunch eligibility for the early years came from the Common Core of Data (CCD) of the National Center for Education Statistics (NCES). The MDE K-12 Database was also the source of the data on student achievement in state tests. The state assessment in Michigan is known as the Michigan Educational Assessment Program, or MEAP in short. Henceforth we will refer to these tests as MEAP tests and we use grade 4 reading and math data.[14] The data used here span the period 1990 to 2001, which straddle 1994, the last year before reform. Henceforth in the paper, we refer to school years by the calendar year of the spring term - e.g., 1990 refers to academic year 1989-90, and so on.

The major part of the California data used in this analysis was obtained from Tom

[14] The scores (both reading and math) report the percentage of students scoring at or above satisfactory level in the corresponding subject.

Downes.[15] For a detailed description of the data, see Downes (1992). The data include school district level data on various financial measures, measures of academic achievement, enrollment and poverty rate in years 1976-77 and 1985-86. Financial measures include per pupil expenditure and revenue limits. Achievement measures include twelfth grade test scores in reading, math, spelling and writing; and sixth grade test scores in reading, math and writing. This dataset also includes data on racial characteristics obtained from the 1970 and 1980 censuses. Some additional financial data used in the paper was obtained from Eric Brunner. These include 1975 data on revenue limit and some early years of data (1965, 1970, 1975) on current expenditures.

5 Empirical evidence

The discussion in section (3) revealed that the high and low expenditure districts are likely to be affected very differently by the school finance reforms. Consequently, we study separately the effects of school finance reforms on low expenditure and high expenditure districts. The effect on low expenditure districts would give the effect of influx of money and loss of discretion. The effect on high expenditure districts on the other hand would give the effect of loss of discretion. However, it is important to note here that the effect of loss of discretion we find here would be specific to high income districts and is not generalizable to other districts.

Second, the extents of loss of discretion varied markedly across programs. California suffered the largest loss of discretion, followed closely by Michigan and then Vermont. As discussed above, one would expect different responses from the districts in these three states. To investigate this issue, we study and compare the responses of the districts in these three states.

[15] We are very grateful to Tom Downes for sharing his dataset on California and Vermont with us.

5.1 Michigan

5.1.1 Effect on School Spending

To examine the effect of Proposal A on school spending in Michigan, we classify the 524 K-12 districts into 5 equal groups based on the 1993-94 level of per pupil spending.[16,17] Some summary statistics on these groups of districts are shown in Table 1.

First, using pre-program data, we look for the existence of differential trends between the different groups before proposal A. We run the following fixed effects regression using data from the five years immediately preceeding the reform (1990 to 1994).

$$Y_{sgt} = \alpha_s + \sum_{g \in \{1,...,5\}} \beta_g * (D_g * t) + \delta * X_{sgt} + \varepsilon_{sgt} \qquad (1)$$

where $g \in \{1, ..., 5\}$, Y_{sgt} is the per pupil revenue or expenditure of district s in group g in year t, α_s is the district fixed effect while X_{sgt} are the time-varying characteristics (controls).[18] D_g's are the dummy variables for the respective groups of districts.

The results are in Table 2. We report results from two samples - the first includes all 524 districts, the second excludes Detroit.[19] The first two columns show the results for per pupil revenues, the third and fourth columns show the results for per pupil expenditures. As is evident, there was a significant hierarchy in spending growth rates at the time of the reform. Both per pupil revenues and expenditures were increasing at the highest rates in Group 5 districts, followed by districts in Group 4, and so on. Conversely, districts in Group 1 were

[16] This classification follows Roy (forthcoming).

[17] There are an additional 31 non-K-12 districts in Michigan,- however, most of these are very small. Further, inclusion of only K-12 districts facilatates comparison with Califoria, where the sample consists of unified districts serving K through 12th grades.

[18] Since free lunch data for 1990 and 1991 are either not available, or not reliable because of small and inconsistent values, we have only included enrollment and racial composition in X_{sgt}. Running the regression on a sub-sample when data on all controls are available does not change the qualitative results.

[19] Detroit is the biggest school district in Michigan, alone accounting for about 10% of all Michigan K-12 students.

lagging behind all other districts. This shows that existing inequalities had been widening in the years just prior to the reform.

We next document the effect of Proposal A. Figure 1 shows the distributions of foundation allowances across school districts in Groups 1 and 5 in 1994 and 2001.[20] There has been a significant convergence between these groups in the post-reform period, both in absolute and in relative terms.

To estimate the trends in spending in the different groups in the post-reform period, after controlling for their respective pre-reform trends, we run the following fixed effects (FE) regression:

$$Y_{sgt} = \alpha_s + \sum_{g\in\{1,...,5\}} \beta_g * (D_g * t) + \sum_{g\in\{1,...,5\}} \gamma_g * (D_g * reform) + \sum_{g\in\{1,...,5\}} \theta_g * (D_g * reform * t) + \delta * X_{sgt} + \varepsilon_{sgt} \qquad (2)$$

Here $reform$ is a binary variable that takes the value of 0 in the pre-reform period (1990-1994) and 1 afterwards (1995-2001). The variable t represents time-trend. X_{sgt} includes racial and gender composition of students and percentage of students eligible for free or reduced-price lunches in the regressions. The variables $reform$ and $reform * t$ respectively control for post-reform common intercept and trend shifts. The coefficients on the interaction terms ($D_g * reform$) and ($D_g * reform * t$) estimate the program effects - γ_g's capture the intercept shifts while θ_g's capture the trend shifts of different groups of districts. However, as mentioned earlier, the reform was staggered over several years and hence the immediate increase in spending was not large. So the estimated intercept effects are very small, and below we focus on trend shifts in the post-program period.

[20] These show the kernel smoothed plots of foundation allowances in the two groups of districts. All figures have been weighted by district enrollment. For 2001, the foundation allowances for all districts in Group 1 were at $6000.

Table 3 reports results obtained from estimation of the above model, showing the effect of the Michigan program on per pupil revenues and expenditures. As can be seen, both revenues and expenditures grew at a considerably higher rate in the low expenditure districts compared to the high expenditure districts. In fact, the hierarchy seen earlier in Table 2 almost completely reversed itself. Controlling for pre-reform trends, Group 1 districts increased their spending at the highest rates in the post-reform period, followed by those in Group 2, and so on. Further, not only are the coefficients economically different, but they are different statistically too.

So, the evidence points to a substantial program effect on equalization of school finances across the high and low expenditure districts. We next estimate the effects of the Michigan reform on academic performance.

5.1.2 Effect on Academic Performance

Figure 2 shows the distributions of the changes in 4th grade proficiency results (reading and mathematics) in Groups 1 and 5 between 1995 and 2001. The top panel compares the change in reading proficiency, while the bottom panel is for mathematics proficiency. In both subjects, there is a reative shift of the lowest spending line to the right after the program, suggesting convergence in the post-reform period. The lowest spending districts significantly narrowing the achievement gaps between them and the highest spending districts.

Table 4 reports the the effects of the program on fourth grade MEAP reading and math tests. As earlier we show results for two samples - the first includes all 524 districts, the second excludes Detroit. The achievement results mirror those obtained for revenue and expenditure above. The first two columns report results for reading and the next two columns for mathematics. The first column in each set includes all districts while the second column excludes Detroit. Results including all districts show relative improvements of low expenditure districts

in both reading and math after the reform. The negative coefficients for math on all groups are just scale effects, reflecting the fact that the 4th grade mathematics test in Michigan was becoming more difficult during this period. This does not affect the relative comparison across different groups of districts, in particular the outcome in the highest-spending districts vis-a-vis that in the lowest-spending districts. Exclusion of Detroit leads to slight moderation of the effects, but still there are positive significant effects in both reading and math. In contrast, high expenditure districts show deterioration in both reading and math after the reform, irrespective of whether Detroit is included or not. With exclusion of Detroit, the declines become larger in magnitude and also statistically significant. These findings are consistent with and support the intuition outlined in section (3). They suggest that loss of discretion, as that occurred in Michigan following Proposal A can lead to a decline in performance for the high expenditure districts.

One concern in analyses looking at the experience of one state in isolation is that there might be other secular factors, so that not all of the estimated effects are unique to the particular state in question. However, comparable data are hard to come by for a state which can act as a control for California, as most states did not administer standardized tests during this period (1970's and 1980's). For Michigan, we compared the evolution of spending and achievement outcomes in the post-Proposal A period to those in two neighboring states, Indiana and Ohio.[21] The results, not reported here but available on request, show that the Michigan experience

[21] To find a control state for Michigan, we first confine ourselves to the five Midwestern states neighboring Michigan, viz., Indiana, Illinois, Ohio, Minnesota and Wisconsin. The obvious criteria for selecting control states among these five are first, the absence of any important educational initiatives during the '90s, particularly the second half, and second, the availability of test score data similar to Michigan's. Based on these, Indiana and Ohio fit the bill best. There have not been any major school-related programs in either state during this period, though following an adverse court ruling in 1997, Ohio had tried to explicitly tie its base funding levels to spending in districts in which students scored well on state tests. The only other exception is the school voucher program in Cleveland which began in 1997,- omitting Cleveland does not change the qualitative results. Further, both states have got test score data in grades and subjects similar to Michigan's.

was unique, as low-spending districts in Indiana and Ohio do not exhibit the catch-up seen earlier in Michigan. Moreover, in neither state do the highest spending districts suffer a decline in student performance, unlike that in Michigan. Note though that, because of differences in institutional framework, initial spending and performance distributions, and the difficulty of ensuring comparability of test score data across states these results are only suggestive, and not conclusive.

5.2 California

As mentioned earlier, California was the first state to implement a school finance reform and it remains unique in the severity of restraints put on subsequent increases on spending. We examine how the changes in California affected groups situated at different points in the pre-reform spending distribution, and how that in turn affected school performance.

Note that the California reform occurred through the 1970s, with its full/long-run effects only likely to be apparent during the 1980s. Using data from 1976-77 and 1985-86, we compare the experience of California districts in 1985-86 to those in 1986-87. Though the California legislature had enacted school finance reforms beginning in the year 1973-74, a California trial court soon ruled that the system of school financing, even with these reforms, violated the state constitution which guarantees equal protection,- a decision that was affirmed by the state Supreme Court on December 30, 1976 (henceforth called Serrano II). So most of the major financing changes, including Proposition 13, took place in the latter half of the 1970s, and would be picked up in our results. In addition, responses to any reform take time to happen and their effects take even more time to be manifest, so 1976-77 is not a very unreasonable pre-program year.

An attractive feature of the data is that both spending data and school performance data

are available for both 1976-77 and 1985-86. This allows us to directly relate the changes in per pupil spending to the corresponding changes in student performance, and thus to analyze the hypothesis that constraints on local discretion over school matters can adversely affect academic achievement.

As in Downes (1992), we use unified districts as the unit of analysis. As their name suggests, unified school districts serve students in grades K through 12. In this study we focus on the unified school districts, which enroll a significant majority of the states K-12 student population. In particular, during the period under consideration, approximately 70% of the states students attended schools in unified districts (Downes, 1992). On the other hand, half of the 723 elementary school districts had fewer than 364 students, and many of these smaller districts were in rural areas.

Since we are interested in comparing the relative effects of the school finance reform on the high-spending and the low-spending districts, we begin by classifying the unified school districts into different groups based on their revenue limit at the time of the program. Recall that the state had enacted financing reforms beginning in the year 1973-74. According to the new school financing rule, each school district was assigned a limit on the sum of its property taxes and non-categorical state aid, and this came to called the districts revenue limit. This limit was based on the districts revenue per pupil from these sources in 197273 and then increased annually from that base. The revenue limit determined school spending for all practical purposes.

We take revenue limits in 1974-75 as the basis for our classification of districts. While the first school-year in the Downes dataset is 1976-77, we were able to obtain revenue limit data for 1975 from Eric Brunner. Consequently, we use the 1975 revenue limit data on unified districts to classify the California districts into groups. We divide the unified school districts into five

quintiles - Group 1 consists of districts in the lowest-spending quintile, Group 2 consists of districts in the next quintile, and so on.

Some summary characteristics on these groups of districts are shown in Table 5. Districts in the lowest spending quintile henceforth, Group 1 districts serve a somewhat lower percentage of whites and a higher percentage of Hispanics. Conversely, districts in the two highest-spending quintiles (Groups 4 and 5) serve a higher percentage of whites and a lower percentage of Hispanics than the other districts. Districts in the two lowest quintiles also have a slightly larger share of students living in poverty at 12 percent and 10 percent for Groups 1 and 2 respectively (Groups 3, 4, 5 respectively at 9%, 8% and 9% respectively).

5.2.1 Effect on School Finances

Before we go to the main regressions, it is useful to briefly look at the pre-reform trends in spending across the different groups of districts. We use data from 1965, 1970 and 1975 to document changes in spending across California school districts during this period. (While enough data for computation of pre-existing trends are not available in the Downes dataset, pre-program data for current per pupil expenditures were obtained from Brunner for 1965, 1970 and 1975. We use these data for pre-program analysis here. The assumption here is that these pre-program trends will not be very different from those of per pupil expenditure and revenue limit considered below.)

$$Y_{sgt} = \alpha_s + \sum_{g \in \{1,\ldots,5\}} \beta_g * (D_g * t) + \delta * X_{sgt} + \varepsilon_{sgt} \qquad (1)$$

where Y_{sgt} is the per pupil spending (total current expenditure) of district s in group g in year t. α_s is the district fixed effect while X_{sgt} are the time-varying characteristics (controls). The variable t represents time-trend. D_g are the dummy variables for the respective groups of

districts. The coefficients β_g capture the trends in spending across the five groups of districts in the immediate pre-reform period. Together they give an idea of the changes in disparities in spending during this period.

The results are presented in table 6. Since 1965 and 1970 were strictly before the implementation of any school finance reform, the first column presents results using just these two years. The second column considers 1965, 1970 and 1975 as the pre-program years. As we argue above (page 21), 1975 can be considered as a pre-program year. School spending in districts in the lowest spending groups were increasing at rates lower than those in other districts. For example, as is seen from column (2), these rates of growth in spending in groups 1 and 2, at just over $330, were significantly below those in groups 4 ($382) and 5 ($549). Given that there already were significant disparities in the levels of spending across these groups, this suggests that not only were the inequalities in spending not significantly reduced in the immediate pre-reform period, but that they had been widening somewhat.

We next turn to the effects of the school finance reform. We estimate the following specification, the dependent variables consist of per pupil expenditure and revenue limit for the finance regressions and grade 12 and grade 6 scores (as described below) for the achievement regressions.

$$Y_{sgt} = \alpha_s + \sum_{g \in \{1,\ldots,5\}} \beta_g * (D_g * reform) + \delta * X_{sgt} + \varepsilon_{sgt} \qquad (2)$$

Table 7 shows the effect of the reform on per pupil spending,- the results are from regressions run on equation (1) using data from the pre and post-reform periods. The first column gives the results for total expenditures, while the second column gives the results for the revenue limits. As is evident, there has been a significant equalization of school resources following

the reform. Both total expenditures and revenue limits have been increasing at significantly higher rates in the lowest spending quintiles (Groups 1 and 2) compared to the highest spending quintiles, and the differences are particularly stark for Group 1 vis--vis Groups 4 and 5. In fact, the hierarchy in spending growth rates seen in Table 6 above has been almost completely reversed,- spending in Group 1 districts is increasing at the fastest rate in the post-reform period, followed by spending in Group 2 districts, and so on. This suggests that the finance reform was successful in significantly reducing existing inequalities in school spending and benefited the lowest spending districts by increasing the amount of resources at their disposal. However, the constraints on spending on the highest spending districts may have adversely affected their ability to tailor spending in accordance to the desires and needs of their residents. We next compare trends in student performance across these different districts to document the effect of the reform, if any, on achievement. Figure 3 presents the distribution of total expenditure per pupil and revenue limitsfor the lowest and highest spending districts before and after the reform. As can be expected, both measures show convergence between the two groups of districts in the post-reform period.

5.2.2 Effects on Performance

Tables 8 and 9 show the effect of the reform on student performance, as measured by standardized tests administered by the state in the 6th and 12th grades. The 12th grade results are summarized in Table 8. We show the results for the four tested areas reading, writing, spelling and mathematics. There has been a significant improvement in student performance in the lowest spending districts (Group 1). In each of the four subject areas, students in Group 1 districts witnessed the highest rates of improvement. They were followed closely by students in Group 2 districts, who also witnessed higher rates of growth in spending following the finance

reform. The improvements for students in these groups were always statistically significant. While unlike in the case of school finances and unlike in the case of Michigan, there is no strict hierarchy amongst the districts in terms of improvements, the high spending districts show considerably smaller improvements than the lowest two groups of districts. In all cases, their improvements are towards the lower end of the distribution. In the case of spelling, they show the lowest improvement; while in the other three subject areasthe show the second lowest improvement. Also comparison with the pre-reform trends (table 6) indicates that after the reform there was a reversal of the general trend pattern with the lower groups showing larger improvements than in the higher groups. This suggests that the limits on additional spending in these highest-spending districts may have adversely affected their subsequent school performance. Note though, that because detailed data on student performance at the district level are not available for the pre-reform period we cannot compare these achievement results to prior trends, and hence the results are not conclusive. However, the close association between the increases in spending and improvements in student performance suggests that the finance reform significantly affected student achievement.

The results in the 6th grade, where students were tested in reading, writing and mathematics, are, however, slightly different. Though there were significant improvements by all of the groups of districts during this time period, there is not much evidence of differential trends across the different groups. This is true for each of the subject areas. It is still generally true that districts in the lowest spending groups witness higher rates of improvement compared to their peers in highest-spending groups (except in reading),- however, the differences are now not large and significant enough.

Figures 4 and 5 show the distribution of 12th grade and 6th grade scores for the highest and lowest spending distrcts before and after the reform. As is seen from above, there is evidence

of convergence in the 12th grade tests, but not on the 6th grade tests.[22]

6 Discussion and Comparing the Effects in Michgan and California

We briefly review our results so far and discuss their implications. We find that the school finance reforms in both California and Michigan were effective in significantly increasing the growth rates of spending in the lowest spending districts, in effect reversing existing trends towards increased disparities evident in the immediate pre-reform period. However, the reforms also constrained the highest-spending districts in each state, which has interesting implications for incentives and behavior if we assume that the initial scenario in these states approximated a Tiebout-type world with families sorting into neighborhoods (school districts) according to their demand for local public goods (education). These districts had been increasing their per pupil spending at significantly higher rates compared to their counterparts at the time of the reforms. But the school finance reforms limited their discretionary power over school spending and the subsequent growth rates of spending in these highest-spending districts were much below those for the other districts. The limits imposed in California were the most stringent, followed by those in Michigan. The results above suggest that the restrictions on spending imposed on the highest-spending districts may have affected their subsequent educational outcomes, as measured by student performance in standardized state tests.

It is instructive to compare the experience of California with that of Michigan, given that the extent of abolition of local discretion was different across the two states, even though the general nature of the reform was somewhat similar.

Table 10 presents the comparison results. All effects are expressed in standard deviation

[22] Note that the exception is 12th grade reading distributions which do not show convergence. But the regressions above are more convincing as the graphs merely show raw data and do not include controls.

terms. In terms of spending, California shows greater convergence than Michigan. Interestingly, highest-spending districts in Michigan seem to have done relatively worse than their counterparts in California in terms of student performance. The highest expenditure group in Michigan suffered larger relative declines compared to their counterparts in California.

Why might this have been the case? Several factors may explain this apparent discrepancy. First, if there are differential movements of demographic/socioeconomic groups into certain groups of districts, then such mobility can potentially lead to the above patterns. Table 11 investigates such differential mobility in California after the reform. (The next version of the paper will also investigate such differential mobilities in Michigan.) As can be seen from table 11, it seems that hispanics tended to differentially move into low spending districts and out from the high spending districts. Also, there seems to have been a relative influx of whites into high spending districts. One would expect such mobility patterns to increase scores relatively in high spending districts and decrease those in low speding ones. So this mobility pattern potentially could have contributed to the above results.

Another factor is voluntary contributions. Unlike in Michigan, high spending districts in California saw a large increase in their donations/voluntary contributions after the school finance reforms (Brunner and Sonstelie, 2003). The purpose was to offset, to some extent, the constraints imposed by the school finance equalization. This could also have led to the above patternof lesser convergence in achievement in California inspite of a larger convergence in spending (relative to Michigan).

Still another factor can be differential movement into private schools, if any, between school districts. We discuss this factor below and the next version of the paper will include a more thorough analysis of this.

Finally, it should be noted that we do not have pre-program data on scores in California and

hence have not been able to control for pre-existing trends in the score regressions in California. If there were substantial differences in pre-program trends, specifically if the high spending districts were improving at a higher rate than low spending districts, then not controlling for such differences can also yield to the above patterns.

7 Were differential movements to private schools across districts important?

One important factor that can potentially bias our results is if there were any differential trends in movement to private schools between the highest spending and the lowest spending districts following the school finance reforms, and if these trends differed across Michigan and California. It is possible, for example, that the constraints on local spending imposed by a school finance reform on the highest spending districts induce some families to exit the public sector and enroll their children in private schools. Under such a scenario, when additional supplementation is not allowed, individual households that value education more might have a greater incentive to exit the public system.[23]In this case, depending on whether the students leaving for private schools are high-performing or low-performing, the relative deterioration in student performance in these highest spending districts may be more of a composition/sorting effect rather than the direct effect of limits on local discretion and spending.

The existing evidence on whether school finance reforms and tax or spending limits in general lead to an influx of students from the public sector to the private one is mixed. Sonstelie (1979) and Sonstelie et al. (2000) argue that the move from local to state finance

[23] Nechyba (2003) however argues that there are two additional effects that may counter this incentive. First, if equalization lowers public school quality in wealthy areas (thus causing an increase in private school attendance), it presumably also raises quality in poor areas (thus causing a decrease in private school attendance there). Second, private school attendees who choose to live in poor districts under local public school financing in order to take advantage of depressed housing values and lower property tax payments lose both these incentives under a move to centralized public school financing.

had little impact on private school enrollments in California. However, Downes and Schoeman (1998) argue that not controlling for unobserved heterogeneity, among other things, makes results of previous studies of questionable value. They use data from the 1970 and 1980 decennial censuses for California, and find that the school finance reform during the 1970s led to a significant rise in the share of enrollment in private schools.[24]Looking at general tax and revenue limits and using a cross-section of MSAs, Schmidt (1992) finds that state-imposed limits on revenue increases were positively related to increases in private school enrollment. Similar conclusions are reached by Hoxby (2001), who argue that large scale school finance reforms limiting spending in richer districts can increase private school attendance by as much as 3 percent.

Since many of the school financing changes in California took place in the later half of the 1970s (after the Serrano II decision and proposition 13), all of their effect on private school enrollment is unlikely to be evident by 1980. Moreover, the above literature does not look at differential patterns in private school enrollment (if any) across different groups of districts. We plan to investigate this issue further (in the next version), by using data from the 1990 census (in addition to 1970 and 1980 censuses) and comparing trends in private school enrollment across the different groups of districts.

In Michigan, we look at the changes in private school enrollment across Michigan school districts between the 1990 and 2000 censuses. The results are in Table 1. Overall, there does not seem to have been any significant changes in private school enrollment in Michigan during this decade. There is not much evidence of differential trends in either the lowest spending districts or high spending districts (or the others). The coefficients are always small and never

[24] In terms of raw numbers, the number of private schools in California went up from 1505 in 1970 to 2130 in 1980. Further, after a decline in the early 1970s, the number of students in private schools in California increased by 22.4% between 1974 and 1980, while the number of students in public schools fell by 6.6% (Downes and Schoeman, 1998).

significant. Overall, though, it looks unlikely that changes in private school markets are driving the changes in segregation seen earlier.

8 Conclusion

Over the last 40 years, school finance reforms have become an ubiquitous feature of the K-12 education system in the U.S. The direct motivation for these reforms is generally the desire to reduce disparities in per pupil spending across districts within a state, and to lessen the burden of local property taxes. As a result of these reforms, low spending districts typically receive significant increases in state aid. However, another important consequence of such reforms, much less studied in the literature, is their effect on local discretion over school spending. With a view to eliminate or drastically reduce disparities in per pupil pending, states with school finance reforms often impose significant constraints on the highest spending districts.

This paper is aimed at advancing our understanding of the effect of school finance reforms, particularly as they operate through their restraints on increases in local school spending. We argue that this diminished local control over local government activities schooling in this case has significant implications for the provision of the same, which can be viewed as a local public good. In a Tiebout framework centralization of public services at higher levels reduce efficiencies associated with providing these services at the local level. This suggests that a school finance reform may have adverse incentive effects on school districts, though for low spending districts such an effect might be tempered by the large increase in per pupil revenue that typically such a reform.

We examine the effects of school finance reforms on school districts within a state, with particular focus on the heterogeneity of effects across districts located at different points of the pre-reform spending distribution. Our sample consists of California, Michigan and Vermont,-

these are among the most important and comprehensive school finance reforms undertaken over the last four decades. Further, since the magnitude of loss of local discretion differed significantly across these three states - California saw the most complete loss of discretion, followed closely by Michigan. Vermont also saw a loss of discretion, though it was less severe than California and Michigan. This allows us to look for differential effects of the reforms on finances and student performance across the various groups of districts in these three states.

We find that the school finance reforms in California and Michigan were instrumental in significantly increasing the growth rates of spending in the lowest spending districts,- as were their stated objectives. In fact, in both states, the reforms overturned trends towards increased disparities in spending evident in the immediate pre-reform period. At the same time, however, the school finance reforms significantly restrained local discretion over school spending, resulting in much lower growth rates of spending in the high spending districts compared to earlier. We provide suggestive evidence that these restrictions affected subsequent educational outcomes in these districts. Interestingly, however, highest-spending districts in Michigan seem to have done worse than their counterparts in California in terms of student performance, even though they were not as constrained in their school spending as the latter. We explore different factors such as differential mobility of various demographic groups across districts after the reform, differential movement to private schools, the role of voluntary contributions as possible causes that might explain the apparent inconsistency. These results have important policy implications, and demonstrate the importance of crafting school financing rules that avoid unintended consequences.

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Table 1: Summary Statistics for Different Groups of Michigan School Districts, 1994

	Group 1 Lowest Spending Group	Group 2 Lower Middle Group	Group 3 Middle Group	Group 4 Upper Middle Group	Group 5 Highest Spending Group
Ethnicity (Percentage)					
Whites	93.59	91.06	93.29	55.13 (77.26)	82.37
Blacks	1.49	3.65	1.68	38.32 (15.49)	12.04
Hispanics	1.96	1.74	1.72	2.80 (3.16)	0.77
Free Lunch Eligibility	23.62	18.43	16.10	31.64 (22.97)	14.68
Pupil-Teacher Ratio	23.00	23.16	23.07	24.54 (23.88)	22.43
4th grade Reading (MEAP)	40.59	43.66	42.72	40.36 (40.95)	49.44
4th grade Math (MEAP)	60.01	63.51	64.04	56.08 (59.82)	67.45

For Group 4, the figures in parentheses correspond to the statistics when I leave out Detroit. Detroit is the largest school district in Michigan, alone accounting for about 10% of the total student population in the state. All figures have been weighted by enrollment of the districts in 1994. The results for MEAP scores correspond to 1995, as tests in Michigan during that time were administered in early fall.

Table 2: Pre-reform Trends in Per Pupil Revenues and Expenditures across Michigan School Districts

	Per Pupil Revenue		Per Pupil Expenditure	
	(1)	(2)	(1)	(2)
Group 1 * t	212***	212***	227***	227***
	(6)	(6)	(5)	(5)
Group 2 * t	249***	249**	248***	245***
	(8)	(8)	(8)	(8)
Group 3 * t	263***	264***	246***	245***
	(9)	(9)	(7)	(7)
Group 4 * t	304***	298***	293***	247***
	(16)	(14)	(27)	(13)
Group 5 * t	353***	357***	287***	287***
	(13)	(13)	(12)	(11)
Observations	2603	2598	2603	2598
R-squared	0.96	0.96	0.96	0.96

Columns marked (1) and (3) include all 524 school districts, while columns marked (2) and (4) exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). All regressions are weighted by district enrollment, include district fixed effects, and control for enrollment and ethnicity. Revenue relates to general fund revenues and expenditure to general fund expenditures. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 3: Effect of Michigan School Finance Reform on Per Pupil Revenues and Expenditures

	Per Pupil Revenue		Per Pupil Expenditure	
	(1)	(2)	(1)	(2)
Group 1 * reform * t	126***	126***	101***	101***
	(9)	(9)	(9)	(9)
Group 2 * reform * t	26**	27**	35***	35***
	(12)	(12)	(11)	(11)
Group 3 * reform * t	-36***	-35***	-16*	-16*
	(11)	(11)	(10)	(10)
Group 4 * reform * t	-20	-37**	-10	17
	(27)	(19)	(40)	(18)
Group 5 * reform * t	-124***	-123***	-33*	-35*
	(21)	(20)	(20)	(19)
Observations	6269	6257	6269	6257
R-squared	0.96	0.96	0.96	0.96

Columns marked (1) include all 524 school districts, while columns marked (2) exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). All regressions are weighted by district enrollment, include district fixed effects, and control for enrollment and ethnicity. Revenue relates to general fund revenues and expenditure to general fund expenditures. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 4: Effect of Michigan School Finance Reform on Grade 4 Reading and Mathematics Tests

	Reading		Mathematics	
	(1)	(2)	(1)	(2)
Group 1 * reform * t	1.29**	1.28**	-4.93***	-4.94***
	(0.53)	(0.53)	(0.62)	(0.61)
Group 2 * reform * t	0.54	0.54	-6.69***	-6.69***
	(0.59)	(0.59)	(0.58)	(0.58)
Group 3 * reform * t	1.03**	1.04**	-5.21***	-5.21***
	(0.50)	(0.50)	(0.59)	(0.59)
Group 4 * reform * t	-1.63*	0.12	-6.75***	-6.04***
	(1.00)	(0.43)	(0.98)	(0.58)
Group 5 * reform * t	-2.39***	-2.35***	-8.02***	-7.99***
	(0.67)	(0.67)	(0.64)	(0.64)
Observations	4678	4671	4678	4671
R-squared	0.82	0.83	0.85	0.85

Columns marked (1) include all 524 school districts, while columns marked (2) exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). All regressions are weighted by district enrollment, include district fixed effects, and control for enrollment and ethnicity. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 5: Summary Statistics for Different Groups of California School Districts, 1976

	Group 1 Lowest Spending Group	Group 2 Lower Middle Group	Group 3 Middle Group	Group 4 Upper Middle Group	Group 5 Highest Spending Group
Ethnicity (Proportion)					
Whites	0.75	0.78	0.80	0.84	0.84
Blacks	0.03	0.02	0.03	0.01	0.03
Hispanics	0.21	0.18	0.15	0.13	0.11
Asians	0.02	0.02	0.02	0.02	0.02
Free Lunch Eligibility	0.12	0.10	0.09	0.08	0.09

Table 6: Pre-reform Trends in Spending across California School Districts (Per Pupil Total Current Expenditures)

	Using 1965 & 1970	Using 1965, 1970 & 1975
Group 1 * t	220***	336***
	(8)	(17)
Group 2 * t	223***	332***
	(18)	(11)
Group 3 * t	248***	352***
	(5)	(21)
Group 4 * t	261***	382***
	(14)	(19)
Group 5 * t	430***	549***
	(68)	(56)
Observations	255	413
R-squared	0.97	0.96

All regressions are weighted by district enrollment, include district fixed effects, and control for enrollment and ethnicity. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 7: Effect of California School Finance Reform on School Spending

	Per Pupil Expenditures	Per Pupil Revenue Limit
Group 1 * reform	2173***	163***
	(86)	(16)
Group 2 * reform	2048***	159***
	(95)	(18)
Group 3 * reform	2086***	125***
	(112)	(24)
Group 4 * reform	1882***	3
	(152)	(22)
Group 5 * reform	1866***	-172***
	(265)	(38)
Observations	318	318
R-squared	0.97	0.96

All regressions are weighted by district enrollment, include district fixed effects, and control for enrollment and ethnicity. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 8: Effect of California School Finance Reform on Grade 12 Reading, Writing, Spelling and Mathematics Tests

	Reading	Writing	Spelling	Mathematics
	(1)	(2)	(3)	(4)
Group 1 * reform	2.11***	3.13***	2.98***	2.63***
	(0.54)	(0.50)	(0.47)	(0.58)
Group 2 * reform	1.28**	2.46***	2.67***	2.60***
	(0.62)	(0.61)	(0.50)	(0.60)
Group 3 * reform	-0.23	0.76	1.33***	1.80***
	(0.68)	(0.61)	(0.38)	(0.64)
Group 4 * reform	0.72	2.11**	2.22***	1.56
	(0.97)	(1.06)	(0.60)	(0.83)
Group 5 * reform	0.71	1.39**	0.98**	1.99***
	(0.65)	(0.60)	(0.39)	(0.59)
Observations	318	318	318	318
R-squared	0.92	0.93	0.86	0.95

All regressions are weighted by district enrollment, include district fixed effects, and control for enrollment and ethnicity. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 9: Effect of California School Finance Reform on Grade 6 Reading, Writing and Mathematics Tests

	Reading	Writing	Mathematics
	(1)	(2)	(3)
Group 1 * reform	3.86***	9.75***	6.48***
	(0.79)	(0.79)	(0.66)
Group 2 * reform	3.90***	10.05***	6.07***
	(0.89)	(1.18)	(0.80)
Group 3 * reform	2.84***	8.51***	5.79***
	(0.60)	(0.58)	(0.48)
Group 4 * reform	3.04***	9.54***	5.36***
	(1.12)	(1.09)	(0.97)
Group 5 * reform	4.00***	8.59***	5.35***
	(0.92)	(1.10)	(0.76)
Observations	318	318	318
R-squared	0.96	0.95	0.97

All regressions are weighted by district enrollment, include district fixed effects, and control for enrollment and ethnicity. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 10: Comparing Impacts in Michigan and California

Panel A: Comparing Effects on School Spending

	California		Michigan	
	Per Pupil Expenditure	Revenue Limit	Per Pupil Revenue	Per Pupil Expenditure
	(1)	(2)	(3)	(4)
Group 5 - Group 1	-0.08	-0.30	-0.04	-0.02

Panel B: Comparing Effects on Achievement

	California				Michigan	
	Grade 12		Grade 6		Grade 4	
	Reading	Math	Reading	Math	Reading	Math
	(5)	(6)	(7)	(8)	(9)	(10)
Group 5 - Group 1	-0.03	-0.01	0.00	-0.02	-0.08	-0.20

All effects are in standard deviation terms.

Table 11: Investigating Differential Movements Into School Districts

	White	Black	Hispanic	Asian
	(1)	(2)	(3)	(4)
Group 2 * reform	0.02	-0.01	-0.01	0.00
	(0.03)	(0.01)	(0.02)	(0.01)
Group 3 * reform	0.00	-0.02	0.01	0.01
	(0.03)	(0.01)	(0.03)	(0.01)
Group 4 * reform	-0.03	0.01	0.00	0.02**
	(0.04)	(0.03)	(0.03)	(0.01)
Group 5 * reform	0.06**	-0.02	-0.05***	0.01
	(0.03)	(0.02)	(0.02)	(0.02)
Obs	318	318	318	318
R-squared	0.94	0.91	0.93	0.89

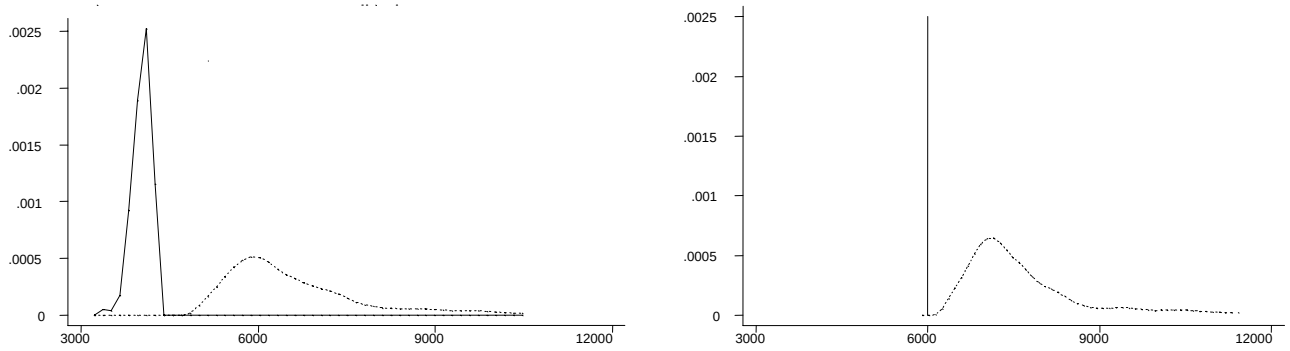
Note: All regressions are weighted by district enrollment and include district fixed effects. *, **, ** denote significance at the 10, 5, and 1 percent level. Group 1 is omitted here. The figures show percentage changes in the various gaps relative to group 1.

Table 12: Changes in Private School Enrollment
(Michigan School Districts, 1990 and 2000 Censuses)

	(1)	(2)
Year 2000 Dummy	0.12	0.12
	(0.48)	(0.48)
Group 1 * Yr 2000	0.76	0.76
	(0.58)	(0.58)
Group 2 * Yr 2000	-0.28	-0.28
	(0.65)	(0.65)
Group 4 * Yr 2000	-0.73	-0.07
	(1.01)	(0.61)
Group 5 * Yr 2000	-0.87	-1.04
	(0.66)	(0.63)
R-squared	0.92	0.92
Observations	1038	1028
Districts	519	514
Weighted	Y	Y
Exclude 5 Biggest Districts	N	Y

The dependent variable is the percentage of enrolled students in a school district who attends private schools. Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The five biggest districts are Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). The regressions are weighted by the enrollment of the district. Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels.

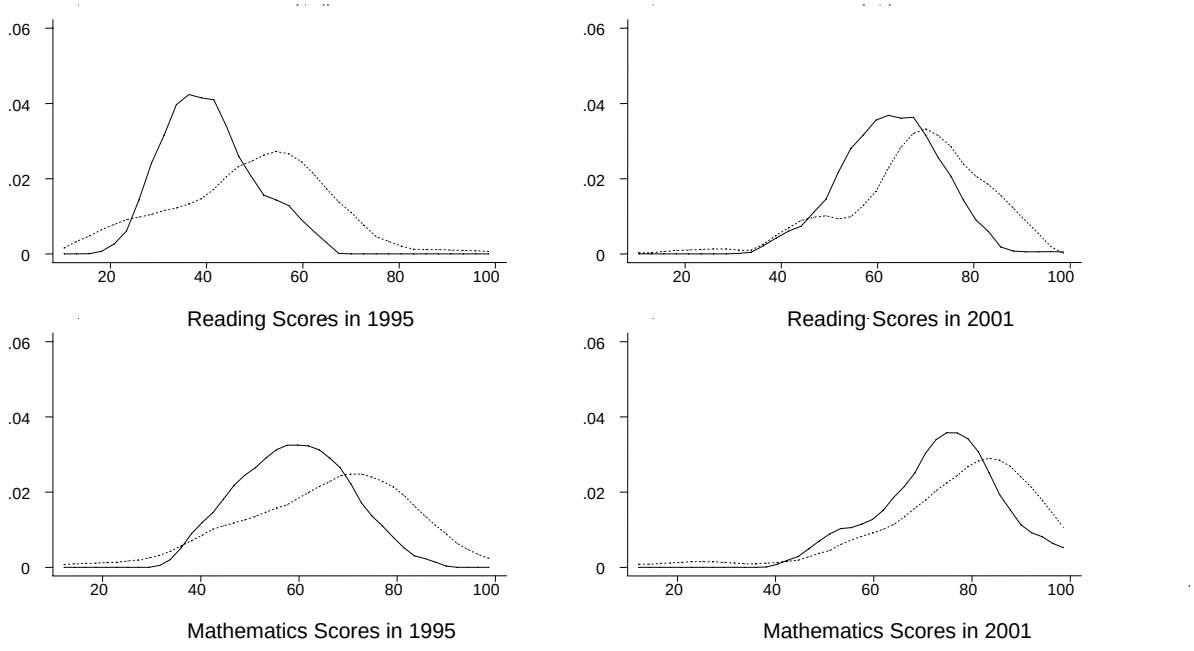
Source: Author's calculations from the 1990 and 2000 decennial censuses.



____ Lowest spending group …… Highest spending group

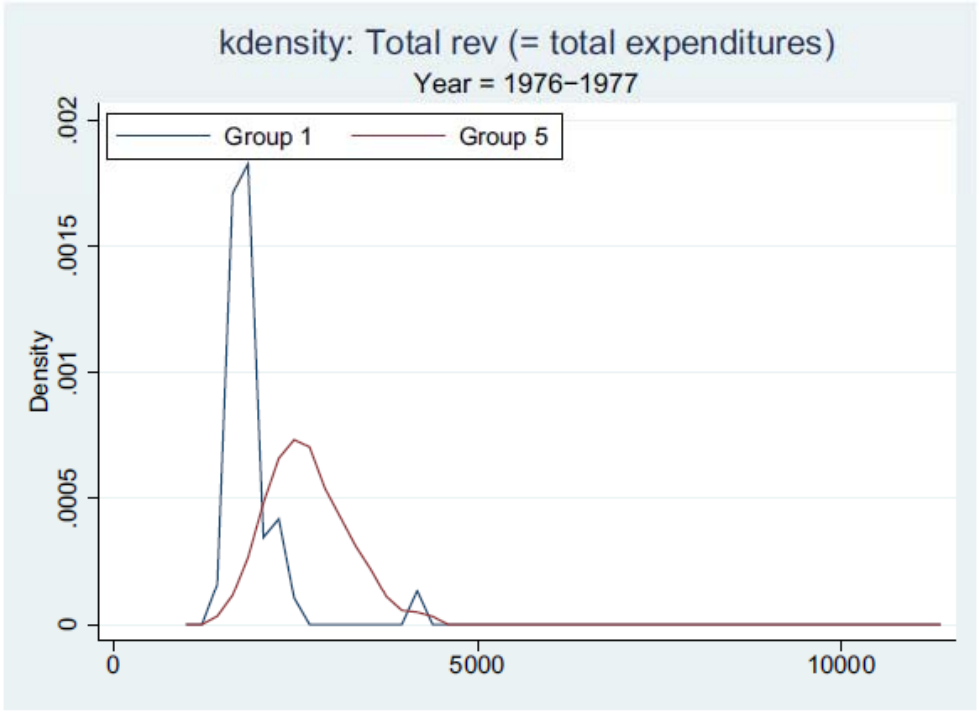
Figure 1. Distribution of Foundation Allowances in 1994 and 2001, Groups 1 and 5

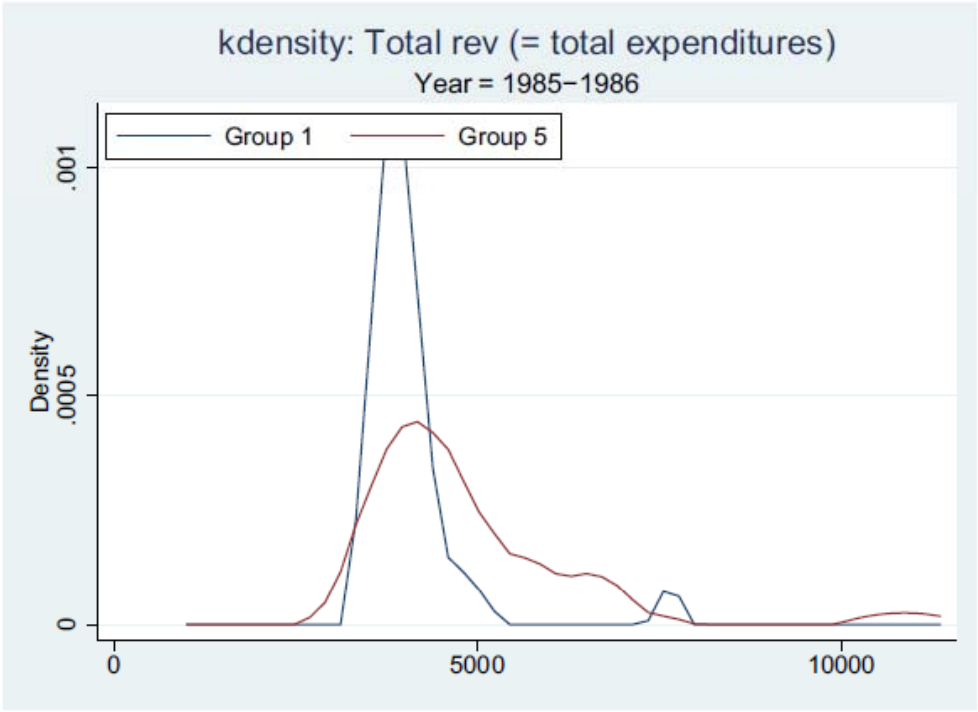
Note: For 2001, the foundation allowances for all districts in Group 1 were at $6000.

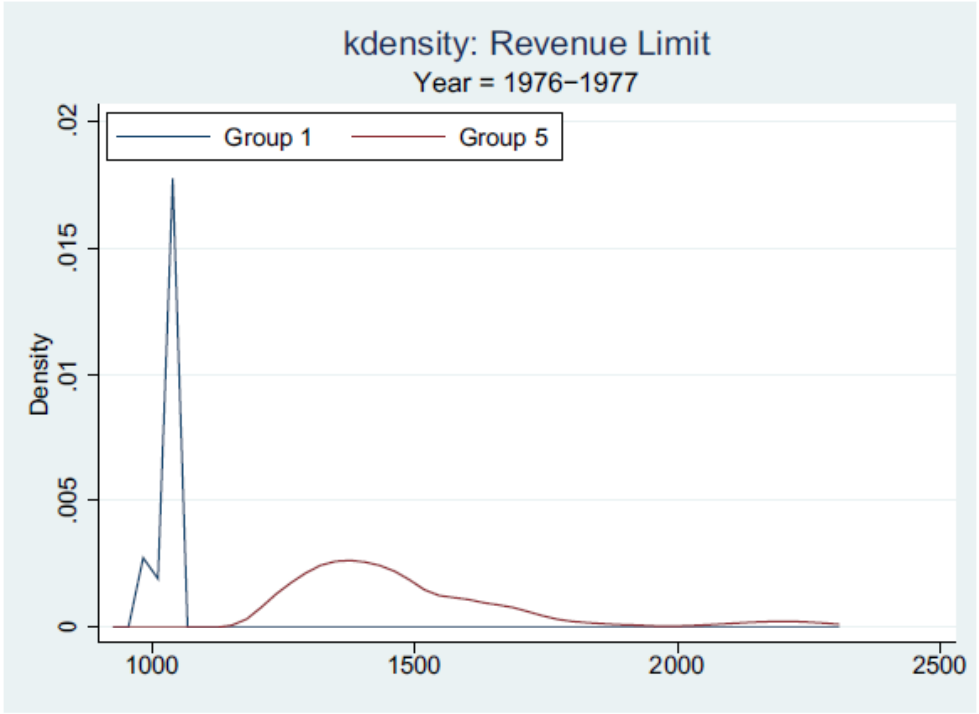


____ Lowest spending group …… Highest spending group

Figure 2. Distribution of Test Scores in 1995 and 2001, Groups 1 and 5







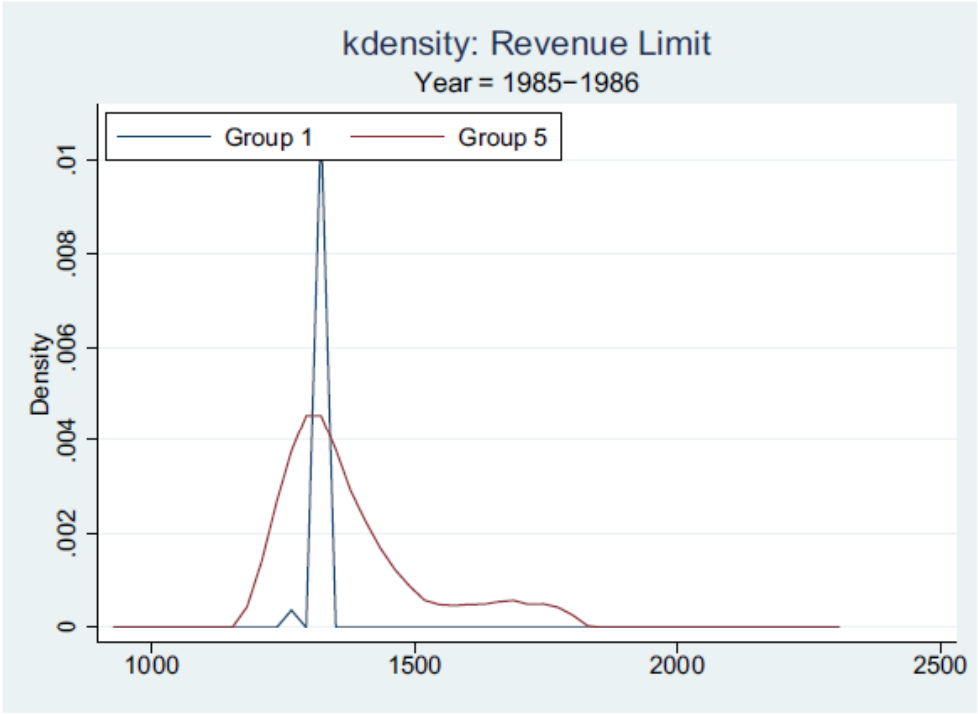


Figure 3. Distribution of Spending in California in 1976 and 1985, Groups 1 and 5

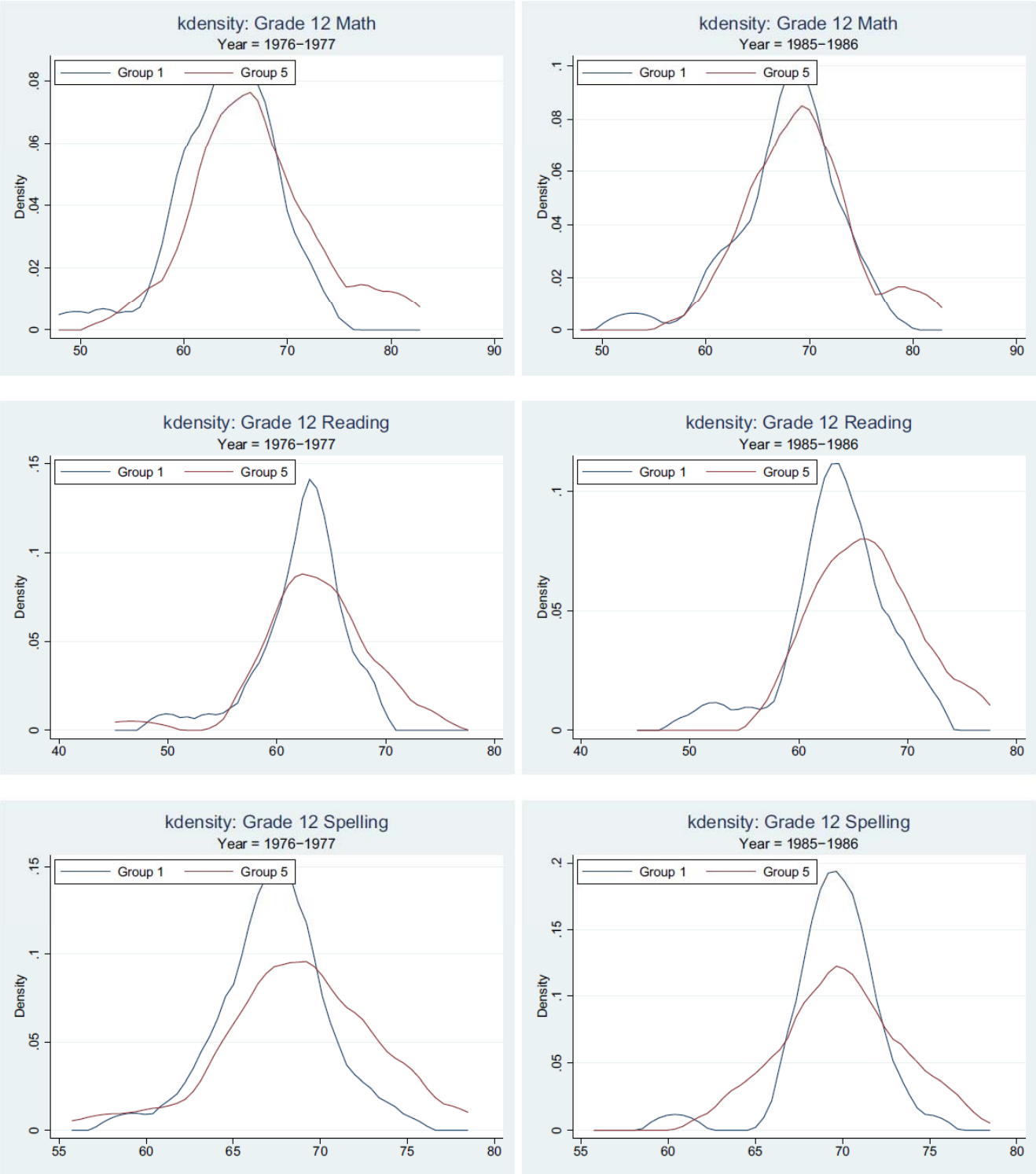


Figure 4. Distribution of Grade 12 test scores in 1976-77 and 1985-86, Groups 1 and 5

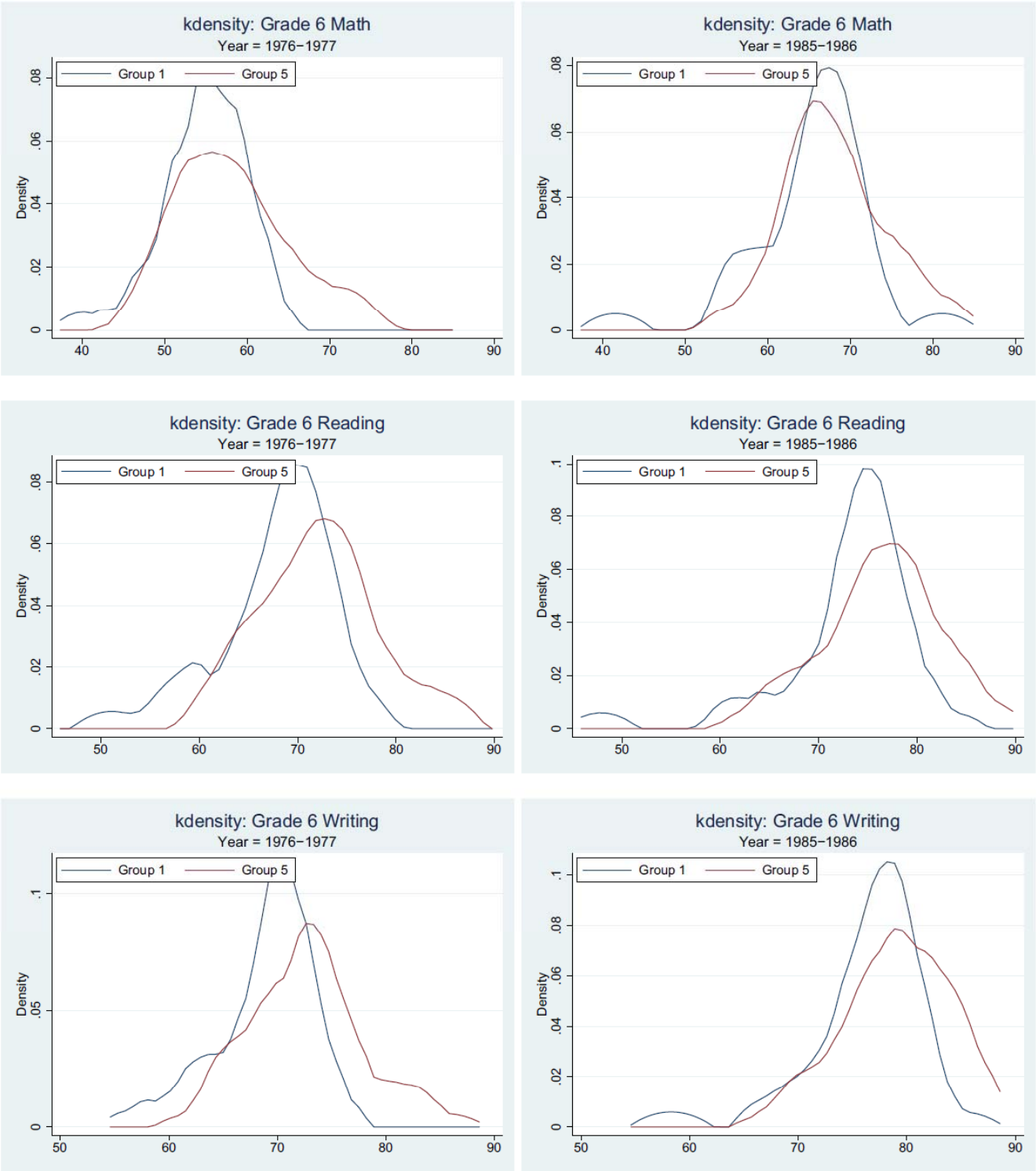


Figure 5. Distribution of Grade 6 test scores in 1976-77 and 1985-86, Groups 1 and 5