Effect of Constraints on Tiebout Competition: Evidence from the Michigan School Finance Reform*

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Abstract

In 1994, Michigan enacted a comprehensive school finance reform that not only significantly increased state aid to low-spending districts, but also placed significant limits on local discretion over school spending. These limits especially constrained the high spending districts. This scenario affords us a unique opportunity to study the implications of such reforms on resource allocation, particularly as they differentially affected districts situated at different points of the pre-reform spending distribution. We find that the reform generally led to a negative effect on the growth of instructional expenditure and its share, as well as in teachers per pupil. But these declines were sharpest in the high spending districts. Interestingly, while trends for shares of administration expenditure as well as administrators per pupil also showed across the board declines, these declines were actually the smallest for the high spending districts. To the extent that instructional expenditures are more productive and contribute to student achievement more than administrative expenditures, these results suggest that loss of discretion acted as a disincentive for districts located throughout the spending distribution. Moreover, this disincentive effect was the strongest in the high spending districts. These findings have important policy implications and suggest that school finance reforms (or other policies) that place significant restraints on local discretion can lead to unintended disincentive effects, which should be taken into account while devising policy.

Keywords: Tiebout, Incentives, Resource Allocation, School Finance
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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 United States. A substantial share of the total funds for educational expenditures is raised at the local school district level, primarily by taxes levied on property. This reliance on local tax revenues leads to a bundling of two distinct choices—residential choice and school choice—and often results in a Tiebout-type sorting across school districts. As is often argued, demand for (and affordability of) a good education increases with parental income and educational attainment. So families with similar demands for education congregate, a pattern that leads to economic and demographic segregation across school districts within a state. This in turn leads to local discretion playing an important role in school spending and related decisions, and to the formation of high-spending and low-spending school districts.

A school finance reform, loosely interpreted as an equalization of school finances within state boundaries, is aimed at weakening this link between residence choice and demand for schooling. Such measures, which have over the years become an important element in the K-12 educational system of the country, typically involve giving large sums of money to the lowest-spending school districts, in an effort to reduce the prevailing disparities in per pupil spending. Moreover, school finance reforms either severely limit local discretion or end it altogether. This diminished local control over local government activities (schooling in this case) might have significant implications for the provision of public education.[1] In this paper we study a hitherto-neglected aspect of school finance reforms—in particular, how they might affect the allocation of expenditures in various categories. Previous literature has documented that such reforms adversely affect student performance in high-spending districts, where the constraints on local discretion are the most binding. In contrast, they are found to favorably affect student performance in previously low-spending districts. These findings suggest that a school finance reform might differentially affect incentives in districts located at different parts of the pre-reform spending distribution. This, in turn, might affect resource allocation differently across these districts. This paper seeks to

[1] 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.

study whether this was indeed the case in Michigan. Since school finance reforms are an important feature of the K-12 educational landscape in the country, understanding the full range of consequences of such reforms is essential from a policy perspective.

We focus on the Michigan school finance reform – one of the most important and comprehensive reforms in the nation. In 1994, Michigan radically altered its school financing rules, and the Michigan school finance reform, known as Proposal A, was enacted. Subsequently there were significant changes in per pupil spending following the reform, and local discretion over school spending was largely abolished. Note that Proposal A did not follow from any court ruling, making Proposal A one of the more unique school finance reforms. Among other things, the practical abolition of local control over the amount of school spending in the aftermath of the reform affords us a unique opportunity to study the implications of limiting local government control over the quality of local public goods.

The school finance reform in Michigan was instrumental in significantly increasing the growth rates of spending in the lowest-spending districts. In fact, the reform overturned trends toward increased disparities in spending evident in the immediate pre-reform period (Cullen and Loeb, 2004; Papke, 2005; Roy, 2011). These studies also find evidence of improvement in test scores of the lowest-spending districts. However, the reforms also limited districts' discretionary power over school spending, affecting in particular the highest-spending districts in the state, which had earlier been increasing their per pupil expenditures at significantly higher rates than others. Consequently, the subsequent growth rates of spending in the highest-spending districts were considerably below those for the other districts. Roy (2011) finds that the restrictions imposed on the highest-spending districts adversely affected their educational outcomes, as measured by student performance on standardized tests administered by the state.

In this paper we go behind the black box to look at whether the changes in student performance were related to changes in resource allocation, and whether changes in the incentives generated by the school finance reform might have caused such changes in resource allocation. For example, the loss of discretion in high-spending districts might have acted as a discouragement and induced them to become

less productive. The low-spending districts also faced a loss of discretion—but at the same time they enjoyed increases in revenue and might have been able to relax previously existing financial constraints.

We use detailed data on disaggregated spending to throw light on whether and how incentives created by the school finance reform mattered. We distinguish between two types of expenditures: (i) instructional expenditure and pupil support (or student services) expenditure that are thought to be closely related to student learning and development and (ii) administrative expenditure such as general support, school support and business support expenditure that are thought to be less so. We find that districts located throughout the spending distribution experienced declines in the growth rate of both instructional expenditure and pupil support expenditure per pupil, and more importantly, their shares, following the Michigan school finance reform.[2] The general across-the-board decline, including declines in the lower spending districts which witnessed steep increases in the growth rate of overall per pupil spending indicates that Proposal A might have had a disincentive effect on the school districts.

Interestingly, the highest spending districts exhibited the sharpest declines in the growth rate of instructional expenditure per pupil as well as its share. This is strongly suggestive of disincentive effects, as the highest spending districts were also the worst affected by loss of discretion brought about by the school finance reform. The decline in the growth rate of the share in the highest spending district is insightful–while the decline in overall spending growth rates in the high spending districts could mechanically lead to decrease in the growth rate in various component categories of expenditure, including instruction, the decline in the growth rate of its *share* reflects deliberate choices made by the school districts.

The patterns obtained for the various categories of administration expenditure reinforce the picture obtained above. Districts throughout the spending spectrum show declines in the growth rate of the shares of various categories of administration expenditure, but interestingly, these declines are

[2] Note that the low spending districts exhibited an increase in the growth rate of instructional expenditure per pupil, but not in its share (which showed a decline, though not statistically significant). Note that the shares are the more relevant measures as the increase in spending growth that the low spending districts faced following the school finance reform could have automatically led to increases in expenditure growth in various categories, including instruction. Moreover, these districts showed a decline in the growth rate of pupil support services per pupil as well as a statistically significant decline in its share.

the *smallest* for the highest spending groups. If the largest cuts in the growth rates of instructional expenditure and their shares were merely due to financial constraints experienced by the high spending districts, then one would also expect to see similar sharp cuts in the various administration categories as well in these districts, especially because instruction is considered to be the more productive category. However, this was not the case, which again suggests the presence of disincentive effects.

Facing revenue constraints, districts may be expected to first implement cuts in less productive categories (such as administration) and maintain productive categories (such as instruction) as much as possible. But patterns in financial indicators as well as non-finance indicators suggest that this was actually reversed in the highest spending districts. Overall, the patterns above suggest that loss of discretion brought about by the school finance reform acted as a disincentive to the school districts, and this effect was most prominent in the high spending districts that were most severely constrained by the reform. The findings have important policy implications—they indicate that school finance reforms that restrict local discretion can have unintended disincentive effects on the school districts. These should be taken into account by policymakers when designing policies that limit local discretion of school districts or similar authorities.

This study is most closely related to two strands of literature in public finance and economics of education – one that deals with the effects of school finance reforms, and one that looks at the effects of previous tax and expenditure limitations. The empirical studies on school finance reforms generally find that these reforms – particularly those mandated by the courts - have had a large positive effect on equalization of school resources (Murray, Evans, and Schwab, 1998; Card and Payne, 2002; Cullen and Loeb, 2004; Corcoran and Evans, 2007). There is also some evidence of positive effects on student performance in districts which witnessed large increases in spending and among family background groups which were initially lagging behind (Card and Payne, 2002; Papke, 2005; Roy, 2011)). However, none of these studies - either for Michigan or any other state - focuses directly on changes in resource allocation. In particular, there is no literature that analyzes spending priorities of districts in the aftermath of such programs and relates them to changes in the nature of the incentives

faced by districts located at different points of the pre-program spending distribution. This study sheds light on this important, but so-far neglected issue.

This study is also related to the literature that analyzes the effects of broader tax and spending limits. 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 1970s and early 1980s-on school services). He finds that limitations were associated with larger student-teacher ratios, lower starting salaries for teachers, and lower student performance. Dye and Mcguire (1997) analyze the effect of a property tax cap enacted in a subsample of Illinois districts in 1991. Their results suggest that the cap had a restraining effect on school district operating expenditures, but no effect on school district instructional spending. Figlio (1998) studies the effect of Oregon's Measure 5, a tax limitation imposed in 1990. He finds that the incidence of Measure 5 was borne by instructional expenditures at least as much as by administrative expenditures

The present study differs from earlier studies in some fundamental ways. First, the questions posed here are different. We are interested in analyzing how school finance reforms, particularly those that constrain local discretion, affect incentives and resource allocation of districts at different parts of the spending distribution. We are particularly interested in how the reforms affected resource allocation in the high-spending districts which arguably felt most constrained by the reform. Second, there are unique advantages of looking at the Michigan school finance reform. Michigan had 524 K-12 districts at the time of the reform – the large number of independent districts, coupled with the predominance of local control in school affairs, ensured a high degree of Tiebout sorting in the pre-reform period. For example, focusing on the Detroit Metropolitan Area, Fernandez and Rogerson (1996) document that there were significant disparities in per pupil spending even across adjacent communities in pre-reform Michigan. For example, in 1986-87, Bloomfield Hills school district was spending about $7000 per child, neighboring Dearborn school district spent much less than $3000. There were similar differences both in median household incomes and in student performance across districts, suggesting that the pre-reform situation closely corresponded to a Tiebout-type sorting of households into desired (educational)

jurisdictions.[3] Thus Michigan provides a setting where local discretion was quite important, and our findings show the effect of abolishing that discretion over educational spending. Third, while some of the previous literature on tax and expenditure limitations concerned property taxes and hence had direct bearing on school expenditures, it is arguable that a school finance reform will have a more direct impact on allocation of educational spending and outcomes than a general tax limitation policy. Note also that, as Hoxby (2001) argues, unlike most other reforms, school finance equalization has affected every school in the nation—some of them dramatically. Fourth, only a few studies make the link between tax or revenue limitations, district incentives and spending allocation. Specifically, no previous study on school finance reform has studied this link. In Michigan, prior literature has documented the restrictions on revenues faced by the highest-spending districts in the post-Proposal A period, as well as the relative decline in student performance in these districts (Cullen and Loeb, 2004; Roy, 2011). We analyze whether this decline might have stemmed in part due to changes in spending priorities by the constrained districts induced by the incentives inherent in the school finance reform. To the best of our knowledge, these results are novel in the literature and have important policy implications. They highlight the fact that there may be unintended consequences of school finance reforms as far as resource allocation is concerned.

2 Michigan School Finance Reform

Unlike most comprehensive school finance reforms, the Michigan program was not a response to any adverse court ruling or to a sudden rise in public concern over inequalities.[4] It was rather a consequence of the prevailing debate over 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 Michigan was fourth among U.S. states in the share of school spending financed locally

[3] Gramlich and Rubinfeld (1982) also found evidence of clustering of households with similar demands in Michigan, particularly in the urban centers.

[4] Two court cases in the previous two decades, Milliken vs. Green in 1973 and East Jackson Public Schools vs. Michigan in 1984, had both found the existing finance system constitutional. For more detailed descriptions of the Michigan reform, see Addonizio, Kearny, and Prince (1995), Courant, Gramlich, and Loch (1995), and Courant and Loeb (1997).

(61 percent).[5] 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 percent. This change led to a more than doubling of the state share of K-12 spending, and state aid was used to equalize per pupil spending across districts.[6]

At the time of the reform, Michigan's state aid was based on a district power-equalizing (DPE) formula, whereby districts were allocated state funds based on their tax efforts. The objective was to make the system wealth-neutral,[7] leaving the choice of millage rates (property tax rates) to the local districts but supplementing revenues in districts with a low property tax base per pupil. However, the equalizing power of DPE 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. In addition, 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 1994-1995 school year, 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. Second, future increases in all districts' foundation allowances were governed entirely by the state legislature. The lowest-spending districts were allowed to increase spending at much faster rates than their richer counterparts so that the spending gap across districts could be progressively closed. Furthermore, all districts, however rich, were held harmless with no absolute decline in per pupil spending in any district.

Local discretion over spending was largely abolished following Proposal A; future increases in spending were dictated solely by the state. This change had interesting implications for the effect of the

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

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

[7] 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. However, preferences for school spending are generally increasing in income and educational attainment, and the wealth-neutrality principle per se does not equalize per pupil expenditures across districts (see Feldstein 1975).

program on the high-spending districts. In these districts, per pupil spending barely kept pace with inflation after the reform and rose by much less than had been the case just before the reform. For example, Bloomfield School District (a high-spending district) could increase its nominal spending by only about 10 percent between 1994 and 2001. Since prices went up more than 20 percent during this period, many of these districts suffered a stagnation, if not an actual fall, in their real per pupil spending.

3 Discussion: Effects of School Finance Changes on Incentives and Responses of School Districts

In this section, we discuss the basic intuition behind the effects of a school finance reform on school district incentives and resource allocation. In particular, do school finance reforms differentially affect school districts situated at different levels of the pre-program spending distribution?

The typical school finance system in the United States 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). This can increase the demand for the respective schools and for the housing in the neighborhood, and thereby increase 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 expenditures, and the districts have virtually no discretion, unlike earlier. Another important feature is that the low-income districts see their per pupil revenue increasing at a very high rate, while the high-income districts see their per pupil revenue barely rise.

How might these changes affect the incentives and responses of public school districts? Because low-income districts face a large increase in per pupil revenue after school finance reform, they might have an incentive to be more productive to attract students and increase revenue. But at the same time,

they lose their local discretionary power in the sense that increasing efficiency to improve school district quality would no longer increase local property tax revenue. This situation might have an adverse effect on effort and thus render the total effect on school district productivity ambiguous. It is worth noting here that, independent of effort, an increase in resources in low-spending districts can by itself affect student test scores. For example, increased resources might relax financial constraints faced previously and thus lead to improvement in performance by itself.

High-expenditure districts, in contrast, face a very different situation. Unlike the low-spending districts, they do not face an influx of money. But they do face a loss of discretion, given that their future revenues and expenditures are determined by the state. No longer can they affect revenue by increasing effort. Local discretion channel that enabled them to affect revenue earlier can no longer operate. Typically, per pupil revenue goes up by very little in such districts. These districts, therefore, might have less incentive to be productive, and one would expect school finance reforms to have an adverse effect on efficiency in high-income districts. In the empirical section, we proxy district productivity by different measures relating to allocation of spending, following the previous literature on this issue (as discussed in section 5). We examine if there is any evidence of an adverse effect of Proposal A on district incentives and productivity (and if it varied by pre-reform spending levels of districts).

Note, though, that while one might expect the above incentives and responses to work in the absence of other forces, these may be diluted or partly offset if there are other related changes, often triggered by school finance programs themselves. First, school finance equalizations might lead to differential movements to private schools across districts. For example, imposition of constraints might make high-spending districts less attractive and might induce parents in these districts to move their children to private schools. If the more motivated parents opt for such a transfer, there might be resultant changes in incentives faced by these school districts which directly affect their spending patterns.[8] Similarly, incentives and resource allocation in low-expenditure districts may also be affected by such differential

[8] There might also be such a change in incentives and spending priorities if instead, it is the low-performing students who move away – they might do so if, for example, the families of these students feel that the reduction in resources will cause the school districts to focus more on the easier-to-teach high-performing students.

moves.

Moreover, during the period under consideration, there was a rapid growth of charter schools in Michigan. Establishment of charter schools could affect student mobilities and exert new competitive pressures on schools on school districts. These factors, might in turn, affect resource allocation in school districts.

Not only can these factors differentially affect high- and low-spending districts, but they can play out differently in different districts and hence can temper or reinforce the effects discussed above. Which factors did indeed come into play, how they affected districts, and what is their potential to bias the estimates are finally empirical questions that we address below in section 7.

4 Data

We use data from multiple sources in the analysis that follows. Most of these come from the Michigan Department of Education (henceforth, MDE) and the School District Finance Survey (F-33) of the National Center for Education Statistics' Common Core of Data. The total revenue and expenditure figures are taken from the Bulletin 1014s, published annually by MDE. The disaggregated data on different spending categories—instructional expenditure, pupil support services, total salaries, instructional salaries, and administration expenditure categories such as general support expenditure, school support expenditure, business support expenditure—are obtained from NCES's School District Finance Survey. Instructional expenditures include teacher salaries and benefits, and classroom supplies; pupil support services include record keeping, counseling, student appraisal, nursing, medical, dental, psychological, speech service; general administration includes expenditure for Board of Education and executive administration (office of the superintendent) services; school administration includes expenditure for the office of the principal services; business support includes payments for fiscal services, purchasing, warehousing, supply distribution, publishing and duplicating services.

The data on ethnic and gender compositions and free lunch eligibility come from the Pupil Headcount

Files and the Food and Nutrition Files of the MDE K-12 database.[9] We use enrollment data from F33 to generate per pupil expenditure figures for variables obtained from that database, while we use enrollment data from Bulletin 1014 to create per pupil figures for variables obtained from Bulletin 1014.

The data used in this study span the period 1990-2001, which straddle 1994, the last year before reform.[10] This time span allows us to capture differences in pre-reform trends across districts and also to capture program effects that may occur only with a lag.

In addition, we use data from the 1980 decennial census and the 2000 decennial census, both obtained from the Census Bureau, to look at the changes in private school enrollment across Michigan school districts during this decade.

For our analysis involving private school entry, we rely on the data on private schools collected by the National Center for Education Statistics (NCES) of the U.S. Department of Education. The NCES administers the Private School Survey (PSS) every other year, which collects information on every private school in the nation. We obtained private school location data from the PSS for the years 1990-2000.

5 Empirical Analysis: Investigating the Impact of the Reform on Resource Allocation in Different Categories

The productivity of school districts is not directly observable. However, we can proxy it using indicators used previously in the literature. Among the most important and popular of these is the allocation of expenditures into individual categories. For example, Welsch (2011) examined the effect that charter school competition in Michigan had on the percentage of total general fund expenditures allocated toward instructors, administrators, and support personnel in public school districts. He found that competition from charter schools resulted in a larger percentage of expenditures on instructors and smaller percentage expenditures on employees who support instructors. In other studies, percentage

[9] Some of the data on ethnicity and free lunch eligibility for the early years come from the Common Core of Data of the National Center for Education Statistics.

[10] Henceforth in the paper, we refer to school years by the calendar year of the spring term; for example, 1990 refers to academic year 1989-90, and so on.

of expenditures spent on administration has often been seen as a measure of rent-seeking activities while the percentage spent on instruction is usually considered to be more beneficial to students and academic outcomes. For example, a recent communiquè from the U.S. Department of Education (2009) explicitly asked school districts to invest Title I dollars in improving instruction, so as to bolster student achievement (Fuller et al., 2011). A study by Webber and Ehrenberg (2009) examining patterns of spending in higher education find that the only expenditure categories that have statistically significant positive impacts on college graduation rates are those for instruction and student services.

We investigate the effect of the Michigan school finance reform on resource allocation using detailed data on revenue allocation obtained from the F33 database. As outlined in section 4, it includes data on different expenditure categories such as instructional expenditure and pupil support services, data on school personnel salaries (including teachers), and administration expenditure categories such as general support expenditure, school support expenditure, and business support expenditure. Resources allocated to these categories after the reform and especially the shares (percentage contributions) of these categories give us a sense of how the school districts responded in the aftermath of Proposal A. In Michigan, there is some evidence that school districts impacted by other reforms did indeed change their allocation of resources. Specifically, as discussed above, Welsch (2011) finds that school districts threatened by competition from charter schools increased the share of instructional expenditures.[11] This indicates that school districts do respond when facing incentives. Therefore, if the school finance reform did indeed dilute their incentives to be productive, one would expect to see corresponding responses from the school districts in terms of changes in resource allocation.

To examine the effect of Proposal A on allocation of school spending in Michigan, we first classify the 524 K-12 districts into five equal groups based on the 1993-94 level of per pupil spending.[12] The

[11] In fact, according to Michigan Law, district administrators have discretion over their employment mix. The Michigan (Revised) school code, section 380.11a, notes that: (3) A general powers school district has all of the rights, powers, and duties expressly stated in this act; ...including, but not limited to, all of the following:...(d) Hiring, contracting for, scheduling, supervising, or terminating employees, independent contractors, and others to carry out school district powers.

[12] This classification follows Roy (2011)—Loeb and Papke too have a similar classification in terms of quintiles of pre-reform spending distribution. There are an additional 31 non-K-12 districts in Michigan; however, most of these are very small.

districts in the lowest-spending group – Group 1 – saw their revenues and expenditures increase at very rapid rates over the next several years. On the other hand, districts in the highest-spending group (Group 5) saw their revenues increase at a very low rate, often below the rate of inflation.

Summary statistics on these groups of districts are shown in Table 1. For districts in the Upper Middle Group, we further show the statistics when we leave out Detroit, the most populous school district in the state. As expected, districts in the lowest spending groups had lower revenues and expenditures per pupil, though the differences across Groups 1, 2 and 3 were not that big. In each of the expenditure categories (except spending on general support expenditures), the two highest spending groups (Groups 4 and 5) spent more than the other three groups. Total salaries per pupil were also lower in the lower spending districts, as were instructional salaries. Again, the differences were modest between Groups 1, 2 and 3 but large with respect to districts in Groups 4 and 5. In almost all expenditure and salary categories (except general support and business support expenditures), there were strict hierarchies between the groups, with group 5 spending the highest and group 1 spending the lowest. Shares of the different expenditure categories (as percentages of total expenditure) are presented in Table A1. As can be seen, for each of the categories, the shares were similar across the different groups of districts in the pre-reform period.

There were some differences across the groups of districts in terms of student demographics. Districts in Groups 1, 2, 3 and 5 were overwhelmingly white, while districts in Group 4 were less so. Group 4 had a significant share of black students unlike the other groups. The proportion of Hispanic students in each of the groups was low. The Group 4 districts had the highest share of poor students (as proxied by their eligibility for the federal free lunch program), while the proportions in the other groups were considerably lower.

Using preprogram data, Table 2 investigates whether there were differences in pre-existing trends between the different groups in per pupil revenue and expenditure before Proposal A. We run the following fixed-effects regression using data from the five years immediately preceding the reform (1990-

94):

$$Y_{sgt} = \alpha_0 + \sum_{g \in \{1,...,5\}} \alpha_{1g} * (D_g * t) + \alpha_2 * X_{sgt} + \alpha_s + \varepsilon_{sgt} \qquad (1)$$

where $g \in \{1, ..., 5\}$, Y_{sgt} is the per pupil revenue or expenditure of district s in group g in year t, t denotes time trend, α_s is the district fixed effect, and X_{sgt} are the time-varying characteristics (controls).[13] D_gs are the dummy variables for the respective groups of districts.

Throughout this study, we report results from two samples: the first includes all 524 districts, and the second excludes Detroit.[14] The first two columns of Table 2 show the results for per pupil revenues; the third and fourth columns show the results for per pupil expenditures. The Table shows a significant hierarchy in spending growth rates before the reform. Both per pupil revenues and per pupil 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 lagging behind all other districts. These data show that existing inequalities had been widening in the years just before the reform.

Having documented the pre-reform setting, we next turn to investigating the effect of Proposal A. To estimate the trends in different variables, including different categories of spending, in the different groups in the post-reform period, we run the following fixed-effects (FE) regression:

$$Y_{sgt} = \beta_0 + \sum_{g \in \{1,...,5\}} \beta_{1g} * (D_g * t) + \sum_{g \in \{1,...,5\}} \beta_{2g} * (D_g * reform)$$
$$+ \sum_{g \in \{1,...,5\}} \beta_{3g} * (D_g * reform * t) + \beta_4 * X_{sgt} + \alpha_s + \varepsilon_{sgt} \qquad (2)$$

Here $reform$ is a binary variable that takes the value of 0 in the pre-reform period (1990-94) and 1 afterward (1995-2001). The variable t represents the time trend. The interaction term $(D_g * t)$ allows for differences in pre-program trends between groups, and allows for estimation of post-program effects after controlling for these pre-reform trends. X_{sgt} includes the racial and gender composition of students and the percentage of students eligible for free or reduced-price lunches in the regressions.

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

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

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: β_{2_g} captures the intercept shifts, while β_{3_g} captures 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. Further, the highest spending districts were held harmless, and no district suffered any actual decline in spending. So, the estimated intercept effects are not that interesting and informative; they were also not very different across groups and not statistically different from each other in most cases. Consequently, to save space, below we focus on trend shifts in the post-program period. These will show if the different groups of school districts responded to the incentives created by Proposal A by changing the allocation mix, as the staggered rules took effect over the years.

6 Results

First, Table 3 analyzes the effect of the Michigan reform on per pupil revenues and expenditures using specification (2). The results obtained in this table mirror those obtained in the previous literature (Papke 2005; Roy 2011). Both revenues and expenditures grew at a considerably higher rate in the low- expenditure districts than in the high-expenditure districts after the reform. In fact, the hierarchy seen above in the pre-reform period 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 Group 2 districts, and so on. Furthermore, these effects were not only economically different from each other, but statistically different as well. In addition to the spending patterns, recall that the previous literature found evidence in favor of improvements in test score performance in low spending districts but deteriorations in high spending districts. In this backdrop, we investigate the impact of the school finance reform on spending in various component expenditure categories in Groups 1-5, and analyze whether these changes could have induced the above documented changes in performance in the literature.

The results for instructional expenditure and pupil support services, the expenditure categories most closely related to student learning and development, are presented in Table 4. The first two columns report changes in instructional expenditures, after controlling for pre-existing trends. As earlier, odd-numbered columns include all 524 school districts, while even-numbered columns exclude Detroit. Instructional expenditures grew at a higher rate in the lowest spending districts after the reform. In contrast, there was a decline in the growth rate of instructional expenditure in each of the other groups. This decline is by far the largest in the highest spending group. It is highly statistically significant, and is also statistically different from the shifts exhibited by Groups 1, 2 and 3.[15] Interestingly, the groups exhibit a strict hierarchy—Group 5 districts show the sharpest decline in the growth rate of instructional expenditure, followed by districts in Group 4, and so on.

Columns (3)-(4) of Table 4 look at the post-program patterns in the percentage of total expenditure allocated to instruction (alternatively referred to as the share of instructional expenditure in the paper). Interestingly, all groups exhibit a decline in the trend (or equivalently, growth rate) of instructional expenditure shares in the post-reform period, though they were not statistically significant in most cases. The sharpest decline is evidenced in the highest spending districts and this decline is also statistically different from zero. From the almost general across-the-board decline, including declines (though not statistically significant) in districts in Groups 1 and 2 which witnessed increases in the growth rate of overall per pupil spending, it seems that Proposal A might have had a disincentive effect on the school districts. The proximate cause was possibly the loss of discretion over spending, working its way through the reduction in growth rate of instructional expenditure as well as its share. While Group 1 exhibits an increase in growth rate of instructional expenditure, it still exhibits a decline in the growth rate of its share (although it is not statistically significant). The share is perhaps a more pertinent measure of the willingness of the districts to invest in instruction, especially because the increase in growth rate of total spending in the lower spending groups would automatically have a tendency to increase growth rates in the various expenditure categories, including instruction.

[15] The statistical differences of effects between groups are discussed in the text, they are not reported in the tables to avoid cluttering.

It is worth pointing out here that the highest spending districts exhibited the sharpest declines in the growth rates of both instructional expenditure and its share. This is interesting, as the highest spending districts were the worst affected by the loss of discretion brought about by the school finance reform. The decline in the growth rate of the share in the Group 5 districts is especially informative—while the restrictions on spending increase could mechanically lead to declines in corresponding growth in instructional expenditure, decline in growth rate of the shares reflects conscious decision made by these school districts. Also of note here is that, in the pre-reform period, the share of instructional expenditure in the highest spending group was roughly comparable, even somewhat lower than the corresponding shares of the other groups (Table A1)[16]. If the Group 5 shares were higher, one could hypothesize that the higher spending districts had flexibility to cut the growth rates of their instructional expenditure shares. Given that the shares in the baseline presented an exactly opposite picture and instruction is the category most closely tied to student learning and development, the largest cuts in the growth rates of instructional shares in the high spending districts provide further evidence of a disincentive effect. Overall, the patterns above provide suggestive evidence that the loss of discretion brought about by the school finance reform adversely affected incentives in the districts concerned.

Columns (5)-(6) present post-program patterns for pupil support services per pupil, the other expenditure category that is thought to be related to student development and well being. All groups show declines in trends in the post-reform period relative to their respective pre-reform trends, but these declines are economically most significant in the Group 4 and Group 5 districts. In addition, the Group 5 declines are statistically different from the declines observed for each of the groups 1, 2 and 3. Also of note here is that the baseline shares of pupil support services were roughly comparable across groups in the baseline and hence do not provide justification for these differential patterns in the post-reform period.

Columns (7)-(8) exhibit post-program trends in the share of pupil support services relative to their pre-program trends. Once again, all groups exhibit declines in the growth rates of the shares of pupil

[16] Also of note here is that there was no evidence of any difference in pre-existing trends in the share of instructional expenditure across the various groups of districts. These results are available on request.

support services and these declines are most prominent for the two highest spending groups. Moreover, the decline in the highest spending group is statistically different from the declines in Groups 1 and 2.

The patterns for pupil support services reinforce the patterns seen for instructional expenditures above. They suggest that the loss of discretion brought about by the school finance reform may have acted as a disincentive and induced declines in not only growth rates of pupil support services after the reform, but also their shares.

Table 5 presents post-program patterns in total salaries and instructional salaries per pupil. Columns (1)-(2) look at total salaries per pupil. While Group 1 exhibits an increase in the growth rate of salaries in the post-program period, all other groups exhibit statistically significant declines in growth rates in the post-reform period. Also of note here is that Group 4 and Group 5 districts exhibit the largest declines in the growth rate of salaries. Columns (3)-(4) study post-program patterns in the share of salaries (as a percentage of per pupil spending). While total salary shares show a declining trend too in the post-reform period (relative to pre-reform trends), none of these declines are statistically different from zero.

Columns (5)-(6) show that except for Group 1, other groups show a negative shift in instructional salaries trend. Moreover, estimation using all districts (column 5) reveals a strict hierarchy between groups, and group 5 exhibits the most prominent decline in the growth of instructional salaries. Share of instructional salaries (columns 7-8) also shows a negative shift in trend in the post-reform period, but these shifts are not statistically different from zero.

Table 6 studies the effect of the school finance reform on shares of different forms of administration expenditure—general support expenditure, school support expenditure and business support expenditure.[17] Shares of general support expenditure in all groups show declining trends (relative to pre-existing trends) in the post-reform period. But, interestingly, the decline is one of the smallest in the highest spending group and the two highest spending groups show smaller declines than each of the other groups. Recall that the two highest spending groups, and especially the highest spending group showed

[17] Since shares are more informative than raw amounts, this table only presents impacts on the shares to save space. The impacts on the raw amounts show a similar picture and are available on request.

economically and statistically the largest and most robust declines in the growth rates of instructional expenditure and pupil support expenditure and their shares. If these declines were merely because of tight revenue situations brought about by the school finance reform, then one would expect similar large declines in growth rates of the shares of the various categories of administrative expenditure as well in these groups. In contrast, the declines in growth rates are actually the smallest in groups 4 and 5 for general support expenditure. These findings are again consistent with the hypothesis that the loss of discretion might have acted as a disincentive which might have discouraged larger declines in growth rates of general support expenditure shares in the high spending groups.

Shares in school support expenditure and business support expenditure for Group 5 show post-program patterns that mirror that of general support expenditure. Once again, while both school support and business support shares show declining trends in all groups, the smallest declines are evidenced in the Group 5 districts in each case.[18] Also, note that the pre-reform shares of the various forms of administration expenditure were comparable across groups and hence do not provide a justification for the above lower declines for Group 5.

Table 7 investigates post-reform patterns in some non-finance indicators—teachers per pupil, local education agency (LEA) or school district administrators per pupil, school administrators per pupil and school administrators support staff per pupil. Columns (1)-(2) present the impact on total teachers per pupil. All groups show statistically significant declines in trends of total teachers per pupil. The across-the-board decline in the trend in teachers per pupil is interesting. Groups 1 and 2 enjoyed an increase in growth rate of spending due to the school finance reform, so the decline in trend in these districts may be indicative of a disincentive effect. It is worthy of special mention here that the decline in teachers per pupil is largest for the highest spending group, Group 5. Group 5 was most adversely affected by the loss of discretion brought about by the school finance reform, and the most prominent decline for the highest spending group may be a reflection of this disincentive effect. In contrast, if these sharp declines in the high spending districts were caused merely by monetary constraints, then such declines should

[18] Note that Group 4 shows large declines in the growth rates of the shares of school support expenditure and business support expenditure which are consistent with a productive response.

also be reflected in various measures of administrators per pupil presented in the remaining columns of the table, especially because teachers (rather than administrators) are acknowledged to be more closely related to education production. Interestingly, this is not the case. Rather, Group 5 districts show the smallest declines in trends for each of the other indicators—LEA administrators per pupil, school administrators per pupil and school administrators support staff per pupil. Moreover, these declines are also sometimes statistically smaller than the corresponding declines in some of the other groups.

The findings in this table reinforce the picture obtained earlier. To summarize, while the decline in trend for teachers per pupil is largest for the highest spending districts, such declines are the smallest for different measures of administrators per pupil. If pure funding restrictions in terms of sharpest declines in spending growth rates in highest spending districts were the causes of the sharpest declines in the trend of teacher per pupil ratio, it is not clear why such sharpest cuts were not seen in the trends for various measures of administrators per pupil, especially because teachers (rather than administrators) are considered to be more valuable as far as education production is concerned.

The findings in this section can be summarized as follows. Loss of discretion brought about by the Michigan school finance reform seemed to have acted as a disincentive for its school districts. This is reflected in across the board trend declines in teachers per pupil, growth rates of instructional expenditure and pupil support expenditure per pupil as well as their shares, even though the lower spending groups enjoyed sharp increases in the growth rate of spending per pupil. The disincentive effect seems to have been the strongest in the highest spending groups, who were the most severely constrained by loss of discretion. These districts show the sharpest trend declines in total teachers per pupil, growth rates of instructional expenditure and pupil support expenditure per pupil, and more importantly, their shares. While one might argue that the sharpest declines in spending growth rate (relative to pre-reform trends) that they faced induced the sharpest declines in growth in these spending categories, it is not immediately clear why the spending growth declines would lead to trend declines in the shares, especially because these are acknowledged to be productive categories. Also of importance is that while the decline in trend in the more productive instruction category and its share is the most

prominent in the highest spending groups, these declines are the least prominent for less-productive categories such as various forms of administrative expenditures and administrators per pupil in these highest spending groups. Facing fiscal constraints, a productive response would entail sharper declines in the less productive categories and efforts to maintain productive categories as much as possible. This seems to have been reversed for the highest spending districts. These provide suggestive evidence that a disincentive effect induced by loss of discretion brought about by the school finance reform led to such behaviors in these districts. From a policy perspective, the findings suggest that school finance reforms that constrain school districts by severely restricting local discretion can have harmful unintended disincentive effects on these school districts. Also of note here is that these post-reform patterns in the highest spending districts are consistent with the sharp declines in achievement evidenced in these districts and may have contributed to it.

7 Sensitivity Checks

In this section, we study other potentially confounding factors, and investigate their roles in explaining the patterns above.

7.1 Were differential movements to private schools across school districts important?

One important factor that could potentially bias our results is if there were any differential trends in movement to private schools between the different groups of districts following the school finance reform. While the existing evidence is mixed (Sonstelie (1979), Sonstelie, Brunner, and Ardon (2000), Downes and Schoeman (1998), Schmidt (1992)), it is possible, for example, that the constraints on local spending imposed by a school finance reform on the highest-spending districts induced some families to exit the public sector and enroll their children in private schools. In this case, changes in resource allocation may at least partly reflect the changed student composition of the district rather than the direct effect of limits on local discretion.

We use the decennial census data to look at any differential change in private school enrollment

across Michigan school districts between 1990 and 2000. The results are presented in Table 8. Group 3 is taken as the omitted category. There is no evidence of differential trends in either the lowest-spending districts or in the high-spending districts (or the others). The coefficients are always small and never statistically significant. Overall, it looks unlikely that changes in private school enrollment are driving the results obtained above.

7.2 Was there differential private school entry?

A related question is whether there was differential private school entry across the different groups of districts in the aftermath of the school finance reform. It is conceivable that private schools would look upon the post-reform era as an opportunity to attract public school students and choose to enter the market, especially in districts that became less attractive following the school finance reform. Such differential entries can bias the results obtained above. In this section, we investigate whether there was any evidence of differential entries of private schools across different groups of districts in the post-reform period.

We use private school survey (PSS) data collected by the National Center for Education Statistics of the U.S. Department of Education for this purpose. First, we obtained private school location data (street addresses) for the years 1990 through 2000 from the PSS, and used ArcGIS to geocode each private school address. The resulting private school map was then overlaid on a map of Michigan school districts obtained from the Census Bureau, and the number of private schools in each school district was counted using ArcGIS. Using data from 1990 through 2000, we next determine whether there were differences in private school entry trends across the different groups of districts in the post-reform period. We use specification (2) for this estimation, where the dependent variable is the number of private schools in a school district and Group 3 is the omitted category. The results are presented in Table 9. There is no evidence of any differential trends in private school entries across the various groups of districts. In particular, private schools do not seem to have differentially entered in the highest-spending districts, which were the most constrained by Proposal A.

7.3 Investigating the role of charter schools

Another important institutional change that took place in the mid-1990s was the entry of charter schools. The competitive effect of charter schools can potentially induce public schools to change the allocation of their resources. In such a case, the results obtained above can at least be partially driven by the entry of charter schools. Was this indeed the case? In fact, Welsch (2011) shows that districts affected by charter competition spent a larger percentage of expenditures on instructors and smaller percentage of expenditures on employees who supported instructors.

However, even though charter schools proliferated in Michigan, they still served only a small fraction of overall K-12 students (Arsen et al. 2001). But, more importantly, charter schools were not evenly spread out through the state. Rather, they were predominantly located in the higher spending districts (Table 10). So the results for the lower spending districts above are unlikely to have been affected by the charter school movement. But then are the patterns obtained above in the higher spending districts driven by the competitive effects of charter schools? The location patterns of charter schools in Michigan can cast light on this question. Geographically, most of the charter schools were located in southeast Michigan, particularly in Wayne County, where they serviced mostly students living in the poorer suburbs or inner-city Detroit. To test the robustness of our results to charter school entry, we separately exclude (1) Wayne county and (ii) Detroit school district from our analysis, and investigate whether our results are sensitive to these exclusions. As seen in the tables above, the results are not sensitive to the exclusion of Detroit school district. The results also remain very similar when we exclude Wayne county instead. They are not reported here for lack of space, but are available on request. So charter schools are unlikely to have driven the results seen above.

7.4 Investigating the role of inter-district choice

Michigan also had an inter-district choice program. However, it was very small: only about 1 percent and 1.5 percent of Michigan public school students enrolled in public schools outside their home district in 2000 and 2001, respectively (see Arsen et al. 2001). As was the case with charter schools, public

school choice too was concentrated mainly in and around Detroit. As Cullen and Loeb (2004) note, "Student participation in schools of choice has largely been a Detroit phenomenon, with more than one-third of all transfers taking place within the Detroit metropolitan area." The results obtained above are robust to the exclusion of the Detroit metropolitan area. The results are not reported here to save space, but are available on request.

7.5 Did the Decline in Michigan's Manufacturing Sector Affect Results?

A potential confounding factor is the secular decline in auto and manufacturing industries in Michigan throughout the last two decades. This decline could have potentially affected revenues and expenditures, as well as resource allocation differently in the different groups of school districts. If this was indeed the case, then the results obtained above could have been confounded with the effects of the decline in Michigan's manufacturing industries.

Note though that most of the secular decline in manufacturing jobs in Michigan occurred after 2000. For example, as Glazer and Grimes (2004) show, manufacturing employment in Michigan stood at 837,600 in 1990 and increased to 896,700 in 2000 – an increase of about 59,000 jobs over 10 years – though this was followed by a large decline in the early part of the last decade. Since we are looking at the period prior to 2001, our analysis is unlikely to be significantly biased by this factor.

Nevertheless, we investigate the role of the decline in Michigan's manufacturing sector more closely in this section. Using decennial census data, we look at the trends in the percentage of workforce employed in manufacturing, and examine if there were differential post-program trends in manufacturing employment in the different groups of districts (relative to their pre-existing trends).

The results are presented in Table 11. They show that there was a small general increase between 1990 and 2000 (relative to that between 1980 and 1990). However, there is no evidence of any differential change in the post-program period across the various groups of districts. All of the post-reform coefficients are small, and are never statistically different from zero. In sum, the decline in Michigan's manufacturing industry does not seem to have been the impetus behind the results above.

8 Conclusion

Over the past 40 years, school finance reforms have become a ubiquitous feature of the K-12 education system in the United States. 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. But, these reforms also restrict local discretion over school spending, imposing significant constraints on the growth of future school spending by individual districts. These limits are particularly binding for high-spending districts, since in the absence of such reforms per pupil expenditure in these districts would typically increase at a considerably higher rate.

We focus on Proposal A in Michigan, which ranks as one of the most important and comprehensive school finance reforms undertaken over the past four decades. In this paper, we study the impact of Proposal A on resource allocation and analyze whether the loss of discretion had any adverse impact on district incentives to be productive. As is well-known, imposition of local control over local government activities in a Tiebout framework and the resultant centralization of public services at higher levels of government reduces efficiencies associated with providing these services locally. We investigate whether the Michigan school finance reform had any such adverse effect, as far as resource allocation is concerned.

We find that the Michigan school finance reform led to decline in the growth rate of instructional expenditure and pupil support (or pupil services) expenditures per pupil, and more importantly, *their shares* in districts spread throughout the spending distribution. Trend declines in teacher per pupil were also observed throughout the spending distribution following the school finance reform. These general across the board declines, including declines in low spending groups, are indicative of disincentive effects brought about by loss of discretion. This is especially because the low spending groups received large infusions of state aid—the only negative consequence they faced was loss of discretion.

However, what is perhaps more interesting is that the highest spending districts exhibited the sharpest and most robust declines in each of the above indicators. While large declines in the growth rate of instructional expenditure can be mechanically caused by the steep decline in spending growth

rate that these districts faced, similar patterns for the shares indicate deliberate choices made by these school districts, and are indicative of disincentive effects. Of note also is the fact that while the highest spending districts showed the steepest cuts in the growth rate of more productive instructional expenditure and its share as well as teachers per pupil, surprisingly they showed the smallest cuts in the growth rate of administration expenditure and its share, and various measures of administrators per pupil. The patterns suggest that while the loss of discretion led to disincentive effects in districts throughout the spending distribution, they were, by far, the most prominent in the high spending districts. This is consistent with the strict limits that the high spending districts faced following the school finance reform.

To the best of our knowledge, these results are novel in the literature. They have important policy implications. They suggest that imposing constraints on a Tiebout framework can have unintended disincentive effects on school districts which might in turn adversely affect resource allocation. The adverse effects on resource allocation in the high spending districts may have been instrumental in their corresponding declines in performance observed in the literature. Policymakers need to take these unintended adverse effects into account when designing school finance reforms and other related policies that limit local discretion of school districts.

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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
Total Rev. Per Pupil	5059.87	5271.10	5380.28	6242.46 (6060.29)	7226.13
Total Exp. Per Pupil	4819.73	5040.35	5161.06	6062.38 (5854.93)	6913.32
Instl. Exp. Per Pupil	3215.21	3320.15	3397.65	3915.61 (2728.73)	4202.00
Pupil Sup. Svcs. Per Pupil	175.77	224.79	236.20	355.54 (408.61)	483.07
Gen. Sup. Exp. Per Pupil	150.57	144.80	143.01	88.19 (109.13)	127.26
Sch. Sup. Exp. Per Pupil	326.45	325.37	343.37	412.91 (378.60)	432.06
Bus. Sup. Exp. Per Pupil	75.65	100.96	92.66	132.72 (121.89)	176.74
Total Salaries Per Pupil	3379.89	3584.59	3698.39	4372.50 (4288.84)	4965.81
Instr. Salaries Per Pupil	2280.26	2375.45	2450.35	2786.28 (3724.03)	3050.83
Ethnicity (%)					
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

For Group 4, the figures in parentheses correspond to the statistics when we 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 are weighted by enrollment of the districts in 1994.

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) 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). Results are obtained from estimation of model 1. 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 Revenue and Expenditure

	Revenue Per Pupil		Expenditure Per Pupil	
	(1)	(2)	(3)	(4)
Group 1 * reform * t	126.43***	125.87***	101.37***	100.69***
	(9.21)	(9.23)	(9.38)	(9.39)
Group 2 * reform * t	26.45**	27.06**	34.69***	35.00***
	(12.10)	(12.18)	(11.23)	(11.30)
Group 3 * reform * t	-35.72***	-35.47***	-16.26*	-16.31*
	(11.15)	(11.09)	(9.83)	(9.82)
Group 4 * reform * t	-19.61	-36.60*	-9.51	17.41
	(27.02)	(18.77)	(39.62)	(18.38)
Group 5 * reform * t	-124.19***	-123.56***	-33.14*	-35.33*
	(20.79)	(20.43)	(19.60)	(19.44)
Number of Observations	6269	6257	6269	6257
R-squared	0.962	0.961	0.957	0.958

Odd numbered columns include all 524 school districts Even numbered columns exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). Results are obtained from estimation of model 2 with the above variables as dependent variables. 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 4: Examining the Effect of Michigan School Finance Reform on Resource Allocation
(Instructional Expenditure and Pupil Support Services)

	Instructional Expenditure Per Pupil		Instructional Expenditure %		Pupil Support Services Per Pupil		Pupil Support Services %	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group 1 * reform * t	29.98*	28.47*	-0.62	-0.63	-6.77	-6.74	-0.29***	-0.29***
	(17.48)	(17.01)	(0.56)	(0.56)	(4.53)	(4.43)	(0.06)	(0.06)
Group 2 * reform * t	-16.38	-18.01	-0.53	-0.54	-15.05***	-14.99***	-0.38***	-0.38***
	(16.66)	(16.37)	(0.57)	(0.57)	(5.65)	(5.68)	(0.08)	(0.08)
Group 3 * reform * t	-30.37	-32.26*	-0.13	-0.13	-11.88	-11.91	-0.24**	-0.24**
	(19.10)	(18.61)	(0.57)	(0.57)	(7.38)	(7.27)	(0.10)	(0.10)
Group 4 * reform * t	-64.71	-70.45**	-0.11	-0.27	-53.16	-42.45**	-0.77	-0.70***
	(91.74)	(33.21)	(0.86)	(0.44)	(37.14)	(17.62)	(0.49)	(0.24)
Group 5 * reform * t	-79.39***	-78.22***	-0.71*	-0.69*	-39.00***	-36.32***	-0.58***	-0.56***
	(25.11)	(24.58)	(0.40)	(0.40)	(8.20)	(8.23)	(0.10)	(0.11)
Number of Observations	4708	4699	4708	4699	4708	4699	4708	4699
R-squared	0.951	0.955	0.488	0.448	0.893	0.916	0.817	0.846

Odd numbered columns include all 524 school districts Even numbered columns exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). Results are obtained from estimation of model 2 with the above variables as dependent variables. 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: Examining the Effect of Michigan School Finance Reform on Resource Allocation

(Total Salaries and Instructional Salaries)

	Total Salaries Per Pupil		Total Salaries %		Instructional Salaries Per Pupil		Instructional Salaries %	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group 1 * reform * t	22.73	21.50	-0.43	-0.42	6.44	5.36	-0.63	-0.63
	(17.17)	(16.73)	(0.60)	(0.60)	(11.44)	(11.30)	(0.43)	(0.43)
Group 2 * reform * t	-33.94*	-35.24*	-0.34	-0.33	-30.29**	-31.31***	-0.47	-0.47
	(18.57)	(18.34)	(0.62)	(0.62)	(12.02)	(11.89)	(0.44)	(0.44)
Group 3 * reform * t	-48.05**	-49.67***	0.34	0.35	-38.21***	-39.27***	-0.07	-0.07
	(18.72)	(18.00)	(0.62)	(0.62)	(13.71)	(13.39)	(0.44)	(0.44)
Group 4 * reform * t	-162.29***	-152.14***	-0.41	-0.50	-60.01	-77.27***	0.04	-0.29
	(38.72)	(46.69)	(0.37)	(0.51)	(49.74)	(25.99)	(0.47)	(0.36)
Group 5 * reform * t	-102.16***	-98.43***	-0.27	-0.28	-69.33***	-68.02***	-0.39	-0.38
	(35.67)	(33.74)	(0.53)	(0.52)	(21.31)	(20.62)	(0.36)	(0.36)
Number of Observations	4708	4699	4708	4699	4708	4699	4708	4699
R-squared	0.954	0.954	0.486	0.464	0.944	0.945	0.493	0.485

Odd numbered columns include all 524 school districts Even numbered columns exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). Results are obtained from estimation of model 2 with the above variables as dependent variables. 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 6: Examining the Effect of Michigan School Finance Reform on Resource Allocation

(Administration Expenditures: General Support, School Support, and Business support)

	General Support Expenditure %		School Support Expenditure %		Business Support Expenditure %	
	(1)	(2)	(3)	(4)	(5)	(6)
Group 1 * reform * t	-0.08*	-0.09*	-0.36***	-0.36***	-0.07	-0.07
	(0.05)	(0.05)	(0.11)	(0.11)	(0.08)	(0.08)
Group 2 * reform * t	-0.14***	-0.14***	-0.39***	-0.39***	-0.10	-0.09
	(0.05)	(0.05)	(0.09)	(0.08)	(0.14)	(0.14)
Group 3 * reform * t	-0.17***	-0.17***	-0.44***	-0.44***	-0.10	-0.10
	(0.05)	(0.05)	(0.07)	(0.07)	(0.06)	(0.06)
Group 4 * reform * t	-0.03	-0.05	-0.64**	-0.57***	-0.19**	-0.08
	(0.04)	(0.05)	(0.27)	(0.19)	(0.09)	(0.07)
Group 5 * reform * t	-0.07	-0.08	-0.33***	-0.33***	-0.04	-0.04
	(0.06)	(0.06)	(0.08)	(0.09)	(0.09)	(0.09)
Number of Observations	4708	4699	4708	4699	1567	1564
R-squared	0.837	0.821	0.647	0.591	0.770	0.767

Odd numbered columns include all 524 school districts Even numbered columns exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). Results are obtained from estimation of model 2 with the above variables as dependent variables. 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: Examining the Effect of Michigan School Finance Reform on Non-Finance Indicators

	Total Teachers Per Pupil		LEA Administrators Per Pupil		School Administrators Per Pupil		School Administrators Support Staff Per Pupil	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group 1 * reform * t	-0.193***	-0.193***	-0.002*	-0.001*	-0.005***	-0.005***	-0.028***	-0.028***
	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)	(0.010)	(0.010)
Group 2 * reform * t	-0.195***	-0.195***	-0.001	-0.001	-0.004***	-0.004***	-0.017***	-0.017***
	(0.004)	(0.004)	(0.002)	(0.002)	(0.001)	(0.001)	(0.003)	(0.003)
Group 3 * reform * t	-0.196***	-0.196***	-0.002	-0.002*	-0.007***	-0.007***	-0.023***	-0.023***
	(0.004)	(0.004)	(0.001)	(0.001)	(0.002)	(0.002)	(0.006)	(0.006)
Group 4 * reform * t	-0.196***	-0.196***	-0.010**	-0.006**	0.001	-0.006***	-0.019**	-0.020***
	(0.008)	(0.005)	(0.004)	(0.002)	(0.005)	(0.001)	(0.006)	(0.004)
Group 5 * reform * t	-0.251***	-0.251***	-0.000	-0.001	-0.003***	-0.003***	-0.016***	-0.016***
	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)
Number of Observations	5091	5082	4634	4626	4678	4669	4622	4614
R-squared	0.710	0.698	0.409	0.538	0.658	0.682	0.499	0.504

Odd numbered columns include all 524 school districts Even numbered columns exclude Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). Results are obtained from estimation of model 2 with the above variables as dependent variables. 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: Were there Differential 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	-0.49
	(1.01)	(0.66)
Group 5 * Yr 2000	-0.87	-0.87
	(0.66)	(0.66)
R-squared	0.92	0.92
Observations	1038	1036
Districts	519	518
Weighted	Y	Y
Exclude Detroit	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 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.

Table 9: Was there Differential Private School Entry?

Dependent Variable = Number of Private Schools	(1)	(2)
reform * trend	-0.20	-0.23
	(0.11)	(0.33)
Group 1 * reform * trend	0.03	0.02
	(0.12)	(0.12)
Group 2 * reform * trend	0.06	0.12
	(0.12)	(0.11)
Group 4 * reform * trend	-2.00**	-0.21
	(0.83)	(0.24)
Group 5 * reform * trend	-0.27	-0.21
	(0.19)	(0.15)
Observations	3126	3120
R-squared	0.99	0.96

*, **, *** denote significance at the 10, 5, and 1 percent levels. This table uses private school location data obtained from the private school surveys of the Common Core of Data, NCES. The private school addresses were geocoded using ArcGIS. This map was overlaid on a Michigan school district map obtained from the Census and the number of private schools in each polygon (school district) was counted using ArcGIS. Column marked (1) includes all 524 school districts, while column marked (2) excludes Detroit, which is the largest district in the state (accounting for about 10% of the total number of students in the state). The table reports results corresponding to model 2 (with group 3 omitted) where the dependent variable is number of private schools. 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: Distribution of Charter Schools across Different Groups, Michigan 1996-2001

	Percentage of Students in Charter Schools					
	1996	1997	1998	1999	2000	2001
Group 1	0.10	0.29	0.58	0.84	0.96	1.07
Group 2	0.10	0.41	0.61	0.95	1.24	1.46
Group 3	0.25	0.63	1.14	1.60	2.13	2.45
Group 4	0.27	0.78	1.33	1.91	2.63	3.03
Group 5	0.31	0.71	1.41	2.03	2.77	3.26
Michigan	0.25	0.68	1.25	1.95	2.71	3.40

Table 11: Assessing the Role of the Decline in Manufacturing Industry as a Potential Confounding Factor

(Michigan School Districts, 1980, 1990 and 2000 censuses, FE Regressions)

	% Employed in Manufacturing	
	(1)	(2)
Trend(t)	-4.93***	-5.13***
	(0.44)	(0.53)
Reform * t	2.09***	2.62***
	(0.68)	(0.77)
Group 1 * t	1.91***	1.39*
	(0.61)	(0.76)
Group 2 * t	1.07*	1.13
	(0.61)	(0.70)
Group 4 * t	-0.16	-1.55**
	(0.60)	(0.74)
Group 5 * t	-0.36	-1.11
	(0.65)	(0.77)
Group 1 * reform * t	-0.65	-0.85
	(0.93)	(1.11)
Group 2 * reform * t	-0.72	-1.24
	(0.95)	(1.05)
Group 4 * reform * t	0.10	1.74
	(0.92)	(1.06)
Group 5 * reform * t	0.62	1.24
	(1.01)	(1.10)
Number of Observations	1558	1555
R-squared	0.919	0.929
Weighted	No	Yes

The dependent variable is the percentage of workforce in a school district employed in manufacturing. Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The regressions in columns (2)-(3) are weighted by the enrollment of the district. Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table A1: Summary Statistics for Different Groups of Michigan School Districts, 1994 (Continued)

	Group 1 Lowest Spending Group	Group 2 Lower Middle Group	Group 3 Middle Group	Group 4 Upper Middle Group	Group 5 Highest Spending Group
Total Exp.	4819.73	5040.35	5161.06	6062.38 (5854.93)	6913.32
Instl. Exp. (%)	67	66	66	65 (47)	61
Pupil Sup. Svcs. (%)	4	4	5	6 (7)	7
Gen. Sup. Exp. (%)	3	3	3	1 (2)	2
Sch. Sup. Exp. (%)	7	6	7	7 (6)	6
Bus. Sup. Exp. (%)	2	2	2	2 (2)	3
Total Salaries (%)	70	71	72	72 (73)	72
Instr. Salaries (%)	47	47	47	46 (64)	44

This table reports percentages of total expenditure allocated to the different expenditure categories in 1994 in the various groups. For Group 4, the figures in parentheses correspond to the statistics when we 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 are weighted by enrollment of the districts in 1994.