Effect of a School Finance Reform on Housing Stock and Residential Segregation: Evidence from Proposal A in Michigan*

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Abstract

Local financing of public schools in the U.S. leads to a bundling of two distinct choices - residential choice and school choice - and increases the degree of socioeconomic segregation across school districts. A school finance reform can go a long way in weakening this link. In this paper I study the Michigan school finance reform of 1994 (Proposal A) which resulted in a comprehensive equalization of per pupil expenditures. Using panel data on Michigan K-12 districts and data from the decennial censuses I investigate whether the reform had any significant effects on spatial segregation. I find that Proposal A has been responsible for increases in housing stock and property values in the lowest spending school districts, and for improvements in several socioeconomic indicators, implying a decline is neighborhood sorting. However, there is continued high demand for residence in the highest spending communities, which points to the importance of neighborhood peer effects ('local' social capital).

JEL Codes: H4, I2, R2

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1 Introduction

Local financing of public schools is 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.[1] This leads to a bundling of two distinct choices - residential choice and school choice. Parents in the U.S. often choose their houses on the basis of desirable schools in the locality. Since demand for a good education and its affordability are increasing in income and educational attainment, this increases the degree of economic and demographic segregation across school districts. A school finance reform, loosely interpreted as an equalization of school finances within state boundaries, can go a long way towards weakening this link between housing choice and choice of schools. It may result in a significant dilution of the extent of socio-economic stratification, which in turn affects house prices and property values. In this paper I study the Michigan school finance reform of 1994 which resulted in a large and comprehensive equalization of per pupil expenditures within the state. I investigate whether the reform had any significant effects on housing stock, property values and inter-district movements of households, and any resultant changes on residential sorting in the state.

In 1994, Michigan embarked on a comprehensive overhaul of its school finance program when it enacted a new plan called Proposal A. This reform significantly increased the state share of K-12 spending and entailed shifting large sums of money to the lowest spending districts, which were allowed to increase their spending at a much faster rate than others. Concurrently, Proposal

[1] 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).

A also ended local discretion over school spending. Given spending in 1993-94, the last year before the program, it is the state that now decides by how much each district can raise its subsequent expenditures. The highest spending districts in the state were held harmless, that is, they did not witness any actual decline in per pupil spending, but were constrained in future increases.

In economics there is a long tradition of interest in residential locations of households, much of which originates from the classic work by Tiebout (1956). Tiebout hypothesized that if people are free to choose where to reside among many competing jurisdictions this would ensure efficiency in the provision of 'local' public services. Given that people would vote 'with their feet' if not satisfied with the existing level and cost of these services (which may include education, police, fire safety, parks, etc.), competition for potential families would eliminate the inefficient producers.

Later work has shown that some of the implications of Tiebout's hypothesis hold only under stringent assumptions,[2] but the basic insight is a powerful one - competition for customers will ensure the efficient provision of local public goods, something that is often very difficult for other (non-local) public goods. This has spawned a large literature on residential choice and resultant spatial segregation, and its efficiency properties, particularly as it relates to investment on education - see e.g. Benabou (1996a, 1996b), Fernandez and Rogerson (1996) and Barrow and Rouse (2004).

The focus of an important strand of this literature has been to estimate the marginal willing-

[2] See, for example, Bewley (1981) and Westhoff (1977).

ness of households to pay for school quality. The general conclusion is that parents are willing to pay a substantial price for 'desirable' schools. Black (1999) finds that parents are willing to pay 2.5 percent more for a 5 percent increase in test scores. Barrow (2002) estimates that in the Washington D.C. area white households with children are willing to pay $1800 more per year for schools generating a 100 SAT point advantage. Downes and Zabel (2002) use data on house prices and school characteristics in Chicago from 1987 to 1991 to show that the elasticity of home values with respect to test scores is approximately equal to one.

In an important contribution, de Bartolome (1990) shows that in a community model with a mobile population and public (school) expenditures set by voting, communities may become heterogeneous in composition and second-best inefficient. He shows that a social planner can effect a Pareto improvement by choosing higher inputs in the less desirable communities (urban cities) - something very similar in principle to a school finance reform. However, though there have been some studies of the effect of school finance reforms on resource equalization and academic performance,[3] to date there has been few systematic evaluations of the impact of these programs on socioeconomic segregation. Nechyba (2003) sets up a general equilibrium model that links schools and housing markets, and conducts simulation exercises calibrating his model to data from New Jersey. He finds that state financing leads to a small decline in residential segregation compared to local financing. Dee (2000) looks at whether in states with school finance reforms encouraged by state court rulings the new resources have been capitalized into housing values and residential rents within the beneficiary districts. He finds that the increases

[3] See, among others, Card and Payne (2002), Clark (2003), Downes (1992, 2002), Murray et al (1998), Roy (2004).

in state aid generated by court mandates substantially increased median housing values and residential rents. Aaronson (1999) studies whether school finance reforms alter neighborhood income heterogeneity. He finds that school finance has a significant effect on school district income sorting, especially among low-income communities. This is among the first papers to empirically examine the effect of a major school finance reform on economic and demographic stratification, and should provide important evidence as to its impact.[4]

Using annual data on housing stock and property values from the Michigan Department of Education I find that there was a positive effect of the school finance reform on these variables in the lowest spending districts. But the results also suggest a continued high level of demand for residence in the highest spending communities. The regressions run on decennial census data show significant improvements in the lowest spending districts in several socioeconomic indicators, particularly in the income and employment variables. However, here also the highest spending districts continue to maintain their superiority. Finally, when I look at within-state migration in the five years after the program, there do not seem to be any significantly larger inflows to the lowest spending districts, who are the chief beneficiaries of the new system. I argue in the paper that presence of neighborhood peer effects can be an important explanation for the pattern evident in the data. Such factors, often referred to in the literature as 'local' social capital and perceived to be quite strong, can have a dampening effect on the equalizing

[4] Dee's analysis only concerns the states with *court-mandated* school finance reforms - in Michigan the drive for change was led entirely by the legislature and the executive. This difference has been argued to be significant for the resultant resource equalization, so the effects on segregation too can be quite different. Aaronson argues that one implication of the Tiebout model is that *within-community* homogeneity declines as a result of limits on the discretion of school districts to set their expenditure levels, but this generally does not follow. Both of these studies include data only upto the 1990's, mainly the 1990 and previous censuses.

forces of even a comprehensive school finance reform.

The remainder of the paper is organized as follows. In Section 2 I outline the main features of the Michigan program, with particular emphasis on the pre-reform scenario and the implications of the program for changes in segregation. Section 3 discusses the sources of data used. In Section 4 I set up a theoretical framework to intuitively discuss the impact a school finance reform might have on residential segregation. Section 5 contains the results. I first present some results on values of housing stock across different school districts in the pre and post-reform period. Next I use the decennial census data to estimate changes in socioeconomic indicators. Finally I present some estimates of the inflows of population into different districts since 1995. Section 6 concludes. In an appendix I provide evidence that the results in Section 5 based on decennial censuses in 1990 and 2000 are robust to controlling for pre-existing trends from the 1980 census. References and tables follow.

2 The Michigan Program

2.1 Michigan Before the Program

Prior to Proposal A, Michigan had been using a district power equalizing (DPE) formula, where districts were allocated state funds based on their tax efforts. This was intended to make the system wealth-neutral,[5] leaving the choice of millage rates (property tax rates) to the local districts, but its equalizing power had considerably eroded over the years. In 1994 about one-

[5] 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 demand for school spending is a positive function of income, this does not equalize per pupil expenditures across districts, see Feldstein (1975).

third of all districts were too rich to be affected. At the same time, there was a heavy reliance on local property taxes as the source of school revenues. In 1994, just before the reform, Michigan's property tax burden was the seventh highest in the country and it was fourth among US states in the share of school spending financed locally (61%).[6] In fact, the Michigan school finance reform was not a response to any adverse court ruling, unlike most such reforms, or to a sudden rise in public concern over spending inequalities. Rather, it was a by-product of the prevailing debate over pervasively-high property taxes, whose main purpose was supporting local schools.

There are 524 K-12 school districts in Michigan,[7] each of which is fiscally independent. This, coupled with the predominance of local control in school affairs, presumably ensured, or at least aggravated, socio-economic segregation along district lines. Table 1 provides some illustrative evidence on the extent of within-county disparities in income distribution in pre-reform Michigan. The 1990 decennial census reported the value of median household income for each school district - I show the maximum and the minimum values of district median income for each of the counties which have more than 10 school districts.[8] As can be seen, there were very significant differences in incomes between the richest and the poorest school districts in each county. Other than Jackson county, in all of the other counties the richest school district has a median income almost twice as high as that of the poorest district, often even higher. The differentials are higher for counties which have more school districts, thereby allowing for a

[6] The three states with a higher share of school expenditures financed locally in 1994 were New Hampshire (86%), Illinois (62%) and Vermont (61%) - later in 1997 both Illinois and Vermont overhauled their school financing laws.

[7] There are an additional 31 non K-12 districts.

[8] There are 83 counties in Michigan, 14 of them have more than 10 school districts each and are included in this table. For example in 1989, of the 14 school districts in Berrien county, Lakeshore School District, the richest district, had a median income of $37,367 while Benton Harbor Area Schools, the poorest, had a median income of only $16,742, a difference of $20,625 (223%).

larger degree of stratification. The pre-reform situation thus closely corresponds to a Tiebout-type sorting of households into desired (educational) jurisdictions.[9]

Fernandez and Rogerson (1996) provides some additional evidence on the extent of disparities in per pupil expenditures within neighboring communities in pre-reform Michigan. Focusing on the Detroit Metropolitan Area, they show that in 1986-87 Bloomfield Hills school district was spending about $7000 per child, whereas Dearborn school district, at the other end of the spectrum, spent much less than $3000 (Table 2, page 136).

2.2 The Michigan Program

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%. This resulted in a large rise in the state share of K-12 spending, from 31.3% in 1993 to 77.5% in 1997, and was followed by efforts to make a significant dent in existing inequalities.

The new school spending plan, effective from 1994-95, works 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

[9] Not surprisingly, these large differences in median incomes translated into large differences in per pupil expenditures, as can be seen in the following columns. In Roy (2004, Table 3) I found that there was a large and positive relationship between district income and school spending in Michigan in the pre-reform period (1990-1994).

narrowing of the revenue gap across districts. Further, all districts, however rich, were held harmless - none suffered any absolute decline in per pupil spending. Table 2 shows the changes in expenditures in six Michigan school districts in the post-reform period. The large catch-up exhibited by the lowest spending districts is immediately evident.

One important characteristic of the Michigan reform is that it was staggered over several years and that all districts, however rich, were held harmless. This has an interesting implication. Though parents cannot spend any extra money[10] in the districts they are currently residing in, they can move to a higher spending district, which will continue to have higher expenditures for the next few years because of the hold-harmless clause. This may imply a high level of demand for residences in the higher-spending communities. While the large increases in state aid to the lowest-spending districts make them more attractive as potential residences, it is intriguing to note that the highest spending districts too may continue to attract parents for years to come.[11] When I discuss the regression results, I shall try to see whether there is any evidence for such two-sided movements.

3 Data

All the data that I use are at the level of individual K-12 school districts. Most of these come from the Michigan Department of Education. The revenue and expenditure figures, as well as those on K-12 enrollment, are taken from the Bulletin 1014's, published annually by the

[10] over and above what is authorized by the state

[11] Simple calculations from the figures in Table 2 show that it will take Standish-Sterling and Delton-Kellogg school districts another 10-15 years to reach a level of spending similar to that in Warren Woods. This is a much longer horizon than parents with school-age children would typically have. (Even at the current rate of equalization, these districts may not catch up to Grant Township until another 25 years or so.)

department. Data on the housing stock variables are also taken from this source, which give the exact definitions for the particular variables used in the calculations. Note that prior to the reform, i.e. till 1994, the bulletins did not separately report the values of homestead housing stock and non-homestead housing stock, since these were taxed at a uniform rate.

The data for some of the control variables, like racial composition of the school districts, come from the Common Core of Data (CCD), a statistical database maintained by the National Center for Education Statistics (NCES). The relevant data from the 2000 decennial census have also been taken from this site. I use the 1980, 1990 and 2000 censuses to look at changes in socio-economic and demographic characteristics of Michigan school districts - the data for 1980 and 1990 censuses are from the respective School District Data Books.

4 Theoretical Background

The literature on residential locations and sorting, particularly as it relates to school choice, rests on two main assumptions. The first is that people are completely mobile, and that they have a large number of possible jurisdictions to choose from.[12] The second assumption is that different people have different preferences over educational spending. This can follow from the assumption that different people have different incomes and because education is a normal good, richer people can afford and consume more educational attainment. But this may also be a result of differences in intrinsic preferences for education.

Under these assumptions, in residential equilibrium there will be sorting by either income or

[12] That is, people can choose from a number of school districts without transportation or other costs featuring prominently in the decision.

demand. I discuss these in what follows. Models with sorting by income are more popular in the literature, so I focus mostly on income sorting.[13]

Sorting by Income

I assume that education is a normal consumption good, so that richer people consume more of it. Ceteris paribus, a higher educational outcome is a positive function of (i) a higher school spending, and (ii) a better peer group at the school and neighborhood. I also assume that peer group is equal to the average achievement of a school's student body, and that richer people have children who have higher achievement (income and achievement are monotonically related, so that living with richer people increases one's educational outcomes).[14]

Under these assumptions, there will be stratification by income across school districts. First, consider (i), a higher school spending. People will tend to cluster together, since under local discretion over school expenditures people will tend to choose communities which spend the same amount of money on education that they themselves would have chosen. With affordability of higher education expenditures closely aligned with income this results in segregation along district boundaries.

Similarly under (ii), if peer effects have a strong positive influence on academic achievement, richer people, who are also the people with a higher demand for education, would be inclined to pay more for residences in communities which have more favorable peer groups. In other words,

[13] The predictions of models with sorting by demand are very similar to those with sorting by income, at least as far as residential segregation is concerned.

[14] The latter is a simple way of modeling the fact that living with richer people often provides important inputs that are complementary to education, viz. motivation, connections to important places and people, crime-free environment, etc.

they would outbid poorer people for the more attractive communities - since 'attractive' is here defined to involve richer people this results in stratification by income.

Thus in the status quo, there will be stratification by income. Richer people will tend to flock together to ensure a higher level of educational expenditures for themselves, and to ensure that they get the best peer groups available. Now suppose there is a school finance reform, interpreted as a change in rules whereby educational expenditures are determined only at the state level. That is, there is abolition of the local discretion over school spending. Motivation (i) for stratification by income is then no longer relevant - since the state equalizes expenditures all around, richer and middle-income people will not be willing to pay extra rent for residences in higher spending communities unless they could get something from the peer group effect. In other words, once a school finance reform is undertaken, the only reason that richer people would be willing to pay higher rents to keep poor people out of their localities is if the peer group effect is particularly strong.

To sum, the prediction of this model is that initially there will be stratification by income across school districts. This should go down after a school finance reform which takes away the local power to decide on school expenditures. But interestingly, the same stratification may persist if peer effects are perceived to be strong.

Formally, a simple stylized model can be set up as follows. Let there be two communities, A and B, indexed by superscript i. Utility of a household depends on educational achievement E and spending on 'all other goods'. E in turn is a function of per pupil school spending in the community (S^i), peer group quality in the community (P^i) and own income y. School spending

is financed by lump sum taxes T^i in community i.[15] Let there be a continuum of households, indexed by income y on the unit interval $[0, 1]$.

Utility of a household with income y who resides in community A, where the rent is R^A and the (lump-sum) tax is T^A, is $U[E(S^A, P^A, y), y - R^A - T^A)]$.[16] Since I assume that both school spending S and school tax T are the same for all persons within a community, they should be equal, i.e. $T^i = S^i$. I approximate the peer group effect by the average income of residents in a community, since by assumption the desirability of a peer group is monotonically related to income. The rent R in each locality is a function of two things - first, the innate cost of housing in the locality, assumed to be the same in both A and B, and second, peer group quality in the community P^i, which gets capitalized in the rent. Thus $R^i = R(P^i)$ by assumption.[17]

Under these circumstances, there will be stratification by income, in the sense that all persons in community A will have incomes at least as high as those in community B.[18] Let the person with income y^* be indifferent between communities A and B. Then y^* would be determined by

$$U[E(S^A, P^A, y^*), y^* - R^A - T^A)] = U[E(S^B, P^B, y^*), y^* - R^B - T^B)]...(1)$$

where $S^i = T^i$ for $i = A, B$ and where S^A and S^B are determined by the preferences of the

[15] I have assumed a lump-sum tax T for all residents of a given community. If people buy homes with values in proportion to their income, then a proportional tax rate on income may be more appropriate. However, in many districts there are zoning laws, so that people have to buy some minimum amount of property. In these cases a head tax per household seems more relevant.

[16] $y - R^A - T^A$, income net of rent payments and taxes for school spending, denotes the consumption of 'all other' goods.

[17] School spending S^i equals the lump sum tax T^i, so school spending does not get capitalized in the rent R^i.

[18] In other words, if a person with income y^1 prefers community A to community B, everyone with an income of y greater than y^1 would also prefer A, and vice versa. To see this, consider two persons with incomes y^1 and y^2, $y^2 > y^1$, both faced with the choice of residing either in community A or in community B. The y^2 person will always be willing to pay more than the y^1 person for residing in A, since he will get a better education in A and he is willing to pay more for a better education.

median voter in the respective communities.[19]

A school finance reform can be approximated in this setup as an equalization of school spending (and hence, as a transfer of resources from community A to community B).[20] Subsequent to the reform, there would still be stratification, but it would presumably be less pronounced, in the sense that there would be an inflow of people from community A to community B.

To see this, note that the reform would result in a shift of the tax burden, assuming that it is progressive in nature and is financed by a relative increase in tax liabilities on the rich. In this case, there will be a big mass of households around the middle of the income distribution who will find that their school spending has gone up without a corresponding increase in their tax burdens. Some of them, who have been staying in the richer community A and paying higher rents for higher school expenditures, would switch back to community B, where the schools are now funded at much higher levels. It follows that there will be an outflow of people from community A and into community B, though the fall in rents in A may moderate some of the actual movement.

The important thing to note is that the changes depend crucially on the strength of the peer group effects. If peer effects are a strong determinant of educational achievement, the movement

[19] Assuming a uniform distribution e.g., the median voter in community A is the one with income halfway between 1 and y^*, i.e., $(1 + y^*)/2$, and the median voter in B is one with income halfway between 0 and y^*, i.e. $y^*/2$. Given this, the preferred values of S^A and S^B (as a function of y^*) can be easily determined from utility maximization. Once we plug in these values for S^A and S^B, the value of y^* can be easily determined from (1). In the general case we can apply a variant of the fixed point theorem to prove existence. Appropriate restrictions on the functional forms should guarantee uniqueness of the solution.

[20] For example, one scenario may be where spending in B is brought up to the level in A, though residents in B only bear a fraction of the cost involved. In an extreme case, where all the additional money is raised from the richer people, we will have S^B equaling S^A, T^B remaining the same and T^A increasing to cover the difference $S^A - S^B$, assuming both communities are equal-sized.

from higher spending to lower spending communities can be muted even if school expenditures are equalized.

A disturbing feature of residential segregation in laissez faire in this case is that it can be 'excessive', that is, the extent of segregation is larger than is optimal from the societal point of view. To see this, note that individual families sort if $E_{Py} > 0$,[21] since in that case it is the richer family (with more income y) which has the most to gain from the move to the richer neighborhood. However, if $E_{PP} < 0$, then the marginal productivity of community quality is decreasing (diminishing returns to peer group effect at the community level), implying an efficiency loss from stratification.[22]

A last point to note is that since there will still be stratification in the post-reform period (because of peer effects), it is not obvious that the average incomes and other socio-economic indicators in the two communities will become more similar. Since it will be the relatively poorer people in community A who now move to community B, the average incomes in both communities will go up. The poorer community is better off from an absolute point of view, but it is possible that the gap between the two communities now becomes even wider.[23]

Sorting by Demand for Education

The point of departure for models of sorting based on demand is that preferences over

[21] E_{ij} is the second derivative of E with respect to i and j.

[22] This is a common feature of models of this type, e.g. in de Bartolome (1990), a Pareto improvement occurs by shifting some more able families from the suburbs to the urban areas. The gain arises because in laissez-faire the migrating families do not take account of the fact that all communities benefit when a more able family migrates in and suffers when it migrates out: this is an externality that is not being internalized by the migrant.

[23] In the example of a uniform distribution, the difference in average incomes between communities A and B remain the same even after some of the poorest people in A shift to B. (The difference is always 1/2.) But for skewed distributions, as income distributions are in real life, there will generally be some differences.

education are considered to be distributed independently of income.[24] That is, people with the same incomes can have very different preferences for education. The models predict that just as in models with income sorting, there will be stratification across school districts, but that this will be demand-based - some people with low incomes but higher demands for education would be residing together with richer people with similar high demands for education. In other words, some poor people would be willing to pay higher rents to ensure a higher level of educational achievement for their kids.

The prediction of these models as to the consequences of a school finance reform is similar to that of models with sorting by income. With expenditures equalized across communities, if there were no peer effects then there would not be any incentive for the poor people to continue residing in the richer districts and paying higher rents. Housing prices in the higher-spending districts would come down and though this may dilute the incentives for people to actually move out of such districts, one should nevertheless see some such outflow. However, just as in models with sorting based on incomes, if peer effects are strong enough then there would continue to be sorting based on demands and corresponding higher rents.

5 Results

Table 1 shows the changes in within-county dispersion of median household incomes and per pupil expenditures in post-reform Michigan. I consider the 14 counties (out of 83) each of which has at least 10 K-12 school districts. The results show that there has been a significant dilution

[24] See Loeb (2001) for a recent example of a model with spatial segregation based on *demand* for schooling.

in disparities of school spending. The difference between the highest spending and the lowest spending districts in each county has gone down not only in relative terms, but in absolute terms as well. The effect on dispersion of household incomes is comparatively muted. In most of the cases there has been an improvement in relative terms, but the (absolute) gaps have widened in all counties, sometimes significantly.

5.1 Values of Housing Stock

I begin by classifying the Michigan K-12 school districts. 1993-94 was the last year before the reform, and state aid after the reform was based on spending in this year. So I divide the 524 K-12 school districts in Michigan into 5 groups on the basis of 1993-94 spending. Group 1 consists of the lowest-spending 105 districts, and so on, Group 5 consists of the richest 105.[25]

Figure 1 shows the distributions of per pupil housing stock in the different groups of districts in 1994, the last year before the reform, and in 2001, the last year in my analysis. The top panel shows the distributions in the lowest spending (Group 1) and highest spending (Group 5) districts, the bottom panel is for the lowest spending districts vis-a-vis the upper middle group (Group 4).[26] There has been a modest to large increase in housing stock in the lowest spending districts in the post-reform period, both in absolute and relative terms.

I next compare the trends in values of housing stock in these different groups of districts,

[25] This is the same classification used in Roy (2004). See Table 4 in that paper for some summary statistics on these groups of districts.

[26] These show the kernel smoothed plots of general fund expenditures in the two groups of districts. All figures have been weighted by district enrollment.

pre and post-reform. I run the following fixed effects (FE) regression on data from 1990 to 2001

$$H_{sgt} = \alpha + \alpha_s + \beta_3 * t + \sum_{g \neq 3} \beta_g * (D_g * t) + \gamma_3 * (reform) + \sum_{g \neq 3} \gamma_g * (D_g * reform)$$
$$+\theta_3 * (reform * t) + \sum_{g \neq 3} \theta_g * (D_g * reform * t) + \delta * X_{sgt} + \varepsilon_{sgt} \qquad (2)$$

H_{sgt} is the value of per pupil housing stock (state equalized valuation or SEV) 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).[27] D_g's are the dummy variables for the respective groups. Group 3, comprising of the middle group of districts, is the omitted category. 'Reform' is a binary variable, taking the value 0 pre-reform and 1 afterwards. t is a time-trend, equal to 0 in 1994, 1 in 1995 and so on. In this specification, θ_g's give the differences in post-reform trends *over and above* the differences in β_g's, the pre-reform trends - they can thus be interpreted as a sort of a difference-in-differences estimate for trends.[28]

The results are in Table 3. Prior to the reform, there was a very significant gap between the highest and the lowest spending districts. The value of housing stock in Group 5 districts was increasing at a much faster rate than districts in Groups 1 and 2.[29] In fact, there was a clear hierarchy in pre-reform trends - Group 1 districts were lagging behind Group 2 districts, who in turn were lagging behind Group 3 districts, and so on. Post-reform, however, the gap is considerably reduced. Though most of the trend estimates (θ_1 and θ_2) are not significant,

[27] Since free lunch data for 1990 and 1991 are either not available or not reliable, I have only included enrollment and ethnic composition in X_{sgt}. Running the regression on a sub-sample when data on both controls are available does not change the qualitative results.

[28] I do not have data on individual house prices before and after the reform. The Michigan Department of Education provides data on the value of total housing stock in the districts. While an analysis with exact house prices has its advantages, it is possible that the value of housing stock is a better indicator of demand for housing, particularly if supplies of new houses are quite elastic.

[29] Recall that the groups are arranged in ascending order of pre-reform spending - Group 1 consists of the lowest spending 105 districts, while Group 5 consists of the highest spending 105.

they are always positive and sometimes large. There is also a large relative increase (intercept shift) in the value of the housing stock in these poorest districts following the reform. Note that in all the specifications the post-reform coefficients for both intercepts and trends maintain a hierarchy ($\theta_1 > \theta_2 > 0 > \theta_3 > \theta_4$, similarly for the γ_g's).

These results on housing stock mirror those for revenues and expenditures.[30] The gap in per pupil spending between the richest and the poorest districts had been increasing in the years before the program. There was a clear hierarchy here too - the richer a group, the higher its growth rate. Post-reform, this completely reversed itself. Since much of the increases in spending in the lowest-spending districts were coming from the state, this should increase the 'desirability' of these communities. That is, some people with high preferences for schooling who earlier had been living in richer districts should now move back - one benefit of living in high property-value districts is no longer operative.

One important difference between the two sets of results is that for school spending, the lowest-spending districts witness higher rates of growth in spending, in an absolute sense, in the post-reform period. For housing stock, the opposite is the case. Districts in the highest spending communities (Groups 4 and 5) continue to outpace districts in Groups 1 and 2 in the post-reform period, though at much reduced rates than before. One reason for this is most possibly the staggered nature of the program in Michigan. As mentioned earlier, individual districts are constrained in the amounts of annual increases to their spending, but parents can move from one district to a higher-spending one, which will continue to have higher levels of

[30] See Roy (2004, Table 5) for results obtained by running equation (2) on district revenues and expenditures.

spending because of the 'hold-harmless' clause in the law. Another reason for the continued high demand for housing in the richer districts may be the strength of the peer effects. If these effects are strong, then even a complete equalization of school resources may not be enough to prevent socio-economic segregation across school districts.

Figure 2 shows the year-to-year changes in housing stocks across the different groups of districts. I run a fixed effects regression similar to equation (2) but with unrestricted year effects, and plot the values of the estimated coefficients.[31] There has been some convergence in the immediate post-reform period between the lowest spending districts and others, though towards the end of the decade the highest spending districts seem to break away from the rest.

Table 4 provides additional evidence on the continued high demand for housing in the highest-spending districts in the post-reform period. I run the following fixed-effects regression, separately for total housing stock, homestead housing stock and non-homestead housing stock for the period 1995 to 2001.[32]

$$H_{sgt} = \alpha + \alpha_s + \beta_3 * t + \sum_{g \neq 3} \beta_g * (D_g * t) + \delta * X_{sgt} + \varepsilon_{sgt} \qquad (3)$$

The results show that in the post-reform period the housing stock, for both homestead and non-homestead, has been increasing in value in each group of districts. For the lowest spending districts in Groups 1 and 2, the differences with Group 3 are not large, except for homestead housing where the former seems to be somewhat lagging behind. The more interesting finding

[31] As earlier Group 3, the middle group of districts, is the omitted category. So the plotted values are the deviations from Group 3 year effects.

[32] All three variables are in per pupil terms. Total housing stock is the sum of homestead and non-homestead housing stock. As mentioned in Section 3, values of homestead housing stock and non-homestead housing stock are not available for the pre-reform period when these were taxed at a uniform rate.

is that even after the reform, property values are growing at the fastest rates in the highest spending school districts, both for homestead and non-homestead properties.

5.2 Effect on Socioeconomic Segregation

First, I use the decennial census data to document changes in socioeconomic segregation between 1990 and 2000, which straddle 1995, the first year of the reform. Next I show whether different Michigan school districts witnessed different rates of inflows of population since 1995. In each of the regressions reported below Group 3, the middle quintile of districts in the pre-reform spending scale, is the omitted category.

5.2.1 Changes between the 1990 and 2000 Censuses

The theoretical discussion in section 4 suggests that following a school finance reform, when resources are equalized across different groups of districts, the poorer districts should be expected to witness inflows of population from their higher-spending counterparts. However, the extent of this inflow might be diluted by decreases in property values in the latter and increases in the former.

I begin my analysis by looking at changes in population and housing variables. Table 5(a) documents the changes in four important variables across different Michigan districts - number of households and total housing units, proportion of occupied housing units and owner-occupied units.[33] As far as the first two are concerned, there is no evidence of a significant influx of

[33] All the regressions reported in this section are of the same form as equation (3), with t=0 for 1990 and t=1 for 2000.

population in the lowest spending districts. In fact, districts in Groups 1 and 2 seem to lag behind all the other groups. However, the proportion of housing units that is occupied went up by the largest amounts in the Group 1 districts, followed by those in Group 2. The same is true for the proportion of occupied units that are owned - possibly an indicator of the confidence of people in their property's price in the near future.[34]

Table 5(b) documents the changes in four income-related variables - median household income in the district, proportion of people with public assistance (PA) income, and the proportions of persons and children below the poverty level. In each of these variables, there has been a large overall improvement between the two censuses. For median household income, the trends in the different groups do not seem to be any different from each other. For all the other three variables however, Group 1 districts seem to have significantly improved over the other groups. In fact, there seems to be a clear hierarchy - the proportion of households under welfare, and the proportions of persons and children under poverty declined at the fastest rates in Group 1 districts, followed by Group 2, and so on.[35]

Table 5(c) presents results on changes in the racial composition of school districts and in the civilian unemployment rate. The results for unemployment rate mirror those for the income variables in Table 5(b) - the largest declines were in the lowest spending districts (Group 1),

[34] One caveat should be mentioned at this point. I cannot strictly disaggregate the changes between 1990 and 2000 into that which happened prior to the reform and that which was post-reform. But in the appendix I control for pre-existing trends using data from the 1980 census, the results are qualitatively similar.

[35] Prior to the reform, Group 1 and Group 2 districts lagged behind others in these income variables. So some of the improvement may be due to regression to the mean. However, as shown in the appendix, between 1980 and 1990 the lowest spending districts mostly performed worse than the others, even though they were already lagging behind in 1980 (Table A-1). So most of the effects, particularly in Group 1 districts, should be a result of the school finance reform.

followed by those in Group 2, and so on. The results on racial composition are slightly different. Overall, the proportion of whites declined in Michigan, while those of the blacks and Hispanics increased, the latter at a faster rate. However, the districts were not equally affected by the changes. Group 1 districts, which already were overwhelmingly white, actually witnessed a slight decline in the black population. The Hispanic population there increased in line with most other groups. Districts in the highest spending quintiles (Groups 4 and 5), which already had the largest presence of blacks and Hispanics in 1990, witnessed the largest increases in these minority populations.

Table 5(d) presents results on variables relating to educational attainment. I include the four measures available from census data - the proportion of adults with less than 12th grade schooling, the proportion who are high school graduates, the proportion with some college education (though not a bachelor's degree), and the proportion with at least a bachelor's degree. The results show that at the lower end of the spectrum - for the proportion of adults who are high school dropouts, e.g. - it is the lowest spending districts in Group 1 who improved at the fastest rate. The proportion of adults with some college education also increased at the fastest rate in Group 1 districts.[36] However, as far as the proportion of college graduates are concerned, it is the richest districts which had the most improvement to show. I also defined a new variable, by adding up the populations with some college education and with a bachelor's degree. This would give the proportion of adults who have had *at least some* college education. I find that for this variable too, it is the lowest spending districts in Groups 1 and 2 which show the most

[36] Like for income variables (see fn. 35), districts in Groups 1 and 2 lagged behind others in educational attainment too. So regression to the mean may explain part of the results. However, accounting for pre-existing trends from the 1980 census does not change the results, see Table A-3.

improvement, while districts in the top quintiles lag behind.

5.2.2 Results relating to Residence in 1995

My final results relate to residence of the current (2000) population in 1995. The 2000 census asked all residents of a school district about their residence in 1995, five years earlier. It is possible to construct from this response a measure of the inflows of population into each district between 1995 and 2000. Note that one of the predictions of the theoretical model is that a school finance reform would lead to more people flocking to the lowest spending districts, the recipients of large amounts of state aid following the program. Since 1995 was the first year of the program, one would expect to see most of the increases in Proposal A-induced mobility beginning this year.

Table 6 shows the results. The dependent variable in the first three columns concerns the proportion of current residents of a school district who were living in a different house in 1995. This includes *all* persons who were living in a different house - whether it is the same school district or not,[37] the same county or not, the same state or not, the U.S. or abroad or at sea. If peer effects were not perceived to be important, one would expect to find a higher value of this variable in the lower spending districts, since a higher fraction of their current residents would come from outside of the districts.[38] But this does not seem to be the case. The proportion of current school district population coming in after 1995 seems to be the highest in Group 4

[37] Unfortunately, this includes residing in a different house within the same school district. It is not possible to filter out from the reported data the proportions living in the same house and in a different house within the same school district in 1995.

[38] Recall the discussion in Section 4.

districts, followed by Group 5, and lowest in the lowest spending districts in Group 1 and Group 2.

One caveat with this variable is that this includes all persons who were living in a different house. It is conceivable that most of the inflow of population to the lowest spending districts in the aftermath of the reform would be a result of relocations *within* the state. So in the last three columns of Table 6 I report the results using a different measure - viz., I use only that proportion of current residents of a district who were living in a different house in 1995, but *within Michigan*. The results are slightly different. Now there is no evidence of any significantly different inflows of populations in any group except Group 4.

6 Conclusion

There is growing concern among educators and policy makers that district and neighborhood based school systems generate incentives that lead to residential income segregation, and there is mounting evidence that such segregation could perpetuate income inequality (Benabou, 1996a, 1996b). In this paper I study the Michigan school finance reform of 1994, called Proposal A, to analyze the impact a change in school financing institutions can have on socioeconomic segregation. Proposal A ended local discretion over school spending and resulted in a comprehensive equalization of per pupil expenditures in the state. Using panel data on all Michigan K-12 districts from 1990 to 2001 and data from the 1990 and 2000 decennial censuses, which straddle 1994, I investigate whether the reform had any significant effects on housing stock, property values and inter-district movements of households, thereby changing the extent of residential

sorting in the state.

The first results on trends in the value of housing stock point to a positive effect of the school finance reform on property values in the lowest spending districts. At the same time, the results point to a sustained high demand for residence in the highest spending communities. When I use census data, there seem to have been significant relative improvements, at least in the poorest districts, in several indicators. This is particularly true for the income and employment variables, and holds good even when I control for pre-existing trends using the 1980 census. Overall, it seems reasonable to conclude that Proposal A has been responsible for some increases in housing stock and property values in the lowest spending districts, and for improvements in several socioeconomic indicators. However, the changes are still relatively modest, and in line with Nechyba's (2003) simulation results that suggest state financing leads to a slight decline in the extent of spatial segregation compared to local financing. The continued 'desirability' of the highest spending districts, which is reflected in the census regressions too, may stem partly from the staggered nature of the reform, though most of it is possibly a reflection of the strength of local peer effects (neighborhood 'social capital').

Appendix

I provide evidence that the results in Section 5.2.1, which use data from the 1990 and 2000 censuses, are robust to controlling for pre-existing trends. In particular, I show that the results are qualitatively similar when I use data from the 1980 census to control for pre-program trends that might otherwise confound the estimates.

I run the following regression on data from the 1980, 1990 and 2000 censuses.

$$Y_{sgt} = \alpha + \alpha_s + \beta_3 * t + \sum_{g \neq 3} \beta_g * (D_g * t) + \theta_3 * (reform * t) + \sum_{g \neq 3} \theta_g * (D_g * reform * t) + \varepsilon_{sgt} \qquad (A-1)$$

Y_{sgt} is the value of the dependent variable in district s in group g in census year t. α_s is the district fixed effect. t takes the values -1, 0, and 1 for 1980, 1990 and 2000 census years respectively. $Reform$ is a binary variable, taking the value of 1 for census year 2000 and 0 otherwise. In this specification β_g' s measure the differential rates of change in different groups in the pre-reform period (between 1980 and 1990 censuses), while θ_g' s are the *additional* effects in the post-program period (between 1990 and 2000 censuses) and can be interpreted as a sort of difference-in-differences estimate, just like in equation (2). As always, Group 3, the middle group of districts, is the omitted category in the regressions which are estimated by fixed effects (FE).

The first results are on population and housing variables in Table A-1. For number of households and total housing units, the lowest spending districts in Groups 1 and 2 are seen to lag behind, both in the pre and the post-reform periods, but the differences are never statistically significant. For occupied housing units and the proportion of occupied units that are owner-occupied, however, there were considerable relative increases in the lowest spending districts in the 1990-2000 period. Note that the post-program results are qualitatively in line with those in Table 5(a).

Table A-2 shows results on income and employment variables. The general picture is that

between 1980 and 1990 districts in Group 1 were lagging behind others, often significantly. But they have outperformed others in the 1990-2000 period, improving at a rate significantly higher than the common trends, which are themselves positive and large.[39] Again, the results are qualitatively similar to those in Tables 5(b) and 5(c).

Finally, Table A-3 shows the results on racial composition and educational attainment. For the former, just like in Table 5(c), Group 1 districts witness slight increases in the proportion of whites and slight declines in the proportion of blacks, but none of the changes are significant. As far as educational attainment of adults over the age of 25 is concerned, there are some improvements at the lower end of the distribution (proportion of high school dropouts declining) but not much otherwise. Like in Table 5(d), the proportion of people with a baccalaureate or more increased at the fastest rate in the highest spending districts (Group 5) in both 1980-1990 and 1990-2000 periods, possibly reflecting the desirability of these districts as residences.

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[39] The differences between districts in Group 2 and others are not large and always insignificant, in both the 1980-1990 and 1990-2000 periods.

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Table 1: Changes in Within-County Inequality in Median Household Incomes and Per Pupil Expenditures
(Michigan, 1989-90 to 1999-00)

County	No. of Districts in the County	Range of District Median Incomes in County		Percentage Difference		Range of District Per Pupil Exp. in County		Percentage Difference	
		1989	1999	1989	1999	1989	1999	1989	1999
Berrien	14	20,625	26,350	223	203	3369	2549	205	143
Calhoun	10	15,262	16,655	172	154	1800	1782	154	130
Genesee	21	33,159	49,038	293	288	2156	4092	165	172
Ingham	12	22,695	33,765	187	212	2188	2177	164	134
Jackson	12	11,069	18,529	144	150	1155	2186	137	138
Kent	19	34,034	47,995	227	229	2010	2122	162	134
Lenawee	12	17,715	19,281	185	151	931	1029	129	117
Macomb	21	26,934	33,850	233	199	3421	3207	202	153
Muskegon	12	23,609	33,308	272	254	1986	2768	162	146
Oakland	28	63,290	78,118	346	317	5108	5281	249	184
Saginaw	13	21,045	28,916	213	205	1862	4344	160	181
Van Buren	11	26,686	32,899	283	232	1754	5491	160	198
Washtenaw	10	25,706	44,801	196	226	2693	2866	173	145
Wayne	34	52,814	70,725	638	499	2869	3602	179	162

There are 83 counties in Michigan. 14 of them have at least 10 K-12 school districts, and are included in this table. For each such county in each census year, I first find the districts with the highest and the lowest values of median household income. The range of income reported above is the absolute difference between these two values. The columns marked Percentage Difference show the corresponding percentage differences - incomes in the richest district as percentages of those in the poorest. For example in 1989, of the 14 school districts in Berrien county, Lakeshore School District, the richest district, had a median income of $37,367 while Benton Harbor Area Schools, the poorest, had a median income of only $16,742, a difference of $20,625 (223%). The same procedure is followed to calculate the corresponding figures for per pupil expenditures.

Source: Author's calculations from the 1990 and 2000 decennial censuses, and Bulletin 1014's published by the Michigan Department of Education.

Table 2: Increases in Foundation Allowances, post-reform Michigan
(Selected districts at different points of pre-reform spending distribution)

District	1994	1995	1996	1997	1998	1999	2000	2001
Standish Sterling	3738	4200	4506	4816	5124	5170	5700	6000
Delton-Kellogg	4501	4740	4988	5235	5462	5462	5700	6000
Kearsley Community	5008	5227	5380	5535	5689	5689	5927	6227
Carman-Ainsworth	6002	6181	6334	6489	6643	6643	6881	7182
Warren Woods	7069	7239	7392	7547	7701	7701	7824	7997
Grant Township	10,681	10,841	10,994	11,149	11,303	11,303	11,484	11,737
FA in Grant Town/ FA in Standish-Sterling	2.86	2.58	2.44	2.31	2.21	2.19	2.01	1.96

Source: Michigan Department of Education. The last row shows the foundation allowances in Grant Township as a proportion of those in Standish-Sterling.

Table 3: Pre and Post-reform Trends in Value of Per Pupil Housing Stock (SEV), Michigan
(FE regressions, 1990-2001)

Trend (t)	4892**	5259**	5327**
	(310)	(366)	(372)
Group 1 * t	-952*	-902*	-942*
	(414)	(457)	(460)
Group 2 * t	-225	-368	-437
	(438)	(479)	(492)
Group 4 * t	2773**	353	1835**
	(578)	(1574)	(603)
Group 5 * t	7978**	2979**	3648**
	(1494)	(785)	(721)
Reform	-4644**	-5184**	-5170**
	(866)	(1113)	(1110)
Group 1 * reform	894	1856	1935
	(1191)	(1387)	(1373)
Group 2 * reform	540	422	674
	(1188)	(1414)	(1439)
Group 4 * reform	-709	-3618	-3360+
	(1528)	(2940)	(1864)
Group 5 * reform	-11456**	-8924**	-9207**
	(3279)	(2083)	(2138)
Reform * t	1129**	1015*	1028*
	(365)	(448)	(454)
Group 1 * reform * t	959*	433	400
	(491)	(547)	(550)
Group 2 * reform * t	147	32	82
	(515)	(572)	(584)
Group 4 * reform * t	-1032	-325	-103
	(665)	(1749)	(742)
Group 5 * reform * t	-2606+	-1627+	-1912*
	(1629)	(904)	(838)
Observations	6269	6269	6209
R-squared	0.96	0.97	0.98
Weighted	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y

Notes: The dependent variable is the per pupil housing value in the district (state equalized valuation). Group 3, the middle group of districts, is the omitted category. All regressions control for race and enrollment, not reported for brevity. +, *, ** denote significance at the 10, 5, and 1 percent levels respectively.

Table 4: Post-reform Trends in Value of Housing Stock, Michigan
(FE Regressions, 1994-2001)

	Total Housing Stock			Homestead Housing Stock			Non-Homestead Housing Stock		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Trend (t)	5169**	5418**	5466**	4014**	4184**	4137**	1801**	2006**	2064**
	(149)	(201)	(203)	(91)	(114)	(115)	(110)	(145)	(142)
Group 1 * t	158	-210	-262	-258*	-387**	-318*	324*	-10	-116
	(199)	(231)	(232)	(112)	(131)	(134)	(158)	(164)	(158)
Group 2 * t	58	-199	-174	-258*	-240	-236	260+	-54	-58
	(198)	(243)	(246)	(125)	(161)	(162)	(150)	(183)	(177)
Group 4 * t	1257**	-557	1074**	536**	-203	600**	877**	219	730**
	(240)	(640)	(316)	(141)	(485)	(180)	(185)	(310)	(267)
Group 5 * t	3776**	370	650+	1378**	779**	610*	3129**	324	677**
	(538)	(401)	(386)	(229)	(274)	(257)	(497)	(245)	(232)
R-squared	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.98	0.98
Observations	4173	4173	4133	3666	3666	3631	3666	3666	3631
Districts	524	524	519	524	524	519	524	524	519
Weighted	N	Y	Y	N	Y	Y	N	Y	Y
Exclude 5 Big Districts	N	N	Y	N	N	Y	N	N	Y

Notes: The dependent variable in columns (1)-(3) is the value of the total housing stock in the district (state equalized valuation). The dependent variable in columns (4)-(6) is the value of the homestead housing stock, while in columns (7)-(9) it is the value of the non-homestead housing stock. All three dependent variables are in per pupil terms. Group 3, the middle quintile of districts in the pre-reform spending distributon, 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 in columns (2)-(3), (5)-(6) and (8)-(9) are weighted by the enrollment of the district in 1990. All regressions control for ethnic composition and size of the districts. For brevity I do not report the other coefficients. $^{+}$, *, ** denotes significance at the 10, 5, and 1 percent levels respectively. Note that Group 1 is the lowest spending quintile, and so on, Group 5 is the highest spending quintile.

Table 5a: Changes in Selected Demographic and Economic Characteristics, Michigan School Districts
(Population and Housing Variables, 1990 and 2000 Censuses, FE Regressions)

	Number of Households			Total Housing Units			Occupied Housing Units			Proportion of Owner-occupied Units		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Year 2000 Dummy	645**	1181**	1181**	702**	1294**	1294**	0.75*	0.16	0.16	2.21**	1.95**	1.95**
(Yr 2000)	(93)	(274)	(274)	(99)	(269)	(269)	(0.35)	(0.30)	(0.30)	(0.23)	(0.28)	(0.28)
Group 1 * Yr 2000	-189+	-596+	-596+	-245*	-682*	-682*	1.93**	1.39*	1.39*	0.51	1.20*	1.20*
	(110)	(299)	(299)	(114)	(296)	(296)	(0.57)	(0.62)	(0.62)	(0.37)	(0.55)	(0.55)
Group 2 * Yr 2000	-85	-375	-375	-114	-512	-512	0.57	1.32+	1.32*	0.59	0.79	0.79
	(123)	(311)	(311)	(165)	(330)	(330)	(0.62)	(0.77)	(0.77)	(0.38)	(0.55)	(0.55)
Group 4 * Yr 2000	196	-11434	864	257	-10640	927	-0.10	-0.71+	-0.33	-0.23	-0.20	-0.20
	(430)	(8575)	(557)	(415)	(8092)	(548)	(0.47)	(0.40)	(0.36)	(0.37)	(0.36)	(0.44)
Group 5 * Yr 2000	375	1222	976+	328	1130	805	0.60	0.16	0.37	-0.04	-0.51	-0.50
	(250)	(900)	(602)	(244)	(831)	(570)	(0.51)	(0.43)	(0.37)	(0.37)	(0.38)	(0.40)
R-squared	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.99	0.98
Observations	1046	1046	1036	1046	1046	1036	1046	1046	1036	1046	1046	1036
Districts	523	523	518	523	523	518	523	523	518	523	523	518
Weighted	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y	N	N	Y	N	N	Y	N	N	Y

Group 3, the middle quintile of districts in the pre-reform spending distributon, 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 in columns (2)-(3), (5)-(6), (8)-(9) and (11)-(12) are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. $^{+}$, *, ** denote significance at the 10, 5, and 1 percent levels.

Table 5b: Changes in Selected Demographic and Economic Characteristics, Michigan School Districts
(Income Variables, 1990 and 2000 Censuses, FE Regressions)

	Median Household Income			Households with PA Income			Persons Below Poverty			Children Below Poverty		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Year 2000 Dummy	14159**	13946**	13946**	-5.49**	-5.05**	-5.05**	-3.08**	-2.46**	-2.46**	-4.25**	-3.54**	-3.54**
(Yr 2000)	(362)	(426)	(427)	(0.27)	(0.32)	(0.32)	(0.30)	(0.31)	(0.31)	(0.50)	(0.48)	(0.48)
Group 1 * Yr 2000	-282	-47	-47	-0.85*	-1.02*	-1.02*	-1.24**	-1.17**	-1.17**	-1.14	-0.96	-0.96
	(518)	(902)	(902)	(0.37)	(0.42)	(0.42)	(0.42)	(0.45)	(0.45)	(0.72)	(0.74)	(0.74)
Group 2 * Yr 2000	-105	280	280	0.23	0.20	20	0.13	-0.03	-0.03	0.89	0.48	0.48
	(491)	(670)	(671)	(0.35)	(0.55)	(0.55)	(0.43)	(0.47)	(0.47)	(0.67)	(0.66)	(0.66)
Group 4 * Yr 2000	517	-1288	169	1.00**	-2.95	0.29	1.38**	-0.28	1.14**	1.73**	-1.55	0.98
	(554)	(871)	(851)	(0.39)	(2.13)	(0.66)	(0.40)	(1.07)	(0.42)	(0.62)	(1.69)	(0.69)
Group 5 * Yr 2000	341	559	765	0.95*	1.51*	1.93**	1.53**	2.20**	2.44**	2.20**	3.02**	3.24**
	(661)	(902)	(889)	(0.48)	(0.67)	(0.46)	(0.43)	(0.47)	(0.43)	(0.63)	(0.65)	(0.61)
R-squared	0.97	0.97	0.97	0.88	0.91	0.88	0.94	0.98	0.97	0.93	0.97	0.96
Observations	1046	1046	1036	1046	1046	1036	1046	1046	1036	1046	1046	1036
Districts	523	523	518	523	523	518	523	523	518	523	523	518
Weighted	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y	N	N	Y	N	N	Y	N	N	Y

Group 3, the middle quintile of districts in the pre-reform spending distributon, 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 in columns (2)-(3), (5)-(6), (8)-(9) and (11)-(12) are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. $^{+}$, *, ** denote significance at the 10, 5, and 1 percent levels.

Table 5c: Changes in Selected Demographic and Economic Characteristics, Michigan School Districts
(Demograhic and Employment Variables, 1990 and 2000 Censuses, FE Regressions)

	Proportion of Non-Hispanic White			Proportion of Non-Hispanic Black			Proportion of Hispanics			Civilian Unemployment Rate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Year 2000 Dummy	-2.57**	-3.02**	-3.02**	0.32*	0.46**	0.46**	0.90**	0.98**	0.98**	-2.82**	-2.40**	-2.40**
(Yr 2000)	(0.30)	(0.38)	(0.38)	(0.14)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.21)	(0.21)	(0.21)
Group 1 * Yr 2000	0.37	1.07*	1.07*	-0.35	-0.68*	-0.68*	0.07	0.02	0.02	-0.19	-0.58	-0.58
	(0.40)	(0.48)	(0.48)	(0.25)	(0.32)	(0.32)	(0.22)	(0.19)	(0.19)	(0.35)	(0.39)	(0.39)
Group 2 * Yr 2000	0.14	0.42	0.42	-0.00	0.06	0.06	-0.05	-0.14	-0.14	0.27	0.09	0.09
	(0.38)	(0.51)	(0.51)	(0.19)	(0.25)	(0.25)	(0.20)	(0.21)	(0.21)	(0.32)	(0.39)	(0.39)
Group 4 * Yr 2000	-1.50**	-4.58**	-2.51**	0.75**	2.60**	1.26**	0.20	1.00*	0.43+	0.95**	-0.63	0.69+
	(0.49)	(1.05)	(0.64)	(0.25)	(0.95)	(0.28)	(0.25)	(0.39)	(0.25)	(0.28)	(1.03)	(0.37)
Group 5 * Yr 2000	-2.72**	-3.94**	-3.97**	1.44**	2.16**	2.16**	0.01	-0.33*	-0.28+	1.07**	0.78*	0.97**
	(0.54)	(0.82)	(0.87)	(0.43)	(0.69)	(0.75)	(0.22)	(0.14)	(0.14)	(0.40)	(0.33)	(0.29)
R-squared	0.98	0.99	0.98	0.98	0.99	0.98	0.88	0.91	0.92	0.88	0.94	0.90
Observations	1046	1046	1036	1046	1046	1036	1046	1046	1036	1046	1046	1036
Districts	523	523	518	523	523	518	523	523	518	523	523	518
Weighted	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y	N	N	Y	N	N	Y	N	N	Y

Group 3, the middle quintile of districts in the pre-reform spending distributon, 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 in columns (2)-(3), (5)-(6), (8)-(9) and (11)-(12) are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. $^{+}$, *, ** denote significance at the 10, 5, and 1 percent levels.

Table 5d: Changes in Selected Demographic and Economic Characteristics, Michigan School Districts
(Variables relating to Educational Attainment, 1990 and 2000 Censuses, FE Regressions)

	Less than 12^{th} grade			High School Graduates			Some College Education			Bachelor's Degree or More		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Year 2000 Dummy	-6.64**	-5.99**	-5.99**	-0.89**	-0.98*	-0.98*	3.69**	2.85**	2.85**	3.88**	4.14**	4.14**
(Yr 2000)	(0.26)	(0.28)	(0.28)	(0.30)	(0.41)	(0.41)	(0.33)	(0.33)	(0.33)	(0.25)	(0.32)	(0.32)
Group 1 * Yr 2000	-0.99**	-1.42**	-1.42**	0.67	0.59	0.59	0.95*	1.22*	1.22*	-0.72*	-0.45	-0.45
	(0.37)	(0.41)	(0.41)	(0.44)	(0.60)	(0.60)	(0.42)	(0.54)	(0.54)	(0.34)	(0.52)	(0.52)
Group 2 * Yr 2000	-0.33	-0.40	-0.40	0.11	-0.12	-0.12	0.34	0.25	0.25	-0.11	0.34	0.34
	(0.39)	(0.40)	(0.40)	(0.44)	(0.57)	(0.57)	(0.54)	(0.67)	(0.67)	(0.37)	(0.44)	(0.44)
Group 4 * Yr 2000	0.82*	0.80	1.04**	-0.54	0.80	-0.28	-1.54**	-1.79*	-2.12**	1.27**	0.20	1.47**
	(0.40)	(0.61)	(0.39)	(0.45)	(0.85)	(0.60)	(0.51)	(0.73)	(0.71)	(0.40)	(0.86)	(0.57)
Group 5 * Yr 2000	0.83+	2.27**	2.29**	-0.78	-0.64	-0.77	-2.27**	-4.22**	-4.36**	2.18**	2.66**	2.86**
	(0.46)	(0.43)	(0.45)	(0.47)	(0.51)	(0.51)	(0.63)	(0.92)	(0.98)	(0.53)	(0.79)	(0.82)
R-squared	0.99	0.99	0.99	0.95	0.96	0.97	0.85	0.77	0.76	0.97	0.98	0.98
Observations	1046	1046	1036	1046	1046	1036	1046	1046	1036	1046	1046	1036
Districts	523	523	518	523	523	518	523	523	518	523	523	518
Weighted	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y	N	N	Y	N	N	Y	N	N	Y

Group 3, the middle quintile of districts in the pre-reform spending distributon, 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 in columns (2)-(3), (5)-(6), (8)-(9) and (11)-(12) are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. $^{+}$, *, ** denote significance at the 10, 5, and 1 percent levels.

Table 6: Proportion of 2000 Population Living in a Different House in 1995, Michigan School Districts

	All Areas, including other U.S. states and abroad			Within-State only (Michigan resident in 1995)		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	38.79**	40.83**	40.83**	33.76**	35.27**	35.27**
	(0.55)	(0.71)	(0.71)	(0.50)	(0.64)	(0.64)
Group 1	-0.42	-1.45	-1.45	-0.75	-1.27	-1.27
	(0.71)	(0.86)	(0.86)	(0.67)	(0.76)	(0.76)
Group 2	-0.30	-0.89	-0.89	-1.14	-1.46	-1.46
	(0.81)	(0.96)	(0.96)	(0.74)	(0.96)	(0.96)
Group 4	2.52**	3.03+	3.98**	1.89*	2.27+	3.26**
	(0.95)	(1.57)	(1.13)	(0.82)	(1.16)	(0.93)
Group 5	1.84*	1.85	1.55	-0.44	-0.19	-0.84
	(0.89)	(1.25)	(1.35)	(0.79)	(0.98)	(0.93)
Observations	523	523	518	523	523	518
R-squared	0.04	0.07	0.08	0.03	0.08	0.11
Weighted	N	Y	Y	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y	N	N	Y

Notes: The dependent variable in columns (1)-(3) is the proportion of 2000 population of the district that was living in a different house in 1995. The dependent variable in columns (4)-(6) is the proportion of 2000 population of the district that was living in a different house, but within Michigan, in 1995. The results are from OLS regressions of the dependent variable on a constant and four group dummies. Group 3, the middle quintile of districts in the pre-reform spending distributon, is the omitted category. The five biggest districts are Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). Robust standard errors are in parentheses. $^{+}$, *, ** denotes significance at the 10, 5, and 1 percent levels respectively.

Source: Author's calculations from the 2000 decennial census.

Table A-1: Changes in Selected Demographic and Economic Characteristics, Michigan School Districts
(1980, 1990 and 2000 Censuses, FE Regressions)

	Number of Households	Total Housing Units	Proportion of Occupied Units	Proportion of Owner-occupied Units
Trend (t)	771**	778**	-2.10**	-1.47**
	(273)	(282)	(0.43)	(0.26)
Group 1 * t	-250	-229	-5.05**	-0.43
	(291)	(299)	(1.11)	(0.48)
Group 2 * t	-178	-229	-1.93*	-0.42
	(308)	(326)	(0.79)	(0.48)
Group 4 * t	-20908	-21450	1.04*	-1.68*
	(15570)	(15776)	(0.48)	(0.66)
Group 5 * t	1250	1629*	0.49	-1.25*
	(889)	(852)	(0.51)	(0.60)
Reform * t	352	461	2.18**	3.43**
	(405)	(414)	(0.67)	(0.44)
Group 1 * reform * t	-326	-425	6.25**	1.70*
	(440)	(450)	(1.67)	(0.87)
Group 2 * reform * t	-190	-279	3.33**	1.18
	(460)	(494)	(1.35)	(0.83)
Group 4 * reform * t	7621	9058	-1.75*	1.56+
	(20810)	(20942)	(0.78)	(0.96)
Group 5 * reform * t	-290	-740	-0.36	0.75
	(1339)	(1262)	(0.83)	(0.87)
R-squared	0.99	0.99	0.91	0.98
Observations	1540	1540	1540	1529
Districts	514	514	514	514

See equation (A-1) in the Appendix. Group 3, the middle quintile of districts in the pre-reform spending distributon, is the omitted category. All regressions are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. $^{+}$, *, ** denote significance at the 10, 5, and 1 percent levels. The results are robust to exclusion of the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5).

Table A-2: Changes in Selected Demographic and Economic Characteristics, Michigan School Districts
(1980, 1990 and 2000 Censuses, FE Regressions)

	Median Household Income	Per Capita Income	Households with PA Income	Persons Below Poverty	Unemployment Rate
Trend (t)	11756**	5969**	3.74**	2.02**	1.08**
	(485)	(224)	(0.28)	(0.31)	(0.20)
Group 1 * t	-2150**	-1074**	0.79*	0.42	1.41**
	(769)	(295)	(0.37)	(0.44)	(0.33)
Group 2 * t	-94	-329	-0.14	-0.22	0.45
	(796)	(307)	(0.49)	(0.51)	(0.40)
Group 4 * t	-2025	-780	4.11+	3.45*	3.18+
	(1899)	(853)	(2.11)	(1.54)	(1.79)
Group 5 * t	2846*	2331**	-0.21	0.48	0.07
	(1271)	(702)	(0.73)	(0.75)	(0.47)
Reform * t	2070**	1632**	-8.86**	-4.49**	-3.51**
	(738)	(326)	(0.54)	(0.54)	(0.38)
Group 1 * reform * t	2140+	820+	-1.72*	-1.54*	-2.06**
	(1336)	(483)	(0.70)	(0.77)	(0.63)
Group 2 * reform * t	310	10	0.28	0.16	-0.36
	(1180)	(459)	(0.96)	(0.88)	(0.70)
Group 4 * reform * t	601	-68	-7.57+	-3.98	-4.02
	(2526)	(1173)	(3.94)	(2.55)	(2.85)
Group 5 * reform * t	-2518	-1074	1.49	1.67	0.62
	(1783)	(976)	(1.34)	(1.18)	(0.78)
R-squared	0.93	0.93	0.89	0.96	0.86
Observations	1540	1540	1538	1540	1540
Districts	514	514	514	514	514

See equation (A-1) in the Appendix. Group 3, the middle quintile of districts in the pre-reform spending distributon, is the omitted category. All regressions are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. $^{+}$, *, ** denote significance at the 10, 5, and 1 percent levels. The results are robust to exclusion of the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5).

Table A-3: Changes in Selected Demographic and Economic Characteristics, Michigan School Districts
(1980, 1990 and 2000 Censuses, FE Regressions)

	Prop. of Whites	Prop. of Blacks	Prop. of Hispanics	Less than 12th grade	High School Graduates	Bachelor's Degree or More
Trend (t)	-1.65**	0.21*	0.97**	-9.37**	-5.26**	1.14**
	(0.30)	(0.11)	(0.19)	(0.38)	(0.49)	(0.27)
Group 1 * t	0.27	-0.18	-0.15	-0.70	2.90**	-0.27
	(0.40)	(0.23)	(0.24)	(0.52)	(0.68)	(0.41)
Group 2 * t	0.09	-0.03	-0.05	-0.59	0.88	-0.33
	(0.44)	(0.27)	(0.24)	(0.51)	(0.75)	(0.41)
Group 4 * t	-5.55*	5.07*	0.66+	0.26	-0.39	0.21
	(2.28)	(2.46)	(0.35)	(0.54)	(1.10)	(0.66)
Group 5 * t	-2.10*	1.82*	-0.05	1.91**	-2.34**	1.36+
	(0.85)	(0.81)	(0.21)	(0.58)	(0.70)	(0.75)
Reform * t	-1.43*	0.24	0.01	3.36**	4.37**	2.91**
	(0.57)	(0.18)	(0.27)	(0.55)	(0.75)	(0.46)
Group 1 * reform * t	0.83	-0.41	0.18	-0.74	-2.28*	-0.13
	(0.73)	(0.43)	(0.36)	(0.78)	(1.09)	(0.73)
Group 2 * reform * t	0.33	0.17	-0.08	0.25	-0.90	0.67
	(0.43)	(0.42)	(0.37)	(0.76)	(1.14)	(0.68)
Group 4 * reform * t	0.83	-2.24	0.35	0.44	1.31	-0.17
	(3.03)	(3.22)	(0.57)	(0.94)	(1.59)	(1.16)
Group 5 * reform * t	-1.73	0.36	-0.29	0.27	1.74	1.17
	(1.31)	(1.18)	(0.31)	(0.84)	(1.03)	(1.30)
R-squared	0.98	0.99	0.85	0.97	0.91	0.96
Observations	1540	1540	1539	1540	1540	1540
Districts	514	514	514	514	514	514

See equation (A-1) in the Appendix. Group 3, the middle quintile of districts in the pre-reform spending distributon, is the omitted category. All regressions are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. $^{+}$, *, ** denote significance at the 10, 5, and 1 percent levels. The results are robust to exclusion of the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5).

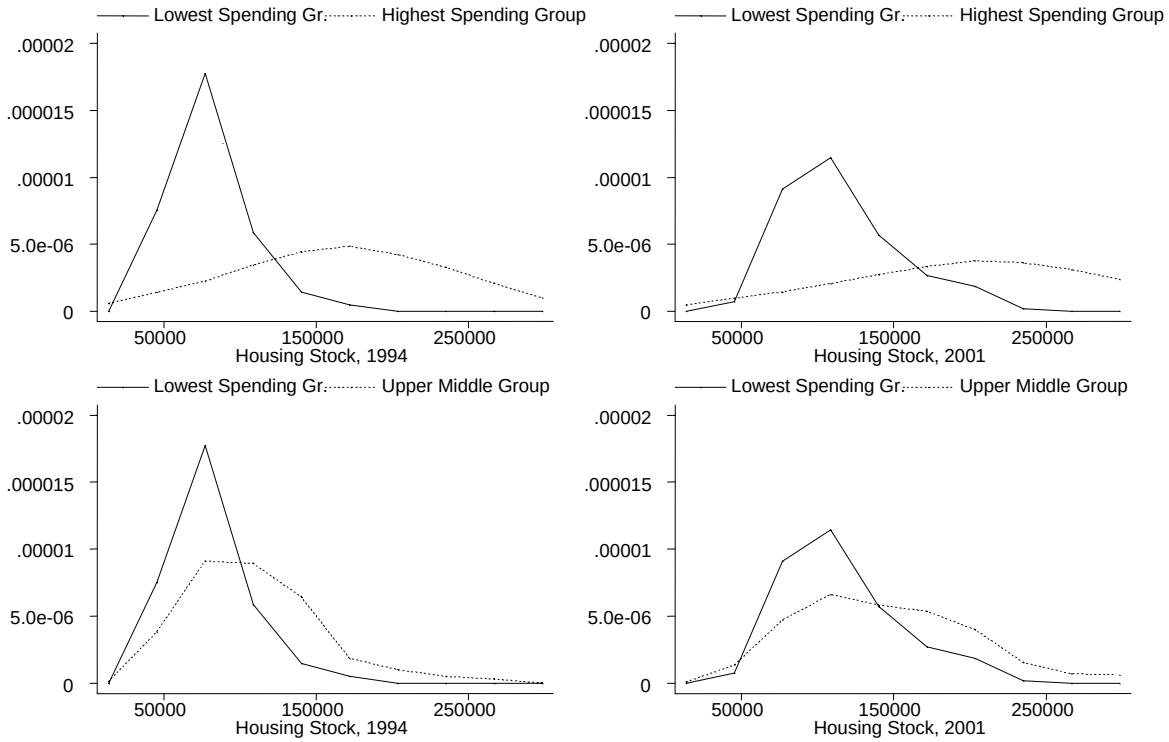

Figure 1. Distribution of Per Capita Housing Stock in Lowest Spending Districts, compared to Highest Spending Districts (Top Panel) and Upper Middle Districts (Bottom Panel), 1994 & 2001

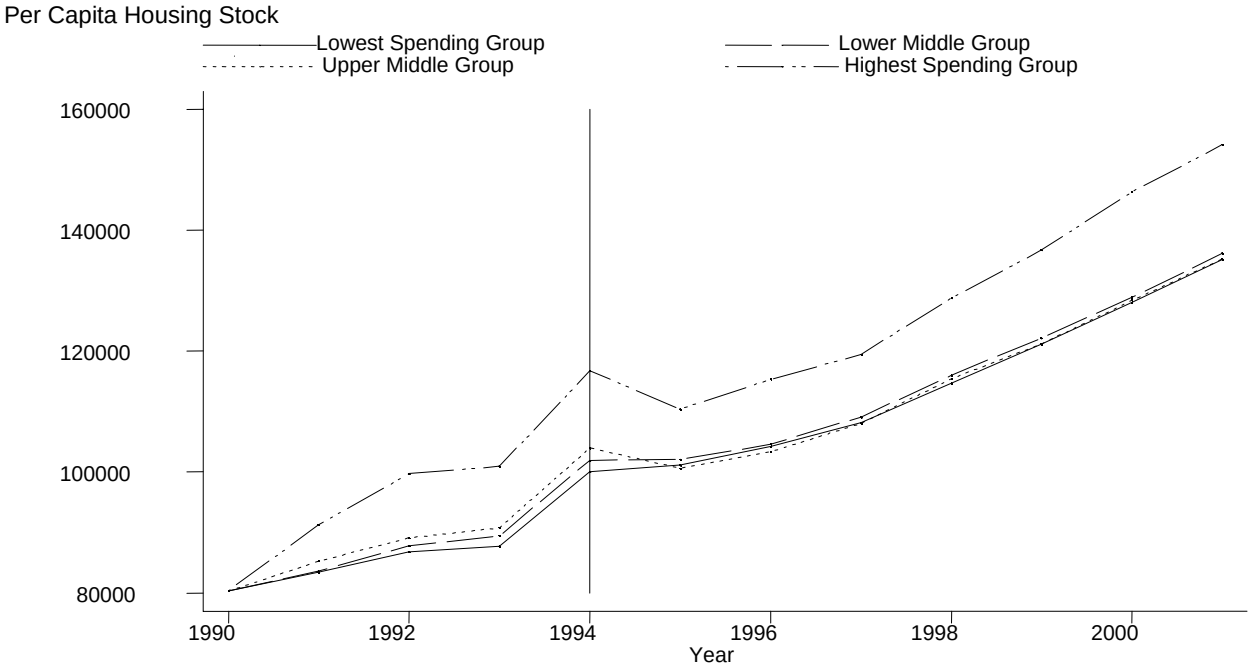

Figure 2. Trends in Per Capita Housing Stock, Michigan School Districts, 1990-2001