Housing Markets and Residential Segregation: Impacts of the Michigan School Finance Reform on Inter- and Intra-District Sorting

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Abstract

Local financing of public schools in the United States leads to a bundling of two distinct choices – residential choice and school choice - and has been argued to increase the degree of socioeconomic segregation across school districts. A school finance reform, aimed at equalization of school finances, can in principle weaken this link between housing choice and choice of schools. In this paper, we study the impacts of the Michigan school finance reform of 1994 (Proposal A) on spatial segregation. The reform was a state initiative intended to equalize per-pupil expenditures between Michigan school districts and reduce the role of local financing. We find that Proposal A was responsible for increases in the value of housing stock in the lowest-spending school districts, and for improvements in several socioeconomic indicators in these districts, implying a decline in neighborhood sorting. We also find that the reform affected dispersion of incomes and educational attainment within school districts, increasing within-district heterogeneity in the lowest-spending school districts, while decreasing the same in the highest-spending districts. However, there is continued high demand for residence in the highest-spending communities, suggesting the importance of neighborhood peer effects ("local" social capital) and implying that even a comprehensive government aid program can fail to make a large impact on residential segregation.

Key words: spatial segregation, school finance reform, tiebout sorting, peer effects

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 residences on the basis of the quality of schools in the locality. Since, as is often argued, demand for (and affordability of) a good education increases with parental income and educational attainment, this can potentially lead to economic and demographic segregation across school districts within a state. A school finance reform, loosely interpreted as an equalization of school finances within state boundaries, can in principle weaken this link between housing choice and choice of schools. It can dilute the extent of socioeconomic stratification and affect house prices and property values. In this paper, we study the effect of the Michigan school finance reform of 1994 on spatial segregation. We investigate whether the reform had any significant effects on values of housing stock and socioeconomic compositions of districts, thereby affecting residential sorting in the state. In the process, we provide evidence on the effectiveness of a comprehensive community-based government aid program in significantly affecting spatial segregation.

In 1994, the state of 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 revenues and included giving large sums of money to the lowest spending districts, which were also allowed to increase their future spending at a much faster rate than others. Concurrently, Proposal A also ended local discretion over school spending. Based on spending by individual districts in 1993-94, the last year before the program, the state now decided the amount by which each district could 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 expenditures, but were constrained in future increases. Over time, the gap in spending was significantly reduced. Also, there is considerable evidence (Papke, 2005; Papke, 2008; Roy, 2011) that the reform led to significant gains in academic performance in the lowest spending districts and the gap in educational outcomes between the highest and lowest

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[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). This percentage would have been even greater in earlier years, when most states had not passed school finance reforms.

spending districts narrowed. This relative equalization sets the stage for studying the impacts on socio-economic segregation. If there was no impact on educational outcomes, then a study of the impact on socio-economic segregation would be largely moot—a priori there would not be much of a case in favor of reductions in socio-economic segregation. However, the increased attractiveness of the low spending districts and the narrowing of the educational gap have made an analysis of the impact on socio-economic segregation interesting and relevant. It is instructive to examine whether a reduction in educational disparities brought about by the school finance reform translated into a reduction in socio-economic segregation.[2]

Using data from 1990 to 2001 (which straddle 1994, the year of the reform), and a difference-in-differences estimation strategy in trends, we find that there was a positive effect of the school finance reform on the values of housing stock in the lowest spending school districts. But the results also suggest a continued high demand for residence in the highest spending school districts. We then use data from the last three decennial U.S. censuses (1980, 1990 and 2000) to study the evolution of different measures of socioeconomic indicators - particularly income, education, and employment variables - across different Michigan districts in the pre- and post-reform periods. The results are consistent with the above findings and show improvements in the lowest spending districts. However, both analyzes show that these districts still significantly lag behind the highest spending districts in these indicators. We also undertake a detailed analysis of within-district dispersions of measures of socioeconomic status. We find that the reform increased within-district heterogeneity of incomes and educational attainment in the lowest spending school districts, while decreasing the same in the highest spending districts.

The results of this study have important policy implications. Geographical segregation, particularly by incomes and socioeconomic status, has been a persistent feature of the U.S. society. Various reforms have been debated that might reduce the extent of socio-economic inequality across neighborhoods. Alternative initiatives like forced busing and assignment have not proved promising—they have either been unpopular with the public or have been struck down in the courts. Therefore, it is important to understand the role of school finance reforms in reducing socio-economic segregation. We do find robust evidence in favor of reduced segregation across districts, but the effects are modest. As discussed later,

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[2]Of note here is that schooling accounts for an overwhelming share of local school spending in Michigan districts. So, it is likely that school spending is a salient factor in households' decisions to choose among alternative districts, particularly because Michigan has a large number of autonomous K-12 school districts.

an important explanation for the patterns seen in the data can be the presence of neighborhood peer effects.[3] Such factors, often referred to in the literature as 'local' social capital and perceived to have a strong influence on household's residence decisions, can have a dampening effect on the equalizing forces of even a comprehensive school finance reform. That is, in the presence of such effects, school finance reforms and similar large government aid programs, while directly improving outcomes in the low-income communities, may have a relatively modest effect on attracting higher-income households away from the high income communities.

This study is related most closely to the strand of literature that studies residential locations of households, stemming from the classic work of Tiebout (1956). Tiebout (1956) hypothesized that if households are free to choose where to reside among many competing jurisdictions, this would ensure efficiency in the provision of 'local' public services. This is because households would vote 'with their feet' if not satisfied with the existing level and cost of these services. The focus of an important branch of this literature has been to estimate the marginal willingness of households to pay for school quality - the general conclusion is that parents are willing to pay a substantial price for schools considered 'desirable' (Black (1999), Barrow (2002), Downes and Zabel (2002) and Figlio and Lucas (2004)). In an important contribution, de Bartolome (1990) shows theoretically that when public service output (like schooling) depends on the characteristics of the other residents in the community (the peer group effect), communities may become heterogeneous in composition and inefficient. He shows that in this scenario a social planner can achieve a Pareto improvement by choosing higher school inputs in the less desirable communities - something very similar in principle to a school finance reform. However, though there have been some empirical studies of the effect of school finance reforms on resource equalization and academic performance,[4] to date there have been few systematic empirical evaluations of the impact of these programs on socioeconomic segregation.[5]

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[3]By neighborhood peer effects, we refer to the general environment under which the school district operates - the composition of its population, the quality of its public goods, crime and safety conditions, employment opportunities, etc. - in short, the other local attributes of the school district.

[4]See, among others, Papke (2005), Roy (2011) and the collection of papers in Yinger (2004). Cullen and Loeb (2004) provide an excellent description of the Michigan program, and discuss some of its effects on equalizing per pupil spending and academic outcomes.

[5]In a theoretical contribution Wyckoff (1995) makes the point that equalizing education aid, which typically follows school finance reforms, may lead to higher housing costs for the poor, thereby reducing its net beneficial effect. In a general equilibrium model that endogenizes school and housing choice and calibrating his model to New Jersey data, Nechyba (2003) finds that state financing leads to a smaller decline in residential segregation compared to local financing.

In two important contributions, Epple and Ferreyra (2008) and Ferreyra (2009) examine the general equilibrium effects of Proposal A on housing prices and neighborhood composition in the Detroit metropolitan area. They find a limited impact of the school finance reform - some effect on housing prices, but little on neighborhood demographics, unlike in this study. The lack of significant impacts may be due to their focus on Detroit, which was relatively less affected by the spending equalization due to Proposal A . This study focuses more on the districts which were significantly affected by Proposal A, and contrasts the experiences of districts lying at different points of the pre-program spending distribution.

This paper is most closely related to Aaronson (1999) and Dee (2000). Using data on all U.S. school districts from 1980 and 1990 censuses, Aaronson (1999) studies whether school finance reforms alter income heterogeneity within school districts. He finds that the poorest and lowest spending districts in states with *court-mandated* school finance systems became significantly more diversified in the post reform period. Dee (2000) also uses decennial census data to look at whether in states with *court-mandated* school finance reforms, the new expenditures on schools have been capitalized into housing values and residential rents. He finds that such reforms increased median housing values and rents in the districts receiving state aid.

The present paper differs from these studies in some fundamental ways. First, one of the main potential ways in which a school finance reform can dilute the extent of segregation is by improving the academic performance of students in the previously resource-constrained districts—thereby increasing their attractiveness as potential residences. However, in neither Aaronson (1999) nor Dee (2000) do we have evidence that the school finance reforms that they were studying had significant positive effects on student performance. In such a scenario, it is difficult to interpret the results involving segregation. For example, the estimated coefficients might be underestimating the true effect of school finance reforms if the states included in their treatment group did not experience substantial gains in learning. In Michigan, on the other hand, there is convincing evidence of the reform having produced significant gains in student performance (Papke, 2005; Papke, 2008; Roy, 2011), so the results are particularly informative from that perspective. Second, Aaronson (1999) and Dee (2000) restrict themselves to heterogeneity in incomes and housing prices respectively. We study a broader range of indicators, including not only housing and income, but also several socioeconomic variables which are perceived to be important indicators of

desirability of school districts as residences. Moreover, while Aaronson (1999) focuses on *within-district* heterogeneity, we study both within-district and across-district heterogeneities.

Third, in contrast to this study which looks at the experience of a comprehensive school finance reform in one state in detail, both the Aaronson and Dee studies are nationwide studies and hence have to classify states into either reform states or non-reform states. However, as emphasized in Aaronson (1999) and Hoxby (2001), the results are often sensitive to the classification used. For example, using the Downes and Shah (1995) classification of reforms, Aaronson does not find any effect of legislature-mandated reforms on neighborhood income dispersion, while alternative classifications of finance reforms in his study give different results.[6] Fourth, unlike Aaronson and Dee, we control for district-specific heterogeneity by including district fixed effects in the specifications, and also control for any pre-existing differences in trends across the districts. Both Aaronson and Dee mostly use data from two time periods only - the 1980 census and the 1990 census - which preclude controlling for pre-existing trends.[7] Fifth, Aaronson argues that one implication of the Tiebout model is that *within-community* heterogeneity increases as a result of limits on the discretion of school districts to set their expenditure levels. We pursue this issue further, and argue that districts may become *more or less* diversified in the post-reform period depending on whether they were at the lower end or the higher end of the spending scale. In the empirical section, we provide important evidence on changes in within-district heterogeneity, and show that the reform had *different* effects in low spending districts compared to high spending districts. Finally, the time period considered here is different from both Aaronson and Dee. Both Aaronson and Dee studies include data only upto the 1990's, mainly the 1990 and previous censuses. We employ a difference-in-differences strategy in trends which uses panel data (available annually) on Michigan school districts from 1990 to 2001 straddling 1994, the year of the reform. We also use data from the 1980, 1990 and 2000 U.S. censuses. Since the 1990s were characterized by an important push in K-12 education towards higher standards and quality, the effects of school finance reforms in this decade can be quite different from those in previous decades. In section 8, we compare our results to those of Aaronson and

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[6]Each state's school financing rule often involves hundreds of intricate details, see Medina (2006) for an illuminating article about the myriad of rules and exemptions that guide the formulas for state aid in the state of New York. Also, there are important differences in presence and timing of school finance reforms across states, including those mandated by state court rulings, and this may make omitted variables bias a significant concern in these analyses.

[7]In one set of regressions, which uses data from the 1970, 1980 and 1990 censuses, Dee controls for pre-existing trends - however, the results are significantly different from his other estimates, possibly due to missing school districts.

Dee and point out several significant differences.

This is the first paper to undertake a detailed analysis of a major school finance reform on socioeconomic stratification. Michigan provides a particularly interesting case, since the large number of fiscally independent school districts (over 500 K-12 districts) resulted in significant disparities in school spending in the pre-program period, accompanied by a high degree of residential segregation. Second, there were large changes in per pupil spending following Proposal A in Michigan. The lowest-spending districts witnessed a significant influx of state aid, while the highest spending districts were constrained in their future increases. Also, local discretion over school spending was mostly abolished. Note that these changes occurred even though the courts had not found the existing finance system unconstitutional, making Proposal A one of the more interesting school finance reforms. Third, there is substantial evidence that the reform was instrumental in significantly improving academic performance in the lowest-spending districts (Papke, 2005; Papke, 2008: Roy, 2011). Thus the Michigan experience allows us to examine the segregation effects of a reform which had demonstrably positive effects on performance, unlike the reforms discussed in Aaronson (1999) or Dee (2000), where evidence on such positive effects is lacking.

2 The Michigan School Finance System

2.1 Michigan before Proposal A

The Michigan school finance reform, Proposal A, was not a response to any adverse court ruling or to a sudden rise in public concern over disparities in school spending. Rather, it was an unexpected by-product of the prevailing debate over high property taxes, whose main purpose was supporting local schools. Prior to Proposal A, Michigan had been using a district power equalizing (DPE) formula, where districts were allocated state funds based on their local property tax rates. This was intended to make the system wealth-neutral - so that high property-tax wealth in a school district does not lead to high revenues except through a higher tax rate - while leaving the choice of property tax rates (called millage rates) to the local districts. But despite this, there were significant differences in spending across school districts. 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 its share of school spending financed locally (61%) was the fourth highest.[8]

There are 524 K-12 school districts in Michigan, each of which is fiscally independent.[9] This, coupled with the predominance of local control in school affairs, led to socioeconomic segregation along district lines. Table 1 provides some illustrative evidence on the extent of disparities in household incomes and per pupil spending across school districts, *even within the same county*, in pre-reform Michigan. For each Michigan county that has more than 10 school districts, we show the median household income in the richest school district as a percentage of that in the poorest school district.[10] As can be seen from column (2), in 1989 there were very significant differences in incomes between the richest and the poorest school districts even within the same county. In every county except Jackson county, the median income in the richest school district was almost twice as high as that in the poorest district, often even higher. The differentials were generally higher for counties which had more school districts, - a larger number of school districts allowed for a greater degree of stratification. The pre-reform situation thus closely corresponded to a Tiebout-type sorting of households into desired (educational) jurisdictions.[11] Not surprisingly, these large differences in median incomes translated into large differences in school spending, as can be seen in column (4) on per pupil spending in 1989.

2.2 Proposal A, the Michigan School Finance Program

In March 1994, Michigan voters overwhelmingly ratified Proposal A, which reduced the reliance of school revenues on property taxes. Most of the lost revenues were replaced by an increase in the statewide 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.

The new school spending plan, effective from 1994-95, worked as follows. First, the 1993-94 level

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[8]The three states with a higher share of school expenditures financed locally in 1994 were New Hampshire (86%), Illinois (62%) and Vermont (61%).

[9]There are an additional 31 non-K-12 school districts, but they generally only enroll a few students each.

[10]There are 83 counties in Michigan, 14 of them have more than 10 school districts each and are included in this table. For each county, the school district with the highest (lowest) value of median household income is defined as the richest (poorest) district. 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. In other words, the richest school district in Berrien county had a median income more than twice as high (223%) as the poorest school district. (The data are from the 1990 census.)

[11]Gramlich and Rubinfeld (1982) also found evidence of clustering of households with similar demands in Michigan, particularly in the urban centers. Fernandez and Rogerson (1996) document the extent of disparities in per pupil spending within the Detroit Metropolitan Area in pre-reform Michigan - in 1986-87 while Bloomfield Hills school district was spending about $7000 per child, Dearborn school district, at the other end of the spectrum, spent much less than $3000.

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of spending in each district was taken as the base, and was called the district's Foundation Allowance (FA). Second, future increases in all districts' FAs were governed entirely by the state legislature - the lowest spending school districts were allowed to increase spending at much faster rates than their higher spending counterparts. Over time this led to a substantial narrowing of the spending gap across districts. Further, all districts, including the highest spending ones, were held harmless - none suffered any absolute decline in per pupil spending. However, their abilities to raise additional money for their local schools in the future, over and above the amount sanctioned by the state, were severely constrained.

Table 2 shows the changes in foundation allowances in Michigan school districts in the post-reform period. We show seven districts located at different percentiles in the pre-reform spending distribution. The large catch-up exhibited by the lowest spending districts is immediately evident. For example, a district like Standish-Sterling Community Schools, in the bottom percentile of the spending distribution in 1994, witnessed an increase of about 61% in foundation allowances over the next 7 years. However, for Bloomfield Schools school district, already spending over $10,000 in 1994, the increase was only about 10%. Note that this narrowing of the spending gap was accomplished mostly by increasing school spending at a higher rate in the lowest spending districts.

3   Theoretical Background

There is a rich literature in public finance and urban economics exploring local segregation and its causes and consequences, see, e.g., Ross and Yinger (1999) for a survey. So we confine ourselves to a discussion of the basic theoretical intuition behind the potential segregation effects of a school finance reform.

To first describe the pre-reform scenario, let there be two school districts, A and B, and a continuum of households with school-age children. Households are mobile between the two school districts, that is, they can choose to reside in either school district without transportation costs featuring prominently in the decision.[12] Utility of a household depends on its educational attainment and its consumption

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[12]Here, we assume that families can migrate from one school district to another comparatively costlessly, without other considerations (job availability, closeness to family, other amenities, etc.) featuring importantly in the decision. While it is true that not all parts of the state afford the same opportunities in terms of relocations, Michigan has 524 K-12 school districts which makes migrating to another school district much more feasible compared to most other states. Recall from Table 1 that in the pre-reform period there were significant disparities in per pupil spending even within the same counties. This implies that often even neighboring districts were differentially affected by the reform,- since other things equal, migrating is presumably much easier within counties, this would have provided comparatively easier opportunities of movement across district boundaries.

of "all other goods". The former is an increasing function of per pupil spending in the school district, peer group quality in the school district and the household's own characteristics (parental education, household income and tastes for education). Peer group quality is an increasing function of the average socioeconomic status (SES) of households in the school district, proxied by household incomes and education. School spending is financed by state aid and local revenue, where the latter is locally determined and locally raised (by property taxes). These tax rates on local property are determined by the median voter within each district.

3.1   Effect on *Inter-district* Stratification

Under the above circumstances, there will be stratification by SES between the two school districts. All households in one of the school districts (say school district A) will have SES at least as high as the household with the highest SES in school district B. First, households will tend to cluster together, since under local discretion over property tax rates (and hence, school spending), households will tend to choose school districts which spend the same amount of money on education that they themselves would have chosen. Since education is a normal good, higher income households demand, and can afford, higher school expenditures, resulting in segregation along income across district boundaries. Second, if peer effects have a strong positive influence on academic attainment, then higher SES households (who can afford to do so) would be inclined to pay more for residences in school districts that have more favorable peer groups.

A school finance reform can be approximated in this setup as an equalization of school spending across school districts (and hence, as a transfer of resources from school district A to school district B). In this scenario, households residing in the poorer school district B will find that their school spending has gone up. This will increase the relative attractiveness of school district B - some households who had earlier been preferring school district A to school district B and paying higher rents (for higher school expenditures and academic attainment), will switch to school district B, where the schools are now funded at higher levels. However, if peer effects are strong and households perceive that the peer group of a student is crucial for his/her future academic achievement, they are less likely to switch school districts just because per pupil spending in a neighboring district has gone up.

If the supply of housing is relatively inelastic in the poorer district B, then most of the increase in

school spending in that district will be capitalized in an increase in house prices. Otherwise, one would expect an increase both in housing prices and in the occupation of housing units in district B, resulting from migration of households from district A. In either case, the value of total housing stock - the variable employed in the empirical analysis later - will go up in the poorer school district B unless, as mentioned, peer effects are quite strong.

3.2 Effect on *Intra-district* Stratification

A school finance reform also has important and interesting implications on stratification *within* school districts. When there is no change in segregation between districts, e.g. when the supply of housing is inelastic, there is no change in variance of different SES measures (like household incomes and educational attainment) within the districts themselves. Most of the adjustment in this case is likely borne by housing prices and rents. However, when there is migration of households across districts, the poorer district B receives an influx of households who are relatively richer and relatively more educated compared to its original (pre-reform) population, while the richer district A loses some of its relatively poorer and relatively less educated households. This leads to an increase in variance of incomes and educational attainment within the poorer district B, and a corresponding reduction within the richer district A. So a school finance reform either leaves within-district dispersion mostly unchanged (when there is little or no inter-district migration), or increases it in the poor and low spending districts (who benefit from the reform) and decreases it in the rich and high spending districts.

Summing up, intuition from this discussion of spatial segregation leads to the following predictions relating to the effects of a school finance reform. First, the move from a locally-financed to a state-financed system would be expected to lead to a weakening of existing segregation, as the reform compresses one dimension - perhaps the most important dimension (expenditure) - along which sorting previously occurred. Second, the reform should increase within-district dispersion of SES in these low spending districts, while decreasing it in the high spending districts (unless there is little or no migration across districts).

4   Data

The data used in this study come from multiple sources - the Michigan Department of Education, the Common Core of Data of the National Center for Education Statistics, and the Census Bureau (for the 1980, 1990 and 2000 censuses). School district data on revenues, expenditures and housing stock, as well as those on K-12 enrollment, are obtained from the Michigan Department of Education. Housing stock refers to the value of housing stock and measures the total amount of housing wealth in a school district. The advantage of this variable is that it is able to capture both changes in house prices and changes in total stock of housing. This is useful as not all changes in housing demand may get reflected in house prices. This is especially relevant in our case—lowest spending districts are more rural (compared to other districts), and inelasticity of housing is not a feature of these districts. Increased demand in these districts might only marginally impact house prices and might mostly get reflected in an increase in the stock of new houses. However, any increased demand for housing (be it capitalized into increased prices or supply) will be captured in our housing stock variable.

We use annual data from 1990 to 2001, which allow us to control for differences in pre-program trends across districts. We do not use data from 2002 and beyond, since the effects of the reform in this period would likely be confounded with those of the introduction of the federal No Child Left Behind Act. Note though, that most of the effects of Proposal A would have likely materialized by 2001.

The data for some of the control variables, like racial composition and free lunch eligibility for the school districts, come from the Common Core of Data (CCD) of the National Center for Education Statistics (NCES).

In addition, we use the 1980, 1990 and 2000 censuses to look at the impact of Proposal A on socioeconomic characteristics of Michigan school districts. These characteristics include multiple housing related variables (percentage of housing units in a district that is occupied, percentage of owner-occupied housing units, median gross rent)[13], measures of income and employment (median household income in the district, percentage of households with public assistance (PA) income, civilian unemployment rate), and measures of educational attainment (percentage of adults with less than 12th grade schooling,

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[13]Gross rent is the monthly amount of rent plus the estimated average monthly cost of utilities (electricity, gas, water and sewer) and fuels (oil, coal, kerosene, wood, etc.). Monthly rents were computed for specified renter-occupied units paying cash rent, which exclude one-family houses on ten or more acres.

percentage with at least some college education (including a bachelor's degree), percentage with at least a bachelor's degree). In sensitivity analysis, we also use data on percentage of a school district's workforce employed in manufacturing from the 1980, 1990 and 2000 censuses to investigate the robustness of our findings to the decline of Michigan's manufacturing sector.

The data for 1980 and 1990 censuses are taken from the respective School District Data Books. These School District Data Books combine information on school districts from multiple datasets - e.g. the 1990 School District Data Book combines district-level information from the 1989-90 CCD, the Census Bureau's 1989-90 Census of Local Government Finances and the 1990 decennial census. The data for the 2000 census are obtained from the U.S. Census Bureau. Table 3 summarizes the basic statistics on the different variables we use in our regressions.

5   Empirical Strategy

We begin by classifying the Michigan K-12 school districts into different groups. 1993-94 was the last year before the reform, and state aid after the reform was based on spending in this year. So we divide the 524 K-12 school districts in Michigan into 5 groups on the basis of their 1994 spending.[14] Group 1 consists of the lowest-spending 105 districts, Group 2 consists of the next 105 districts in terms of spending, and so on,- Group 5 consists of the highest-spending 105 districts. We will henceforth refer to Group 1 as the lowest spending group and Group 5 as the highest spending group.[15] To ensure that our results are not driven by the presence of a few very large districts, we report results from multiple sets of regressions in the analysis below, both including and excluding the 5 largest districts in Michigan. These five districts are Detroit, Lansing and Grand Rapids (all in Group 4) and Flint and Utica (both in Group 5).

5.1   Changes in School Spending and Values of Housing Stock

To formally compare the effect of the program on trends in school spending and values of housing stock in these different groups of districts, we run the following fixed effects (FE) regression on data from 1990

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[14]For the remainder of the paper, we will refer to school years by the calendar year of the spring semester, e.g. 1994 will refer to the 1993-94 school year.

[15]We experimented with a variety of alternative classifications, such as grouping the districts such that there are an equal number of K-12 students in each group. The results are qualitatively similar.

to 2001.[16,17]

$$Y_{sgt} = \alpha + \alpha_s + \beta_3 * t + \sum_{g \neq 3} \beta_g * (D_g * t) + \gamma_3 * (reform) + \sum_{g \neq 3} \gamma_g * (D_g * reform)$$

$$+\theta_3 * (reform * t) + \sum_{g \neq 3} \theta_g * (D_g * reform * t) + \delta * X_{sgt} + \varepsilon_{sgt} \qquad (1)$$

where $g \in \{1, .., 5\}$, Y_{sgt} is the per pupil spending or value of housing stock of district s in group g in year t. α_s is the district fixed effect while X_{sgt} are the time-varying characteristics (controls).[18] D_g's are the dummy variables for the respective groups of districts. Group 3, comprising of districts in the middle quintile of the pre-reform spending distribution, is the omitted category. $Reform$ is a binary variable that takes the value of 0 in the pre-reform period (1990-1994) and 1 afterwards (1995-2001). The variable t represents time-trend. The variables $reform$ and $reform * t$ respectively control for post-program common intercept and trend shifts. The coefficients on the interaction terms $(D_g * reform)$ and $(D_g * reform * t)$ estimate the program effects - γ_g's capture the intercept shifts while θ_g's capture the trend shifts of different groups of districts.[19,20]

5.2   Effect on Socioeconomic Segregation

We investigate the effect of Proposal A on socioeconomic segregation using data from the last three decennial censuses, 1980, 1990 and 2000. The general form of the regression is as follows.

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

$$+\delta * X_{sgt} + \varepsilon_{sgt} \qquad (2)$$

Y_{sgt} is the value of the dependent variable (various socioeconomic indicators as detailed in section 6.2) in district s in group g in census year t. α_s is the district fixed effect while X_{sgt} are the controls.

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[16]We prefer fixed effects regressions to simple OLS, as this allows us to control for all time-invariant characteristics of the school districts, including unobserved preferences for schooling, quality of housing stocks, etc. However, we also run the corresponding OLS regressions - the results, which are similar, are available on request.

[17]As mentioned earlier, we restrict ourselves to the pre-2002 period. Since we already include data on 7 post-reform years in our analysis, in addition to 5 pre-reform years, this should capture most of the effects of the program.

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

[19]Since the districts are of different sizes, the regression errors are likely to be heteroscedastic. So we employ heteroscedasticity-robust standard errors in all regressions reported here. In addition, to control for serial correlation across observations for the same district, we clustered the standard errors at the school district level - the results are similar and hence not reported separately.

[20] For the nominal variables used below, the results are similar if we deflate them using the consumer price index for Midwest Urban (obtained from the U.S. Bureau of Labor Statistics). These are not reported but are available on request.

The variable t represents time-trend, taking 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 pre-reform trends - the differential rates of change in different groups of districts in the pre-reform period (between 1980 and 1990 censuses). θ_g' s, the coefficients on the interaction terms ($D_g * reform * t$), capture the program effects - the trend shifts on the different groups after controlling for differences in pre-program trends. As always, Group 3, the middle group of districts in the pre-reform spending distribution, is the omitted category in the regressions. In addition to the fixed effects (FE) regressions, we also do OLS estimations. The OLS results are qualitatively very similar to the FE estimates and hence not reported separately.

5.3   Effect on *Within-District* Segregation

As discussed in section 3.2, a school finance reform also has interesting implications for dispersion of incomes and other socioeconomic indicators *within* school districts. To investigate the effect of Proposal A on within-district segregation, we look at incomes of households and educational attainment. For each indicator, we use a measure of dispersion based on the Herfindahl index. We calculate the value of this measure for each district in 1990 and 2000, and compare the changes between these two years across the different groups of districts.

The Herfindahl index, also sometimes known as the Herfindahl-Hirschman Index, originated in studies of market power in the industrial organization literature and is defined as the sum of the squares of the market share of each individual firm. A nice intuitive measure of dispersion is given by 1 minus the Herfindahl index. Formally, assuming that households in each district are divided among M (mutually exclusive) categories (in terms of incomes or educational attainment), this measure of dispersion is defined as $1 - \sum_{i=1}^{M} s_i^2$, where s_i is the share of the ith category. The intuitive interpretation is that if one randomly picks up two households in a district, this measure gives the probability that they do not belong to the same category. The measure lies between 0 and 1 - a value of zero implies that all households in the district belong to the same category, while a value close to 1 implies that the population is roughly equally divided among all the categories. Thus a move from 0 towards 1 - or an increase - implies an increase in within-district dispersion. This particular measure of dispersion has been widely used in previous studies in the literature, see e.g. Hoxby (2000).

In each district, we divide households and persons into different categories based on census data. For incomes, households in each district in each census year are divided into 15 categories. For educational attainment, households in each district over the age of 25 are grouped into the following four categories - less than high school education, high school graduate, some college, and bachelor's degree or more.[21]

6   Results

Table 1 shows the changes in median household incomes and per pupil expenditures in districts within the large counties in post-reform Michigan. We consider the 14 counties (out of 83) that have at least 10 K-12 school districts. For each county, columns (2) and (3) compute the median household income in the richest school district as a percentage of that in the poorest school district in 1989 and 1999 respectively. Columns (4) and (5) compute similar percentages for per pupil spending. We find that there has been a significant decrease in disparities in school spending in the post-reform period. The ratio of spending between the richest and the poorest districts in each county has gone down considerably. For example, while in 1989 the *smallest* ratio between the richest and the poorest school districts in a county was about 29% (Lenawee county), in 1999 in half the counties the ratio was less than 25%. The effect on dispersion of household incomes is comparatively modest, though the gap has declined in most counties.[22]

6.1   Changes in School Spending and Values of Housing Stock

Figure 1 shows the distributions of per pupil revenues in the highest spending and the lowest spending groups of districts (Groups 1 and 5). We compare the distributions for 1994, the last year before the reform, to those in 2001, seven years after the reform.[23] There has been a significant convergence between these groups after the reform, particularly due to the fact that the lowest spending districts witnessed large increases in revenues after Proposal A (close to 60%) which shifted the distribution to the right.

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[21]The value of this measure of dispersion, based on the Herfindahl index, is sensitive to the number of categories. However, since we are only interested in a comparison across groups of school districts and moreover, want to compare the changes in this measure over time, this should not be a problem. The results remain qualitatively similar if we use alternative definitions of categories.

[22]Roy (2011) shows that in the pre-Proposal A period, there was a large positive relationship between median household incomes and per pupil spending across Michigan school districts, which was significantly attenuated in the post-Proposal A period.

[23]These show the kernel smoothed plots of general fund revenues in the two groups of districts. All figures have been weighted by district enrollment. The results are very similar if we use alternate measures of spending like general fund expenditures or current operating expenditures.

Figure 2 similarly compares the distributions of per pupil housing stock across the different groups of districts in 1994 and 2001. The top panel shows the distributions for the lowest spending (Group 1) and highest spending (Group 5) districts, the bottom panel shows the distributions for the lowest spending districts and the upper middle group (Group 4). There has been a modest increase in values of housing stock in the lowest spending districts in the post-reform period (both in relation to the highest spending group as well as the upper middle group).

The results from estimating specification (1) using per pupil revenues and values of housing stock as dependent variables are presented in Table 4. The first three columns (marked (1)-(3)) show the results for revenues, columns (4)-(6) are for housing stock.[24] For revenues, the gap between the highest spending and the lowest spending districts has been increasing in the years before the reform. In fact there was a clear hierarchy - the growth rates of per pupil revenues were higher in the school districts which were already spending more. Post-reform, however, this has completely reversed itself. The reform has been instrumental in raising the growth rates of revenues in school districts in Groups 1 and 2. The annual growth rates of revenues in these lowest-spending districts are now significantly higher than earlier and other school districts, demonstrating a significant catch-up.

Columns (4)-(6) show the results for the value of housing stock in a district, which is known as state equalized valuation or SEV in Michigan. Prior to the reform, there was a very significant gap in growth rates of housing stock between the highest and the lowest spending districts. The value of housing stock in Group 5 districts, the highest spending districts, was increasing at a much faster rate than districts in Groups 1 and 2, the two groups of lowest spending districts. In fact, just like for school revenues there was a clear monotonicity in pre-reform trends - Group 1 districts were lagging behind Group 2 districts, which in turn were lagging behind Group 3 districts, and so on. Post-reform, however, there is a reversal and the gap is considerably reduced. Though most of the estimates of θ_1 and θ_2 - the changes in trends in the post-reform period in the lowest spending two groups - are not statistically significant, they are always positive and modest in size. In all the specifications the post-reform coefficients for both intercepts and trends maintain a hierarchy, similarly for the γ_g's.

These results on housing stock mirror those for revenues. The gap in per pupil revenues between the

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[24]The estimates in columns (2)-(3) and (5)-(6) are from regressions that are weighted by district enrollment. The estimates in columns (3) and (6) are from regressions that omit the five largest districts in Michigan - Detroit, Grand Rapids, Lansing, Flint and Utica - to ensure that the results are not driven by a few large observations.

highest spending and the lowest spending districts had been increasing in the years before the program,- however, this completely reversed itself in the post-program period. Since much of the increase in spending in the lowest-spending districts was coming from the state, this increased the 'desirability' of these communities. That is, some households with high preferences for schooling who earlier had been living in richer and high spending districts now find it worthwhile to move to the lower spending school districts which witness significant increases in per pupil spending. One benefit of living in high property-value districts - higher per pupil spending - is no longer operative.

There is an important difference between the two sets of results (revenues in columns (1)-(3) versus housing in columns (4)-(6). For school revenues, the lowest-spending districts witness higher rates of growth, in an absolute sense also (as seen from the sum $\beta_g + \theta_g$) relative to the high spending districts, in the post-reform period. For housing stock, however, districts in the highest spending communities (Groups 4 and 5) continue to have higher rates of growth (in an absolute sense) than districts in Groups 1 and 2 in the post-reform period, though the *gap in growth rates* has narrowed. In other words, though there was a positive relative post-reform shift in trend growth rates for housing stock in the lowest spending districts, this was not sufficient to outweigh the gap in pre-reform trends between them and the highest spending districts, unlike for school spending.

One reason for this may be the strength of the peer effects at the local level, where the presence of more educated and wealthy households in a community increases the demand for residence in that community. Another reason for the modest effects may be the staggered nature of the program in Michigan, coupled with the 'hold-harmless' clause in the law, which implies that some high-spending districts may still remain attractive in the immediate post-reform period, moderating the movement towards lowest-spending districts.

To sum, following the school finance reform the lowest spending districts were able to modestly narrow the gap in growth rates of housing stock between them and the highest spending districts. However, the absolute gap between these groups still remains large, and the results in Table 4 suggest that the highest spending school districts, which are also the richest districts in terms of median incomes, continue to witness high demands for residences therein. The effect of Proposal A on housing stock is more modest compared to the equalization of school resources.

6.2 Effect on Socioeconomic Segregation

We use data from the last three decennial censuses to document changes in socioeconomic segregation in the post-reform period. Controlling for pre-existing trends and district fixed effects, we analyze the effect of Proposal A on different groups of districts. In each of the regressions reported below, Group 3, the middle quintile of districts in the 1994 spending scale, is the omitted category.

The theoretical discussion in section 3.1 suggests that following a school finance reform, when resources are equalized across different groups of districts, the low spending districts should be expected to witness inflows of population from their higher-spending counterparts. However, depending on factors like the elasticity of supply of housing, the extent of this inflow might be diluted by increases in property values in the former and decreases in the latter. Second, if peer effects are strong and positive, and richer and more educated neighborhoods are perceived to provide more desirable peer groups, the outflows from the richer and higher spending districts may be smaller in magnitude.

We begin our analysis by looking at changes in housing variables.[25] Table 5 documents the changes in three important housing-related variables across different Michigan school districts - percentage of housing units in a district that is occupied, percentage of owner-occupied housing units and median gross rent. The percentage of housing units that is occupied went up by the largest amounts in the Group 1 districts after the reform, followed by those in Group 2 (columns (1)-(2)). The same is true for the percentage of occupied units that is owned (owner-occupied) - possibly an indicator of the confidence of households in their property's price in the near future. Residential rents also show a similar pattern (columns (5)-(6)) - the coefficient on Group 1 districts is positive and modestly large, however they are not statistically significant. Note that for most of these variables, the coefficients on the two highest spending groups - Groups 4 and 5 - are negative. However the coefficients for Group 5 are small and often not statistically different from zero.

We next look at variables related to the average socioeconomic status (SES) in a school district. Table 6 analyzes the changes in three income and employment-related variables - median household

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[25]For brevity, in all the tables below, we only report the coefficients on the post-reform variables - reform interacted with the time trend, and reform interacted with the time trend interacted with the group dummies. These regressions also include district fixed effects, time trend and interactions of time trend with group dummies. All regressions are weighted by the population of the district. The estimates in columns (2), (4) and (6) are from regressions which omit the five largest districts - Detroit, Grand Rapids, Lansing, Flint and Utica.

income in the district, percentage of households with public assistance (PA) income and the civilian unemployment rate. In each of these variables, there has been a large overall improvement between the 1990 and 2000 censuses in Michigan, as seen from the coefficients on post-reform common time trends. Overall median household incomes have gone up, while there have been significant declines in the percentage of households with PA income and in the unemployment rate.

For all three variables, however, the lowest spending districts have improved even more than the other groups. In fact, there is generally a clear hierarchy when we exclude the 5 largest school districts. Median household incomes went up, the percentages of households with PA income and the unemployment rate declined - at the fastest rates in Group 1 districts, followed by those in Group 2, and so on.[26]

Table 7 presents results on variables relating to educational attainment. We include the following three measures - the percentage of adults with less than 12th grade schooling (columns (1)-(2)), the percentage with at least some college education (including a bachelor's degree) (columns (3)-(4)), and the percentage with at least a bachelor's degree (columns (5)-(6)). The results show that for the first two measures - the percentage of adults who are high school dropouts and the percentage of adults who have at least some college education - the lowest spending districts in Group 1 improved at the fastest rate. The difference with the other groups is particularly large and significant for the percentage of adults with at least some college education. However, as far as the percentage of college graduates is concerned, it is the districts in Group 5 that has the largest coefficients, though these are never significant. This suggests that these richest and highest-spending districts continue to enjoy superior peer groups - at least in terms of educational attainment - and possibly remain attractive as prospective residences.

6.3 Changes in segregation *within* districts

Table 8 compares the average values of the measure of dispersion discussed above, based on the Herfindahl index, in the different groups of districts in 1990 and 2000.[27] For educational attainment, all the groups except those in the upper middle quintile (Group 4) had similar values in 1990. Over the next decade,

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[26]Note that the lowest spending districts were already lagging behind the others in 1980 in most of these socioeconomic indicators. Since we control for pre-existing trends (trends between 1980 and 1990, prior to Proposal A) in these regressions, this suggests that most of the effects between 1990 and 2000, particularly in Group 1 districts, are a result of the school finance reform and not just regression to the mean.

[27]Income was differently categorized in the 1980 census, as compared to the 1990 and 2000 censuses (in terms of the ranges of the respective bins). Since use of the Herfindahl index-based measure of dispersion requires consistent categories (across years) for comparison, this precluded use of income data from the 1980 census in these calculations. The results for educational attainment are similar if we include data from the 1980 census.

while the lowest spending districts witnessed an increase in dispersion, the measure declined in the highest spending districts. For household incomes, although there was an increase in income dispersion in all districts in 2000, the increase was by far the largest in Group 1 districts. In fact, by the year 2000, the lowest spending districts were the most heterogeneous with respect to household incomes.

Table 9 shows results from fixed effects regressions where this measure of dispersion is regressed on the year 2000 dummy and group dummies interacted with the year 2000 dummy. These show the changes in within-district dispersion of educational attainment and household incomes between 1990 and 2000. These results confirm the general pattern seen in Table 9. For both educational attainment and household incomes, within-district dispersion increased at a much higher rate in the lowest spending districts (Group 1) than in any other group. Conversely, the relative increase in this dispersion was the lowest in the highest spending districts, as intuitively predicted by the theoretical discussion in section 3.2.

7   Robustness Checks

The results of the empirical analysis suggest that there were moderate increases in the value of housing stock in the lowest spending districts in Michigan following Proposal A, accompanied by some reductions in the extent of spatial segregation across the lowest and highest spending districts. In addition to inter-district changes, there were intra-district changes in dispersion,- the lowest spending districts became more diversified in the post-reform period (as measured by dispersions of incomes and educational attainment), while the highest spending districts became less so. In this section, we discuss the robustness of these results and the role of other potential factors in explaining these results.

7.1   Examining the Role of Charter Schools as a Potential Confounding Factor

One important institutional change that took place in Michigan during the 1990s was the introduction of charter schools.[28] However, even though charter schools spread very rapidly in Michigan, they still serve only a small percentage of overall K-12 students (Arsen et al. (2001)). Second, the presence of charter schools would bias some of our results for the lowest spending districts only if it were true

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[28]There is also an inter-district choice program in Michigan. However, it is very small - only about 1% and 1.5% of Michigan public school students enrolled in public schools outside their home district in 2000 and 2001 respectively, see Arsen et al. (2001). As is somewhat true for charter schools too (see below), public school choice is mainly concentrated in and around Detroit, see Cullen and Loeb (2004, page 242).

that these schools were relatively more concentrated in these districts - so that property values went up due to charter schools, and wealthier and more educated households relocated to take advantage of these schools. However, the opposite is true in Michigan (see Roy 2011). The lowest spending groups (Groups 1 and 2) are predominantly rural, while charter schools in Michigan mostly serve urban city children and are located in the high spending districts. Geographically, many of the charter schools are located in southeast Michigan, particularly in Wayne county, where they service mostly students living in the suburbs or inner city Detroit.[29] To test the robustness of our results to the charter school movement, we separately exclude (1) Wayne county and (2) Detroit school district from our analysis, and re-estimate the above regressions. The results remain very similar and are available on request. So charter schools are unlikely to have been the catalyst behind the results seen above. One might argue though, that one explanation for the continued high demand for residences in the highest spending districts was the opportunity to take advantage of the growth of charter schools in these school districts. However, this does not seem to be a plausible reason because prior literature has failed to document significant positive effects of Michigan charter schools on student achievement (Eberts and Hollenbeck (2001), Bettinger (2006), Chakrabarti and Roy (2010)).[30] As a result, it is unlikely that the presence of charter schools in the high spending districts was the driving factor behind the continued high demand for residences in the highest spending districts.

7.2 Assessing the Role of Private School Markets

First, if there were changes in the private school markets - either as a result of Proposal A itself or independent of it - then this might have direct effects on income segregation within and across districts. For instance, if the reform led to a perception of improvements in public school quality in the low spending districts, then this might lead to migration of private school households to lower spending districts. To investigate if this has been the case, we used decennial census data to look at the changes

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[29]None of the school districts in Wayne county fall in the lowest spending quintiles (Groups 1 and 2). In fact, most of the school districts in Wayne county fall in Group 5, the highest spending quintile, as these are located in the affluent suburbs of Detroit.

[30]Bettinger (2005) found that test scores of charter school students in Michigan did not improve, and may have actually fallen, relative to their counterparts in public schools. Eberts and Hollenbeck (2001) also reach the same conclusion - students attending charter schools in Michigan were not reaching the same levels of achievement as students in traditional public schools in the same districts. Chakrabarti and Roy (2010) provide evidence of only a modest decline in enrollment in private schools in areas with charter penetration, suggesting that private school parents do not universally regard charter schools to be an improved alternative in comparison to the regular public schools.

in private school enrollment across Michigan school districts between 1990 and 2000. The results are in Table 10. There is no evidence of any differential trends across different groups of districts during this period.

7.3 Examining the Role of Michigan's Manufacturing Sector

A concern is the secular decline in auto and manufacturing industries in Michigan throughout the last two decades. It is possible that these structural shifts in the economy in turn led to demographic shifts, biasing some of our results. 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 whether mobility patterns triggered by the decline in Michigan's manufacturing industries may have contributed to the above patterns. We use two strategies for this purpose. First, 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 higher expenditure or lower expenditure districts (that might have contributed to the patterns seen above). Second, we explicitly control for percent manufacturing in the above regressions to examine whether our results are sensitive to this inclusion. The results are in Tables 11 and 12A-12B.

The results in Table 11, which examine changes in the percent of workers employed in manufacturing, show that there actually was a small general increase between 1990 and 2000 (relative to that between 1980 and 1999). 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, interacted with the respective group dummies, are small and insignificant. In particular, districts in Groups 1 (or Group 5) do not seem to have experienced any unique or significant changes in manufacturing employment that might explain our previous results.

Next we directly control for the percentage of the labor-force that is employed in manufacturing in each school district in our census regressions (Tables 12A and 12B). The top panel of Table 12A

shows the results for various housing variables (the same ones that are analyzed in Table 5), while the bottom panel shows the results for different income and employment-related variables (same variables as in Table 6). The results are very similar to those obtained above - the inclusion of the share of workforce in manufacturing does not affect the patterns seen above.

Table 12B looks at the variables related to educational attainment (same variables as in table 7). Again, the patterns seen above hold up well, with only minor changes in the magnitudes of the coefficients and/or their significance levels.

To sum, prevailing economic conditions particularly as they relate to employment in manufacturing do not seem to have differentially affected Michigan school districts during the 1990s, and when controlled for separately in the census regressions, they do not alter the picture seen above.

8   Discussion

To summarize, there is robust evidence of a decline in spatial sorting across school districts in Michigan following Proposal A, accompanied by increases in the average values of several socioeconomic indicators in the lowest spending districts. However, there is continued high demand for housing in the highest spending districts. One reason for the latter may be the strength of the local peer effects or neighborhood 'social capital'.[31]   The highest spending school districts contain the richest and the most educated households, have lower incidence of poverty and unemployment, and have schools with the best test scores in the state. This suggests that if peer group effects stemming from proximity to well-educated and wealthy neighbors are strong, then even a comprehensive equalization of school resources may not be enough to prevent socioeconomic segregation across school districts.

In addition, there is evidence of some significant changes in within-district stratification in Michigan after Proposal A, particularly in districts at the extremes of the pre-reform spending distribution. The within-district dispersions of household incomes and educational attainment have gone up in the lowest spending school districts, while declining in the highest spending districts. In other words, the lowest spending districts became more heterogeneous socioeconomically after the reform, while the highest spending districts became more homogeneous.

It is instructive to briefly compare these results to those of Dee (2000) and Aaronson (1999). Dee

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[31]For more on the concept of (local) social capital, see Benabou (1996).

(2000) argues that in the poorest school districts of the states where school finance reforms were mandated by court rulings, housing values and rents went up by at least 8 percent, implying that a large share of the new per pupil spending was capitalized into residential rents.[32] Our analysis, on the other hand, suggests a more modest effect. Though the increases in spending in the lowest spending school districts in Michigan following Proposal A were large and significant, the effects on housing stock were much smaller. Proposal A led to a significant narrowing of the spending gap, and spending in the lowest spending district grew at a higher rate (even in an absolute sense, $\beta_g + \theta_g$) than in the highest spending districts. In contrast, the picture for housing stock was different. While for housing stock, there was a narrowing of the existing growth rates, the high spending districts still continued to exhibit larger absolute growth rates compared to the low spending districts.

Aaronson (1999) finds that low-income sorting - measured by the percentage of low-income households in a low-income school district - increased by only about 3-5 percent in states with court-mandated school finance reforms, compared to an increase of about 13-15 percent in states where the school finance systems were ruled to be constitutional. That is, he finds that court-mandated reforms increased the dispersion of incomes in the poorest districts. However, he does not find any effect of school finance reforms in the high income districts. Our analysis, on the other hand, suggests that both the low spending as well as the high spending districts were affected in the aftermath of Proposal A. The former became more heterogeneous in terms of incomes and education levels, while the latter became less so.

9   Conclusions

Neighborhood-based school finance systems, particularly in the U.S., have been argued to generate and perpetuate residential segregation (see, e.g., Fernandez and Rogerson, 1996, and Nechyba, 2003). A school finance reform, which substitutes state aid for locally-raised revenues and raises spending in the lowest-spending school districts, has the potential to alter the extent of this segregation. In this paper, we study the Michigan school finance reform of 1994, called Proposal A, to analyze the impact a change in school financing can have on socioeconomic segregation. Proposal A ended local discretion over school spending and resulted in a large increase in state aid to the lowest spending districts in Michigan. Prior

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[32]Dee's results suggest that about 74% of the new per pupil spending was capitalized into residential rents in the poorest school districts (his model 2),- the corresponding numbers for median housing values range from 30-64%, depending on the discount rate used.

to Proposal A, Michigan districts could decide their own educational expenditures, and this had resulted in widespread disparities in per pupil spending across school districts in the state. These spending disparities were accompanied by large disparities in median household incomes, educational attainment and other socioeconomic variables.

Employing a difference-in-differences estimation strategy in trends, and using data from the Michigan Department of Education, the National Center for Education Statistics and the 1980, 1990 and 2000 decennial censuses, we investigate whether the reform had any significant effects on per pupil spending and whether this affected housing stock and socioeconomic composition of school districts, thereby changing the extent of residential sorting in the state. This is the first paper to undertake a comprehensive analysis of a major school finance reform on socioeconomic stratification. Unlike previous studies in the literature we consider a wide range of indicators including housing, income and educational attainment, and look at both across-district and within-district dispersion.

We find that Proposal A has been responsible for significant increases in per pupil spending in the lowest spending school districts. This has led to increases in the values of housing stock in these low spending districts, and to improvements in several socioeconomic indicators. However, there is still a significant gap between the highest spending and the lowest spending school districts in most such indicators. We also find that within-district heterogeneity in household incomes and educational attainment has gone up in the lowest spending school districts, while declining in the highest spending districts. The results of this paper have important policy implications. They suggest that a large program of government aid targeted to poorer communities can change the existing level of neighborhood socioeconomic stratification, but communities with the richest and the most educated households are likely to still remain attractive.

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

County	Number of School Districts in the County	Median Income in Richest District as a percentage of Median Income in Poorest District		Per Pupil Spending in Richest District as a percentage of Per Pupil Spending in Poorest District	
		1989	1999	1989	1999
	(1)	(2)	(3)	(4)	(5)
Berrien	14	223	203	205	160
Calhoun	10	172	154	154	109
Genesee	21	293	288	165	121
Ingham	12	187	212	164	136
Jackson	12	144	150	137	104
Kent	19	227	229	162	125
Lenawee	12	185	151	129	122
Macomb	21	233	199	202	152
Muskegon	12	272	254	162	112
Oakland	28	346	317	249	195
Saginaw	13	213	205	160	121
Van Buren	11	283	232	160	149
Washtenaw	10	196	226	173	146
Wayne	34	638	499	179	158

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 county, the districts with the highest and the lowest values of median household income are defined as the richest and the poorest districts respectively. The table shows the difference in median incomes and in per pupil spending between the richest district and the poorest district in each county. 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 spending.

Table 2: Increase in Foundation Allowances, Post-reform Michigan
(Selected districts at different percentiles of pre-reform spending distribution)

School District	1994	1995	1996	1997	1998	1999	2000	2001
Standish Sterling Community Schools (1st percentile)	3,738	4,200	4,506	4,816	5,124	5,170	5,700	6,000
Harrison Community Schools (5th percentile)	3,905	4,200	4,506	4,816	5,124	5,170	5,700	6,000
Adams Township School District (25th percentile)	4,321	4,566	4,832	5,099	5,362	5,362	5,700	6,000
Concord Community Schools (50th percentile)	4,669	4,900	5,130	5,308	5,462	5,462	5,700	6,000
Oxford Area Community Schools (75th percentile)	5,249	5,458	5,611	5,766	5,920	5,920	6,158	6,458
Waverly Community Schools (95th percentile)	6,998	7,159	7,312	7,467	7,621	7,621	7,743	7,914
Bloomfield Hills School District (99th percentile)	10,294	10,454	10,607	10,762	10,916	10,916	11,091	11,335

Foundation allowances refer to the base level of per pupil spending. 1994 refers to the academic year 1993-94, and so on. Note that due to court-related problems, foundation allowances did not increase between 1998 and 1999, except marginally for the lowest spending districts.

Table 3: Summary Statistics on Variables

Variable	Mean	Std. Deviation	Min	Max
Per Pupil Revenue	5,770	1,516	2,739	17,027
Per Pupil Expenditure	5,501	1,430	2,651	13,416
Enrollment	3,172	8,361	68	183,151
Racial Composition				
Percentage White	89.6	15.9	0	100
Percentage Black	4.5	14.2	0	99
Percentage Hispanic	1.9	3.9	0	37
Percentage American Indian	1.4	5.3	0	63
Percentage Asian	0.5	1.4	0	16
Per Pupil Housing Stock	114,010	89,099	21,804	1,553,713
Percentage of Housing Units occupied	86	15	25	99
Percentage of Owner-occupied Housing Units	80	9	34	96
Median Gross Rent	378	135	145	1035
Median Household Income	30,635	14,087	8,079	114,164
Percentage of Households with PA Income	5.0	3.8	0	35
Civilian Unemployment Rate	7.0	3.4	1	35
Percentage with less than 12th grade education	24	10	1	57
Percentage with at least some college education	37	15	9	92
Percentage with bachelor's degree or more	14	9	2	71

The results from weighting the variables by school enrollment or population of the respective districts are qualitatively similar and hence not separately reported.

Table 4: Effect of Proposal A on Per Pupil Revenues and Value of Per Pupil Housing Stock, Michigan
(FE regressions, 1990-2001)

	Per Pupil Revenues			Per Pupil Housing Stock		
	(1)	(2)	(3)	(4)	(5)	(6)
Trend (t)	270***	260***	262***	4892***	5259***	5327***
	(8)	(10)	(10)	(310)	(366)	(372)
Group 1 * t	-54***	-48***	-48***	-952**	-902**	-942**
	(11)	(13)	(12)	(414)	(457)	(460)
Group 2 * t	-18*	-12	-17	-225	-368	-437
	(11)	(15)	(16)	(438)	(479)	(492)
Group 4 * t	13	15	14	2773***	353	1835***
	(13)	(24)	(17)	(578)	(1574)	(603)
Group 5 * t	89***	86***	91***	7978***	2979***	3648***
	(18)	(22)	(19)	(1494)	(785)	(721)
Reform	457***	455***	462***	-3515***	-4168***	-4142***
	(28)	(31)	(29)	(987)	(1244)	(1245)
Group 1 * reform	-7	10	7	1852	2289	2335
	(42)	(43)	(42)	(1344)	(1571)	(1559)
Group 2 * reform	-2	20	44	687	454	755
	(40)	(51)	(55)	(1367)	(1608)	(1651)
Group 4 * reform	52	109	20	-1741	-3943	-3464
	(46)	(88)	(52)	(1760)	(3874)	(2040)
Group 5 * reform	-243***	-178**	-206***	-14062***	-10551***	-11119***
	(63)	(67)	(61)	(3915)	(2371)	(2349)
Reform * t	-40***	-36***	-36***	1129***	1015**	1028**
	(9)	(11)	(11)	(365)	(448)	(454)
Group 1 * reform * t	174***	162***	159***	959**	433	400
	(14)	(14)	(14)	(491)	(547)	(550)
Group 2 * reform * t	71***	62***	67***	147	32	82
	(13)	(17)	(17)	(515)	(572)	(584)
Group 4 * reform * t	-17	16	-15	-1032	-325	-103
	(15)	(29)	(19)	(665)	(1749)	(742)
Group 5 * reform * t	-80***	-88***	-89***	-2606*	-1627*	-1912**
	(22)	(24)	(21)	(1629)	(904)	(838)
Observations	6269	6269	6209	6269	6269	6209
R-squared	0.95	0.96	0.96	0.96	0.97	0.98
Weighted	N	Y	Y	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y	N	N	Y

Notes: The dependent variable is per pupil revenues in the district in columns 1-3 and per pupil housing value in the district (state equalized valuation) in columns 4-6. Group 3, the middle group of districts in the pre-reform spending distribution, is the omitted category. All regressions include district fixed effects, and control for race and enrollment, not reported for brevity. Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 5: Effect of Proposal A on Housing Characteristics, Michigan School Districts
(1980, 1990 and 2000 Censuses, FE Regressions)

	Percentage of Housing Units Occupied		Percentage of Owner-occupied Housing Units		Median Gross Rent	
	(1)	(2)	(3)	(4)	(5)	(6)
Reform * time trend (t)	2.38***	2.38***	3.39***	3.39***	-29***	-29***
	(0.69)	(0.69)	(0.45)	(0.45)	(8)	(8)
Group 1 * reform * t	6.46***	6.46***	1.69**	1.69**	15	15
	(1.66)	(1.66)	(0.82)	(0.82)	(11)	(11)
Group 2 * reform * t	3.03**	3.03***	1.21	1.21	2	2
	(1.33)	(1.33)	(0.82)	(0.82)	(11)	(11)
Group 4 * reform * t	-1.88**	-1.38*	1.32	0.31	-29**	-34***
	(0.80)	(0.82)	(0.96)	(0.81)	(11)	(11)
Group 5 * reform * t	-0.48	-0.24	0.69	0.38	-51***	-53***
	(0.83)	(0.79)	(0.87)	(0.83)	(14)	(13)
R-squared	0.91	0.92	0.98	0.97	0.96	0.96
Observations	1567	1552	1555	1540	1569	1554
Districts	523	518	523	518	523	518
Exclude 5 Biggest Districts	N	Y	N	Y	N	Y

See specification (2) in the text. Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The regressions are weighted by the population of the school district. All regressions include district fixed effects, time trend and interactions of time trend with group dummies, not reported for brevity. The regressions in columns (2), (4) and (6) exclude the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels.

Table 6: Effect of Proposal A on Demographic and Economic Characteristics, Michigan School Districts
(1980, 1990 and 2000 Censuses, FE Regressions)

	Median Household Income		Percentage of Households with PA Income		Civilian Unemployment Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Reform * time trend (t)	2089***	2089***	-8.73***	-8.73***	-3.48***	-3.48***
	(746)	(746)	(0.52)	(0.52)	(0.35)	(0.35)
Group 1 * reform * t	2128	2128	-1.94***	-1.94***	-1.98***	-1.98***
	(1301)	(1301)	(0.69)	(0.69)	(0.61)	(0.61)
Group 2 * reform * t	277	277	0.39	0.39	-0.29	-0.29
	(1188)	(1188)	(0.89)	(0.89)	(0.66)	(0.66)
Group 4 * reform * t	314	-1068	-6.55*	0.06	-3.35	0.85
	(2489)	(1494)	(3.77)	(1.11)	(2.70)	(0.70)
Group 5 * reform * t	-2713	-2978*	-1.97	2.93***	0.92	1.38
	(1742)	(1595)	(1.20)	(0.75)	(0.70)	(0.52)
R-squared	0.93	0.94	0.89	0.87	0.85	0.81
Observations	1567	1552				
Districts	523	518	523	518	523	518
Exclude 5 Biggest Districts	N	Y	N	Y	N	Y

See specification (2) in the text. Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The regressions are weighted by the population of the school district. All regressions include district fixed effects, time trend and interactions of time trend with group dummies, not reported for brevity. The regressions in columns (2), (4) and (6) exclude the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels.

Table 7: Effect of Proposal A on Educational Attainment, Michigan School Districts
(1980, 1990 and 2000 Censuses, FE Regressions)

	Percentage with less than 12th grade		Percentage with at least some College Education		Percentage with Bachelor's Degree or more	
	(1)	(2)	(3)	(4)	(5)	(6)
Reform * time trend (t)	3.33***	3.33***	-7.90***	-7.90***	2.96***	2.96***
	(0.55)	(0.55)	(0.62)	(0.62)	(0.46)	(0.46)
Group 1 * reform * t	-0.69	-0.69	3.03***	3.03***	-0.10	-0.10
	(0.78)	(0.78)	(1.07)	(1.07)	(0.73)	(0.73)
Group 2 * reform * t	0.17	0.17	0.95	0.95	0.62	0.62
	(0.75)	(0.75)	(1.09)	(1.09)	(0.70)	(0.70)
Group 4 * reform * t	0.59	1.14	-1.88	-2.24**	-0.04	0.91
	(0.93)	(0.79)	(1.39)	(1.00)	(1.15)	(0.84)
Group 5 * reform * t	0.35	0.27	-2.16**	-2.04**	1.06	1.08
	(0.82)	(0.86)	(0.99)	(1.03)	(1.28)	(1.35)
R-squared	0.97	0.97	0.98	0.98	0.97	0.97
Observations	1559	1544	1559	1544	1559	1544
Districts	523	518	523	518	523	518
Exclude 5 Biggest Districts	N	Y	N	Y	N	Y

See specification (2) in the text. Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The regressions are weighted by the population of the school district. All regressions include district fixed effects, time trend and interactions of time trend with group dummies, not reported for brevity. The regressions in columns (2), (4) and (6) exclude the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels.

Table 8: Within-district Heterogeneity in Educational Attainment and Household Income
(Michigan School Districts, 1990 and 2000 Censuses)

	Educational Attainment		Household Income	
	1990	2000	1990	2000
Group 1	0.700	0.704	0.893	0.918
Group 2	0.701	0.703	0.901	0.914
Group 3	0.707	0.706	0.906	0.917
Group 4	0.716	0.719	0.888	0.913
Group 5	0.699	0.679	0.908	0.912

The measure of dispersion used here is defined as one minus the Herfindahl index, see text for details. All figures are weighted by the number of persons in the district in 1990. As noted in footnote 32, the income categories in the 1980 census were different from those in the 1990 and 2000 censuses (in terms of the ranges of the respective bins). Since use of the Herfindahl index-based measure of dispersion requires consistent categories (across years) for comparison, this precluded use of income data from the 1980 census in these calculations. So the intra-district analysis includes data from the 1999 and 2000 censuses only. The results for educational attainment are similar if we include data from the 1980 census.

Table 9: Effect of Proposal A on Within-district Heterogeneity in Educational Attainment and Household Income
(Michigan School Districts, 1990 and 2000 Censuses)

	Educational Attainment			Household Income		
	(1)	(2)	(3)	(4)	(5)	(6)
Year 2000 Dummy	0.002	-0.002	-0.002	0.014***	0.011***	0.011***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Group 1 * Yr 2000	0.004**	0.005**	0.005**	0.017***	0.014***	0.014***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Group 2 * Yr 2000	0.001	0.004	0.004	0.004	0.002	0.002
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Group 4 * Yr 2000	-0.003	0.005	-0.001	-0.004	0.014	-0.002
	(0.002)	(0.003)	(0.003)	(0.003)	(0.011)	(0.004)
Group 5 * Yr 2000	-0.011***	-0.018***	-0.021***	-0.001	-0.007*	-0.009***
	(0.003)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)
R-squared	0.87	0.92	0.92	0.64	0.69	0.67
Observations	1046	1046	1036	1046	1046	1036
Districts	523	523	518	523	523	518
Weighted	N	Y	Y	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y	N	N	Y

The dependent variable is the measure of dispersion defined as one minus the Herfindahl index, see text for details. Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The five biggest districts are Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). The regressions in columns (2)-(3) and (5)-(6) are weighted by the number of persons in the district in 1990. Robust standard errors are in parentheses. As noted in footnote 32, the income categories in the 1980 census were different from those in the 1990 and 2000 censuses (in terms of the ranges of the respective bins). Since use of the Herfindahl index-based measure of dispersion requires consistent categories (across years) for comparison, this precluded use of income data from the 1980 census in these calculations. So the intra-district analysis includes data from the 1999 and 2000 censuses only. The results for educational attainment are similar if we include data from the 1980 census. Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels.

Table 10: Were there Differential Changes in Private School Enrollment?
(Michigan School Districts, 1990 and 2000 Censuses, FE Regressions)

	(1)	(2)	(3)
Year 2000 Dummy	0.48	0.12	0.12
	(0.38)	(0.48)	(0.48)
Group 1 * Yr 2000	0.52	0.76	0.76
	(0.50)	(0.58)	(0.58)
Group 2 * Yr 2000	-0.02	-0.28	-0.28
	(0.55)	(0.65)	(0.65)
Group 4 * Yr 2000	-0.60	-0.73	-0.07
	(0.57)	(1.01)	(0.61)
Group 5 * Yr 2000	-0.91	-0.87	-0.87
	(0.55)	(0.66)	(0.63)
R-squared	0.90	0.92	0.92
Observations	1038	1038	1028
Districts	519	519	514
Weighted	N	Y	Y
Exclude 5 Biggest Districts	N	N	Y

The dependent variable is the percentage of enrolled students in a school district who attends private schools. Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The five biggest districts are Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). The regressions 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.

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)	(3)
Trend(t)	-4.93***	-5.13***	-5.13***
	(0.44)	(0.53)	(0.53)
Reform * t	2.09***	2.62***	2.62***
	(0.68)	(0.77)	(0.77)
Group 1 * t	1.91***	1.39*	1.39*
	(0.61)	(0.76)	(0.76)
Group 2 * t	1.07*	1.13	1.13
	(0.61)	(0.70)	(0.70)
Group 4 * t	-0.16	-1.55**	-1.20*
	(0.60)	(0.74)	(0.71)
Group 5 * t	-0.36	-1.11	-0.68
	(0.65)	(0.77)	(0.70)
Group 1 * reform * t	-0.65	-0.85	-0.85
	(0.93)	(1.11)	(1.11)
Group 2 * reform * t	-0.72	-1.24	-1.24
	(0.95)	(1.05)	(1.05)
Group 4 * reform * t	0.10	1.74	1.55
	(0.92)	(1.06)	(1.04)
Group 5 * reform * t	0.62	1.24	0.98
	(1.01)	(1.10)	(1.02)
Number of Observations	1558	1555	1540
R-squared	0.919	0.929	0.927
Weighted	No	Yes	Yes
Exclude 5 largest districts	No	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 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) 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 12A: Did the Decline in the Manufacturing Sector Play a Major Role?
(Michigan School Districts, 1980, 1990 and 2000 Censuses, FE Regressions)

	Percentage of Housing Units Occupied		Percentage of Owner-occupied Housing Units		Median Gross Rent	
	(1)	(2)	(3)	(4)	(5)	(6)
Reform * time trend (t)	2.47***	2.59***	3.01***	3.14***	-36***	-34***
	(0.70)	(0.70)	(0.48)	(0.47)	(8)	(8)
Group 1 * reform * t	6.74***	6.70***	1.89**	1.85**	15	14
	(1.64)	(1.63)	(0.82)	(0.81)	(11)	(11)
Group 2 * reform * t	2.85**	2.79**	1.41*	1.35	5	4
	(1.33)	(1.34)	(0.83)	(0.83)	(11)	(11)
Group 4 * reform * t	-1.69**	-1.16	1.06	0.13	-34***	-37***
	(0.80)	(0.82)	(0.90)	(0.81)	(11)	(11)
Group 5 * reform * t	-0.34	-0.07	0.47	0.23	-53***	-54***
	(0.84)	(0.79)	(0.83)	(0.82)	(13)	(13)
R-squared	0.92	0.92	0.98	0.97	0.96	0.96
Observations	1559	1544	1548	1533	1563	1548
Districts	523	518	523	518	521	516
Exclude 5 Biggest Districts	N	Y	N	Y	N	Y

	Median Household Income		Percentage of Households with PA Income		Civilian Unemployment Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Reform * time trend (t)	1118***	1516***	-8.48***	-8.66***	-3.40***	-3.59***
	(836)	(785)	(0.54)	(0.53)	(0.37)	(0.36)
Group 1 * reform * t	2366*	2237*	-2.05***	-1.96***	-1.98***	-1.92***
	(1357)	(1319)	(0.70)	(0.70)	(0.62)	(0.62)
Group 2 * reform * t	684	495	0.26	0.34	-0.32	-0.23
	(1261)	(1221)	(0.88)	(0.89)	(0.66)	(0.67)
Group 4 * reform * t	-442	-1717	-6.42*	0.13	-3.42	0.74
	(2366)	(1500)	(3.69)	(1.10)	(2.64)	(0.69)
Group 5 * reform * t	-3201*	-3234**	2.07*	2.94***	0.92	1.30**
	(1644)	(1575)	(1.18)	(0.75)	(0.69)	(0.52)
R-squared	0.94	0.94	0.89	0.87	0.86	0.82
Observations	1553	1538	1551	1536	1553	1538
Districts	523	518	523	518	523	518
Exclude 5 Biggest Districts	N	Y	N	Y	N	Y

Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The regressions are weighted by the population of the school district. All regressions include district fixed effects, time trend, interactions of time trend with group dummies, and percentage of school district workforce employed in manufacturing, not reported for brevity. The regressions in columns (2), (4) and (6) exclude the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels.

Table 12B: Did the Decline in the Manufacturing Sector Play a Major Role? (Continued)
(Michigan School Districts, 1980, 1990 and 2000 Censuses, FE Regressions)

	Percentage with less than 12th grade		Percentage with at least some College Education		Percentage with Bachelor's Degree or more	
	(1)	(2)	(3)	(4)	(5)	(6)
Reform * time trend (t)	2.71***	2.72***	-7.47***	-7.31***	2.71***	2.86***
	(0.56)	(0.56)	(0.64)	(0.64)	(0.50)	(0.49)
Group 1 * reform * t	-0.30	-0.30	2.80***	2.75***	-0.04	-0.09
	(0.73)	(0.73)	(1.04)	(1.04)	(0.77)	(0.75)
Group 2 * reform * t	0.47	0.47	0.72	0.65	0.68	0.62
	(0.75)	(0.75)	(1.08)	(1.08)	(0.73)	(0.72)
Group 4 * reform * t	0.11	0.76	-1.56	-2.06**	-0.30	0.69
	(0.97)	(0.80)	(1.47)	(1.03)	(1.16)	(0.86)
Group 5 * reform * t	0.07	0.06	-1.96*	-1.82*	0.92	1.03
	(0.77)	(0.81)	(0.99)	(1.02)	(1.30)	(1.37)
R-squared	0.98	0.97	0.98	0.98	0.97	0.97
Observations	1545	1530	1545	1530	1545	1530
Districts	523	518	523	518	523	518
Exclude 5 Biggest Districts	N	Y	N	Y	N	Y

Group 3, the middle quintile of districts in the pre-reform spending distribution, is the omitted category. The regressions are weighted by the population of the school district. All regressions include district fixed effects, time trend, interactions of time trend with group dummies, and percentage of school district workforce employed in manufacturing, not reported for brevity. The regressions in columns (2), (4) and (6) exclude the five biggest districts - Detroit, Grand Rapids, Lansing (all in Group 4), Flint and Utica (both in Group 5). Robust standard errors are in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent levels.

Figure 1. Distribution of Per Pupil Revenues across Districts in the Lowest Spending Group, compared to that in the Highest Spending Group (Top Panel) and the Upper Middle Group (Bottom Panel), 1994 & 2001

Note: Districts are divided into quintiles based on spending in 1993-94. The lowest spending group corresponds to the bottom quintile, the upper middle group is the fourth quintile, and the highest spending group is the top quintile.

Figure 2. Distribution of Per Capita Housing Stock across Districts in the Lowest Spending Group, compared to that in the Highest Spending Group (Top Panel) and the Upper Middle Group (Bottom Panel), 1994 & 2001

Note: Districts are divided into quintiles based on spending in 1993-94. The lowest spending group corresponds to the bottom quintile, the upper middle group is the fourth quintile, and the highest spending group is the top quintile.