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ABSTRACT

The income distribution in many developed countries widened dramatically from 1970 to 2000. Scholars speculate that inequality contributes to a host of social ills by weakening the public sector. In contrast, we find that growing income inequality is associated with an expansion in revenues and expenditures on a wide range of services at the municipal and school district levels in the United States. These results are robust to a number of model specifications, including instrumental variables that deal with the endogeneity of local expenditures. Our results are inconsistent with models that predict heterogeneous societies provide lower levels of public goods.

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I. Introduction

Over the past thirty years, the income distribution has widened dramatically in the United States and many other developed countries (Piketty and Saez, 2003; Smeeding, 2004). Income inequality is correlated with several negative social outcomes—including high crime rates, low levels of education achievement, and bad health.[1] Yet, little is known about whether these relationships are causal and, if so, the channels through which a widening income distribution might translate into these social ills.

One frequently proposed mechanism is that income inequality may weaken the public sector. Some political economy models suggest that, in heterogeneous societies, residents cannot agree either on the composition of public goods or on the taxes and charges used to fund them (Benabou, 1996, 2000). In particular, rich households may rely on private alternatives to public goods and the poor may prioritize personal consumption over public contributions, generating dissent between the ends and the middle of the income distribution (Epple and Romano, 1996).[2] On the other hand, models based on the median voter theorem predict that a widening of the income distribution will encourage greater use of progressive taxation for redistribution (Meltzer and Richard, 1981; Alesina and Rodrik, 1994; Persson and Tabellini, 1994). Societies with greater inequality may also have greater needs, leading altruistic voters to support social programs.

Existing empirical work has not provided definitive evidence for the direction of the relationship between income inequality and the size of the public sector.[3] Two types of

[1] See, *inter alia*, Kawachi, et al., 1997; Kennedy, et al., 1998; and Fajnzylber, Lederman and Loayza, 2002. For an opposing view, see Deaton and Lubotsky, 2002.

[2] Heterogeneity can also reduce social capital between residents, which may undermine trust, norms of reciprocity, and support for local government activity (Putnam, 2000; Boix and Posner, 1998; Costa and Kahn, 2003).

[3] In a cross-section of countries, countries with high levels of inequality, like the United States, engage in less public spending (see, for example, Lindert, 1994, 1996; Moene and Wallerstein, 2005; Schwabish, Smeeding, and Osberg, 2006). In contrast, comparisons across US states and within states over time find that rising income inequality is

identification problems compound the lack of a consistent empirical relationship between income inequality and public goods provision. Cross-country comparisons suffer from omitted variable bias; that is, countries with high income inequality may also have other characteristics that could limit the size of the public sector. Cross-state comparisons additionally suffer from endogenous household sorting. If high-income families migrate to states with high public expenditures, the positive association observed in the literature between state public expenditures and income inequality may be spurious.

In this paper, we examine the relationship between income inequality and government finances at the local level in the United States from 1970 to 2000. We focus mainly on municipalities and school districts, but also present estimates for states. Local government represent a large segment of the economy; in the 2009 fiscal year, local governments disbursed more than $3 trillion in aggregate for such important services as education and public safety.[4]

Our study has several advantages over existing empirical work. First, large samples of municipalities and school districts exhibit much greater variation in income inequality over time than do the small number of countries or states used in previous studies. Secondly, we develop an instrumental variable strategy to mitigate concerns about potential reverse causality from the endogenous sorting of households across localities. Our procedure synthetically advances the income distribution in a city or school district forward from 1970 by matching the *initial* income distribution to national patterns of income growth over the next decades. By design, our instrument cannot be influenced by mobility into and out of communities; rather, it isolates the

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accompanied by higher government expenditures and increasing progressivity in the state tax code (Chernick, 2005; Schwabish, 2008).

[4] State governments accounted for $1.36 billion in expenditures in 2009, while all other local governments (cities, school districts, etc.) accounted for $1.72 billion in that fiscal year. The federal government spent $3.52 billion in 2009. Beyond cities and school districts, counties and special districts provide local services, though these governmental units represent a relatively small share of the total expenditures. These facts were compiled from the website http://www.usgovernmentspending.com/.

component of change in the local income distribution that is driven by shifts in the return to skill over time.

We find no evidence that an increase in income inequality reduces expenditures on public services in cities or school districts; rather, as the income distribution widens, localities *increase* their revenue collection and expenditures. Our best causal estimates suggest that the average increase in the city-level Gini coefficient over this period (5 points) leads to a $63 increase in expenditures per resident. These values imply that the widening of the income distribution from 1970 to 2000 can explain 15 percent of the growth in municipal expenditures over this period. Among school districts, the average change in the Gini is associated with a $198 increase in property tax revenue per pupil with a corresponding $190 decline in state transfers. Although rising inequality can explain 29 percent of the growth in property tax revenue from 1970 to 2000, state systems of school finance equalization appear to have undone much of the connection between changes in the local income distribution and local revenue collection.

For municipalities, rising income inequality is not only associated with increased expenditures on police services, which we may expect if inequality also leads to higher crime rates, but also generates additional outlays for fire protection and road maintenance. In related results, we find that growing racial fractionalization is associated with larger government expenditures across a wide range of expenditure categories, casting doubt on earlier findings that more racially fragmented cities spend a smaller share of their budget on public goods (Alesina, Baqir and Easterly, 1999; see also Cutler, Elmendorf and Zeckhauser, 1993; Hopkins, 2009). State level results also show a positive impact of inequality on local finances, but the estimates are not precise enough to be statistically distinguished from zero.

Our results are consistent with recent work by Corcoran and Evans (2010), which documents a positive relationship between income inequality and educational expenditures at the school district level.[5] Yet, a series of papers have found that, before World War II, unequal communities raised less local revenue and provided fewer common goods and services (Goldin and Katz, 1999; Ramcharan, 2009; Galor, Moav and Vollrath, 2009; Zolt, 2009). Taken together, these results suggest that the relationship between income inequality and the size of local government has changed over time. This change may be due to shifts in the sources of local revenue away from property taxation toward more regressive revenue sources like sales taxes and direct charges, or to the increasing role of state governments in funding (and, in some cases, providing) goods that have historically been the responsibility of localities.

Our findings are inconsistent with models that predict that heterogeneous societies are unable to compromise on common public goods and services. While our evidence is more supportive of the median voter model, we caution that cities and school districts do not rely on progressive forms of revenue, such as income taxation, and rarely engage in spending that is explicitly redistributive. Therefore, it is unlikely that, in this context, rising inequality lowers the tax price of public services for the median voter. With this caveat in mind, we prefer to emphasize our substantive findings; reconciling these patterns with models of local political economy provides a rich area for future research. Overall, our findings challenge the hypothesis that income inequality reduces the provision of public goods from local governments in the United States.

The remainder of the paper is organized as follows. The next section discusses our measures of income inequality and government activity at the local level. Section III describes

[5] Our results were generated independently of Corcoran and Evans' recent study. We reach similar conclusions despite using different methods to measure income inequality within school districts and developing a different instrument for changes in inequality at the local level.

our panel estimation as well as an instrument for shifts in the local income distribution. Section IV documents the positive relationship between changes in local inequality and growing revenues and expenditures at the city, school district and state levels. Section V concludes.

II. Data on Income Distribution and Government Activity at the Local Level

II.A. Income Inequality

We collect decadal data on the income distribution and the levels of expenditures and revenues from 1970 to 2000 for a large number of cities and school districts. The municipal sample consists of a balanced panel of every Census-defined place (incorporated city or town) with 2,500 or more residents in 1970. We exclude the 903 municipalities that were directly responsible for providing education services, leaving us with a sample of 3,369 cities and towns. The majority of our sample is made up of small towns: 65 percent of the municipalities in the sample have fewer than 10,000 residents. Our school district sample contains the 9,024 districts with more than 2,500 residents in 1970.[6]

Because of Census privacy restrictions, we cannot recover the full income distribution at the local level. Instead, we use published Census reports, which indicate the number of households in a jurisdiction in each of 15 to 20 income categories, to generate an (approximate) income distribution. We assign each household an income level equal to the median income in its

[6] The Census of Population provides demographic information for 11,687 and 14,405 school districts in 1970 and 2000, respectively. We use the School District Geographic Reference File for 1970 to combine the demographic information with expenditure data from the Census of Governments (available at http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/3515/detail). The sample consists of the 9,024 school districts that could be matched between 1970 and 2000. This sampling rule eliminates school districts that eventually disappear from the data due, for example, to consolidations with other districts. We choose not to aggregate districts that eventually consolidate because the political economy mechanism that we have in mind pertains to the actual voters and residents of a district. As a result, a component of the measured variation in income inequality over time within a district will be due to mergers with neighboring districts.

bin by decade as calculated from Census micro-data. We then generate Gini coefficients at the local level for this modified income distribution.[7]

In 1970, the average municipality in our sample had a Gini coefficient of 0.32, compared to the national Gini coefficient of 0.39 (Table 1). By 2000, the Gini coefficient in the average municipality increased by 5.5 points to 0.38. However, this average increase hides tremendous variation across municipalities. The Gini coefficient increased by less than one point (or even decreased) in one third of the cities in our sample, while in another third the Gini coefficient increased by more than five points.

II.B. City Finances

The Census (and Surveys) of Governments provide information on municipal revenues and expenditures by detailed category. The first panel of Table 1 contains summary statistics on the sources of revenue and the categories of current expenditures at the municipality level. All values are reported in year 2000 dollars. In the average municipality, expenditures per resident doubled from $460 in 1970 to $870 by 2000. Municipalities allocate the majority of their budget toward the maintenance of local infrastructure and on fire and police protection. Spending on infrastructure, including roads, sewers, water and electricity, comprise 44 percent of average municipal budgets and spending on police and fire protection make up another 21 percent. In comparison, redistribution in the form of direct public welfare and expenditures on health and public hospitals contribute a negligible amount (less than five percent) of the typical municipal budget.

[7] Without a full set of micro data at the municipal level, we are unable to calculate other measures of inequality, such as the 90-10 ratio, with sufficient accuracy.

In 1970, property taxes were the largest source of municipal revenue, accounting for 33 percent of total proceeds. By 2000, the reliance on property taxes declined to only 22 percent of the total budget, replaced in large part by inter-governmental transfers and direct charges for services.[8] Sales taxes also increased from a negligible portion of the budget in 1970 to 12 percent of total revenue in 2000. Political economy models often assume that tax revenue is generated through a progressive tax instrument, such as an income tax. However, most property and sales taxes are regressive in the sense that they require higher tax payments as a share of total income from poor households (Suits, 1977; Phares, 1985).[9] Direct charges may be even more regressive than property taxation because they are levied on a per house basis rather than tied to the value of the home.[10] On the other side of the ledger, inter-governmental transfers are often financed through progressive state or federal income taxes; however, the tax burden for these transfers disproportionately falls on households living outside of the locality in question.

We caution that higher government expenditures need not be synonymous with a higher quality or quantity of public services for the average resident. First, the majority of government expenditures cover the wages and salaries of municipal workers, an increase in which may not translate into a higher quality of service provision. Secondly, anecdotal evidence suggests that a greater share of city services are directed toward high-income neighborhoods; however, with existing data sets, we cannot observe how municipal services are allocated within the jurisdiction. Finally, we note that local governments may expand certain programs in order to

[8] The relative decline in property taxes from 1970 to 2000 was part of a larger decline in the use of local property taxes over the twentieth century (Oates and Schwab, 2004; Sokoloff and Zolt, 2007). This trend was accelerated in the 1980s by statutory limits on the level or growth of property tax rates in some states.

[9] Specific features of the tax system, including exemptions for food and other items from sales taxes or initial threshold exemptions from property taxes, can affect the incidence of these instruments. There is significant scholarly debate about the true incidence of the property tax (see Mieszkowski, 1972; Aaron, 1974; Musgrave, 1974 and Hamilton, 1976).

[10] The largest categories of direct charges are for sewers (23 percent), hospitals (20 percent), airports (8 percent) and sanitation services (8 percent).

combat new social problems associated with rising income inequality, thereby leaving the level of public services unchanged. For example, inequality has been linked to higher rates of violent crime (Fajnzylber, Lederman and Loayza, 2002). Cities may hire additional police officers to combat the higher crime rates, resulting in more government spending without net improvements in public safety.

II.C. School District Finances

The second panel of Table 1 presents the descriptive statistics for our school district sample. In 1970, the typical district spent $4,140 per pupil. By 2000, this total nearly doubled to $7,868 per pupil. The sources of school district revenue changed dramatically over this period. While, in 1970, school revenues were evenly split between local property taxes and inter-governmental transfers, by 2000 state and federal transfers made up 70 percent of the average school district budget.

The changing pattern of revenues in our sample reflects the increasing centralization of K-12 funding over time. States began to supplement local revenues for education services in the mid-twentieth century. At that time, state aid was typically disbursed as a flat grant per pupil, with additional funds provided to poor districts (Hoxby, 2001). In 1965, the federal government began providing school funding through Title I of the Elementary and Secondary School Act (Cascio, et al., 2010). As a result, by 1970, locally-raised revenue only accounted for 60 percent of school district budgets.

More recently, the use of local revenue sources, even as a supplement to state aid, has been called into question. Property taxes allow wealthy districts to raise more revenue than poor districts at the same tax rate, thereby generating an association between the level of wealth in a

district and its level of school funding. Starting with the *Serrano v. Priest* decision in California (1971), many state supreme courts have ruled that existing systems of local school finance are unconstitutional.[11]

In response to these legal challenges, states have adopted various plans to equalize school funding across districts (Hoxby, 2001; Metzler 2003). The most common approach has been to modify a state's aid formula in order to directly supplement districts with smaller local property tax capacity. Some states also guarantee that districts will be able to raise a certain level of revenue at a given tax rate; the difference between locally raised revenue and the guaranteed level is then made up by the state. Following this wave of reforms, the share of school revenues raised through local property taxes declined from 60 percent in 1970 to 30 percent in 2004.

III. Estimating the Relationship Between Income Inequality and Government Activity

III.A. Basic Specification for Municipalities

The relationship between income inequality and public finances can be described by the following equation:

$$y_{it} = \beta(Gini)_{it} + \Gamma X_{it} + \varepsilon_{it} \qquad \varepsilon_{it} = \alpha_i + \upsilon_{it} \qquad \textbf{(1)}$$

where *i* indexes a city or town in Census year *t*, *y* is a local public finance outcomes such as total expenditures, *Gini* is the Gini coefficient, and the coefficient β indicates the estimated effect of income inequality on local finances. *X* contains a set of time-varying city characteristics,

[11] Differences in school funding on the basis of local property wealth have been found to violate rights to equal protection under some state constitutions (Briffault, 2006). In other states, local financing violates constitutional provisions requiring that the state provide an adequate elementary and secondary education to all students. Claims under the Federal equal protection clause were denied by the Supreme Court in *San Antonio Independent School District v. Rodriguez*.

including total population, the share of the population that is black, Hispanic, or over 65 years of age, and median household income. ε_{it} captures the unobserved determinant of local finances, which depends on a permanent component α_i and a transitory component υ_{it}.

Pooling data from 1970 to 2000, we estimate the following equation in first differences to absorb the permanent component of the error term (α_i):

$$\Delta y_{it} = \beta(\Delta Gini)_{it} + \Gamma \Delta X_{it} + R_{it} + \Delta \upsilon_{it} \qquad \textbf{(2)}$$

where equation (2) also includes the vector R_{it} to allow each Census region to have distinct time trends in both patterns of government finances and income inequality. The coefficient of interest (β) indicates the relationship between changes in the Gini coefficient and changes in government revenue or expenditure within a municipality over time, holding constant changes in median income and basic demographics. For the rest of the paper we refer to equation (2) as the OLS specification.

III.B. Instrumental Variable for Income Inequality

Equation 2 is not sufficient, on its own, to establish a causal relationship between income inequality and local government finances. On the one hand, the income distribution may affect government activity through a number of channels: the preferences of local voters, compensatory transfers from the state and federal government, or simply a mechanical relationship between inequality and the size of the local tax base. However, it is also possible that changes in government expenditures could induce shifts in the local income distribution. For instance, an increase in local expenditures may attract wealthy households who prefer generous public

services even at the expense of higher taxes. These high-income arrivals would widen the local income distribution.

To mitigate concerns about this form of reverse causality, we construct an instrumental variable that is correlated with changes in an area's Gini coefficient but is not otherwise associated with changes in local revenues or expenditures. Our instrument is based on a "synthetic" version of the income distribution in a municipality. Recall that the actual Gini coefficient is calculated from counts of the number of households in a locality by income bin in every decade. The first step in constructing our instrument is to replace these decade-specific household tallies with the initial (1970) distribution of households by income bin. By freezing the distribution of households across bins in 1970, we foreclose the possibility that richer or poorer households move into a town in search of a given bundle of public goods.

We then allow the income level of households in the synthetic distribution to grow over time according to the actual change in median income by income bin and decade from the Census micro-data.[12] As a result, time series variation in the synthetic distribution stems only from national patterns of income growth by segment of the income distribution. In other words, the initial income distribution in an area serves as a set of weights indicating how national income growth likely affects each locality. For example, in the 1980s, the income level of households in the top income bin grew faster than those for the rest of the distribution. The instrument will therefore predict greater changes in the Gini coefficient over the 1980s in municipalities that started out with a large number of high-income households in 1970.

[12] To calculate the median income of a 1970 income bin in later decades, we convert the endpoints of each bin, which are denominated in absolute income levels, into percentiles of the income distribution. Results are qualitatively similar when we allow changes in median income by bin and decade to vary by region.

We present the first stage relationship between the actual and synthetic Gini coefficients in graphical form in Figure 1 both in level and in changes. We find a strong positive relationship between the two measures, suggesting that much of the change in local income distributions from 1970 to 2000 was driven by trends in income growth, rather than by in- and out-mobility of households from the top or bottom of the income distribution. The F-statistic on the relationship between the actual and synthetic Gini coefficients is 975.77, surpassing the conventional threshold for a strong instrument by two orders of magnitude.

III.C. Additional Specification for School Districts

Because of the substantial changes in the arrangement of school finance over this period, analyzing the relationship between income inequality and school district revenues requires some care. In particular, we want to allow for the possibility that an increase in income inequality may have different effects in states with and without school financing equalization plans. Districts that experience rising income inequality due to income growth for the rich may be heavily taxed by state equalization plans, whereas districts with inequality driven by falling incomes among the poor may be heavily subsidized.

We define SFR ("school finance reform"), an indicator variable equal to one in states whose systems of school finance have been deemed unconstitutional by the state supreme court. This condition that applies to 14 states by 2000.[13] Equation 3 interacts this state-level reform indicator with changes in the school district-level Gini coefficient. We estimate:

$$\Delta y_{it} = \theta(SFR)_{it} + \beta_1(\Delta Gini)_{it} + \beta_2(\Delta Gini \cdot SFR)_{it} + R_{it} + \Gamma \Delta X_{it} + \upsilon_{it} \qquad \textbf{(3)}$$

[13] We rely on Card and Payne's (2002) taxonomy of school finance cases as updated by Baicker and Gordon (2006).

where *i* indexes school districts and *t* indicates the Census decade (*t* = 1970, 2000). The coefficient β_1 summarizes the relationship between changes in income inequality and changes in revenues or expenditures per pupil in the average school district. The coefficient β_2 tests whether this relationship is different in states that fell under court order to reform their system of school finance by 2000. We also allow the effect of district-level median income to vary according to a state's school finance regime.

We should note that some states that did not face a court order to equalize school spending over this period might have reformed their school finance systems preemptively in order to avoid the threat of litigation (Metzler, 2003). In this case, the two groups of states may respond equivalently to changes in inequality, leading the coefficients on the interaction terms to be indistinguishable from zero.

IV. Results

IV.A. Impact of Income Inequality on Municipalities

Table 2 presents results from equation 2, which estimates the relationship between changes in income inequality and changes in government revenue or expenditure within a city over time. We find that an increase in inequality leads to modest *growth* in municipal revenues and expenditures. The coefficients imply that a five point increase in the Gini coefficient, the average change in the Gini over this period, is associated with a $27 increase in expenditures per capita. Police spending represents $3 of the total increase in municipal expenditures, while the remainder is spent on other "productive" public services including fire protection and local roads. Income inequality has little effect on spending for either public welfare or health and

hospitals; however, together, these categories represent less than five percent of the typical municipal budget.

The revenues required to fund these expenditures are collected by means of a range of local tax instruments, including property taxes, sales taxes, and direct charges for services. Higher property tax revenues could stem either from a decision to increase the *tax rate* or from a more mechanical relationship between inequality and the property *tax base*. The one revenue category that is not associated with a widening of the income distribution is federal and state transfers. This may not be surprising because the majority of state transfers to local governments are provided to school districts, which are examined in the next section, and because state transfers to municipalities are based on formulas that often do not take into account the local income distribution.

Table 3 considers heterogeneous effects of inequality on government revenue by initial municipality size and by initial median income. We subdivide the sample first by median size in 1970 (6,500 residents) and then by median household income ($41,000 in 2000 dollars). An increase in income inequality is associated with greater revenue collection in all cases. However, the positive relationship between income inequality and government revenues is strongest in smaller and richer towns. Residents of smaller towns may develop a stronger base of social capital and therefore be willing to fund public goods even as the ends of the income distribution begin to pull away from the middle. We note that, in particular, rich towns are more likely to expand their property tax collection as the income distribution widens. This is consistent with a greater increase in top-end inequality in rich towns; as the rich get richer, the property tax base may increase.

Table 4 contains results from the second stage of our instrumental variables analysis, in which we instrument for actual changes in the Gini coefficient with changes in national income growth weighted by the initial income distribution in a locality. Most of the IV coefficients are positive, statistically significant and, if anything, are larger than their OLS counterparts. In the IV specification, rising inequality increases municipal revenue from all major sources, including inter-governmental transfers. However, the relationship between inequality and the separate categories of expenditures are not statistically significant in the IV regressions, with the exception of fire protection.

If our OLS estimates were plagued by reverse causality – for example, because the rich are attracted to towns with generous public services – we would expect the IV coefficients to be smaller than OLS. The fact that the IV estimates are larger than OLS suggests that the instrumental variables procedure may instead be correcting for measurement error, which can bias estimates towards zero. By these estimates, a five point increase in the Gini coefficient leads to a $63 increase in expenditures per capita. From 1970-2000, the average municipality experienced a $410 increase in revenues per capita. The widening of the income distribution can thus explain 15 percent of the growth in the size of local governments from 1970 to 2000 (= 63/410). Overall, the pattern of both OLS and IV results suggests that income inequality neither reduces the demand for municipal goods and services nor does it limit residents' ability to pay for them.

IV.B. Impact of Change in Racial Heterogeneity on Municipalities

Table 5 examines the effect of another form of local heterogeneity, racial fractionalization, on municipal budgets. Alesina, Baqir and Easterly (1999) argue that, although

cities with a racially diverse population spend more per resident, they devote a smaller share of their budget to "productive" public goods, such as roads, sewers and trash collection. We re-estimate equation 2, replacing the separate measures of black and Hispanic population share with an index of racial/ethnic fractionalization. Our index is based on four racial/ethnic categories: white, non-Hispanics; black, non-Hispanics; Hispanics; and other races (which include Asians, Pacific Islanders and American Indians).[14] We improve upon the methodology used in Alesina, et al. by using a panel of cities from 1970 to 2000, rather than a single cross-section in 1990, and by extending the analysis to municipalities with fewer than 25,000 residents.

As in Alesina, et al., we find that an increase in racial heterogeneity is associated with larger municipal expenditures. While half of the increase is due to higher police spending, we also find large positive effects on fire protection and health and hospital spending. Because spending on roads fails to keep pace with the overall increase in expenditures, the *share* of the budget dedicated to roads does fall, which Alesina, et al. interprets as a decline in the share of revenue dedicated to productive public goods. However, we contend that the interpretation of these patterns are extremely sensitive to the classification of municipal spending into "productive" versus "non-productive" public goods. It is reasonable to believe that spending on fire protection and public hospitals are equally as productive as spending on roads and, conversely, that spending on roads is equally susceptible to corruption for patronage purposes.

On the revenue side, we confirm Alesina et al.'s finding that racial heterogeneity is associated with an increase in inter-governmental transfers. However, we dispute the interpretation that racially diverse cities are unwilling to raise their own revenue and therefore need to be subsidized by the state "to compensate…[for] the difficulties…in directing local

[14] The racial fractionalization index is defined as $1 - \Sigma_i$ (Number of residents of race or ethnicity$_i$)^2. Separate counts of Asian and Pacific Islanders do not exist at the municipal level in 1970 or 1980.

resources to the supply of public goods" (p. 1266). Instead, we find that an increase in racial diversity is also associated with an increase in own-source revenue collection, including both property and sales taxes.

IV.C. Impact of Income Inequality on School Districts

Turning to school districts, we begin in Table 6 by estimating the baseline specification (equation 2), which relates decadal changes in income inequality to changes in government activity, first in OLS and then using our instrument for district-level changes in inequality. As for municipalities, we find that an increase in income inequality among residents of a school district is associated with *rising* expenditures per pupil. However, the relationship between income inequality and total expenditures per pupil is small. According to our IV estimate, a 1.1 point increase in the Gini coefficient, the average increase at the district-level from 1970 to 2000, would result in only $29 additional dollars of expenditure per pupil.

The total effect of inequality on school resources masks countervailing trends for the two main sources of revenue. A 1.1 point increase in the Gini is associated with a $198 increase in property tax revenue per pupil and a corresponding $190 decline in state transfers. This pattern is consistent with the prospect that state systems of school finance equalization worked to undo the association between the local income distribution and local revenue collection. The next table tests this hypothesis more directly.

Table 7 presents coefficients from equation 3, which allows the effect of income inequality on school district finances to vary with a state's system of school finance. For this specification, we consider long-run changes in school expenditures from 1970 to 2000 in order to allow the reforms of the 1970s and 1980s time to take hold. Table 7 reports only OLS results

because the instrument is not sufficiently powerful to explain changes in inequality over this thirty year interval. The first panel replicates the basic specification (presented in Table 6) over this thirty year period; in the second panel, we allow the relationships between a district's level of income inequality and its median income to differ in states with and without court-ordered school finance reform.

The first row of Table 7 shows that states under court-order to reform their system of school finance provide a higher level of state transfers per pupil (see also Card and Payne, 2002). By 2000, the average district under court order received an additional $474 of state funding per pupil. However, a portion of this state transfer was reversed by a corresponding reduction in local property tax revenue. Overall, we find no difference in the *level* of total expenditures per pupil in states with and without court-ordered school finance reform, but instead see differences only in the *source* of this revenue. As in Table 6, we document that school districts in which the income distribution widened between 1970 and 2000 raise more revenue per pupil from property taxation. The magnitude of these effects is somewhat smaller than the decadal IV estimates; a 1.1 point increase in the Gini coefficient is associated with $57 of additional property tax revenue per pupil. In this specification, we do not find a corresponding decline in state transfers in the average district. However, as the next panel shows, the relationship between inequality and state transfers differs in states with and without court-ordered school finance reform.

Panel 2 demonstrates that the relationship between income inequality and school expenditures is mediated by a state's system of school finance. In districts whose state system of school finance are not under court supervision, rising inequality is positively related to both property tax revenue and state transfers, such that a 1.1 point increase in the Gini would lead to a $61 increase in total resources per pupil. However, in states required to equalize school funding,

a 1.1 point increase in the Gini coefficient is associated with a $44 decline in state transfers per pupil offset by a corresponding $94 dollar increase in property tax revenue. This pattern could be generated by a rise in top-end inequality. As the rich get richer, the property tax base in a district may expand, allowing for greater amounts of own-source revenue collection. However, in states with strong equalization programs, most of the excess taxing capacity that accompanies rising income inequality is offset by reductions in state aid.

Table 7 also reports the relationship between educational expenditures and the median income of a school district's residents. Not surprisingly, wealthier districts spend more on education per pupil. On average, a five percent increase in median income is associated with a $102 dollar increase in per-pupil expenditures. As in Card and Payne (2002), we find that the presence of an equalization court order does not change the magnitude of the relationship between local income and school expenditures but does alter the source of these additional funds. In states that are not under court order, an increase in local median income is associated with greater school resources from both own-source revenue and state transfers. In contrast, in equalization states, state transfers do not increase with local median income. Instead, the loss of state revenue is compensated with a stronger association between median income and property tax revenue.

IV.D. Impact of Income Inequality on States

Lastly, we consider the relationship between changes in income inequality and changes in revenues and expenditures at the state level. State-level tax systems vary greatly, both in their choice of tax instruments and in their degree of progressivity. For example, while the average state relies on personal income taxation for 12 percent of its revenue, nine states do not impose

an income tax at all. Although state income taxes are generally progressive, with the degree of progressivity determined by the rate structure, the tax-free threshold, and the use of exemptions and credits, the overall bundle of state taxes tend to be mildly regressive (Chernick, 2005; Davis, et al., 2009).

In states with a progressive income tax system, the median voter model would predict a *stronger* relationship between income inequality and state-level fiscal outcomes (Hayes and Slottje, 1989; Fletcher and Murray, 2008). Descriptive statistics seem to confirm this intuition: average state Gini increased from 0.357 in 1970 to 0.43 in 2000, while total revenues and expenditures per capita increased by approximately $1,800 (on a basis of approximately $2,000) over these decades.[15] Yet, mechanisms like voter altruism and social capital may be less effective for larger jurisdictions, which could attenuate (or even reverse) any positive relationship between inequality and expenditures at the state level.

Table 8 presents state level results. Estimates are based on equation 2, with all municipal fiscal outcomes replaced by state fiscal outcomes. We find that an increase in inequality has a positive effect on state revenues and expenditures but all estimates are statistically indistinguishable from zero at conventional levels. Consistent with median voter models, we do see that a 7.3 point increase in the Gini coefficient, the average increase in this measure of income inequality at the state level from 1970 to 2000, is associated with a $913 increase in general tax revenue per capita. Similarly, changes in income inequality have a positive effect on total state-level expenditures (but are statistically indistinguishable from zero). All expenditure sub-items show a positive effect, with the exception of public welfare. Instrumental variable estimates show similar patterns.[16] Overall, Table 8 estimates suggest that increasing income

[15] State fiscal data are collected from the Census of Governments. Appendix Table 1 provides summary statistics.
[16] These estimates are available upon request.

inequality had, if any, a positive impact on the fiscal situation of state governments. However, as opposed to our previous estimates at the city and school district level, the limited number of observations at the state level does not allow us to draw precise inference about the impact of income inequality on state finances.

V. Conclusion

The income distribution in the United States widened greatly from 1970 to 2000. We use variation in income dispersion at the local level to examine the relationship between inequality and the size of the public sector. Contrary to models that emphasize disagreements between residents of heterogeneous societies over the optimal level of public expenditures, we find that rising income inequality is associated with larger increases in tax revenues and faster growth in public expenditures at municipal, school district and state levels.

Revenues and expenditures per resident increased in nearly all communities over this period. Our best causal estimates suggest that a five point increase in the Gini coefficient, roughly the change in the average locality from 1970 to 2000, leads to a $63 increase in municipal expenditures per resident to cover services like police and fire protection and infrastructure maintenance and a $190 increase in locally-raised school expenditures per pupil. By the estimates, the widening of the income distribution can explain around 15 percent of the growth in the size of local government over the period.

We conclude by noting that, although income inequality is associated with greater public expenditures, it is not clear that additional funds necessarily translate into a larger quantity or higher quality of public goods. Furthermore, the incidence of local taxation and the distribution of local services need not be progressive and likely varies substantially across governmental

units. Hence, we stop short of claiming that local government activity wholly or partially compensates for the potential social ills associated with income inequality. However, given the empirical patterns documented here, we argue that it is unlikely that the social ills correlated with inequality are due to a weakening of the public sector.

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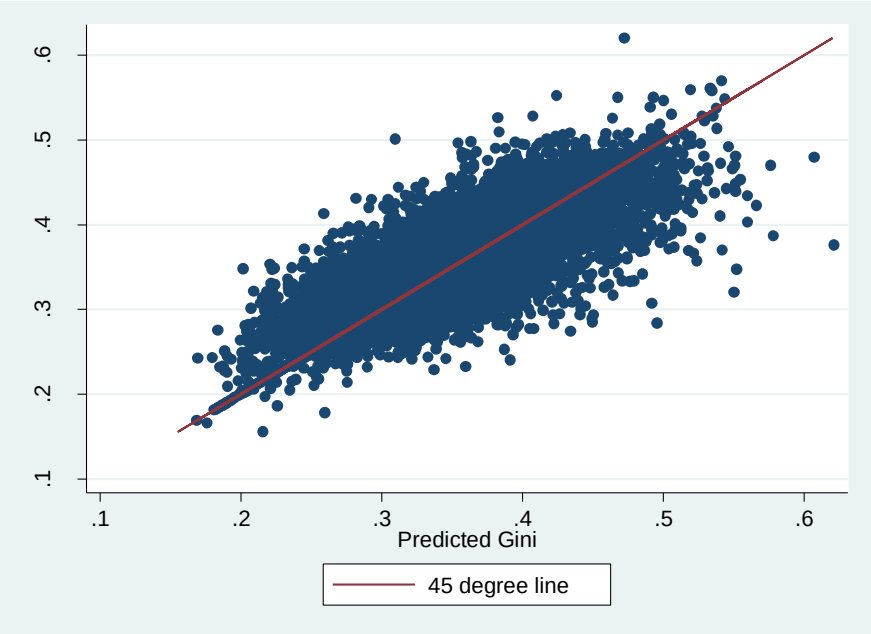
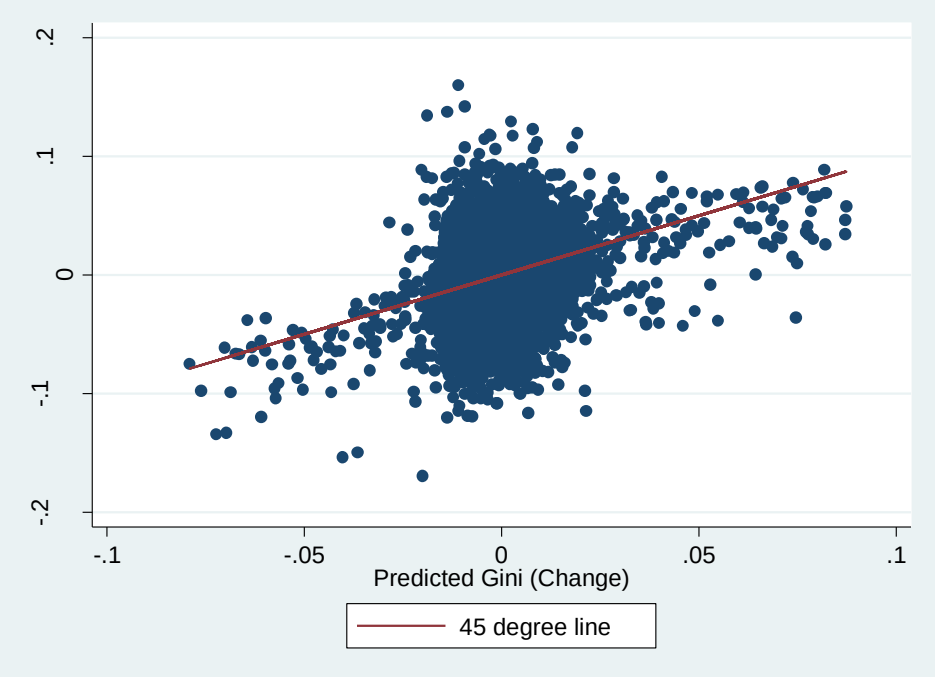
Figure 1: First stage regression, Relationship between actual and synthetic Gini coefficients at the municipal level, 1970-2000

A. Levels



Notes: Each point in the scatter diagram represents a municipality's actual and predicted Gini coefficients. Gini coefficients are calculated using the income bins from Census reports and the median income of each bin from Census Microdata. The computation of predicted Gini coefficients is described in section *III.B.*

B. Changes



Notes: Each point in the scatter diagram represents the residual change in a municipality's actual and predicted Gini coefficients over a decade after controlling for changes in population, share of black and Hispanic population, median income, share of individuals older than 65 and regional trends.

Table 1: Summary statistics, municipal and school district revenues and expenditures, 1970-2000

	I. Municipalities (per capita)					
	Gini coefficient	General revenue	Property tax	Inter-gov transfers	Direct charges	Sales Tax
A. Revenue						
1970 Mean	0.320	449.7	149.1	99.4	90.2	3.1
1970 SD	(0.054)	(300.7)	(116.9)	(143.2)	(143.5)	(7.1)
Δ 1970-2000	*0.055*	*428.6*	*45.2*	*100.9*	*105.1*	*57.5*
	General expenditures	Police	Fire	Highways	Public welfare	Health & hospitals
B. Expenditure						
1970 (Mean)	462.2	76.1	31.4	60.7	0.6	20.6
1970 (SD)	(436.5)	(45.1)	(34.4)	(34.7)	7.7	117.5
Δ 1970-2000	*410.0*	*56.6*	*20.0*	*9.8*	*1.9*	*10.4*
	II. School districts (per pupil)					
	Gini coefficient	Total revenue	Total expenditure	Property tax	Inter-gov transfers	Direct charges
1970 (Mean)	0.370	4185.9	4138.9	2071.4	1821.0	238.3
1970 (SD)	(0.039)	(1833.9)	(2122.2)	(1597.9)	(1036.1)	(246.5)
Δ 1970-2000	*0.011*	*3794.1*	*3730.3*	*679.8*	*2757.9*	*48.1*

Notes: Revenues and expenditures are reported in 2000 dollars. We provide the mean of each variable in 1970, the standard deviation in 1970 in parentheses and the average change from 1970-2000 in italics. The municipality statistics are for the 3,369 cities and towns with at least 2,500 residents in 1970 that do not provide education services. The school district statistics reflect the 9,024 districts with more than 2,500 residents in 1970.

Table 2: OLS estimates of the relationship between income inequality and municipal revenue and expenditures per capita, 1970-2000

General revenue	Property tax	Inter-govern Transfers	Direct charges	Sales tax	Other tax
474.1**	119.3***	52.46	289.5**	262.5**	73.53***
[209.3]	[43.09]	[85.09]	[120.4]	[120.5]	[26.50]
General expenditures	Police	Fire	Highways	Public welfare	Health & hospitals
536.3**	53.81**	63.16***	68.41***	-4.399	42.13
[209.2]	[25.31]	[17.48]	[19.70]	[71.06]	[207.9]

Notes: Sample includes municipalities in Census years 1970-2000 that were not responsible for education services in 1970 (N = 13476, or 3369 municipalities per year). Cells report the estimated coefficient on the change in the Gini coefficient from equation 2 in text. Standard errors in parentheses and are clustered by municipality.

Table 3: The relationship between income inequality and municipal revenue per capita by initial population and median income, 1970-2000

	General revenue	Property tax	Inter-govern transfers	Direct charges	Sales tax	Other tax
	A. By initial population					
Below med	578.3*	88.87*	163.1	331.3**	237.0	102.3***
	[298.3]	[49.39]	[103.7]	[166.0]	[150.9]	[33.59]
Above med	170.0	196.6***	-205.8	201.2	263.7*	-0.866
	[233.5]	[65.08]	[138.7]	[133.3]	[141.7]	[39.32]
	B. By initial median income					
Below med	97.11	57.80	-72.36	352.0*	270.8**	59.10*
	[341.5]	[42.70]	[116.1]	[191.8]	[132.0]	[32.50]
Above med	802.2***	127.3*	176.8	231.9*	211.0	66.48
	[261.2]	[74.51]	[128.1]	[121.1]	[216.8]	[42.14]

Note: Sample includes municipalities in Census years 1970- 2000 that were not responsible for education services in 1970 (N = 13476, or 3369 municipalities per year). The first and third rows are the estimated coefficients on the change in the Gini coefficient from equation 2 for a subsample of municipalities whose population (Panel A) or household median income (Panel B) are below the sample median in 1970. The second and fourth rows report the same coefficients but for those municipalities whose population (Panel A) or household median income (Panel B) are above the sample median in 1970. Median initial population in 1970 was 6,430. Median initial household median income was $41,273 in 2000 dollars. Standard errors in parentheses and are clustered by municipality.

Table 4: IV estimates of the relationship between income inequality and municipal revenue and expenditure per capita, 1970-2000

General revenue	Property tax	Inter-govern transfers	Direct charges	Sales tax	Other tax
1079*	620.2***	596.3***	498.0**	657.8*	151.8
[646.8]	[175.2]	[195.3]	[237.6]	[349.1]	[96.83]
General expenditures	Police	Fire	Highways	Public welfare	Health & hospitals
1260*	-44.87	134.4**	93.02	-103.2	329.7
[701.5]	[160.2]	[65.56]	[75.39]	[237.0]	[425.6]

Notes: Sample includes municipalities in Census years 1970-2000 that were not responsible for education services in 1970 (N = 13476, or 3369 municipalities per year). Cells report the estimated coefficient on the change in the Gini coefficient from equation 2 in text. The instrument for the actual Gini coefficient is based on a "synthetic" version of the local income distribution; see Section III*b* for details. Standard errors in parentheses and are clustered by municipality.

Table 5: OLS estimates of the effect of racial fractionalization on municipal revenue and expenditures per capita, 1970-2000

General revenue	Property tax	Inter-govern transfers	Direct charges	Sales tax	Other tax
108.7**	58.12***	56.51*	-9.451	13.49	-0.911
[52.39]	[14.43]	[30.92]	[29.57]	[37.15]	[13.14]
General expenditures	Police	Fire	Highways	Public welfare	Health & hospitals
103.0*	53.76***	21.75***	5.167	-52.91*	139.8*
[58.83]	[11.58]	[6.555]	[6.877]	[31.68]	[83.55]

Notes: Sample includes municipalities in Census years 1970-2000 that were not responsible for education services in 1972 (N = 13476, or 3369 municipalities per year). Cells report the estimated coefficient β from equation 2 in text but replacing the Gini coefficient by the index of racial fractionalization. Standard errors in parentheses and are clustered by municipality.

Table 6: OLS and IV estimates of the relationship between income inequality and school district revenue and expenditure per capita, 1970-2000

OLS		
Total spending	Property tax	State transfers
946.3	2471***	-2086***
[657.8]	[625.5]	[555.6]

IV		
Total spending	Property tax	State transfers
2678	18084***	-17341***
[4405]	[4298]	[2762]

Notes: Sample includes school districts in Census years 1970-2000 (N = 36,096, or 9,024 school districts per year). Standard errors in parentheses and are clustered by school district. Cells report the estimated coefficient on the change in the Gini coefficient from equation 2 in text. The instrument for the actual Gini coefficient is based on a "synthetic" version of the local income distribution; see Section III*b* for details.

Table 7: Effect of median income and income inequality on school district revenue and expenditures per pupil, 1970-2000

	Panel 1			Panel 2		
	Total spending	Property tax	State transfers	Total spending	Property tax	State transfers
Court order (SFR)	72.10	-147.0	473.9**	-4506	-9619	14884**
	[262.0]	[259.7]	[218.4]	[6531]	[8460]	[7033]
Gini coefficient	6089***	5232***	1414	5626**	4069**	3210*
	[1871]	[1694]	[1612]	[2251]	[1893]	[1681]
Gini · SFR				796.9	4503	-7213**
				[4457]	[4256]	[3437]
ln(median income)	2036***	265.1***	1447***	2043***	281.5***	1422**
	[138.9]	[68.85]	[80.34]	[143.3]	[69.68]	[77.57]
ln(median) · SFR				403.2	731.0	-1099*
				[526.1]	[684.0]	[583.9]

Notes: Sample includes school districts in Census years 1970 and 2000 (N = 18,048, or 9024 school districts per year). Cells report the estimated coefficients of equation 3 in text. SFR is an indicator variable equal to one in the year 2000 for the 14 states whose systems of school finance were deemed unconstitutional by the state supreme court. Standard errors in parentheses and are clustered by school district.

Table 8: OLS estimates of the relationship between income inequality and state revenues and expenditures per capita, 1970-2000

General revenue	Sales tax	Income tax	Intergov. Transfers	Charges & Misc.	
12503	1773*	20052**	2735	-22579	
(8058)	(1050)	(10064)	(1893)	(15156)	
General expenditures	Public safety	Highways	Education	Health & hospitals	Public welfare
13099	167	388	3633	329	-39
(11229)	(282)	(1375)	(5569)	(933)	(1269)

Notes: Sample includes all US states in Census years 1970-2000. Cells report the estimated coefficient on the change in the Gini coefficient from equation 2 in text. Standard errors in parentheses and are clustered by state.

Appendix Table 1: Summary statistics, State revenue and expenditures per capita, 1970-2000

	Gini coefficient	General revenue	Sales tax	Income tax	Intergov. transfers	Charges & Misc.
A. Revenue						
1970 Mean	0.357	2057	601	253	506	515
1970 SD	(0.024)	(2241)	(188)	(202)	(220)	(2030)
Δ 1970-2000	*0.073*	*1717*	*281*	*486*	*525*	*321*
	General expenditures	Public safety	Highways	Education	Health & hospitals	Public welfare
B. Expenditure						
1970 (Mean)	1849	43	367	751	113	241
1970 (SD)	(642)	(23)	(162)	(250)	(35)	(103)
Δ 1970-2000	*1805*	*117*	*-28*	*549*	*140*	*569*

Notes: Revenues and expenditures are reported in 2000 dollars. We provide the mean of each variable in 1970, the standard deviation in 1970 in parentheses and the average change from 1970-2000 in italics. The state statistics are for all US states.