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The Long and Winding Road to Local Fiscal Equity in the United States: A Fifty Year Retrospective[1]

Jorge Martinez-Vazquez and Andrey Timofeev

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Abstract

Outside the United States, fiscal equity is a common explicit objective for intergovernmental transfers at the central and regional levels, with transfers often having specific equalization targets. In contrast, the United States does not have a comprehensive federal transfer scheme for explicit fiscal equalization but rather employs an array of categorical and block grants, some of which are formula-based while others are project-driven. However, the allocation of many of these grants has equalization effects resulting in the narrowing of fiscal disparities among jurisdictions. Indeed, almost half of federal grants in the United States are allocated to healthcare and another quarter to income security programs. In addition, the largest category of state grants is allocated to school districts using formulae similar to those used in other countries for fiscal equalization by the central government, including the measurement of fiscal capacity and expenditure needs.

Few studies have attempted to quantify the extent of equalization achieved with federal and state grants in a manner that would allow comparisons across states and over time. While recently several important studies have been published on fiscal inequities between and within states (e.g., Murray et al., AER 1998), their focus has been narrowed to school districts. In this study we set out to take this literature further by measuring the extent of equalization across local governments in the United States that is implicit in the federal grants system and more explicit in the grants implemented by the individual states. Rather than focusing on specific types of local services, we look at the evolution of per capita resources available to all types of local governments combined. The extent of equalization is measured by the ratio of inequality indices before and after the allocation of grants, following the methodology used in Martinez-Vazquez and Timofeev (JCE 2008).

We find that, on average, state grants tend to considerably reduce the within-state inequality but tend to slightly increase the between-state inequality. States showing more equalization are those with less socio-political fractionalization, higher income inequality, less decentralization of revenue, and court-ordered reforms of school financing. The equalizing impact of direct federal grants to local governments has fluctuated over time but all in all it has

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been much smaller than that of the state grants. Overall, federal grants tend to slightly reduce the between-state inequality but slightly increase the within-state inequality. Because the within-state disparities in own-source revenues have become dominant, the overall level of inequality across local jurisdictions has tended to increase with the allocation of federal grants.

Introduction

Given the impact of expenditure incidence, redistribution of fiscal resources among subnational government units is no less important for equity outcomes than inter-personal redistribution of income. In the United States this is particularly true for inter-jurisdictional redistribution within states as the share of intergovernmental grants in local budgets has recently approached forty percent. In many other countries the dependence of subnational governments on intergovernmental revenue has been even traditionally higher.

Outside the United States, fiscal equity is a common explicit objective for intergovernmental transfers, which often have specific equalization targets. For example, federal countries with more recent constitutions often have a constitutional requirement of equalization payments to federating units (e.g. Canada and Germany). The common equalization targets include equal service for a given level of tax effort or equal tax effort for a given level of public services.

By contrast, the United States does not have a comprehensive federal transfer scheme for explicit fiscal equalization but rather employs an array of categorical grants, some of which are formula-based while others are project-driven. However, the allocation of many of these grants has equalization effects resulting in the narrowing of fiscal disparities among jurisdictions. Indeed, almost half of federal grants in the United States are allocated to healthcare and another quarter to income security programs. In addition, fully funded programs like Food Stamps are inherently equalizing across sub-national jurisdictions because poorer states have more eligible

population, and matching grants like Medicaid are even more equalizing because poorer states have higher federal matching rates.

For within-state transfers the largest category of state grants (more than half) are allocated to school districts, and in many states the formulae used for the allocation of education grants are close to those used in other countries for fiscal equalization at the federal or central level, including the measurement of fiscal capacity and expenditure needs. Historically, this stems in part from the education equity clauses inserted in the first constitutions of the newly formed states to assure the Congress that the availability of schools would support land values throughout the states' territories, as sales of federally-owned land was the main source of federal government revenues at that time (Fischel, forthcoming). This peculiar historical legacy led two hundred years down the road to major litigations regarding school finance equity in many states, but until the 1990s surprisingly little had been "known about the level of equity being achieved across the country." (Augenblick et al. 1997, pp. 70-71). In particular, few studies have attempted to quantify the extent of equalization achieved with federal and state grants in a manner that would allow comparisons across states and over time. While several important studies have been published in the last decade (e.g., Murray et al., 1998), they have mostly narrowly focused on school districts.

In this study we set out to take this literature further by measuring the extent of equalization across local governments in the United States that is implicit in the federal grants system and more explicit in the grants implemented by the individual states. Rather than focusing on specific types of local governments and types of local services, we look at the evolution of per capita of resources available to all types of local governments before and after the allocation of grants. The main rationale behind our approach is that it is the incidence of

benefits from all local services that matters for inter-personal equity comparisons (as opposed to narrower perspectives, nevertheless important, such as the issue of equal education opportunities). The ultimate fiscal impact on a local resident is determined by the balance of tax burdens and service benefits from all local authorities that have jurisdiction over his or her place of residence.

The relevance of our broader approach is brought home by a closer examination of previous results in the literature. While previous studies (e.g., Murray et al., 1998) have linked education finance litigation to the reduction of within-state inequality in school funding for the 16 affected states, these developments were not representative of the overall trends for nation-wide inequality in school finances. In fact, two thirds of the nationwide inequality in school finances has been contributed by the between-state disparities. These disparities were the prime driver of the overall trend in inequality, which dramatically declined between 1972 and 1982 and abruptly reversed direction by 1987. While these findings might be puzzling in the context of education finance reform, a broader examination allows searching for possible explanations, such as the general revenue sharing brought about with the State and Local Fiscal Assistance Act of 1972, but which was allowed to expire in 1986.

Furthermore, even for within-state disparities, looking at the actual expenditures would miss disparities in own-source revenues across local governments. Thus, for example, the dominant role of between-state inequality in education expenditures is due to the fact that state grants mitigate the within-state disparities in own-source revenue, which have been much larger than between-state disparities in own-source revenue since 1982. In this study, we measure the extent of equalization by comparing the inequality indices before and after the allocation of

grants. We will follow the methodology used in Martinez-Vazquez and Timofeev (2008), which looked at similar issues using Russian data.[2]

As primary ingredients, our equalization measure employs two indices of inequality belonging to the class of general entropy measures: the square coefficient of variation (I_2) and the mean log deviation (I_0), also known as Theil's second measure. These measures have a number of properties instrumental for this study. They allow us to quantify the relative contributions of between-state and within-state disparities to the nationwide inequality, to derive quantitative measures for the relative contributions to the ultimate inequality measure from different revenue sources, and to decompose the relative contributions of each revenue source into within-state and between state components. Furthermore, the two measures that we chose out of the broad class of general entropy measures nicely complement each other as I_0 gives more weight to disparities in the lower tail and I_2 gives more weight to disparities in the upper tail of the distribution. In addition, the I_2 measure is equivalent to the coefficient of variation, which is commonly reported among descriptive statistics, in particular in the school finance studies. Beyond quantifying the extent of between- and within-state equalization, we also attempt to explain the existing differences in within-state equalization (as opposed to just observed equity outcomes as in other studies) by looking at possible causes grouped along several relevant dimensions, including demographic, socio-economic, legal, and political variables.

The remainder of the paper is organized as follows: In the next section we provide a discussion of the concept of fiscal equity. Then we provide a brief description of local governments in the USA and their revenue sources. After that we turn to the assessment of fiscal

[2] Our focus on the inequality in own-source and intergovernmental resources makes another difference vis-a-via studying inequality of actual expenditures: we do not capture inequality in debt-financed expenditures. The advantage is that we ignore lumpy one-time inflow of borrowed resources instead capturing it as the debt is serviced from the own-source revenue, which should roughly correspond to the flow of benefits from debt-financed infrastructure. The disadvantage is that we ignore inequality in borrowing capacity other than ability to pay (size, administrative capacity for debt management, etc).

outcomes at the local government level resulting from own-source revenues and allocation of intergovernmental transfers. Next, we attempt to explain why the extent of intra-state equalization varies from state to state. The final section concludes.

Fiscal equity and intergovernmental transfers

In the first-best theory of fiscal federalism there is no place for general-purpose grants. Local governments are prescribed to engage only in the provision of local public goods financed with benefit taxes. When the benefits of local public goods spill over the jurisdictions' borders, the central government is supposed to internalize these benefits through conditional matching grants to local governments. However, in the second-best world it might not be feasible for local governments to rely exclusively on benefit taxation.[3] There are many practical constraints to the implementation of benefit taxation, but there are also some theoretical reasons for not fully relying on this form of financing. For example, if the production of local public goods exhibits decreasing costs, revenue generated through benefit taxation would not be sufficient to cover total costs with marginal costs being below average costs. At the same time non-benefit taxation necessary to make up the difference would be associated with a larger deadweight loss when undertaken at the local level due to mobility of economic agents across local jurisdictions.

In theory, intergovernmental grants can be also provided by a central government pursuing inter-personal redistribution if the central government welfare is a function of the welfare functions of constituent jurisdictions (Tresch 2002). In this case, the national government only would need to redistribute among localities with the inter-personal redistribution being done by the local governments. Equalization grants can be also used as a second-best arrangements (when the first best direct arrangements of grants to individuals is not administratively feasible)

[3] See, for example, the discussion in Tresch (2002, p. 844).

to improve economic efficiency by reducing horizontal inequities as it allows local governments to provide equal service for a given level of tax effort (Buchanan, 1950). This potentially restores horizontal equity (and reduces economic losses from tax avoidance and evasion) as 'equals' face the same net fiscal residuum (inclusive of local services) regardless of the place of residence. However, in addition to horizontal equity, equalization of fiscal capacity also brings some vertical equity—associated with economic losses—by equating "net fiscal residua" for "everybody" not just among "equals" (Mieszkowski and Musgrave, 1999). Therefore, inter-governmental grants are efficiency enhancing when it comes to disparities in rent and source-based government revenues but less so with respect to disparities in household income.[4]

Another theoretical case for fiscal equalization is that it can mitigate the negative externalities of tax competition by essentially acting as Pigouvian subsidies internalizing fiscal externalities from decentralized taxation (Smart 1998). However, if the extent of equalization exceeds the extent of fiscal externalities, equalization can lead to overtaxing because it pushes social costs of taxation to other jurisdictions. Similarly, fiscal equalization can affect local government incentives to allow location of businesses through zoning, environmental regulation, public right of way, and so on (Fischel, 1975).

All in all, there are a number of theoretical cases for allocating intergovernmental transfers based on fiscal equity. In practice, block grants with equalization objectives constitute a prevalent form of intergovernmental transfers in many countries. England's Grants in Aid go as far back as 1830 (Webb, 1920). The notion of "fiscal equity" has been the prime objective for grant schemes in many countries since the beginning of the twentieth century, when the concept of a "national minimum" level of services for all citizens entered the policy debate. This is

[4] Inefficient migration induced by local rents can be prevented without equalization grants by the capitalization of rent differentials in real property values but, that would be at the expense of creating inefficiencies in the consumption of housing.

attributed to the switch of local governments' scope from merely protective services to social services thus moving further away from the textbook maximum use of benefit taxation (Buchanan 1950). Federal countries with more recent constitutions often have a constitutional requirement of equalization payments to federating units.[5] The common equalization targets include equal service for a given level of tax effort or equal tax effort for a given level of service provision. Easing the burden of providing the standard quality of public services requires larger assistance in the form of grants to sub-national units with smaller revenue capacity and larger expenditure need.

In the United States, one of the first proposals for such equalization schemes emerged in the 1923 report on education financing in the State of New York submitted by Strayer and Haig to the Educational Finance Inquiry Commission, which operated under the auspices of the American Council on Education from 1921-1924 (Augenblick et al., 1997). Today this so-called foundation formula is used in some forty states, where state grants make up the difference between the minimum (or foundation) level of per-student financing and the level that local governments can raise at some standard property tax rate given the taxable values per student in their jurisdictions (Verstegen and Jordan, 2009). Other states (e.g. Georgia) supplement the foundation level of financing with the matching of local tax effort in excess of the minimum level to allow equal increase in service for an equal increase in the tax rate. The next two largest types of states grants, on welfare and highway respectively, are also usually distributed based on some form of formula (Lee et al 2004, p. 521).

[5] For example, Section 36 of Canada's Constitution Act of 1982 establishes the "principle of making equalization payments to ensure that provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation." Other examples include Australia, Germany, and South Africa.

Local Government Revenue in the United States

In the United States, local governments are creations of each individual state government, which is free to define its local government structure. Essentially, counties (also called parishes or boroughs in some parts of the country) and school districts are established uniformly to ensure that essential local services, such as law enforcement and education, are provided across the entire state's territory. In addition, sub-county authorities, such as cities and townships, are established in some areas of the state through a local referendum subject to certain conditions—such as minimum population, minimum geographical area, and minimum population density—prescribed in the state legislation. [6]

According to the 2007 Census of Government (U.S. Census Bureau, 2007), in the United States there are 89,476 local government authorities: 3,033 counties, 19,492 municipalities, 16,519 towns or townships, and 50,432 special purpose authorities (school districts, fire districts, watersheds, etc). Given this multiplicity of local government structures and the differences across the 50 states in terms of general purpose versus special purpose arrangements, in this study we use data aggregated to the county level, as a more uniform structure of administrative division. As our focus is on local government revenues, we think this choice accords well with the fact that for all these overlapping local authorities, the property tax is usually administered by the county assessor's office. Fisher and Papke (2000, p. 161) provide another argument for joint consideration of overlapping local authorities:

[6] Several states (Maryland, Missouri, Nevada, and Virginia) established independent cities that are not part of any county jurisdiction. The U.S. Bureau of Census treats independent cities as county-equivalent base units for presentation of statistical data, which we utilize in this study.

> *… consider that if aid to school districts decreases local school taxes, opposition to increased city taxes may also be reduced. The lower school taxes may allow local municipalities to increase local city taxes and expenditures.*

Being creations of their states, local governments derive their taxing authority from the states, which set specific limits on local revenue sources and tax burdens. As is evident from Table 1 the composition of own-source revenue of local government has undergone several important developments over the last fifty years. First, the share of the property tax in own-source revenue had declined from 70 percent in 1957 to under 50 percent by 1987, where it has remained thereafter. At the same time, the share of non-tax revenue, in particular user charges, has been steadily increasing from 20 percent in 1957 to almost 40 percent today. The importance of other taxes, mostly the sales tax, has increased less dramatically.

Table 1. Average Structure of own-source revenue (%)

	1957	1962	1967	1972	1977	1982	1987	1992	2002
Property Taxes	69.3	69	66.2	64	59.7	48.6	46.1	48	45.3
Other Taxes	10.6	9.7	10.2	12.5	14.4	15.3	16.6	15.1	16.5
out of which									
General Sales and Gross Receipts Taxes	*n.a.*	*n.a.*	*n.a.*	*4.1*	*5.3*	*6.2*	*6.8*	*6.4*	*7.2*
Non-tax revenue	20.1	21.4	23.6	23.5	25.9	36.1	37.3	36.8	38.2
out of which									
User charges	*n.a.*	*n.a.*	*n.a.*	*16.2*	*17.8*	*21*	*21*	*23.8*	*25.7*

Note: n.a. —non-available. Individual Income Tax accounted for less than 3% throughout these years

Source: Authors' calculation based on data from the Census of Government.

However, the yield of these own sources of local revenues varies a lot from county to county as a result of both the productivity of revenue instruments authorized by the state and the capacity of local governments to tap particular revenue bases.[7] As shown in Table 2, in 2002 the highest per capita level of own-source revenue was 25 times the median level. This was in the North Slope Borough, Alaska due to high taxable values of oil and gas facilities combined with one of the lowest population densities in the nation. In that county, property taxes account for 80 percent of own-source revenue, which is twice the average share in the nation. By contrast, in Gilpin County, Colorado other taxes, mostly on gaming, accounted for 86 percent of own-source revenue, yielding 27 times the median per capita level of revenue in the "other taxes" category. The coefficient of variation in own-source revenue for 2002 stands at a rather high level of 0.72, and that is even higher for individual revenue sources ranging from 1.02 for user charges to 1.41 for other non-tax revenue (mostly asset income).

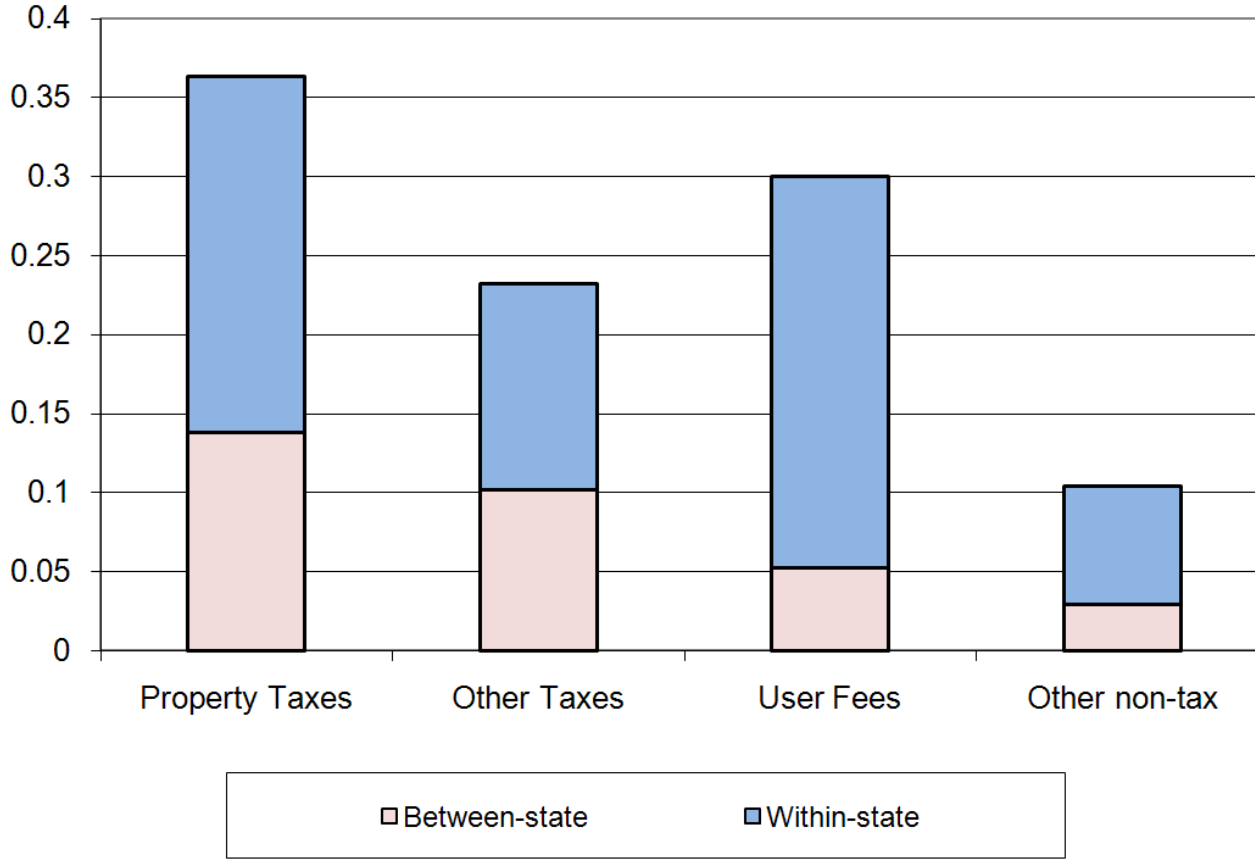
Table 2. Disparities in Own-source Revenue of Local Governments, 2002

	Own -source	Property Taxes	Other Taxes	User Fees	Other non-tax
Grand mean, USD	1,718	802	202	498	217
Grand median, USD	1,507	681	152	305	159
Grand maximum, USD	38,006	30,487	4,140	4,168	8,521
Grand minimum, USD	18	0	0	0	5
Coefficient of Variation	0.72	1.07	1.04	1.02	1.41

Note: Computation of the Coefficient of Variation does not use county-population weights
Source: Authors' calculation based on data from the Census of Government.

[7] The lack of data does not allow us to determine whether the disparities in own-source revenues are due to variations in revenue capacity or revenue-raising efforts by local governments. County-level data on property values are not readily available while household income data would underestimate inequality in revenue capacity as property wealth is more unequally distributed than personal income (Corcoran and Evans 2010). The lack of data does not allow us to make adjustments for differences in the costs of service provision that would be necessary to gauge disparities in local government services resulting from disparities on fiscal resources,

Figure 1. Relative factor components for inequality in own-source revenues of local governments, 2002



Source: Prepared by authors based on data from the Census of Government.

To further examine the sources of revenue disparities across counties, we additionally employ two general indicators of inequality belonging to the class of general entropy measures. The first, denoted I_2, is just the squared coefficient of variation, which however is calculated by weighting counties according to their population. The second measure, denoted as I_0, is the mean log deviation, also known as Theil's second measure. These measures have a number of properties instrumental for this study, as explained further in the appendix. Firstly, these indexes allow us to quantify relative contributions of between-state and within-state disparities to the

nation-wide inequality (Shorrocks, 1984). Secondly, we can derive quantitative measures for relative contributions of different revenue sources (e.g., property taxes versus sales taxes) to the ultimate inequality (Shorrocks, 1982). Thirdly, we can decompose relative contributions of each revenue source into within-state and between-state components (Tsui, 1998). And finally, the two measures that we chose out of the broad class of general entropy measures nicely complement each other as I_0 gives more weight to disparities in the lower tail and I_2 gives more weight to disparities in the upper tail of the distribution.

The role of own taxes in inequality

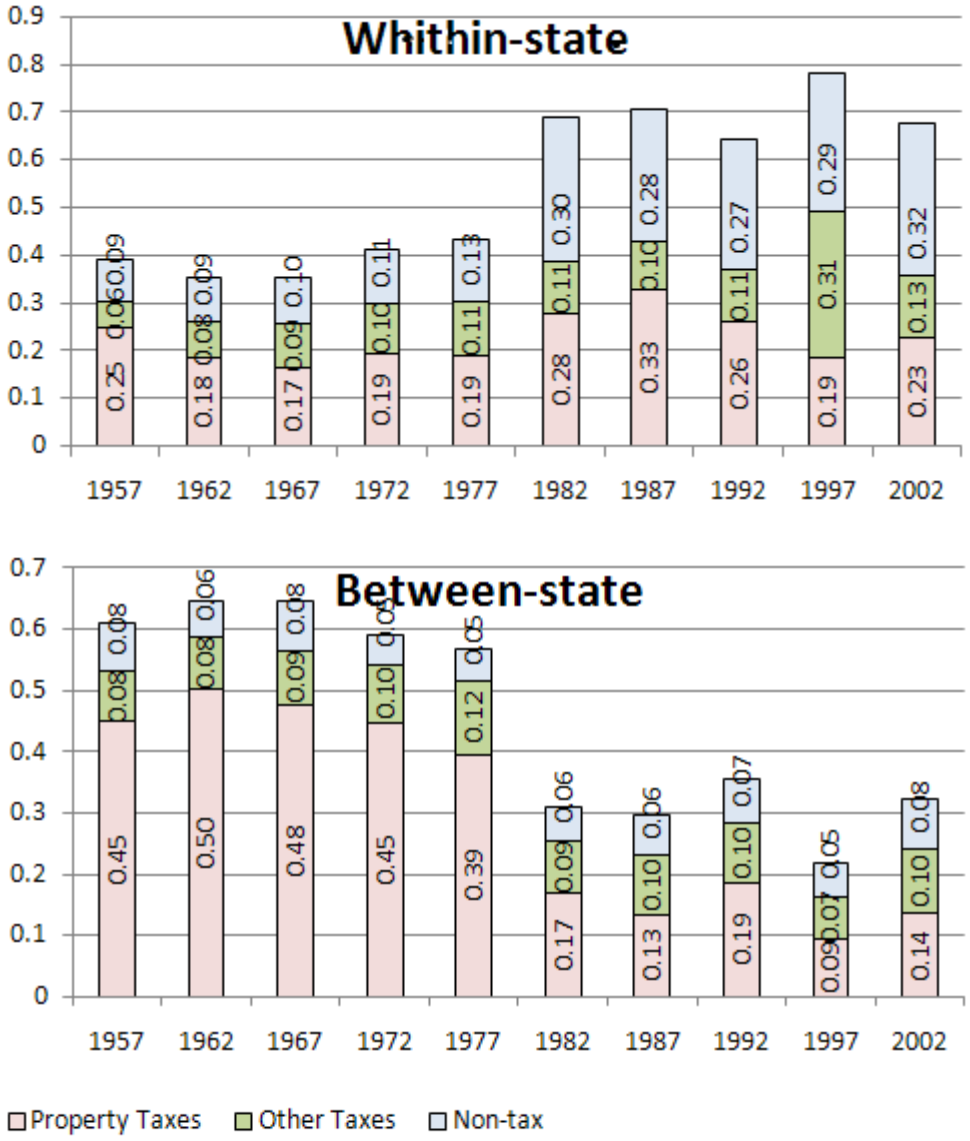
As shown on Figure 1, in 2002 property taxes accounted for 36 percent of the existing inequality while accounting for 45 percent of own-source revenues.[8] At the same time, all other taxes accounted for a larger share of inequality than their respective share in own-source revenues. For each source of own revenue, most of inequality occurred within states. By contrast, before 1982, most of the inequality in own-source revenues as a whole occurred between states (see Figure 2). The switch in roles is mostly driven by the property and other taxes, for which most of inequality had been between states before 1982 but has been within states thereafter. Inequality in non-tax revenues has always been dominated by the within-state disparities; however these disparities have become especially large since 1982.

The role of federal and state grants in inequality

Next we examine how the extent of disparity is transformed after each cumulative stage of revenue allocation by observing first the extent of inequality arising from own-source revenues, and then noting changes in the inequality measures after consecutively adding state

[8] The contribution of a revenue component to the total inequality is above its share in the total revenue if it is more unevenly distributed than the total revenue; while the contribution of a revenue component is below its respective share in the total revenue when it is either weakly correlated with the total revenue or it is more evenly distributed than the total revenue (See Appendix I).

Figure 2. Evolution of relative factor components for inequality in own-source revenues

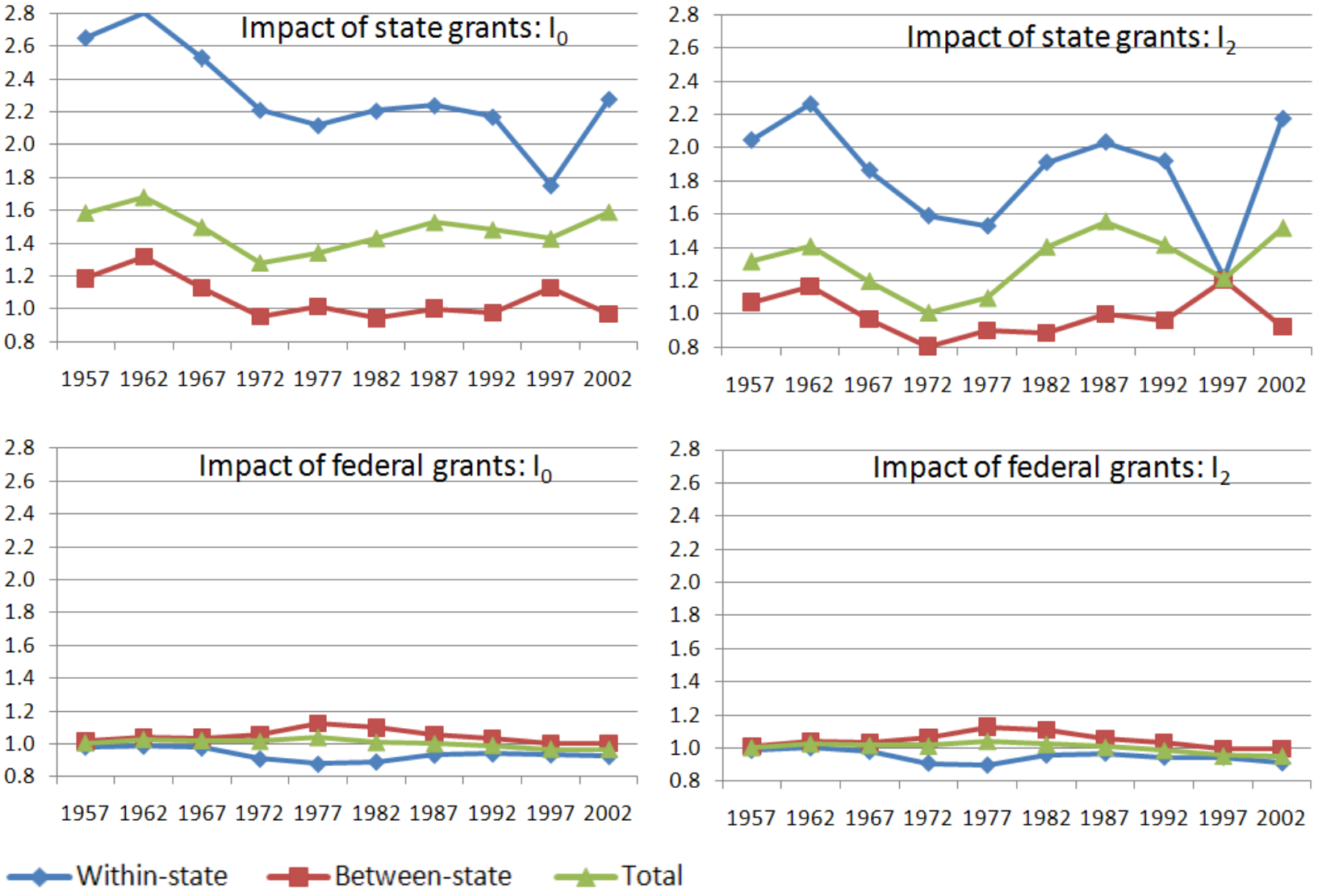


Note: Our sample excludes Alaska in 1957 but includes thereafter

Source: Prepared by authors based on data from the Census of Government.

and federal grants. Following Martinez-Vazquez and Timofeev (2008), we measure the extent of equalization by comparing the inequality indices before and after the allocation of grants. The

Figure 3: Evolution of equalization impact of state and federal grants



Note: Our sample excludes Alaska in 1957 but includes thereafter

Source: Prepared by authors based on data from the Census of Government.

four panels of Figure 3 plot the ratios of the inequality measures before and after allocation of the state and federal grants on the top two and bottom two panels correspondingly.

As is evident from the top panel of Figure 3, on average, state grants tend to considerably reduce the within-state inequality but, at least since 1967, tend to slightly increase the between-state inequality especially at the upper tail (I_2). Thus, within each state, worse-off counties tend to receive more state grants, however in worse off states local governments tend to receive less state grants than in better-off states. By contrast, going back to 1957-62, state grants were reducing both the within-state and between state inequality.

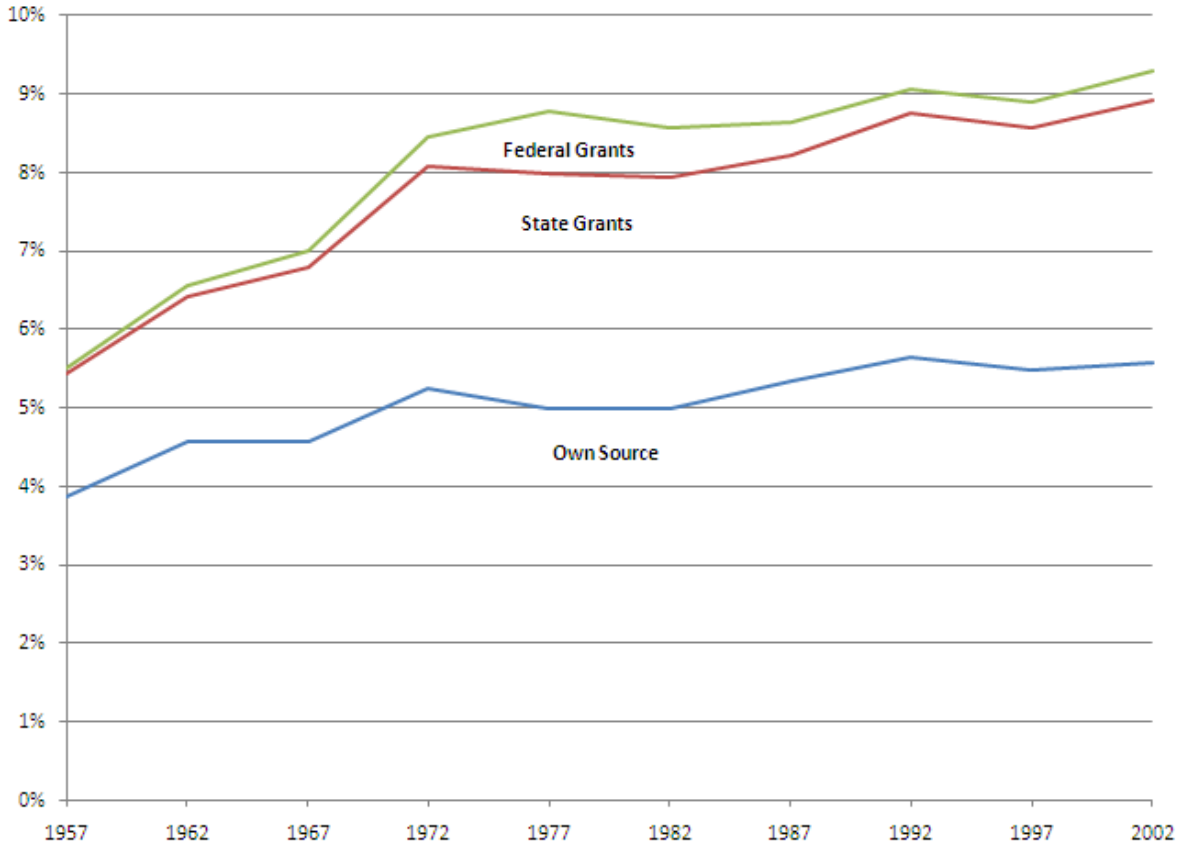
As shown in the bottom panel of Figure 3, the equalizing impact of direct federal grants to local governments has been much smaller than that of the state grants.[9] Overall the federal grants tend to slightly reduce the between-state inequality but slightly increase the within-state inequality. This means that the federal government appears to channel resources to better-off counties in worse-off states. This could be due to proposal-based allocation of many of federal grants that may discriminate against less developed localities lacking "grantmanship" capabilities (Lee et al 2004, p. 536). Because the within-state disparities have become dominant in the own source revenues, the overall inequality has tended to increase, albeit very little, after the allocation of federal grants since 1992.

A historical overview of fiscal equalization, 1957-2007

The preceding discussion suggests there have been some ups and downs in the extent of inequality across counties in the United States. In addition to the evolution of disparities in own-source revenues, the evolution of inequality has also been affected by the size and allocation patterns for state and federal grants. As shown in Figure 4, while the share of federal grants in

[9] Note that here we do not capture the equalizing impact of federal grants received by states and passed on to their constituent localities.

Figure 4. Evolution of local government finances (% of GDP)



Note: Our sample excludes Alaska in 1957 but includes thereafter

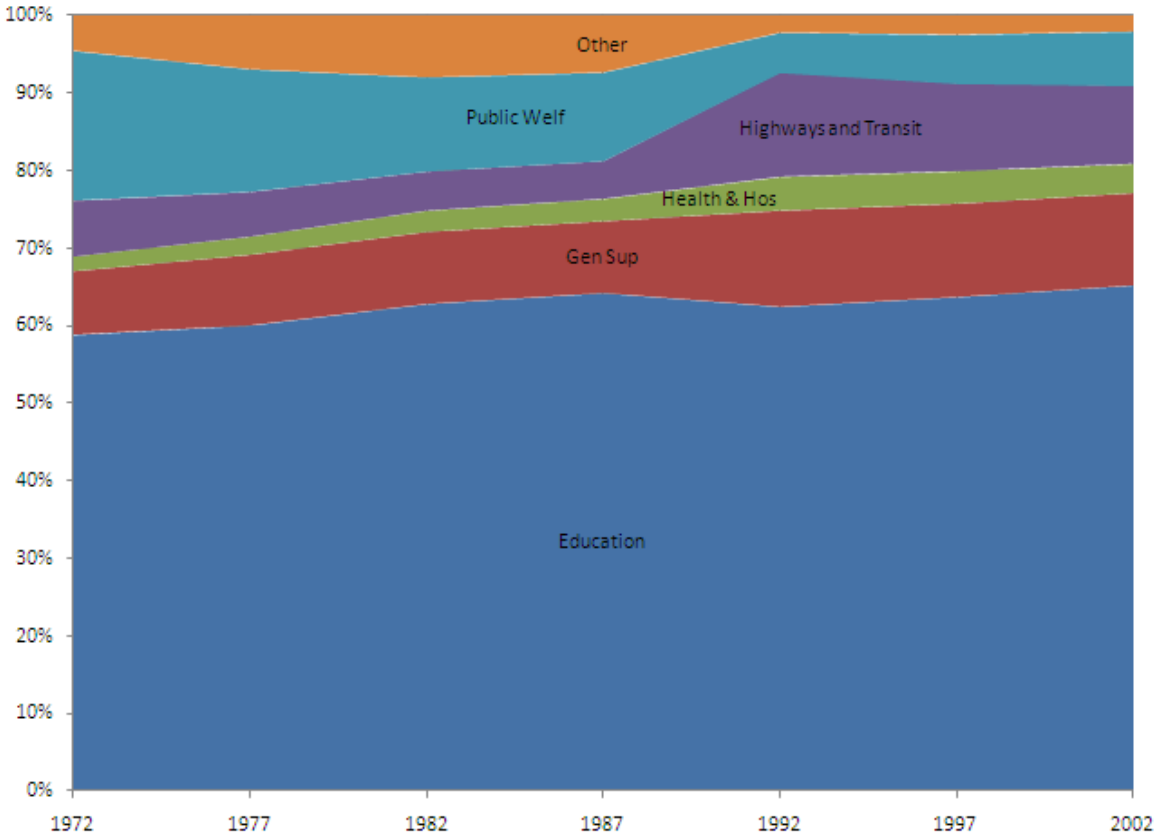
Source: Prepared by authors based on data from the Census of Government.

local government revenues increased seven-fold from 1.4 percent in 1957 to 9.3 percent in 1977, the share of state grants increased from 28 percent in 1957 to 34 percent in 1977. Since that time the share of federal grants halved to 4 percent of local government revenues while the share of state grants remained roughly the same.

The composition of state grants has also undergone some evolution since 1972, when the Census of Government started reporting sectoral breakdown of these transfers (see figure 5). Education has accounted for the largest share of state grants reaching 65 percent in 2002 up from 59 percent in 1972. The share of public welfare grants dropped from 19 percent in 1972 down to

7 percent in 2002, with the largest drop occurring between the 1987 and 1992 censi. At the same time the share of transportation grants increased from 7 percent in 1972 up to 10 percent in 2002, with the largest jump occurring again between the 1987 and 1992 censi.

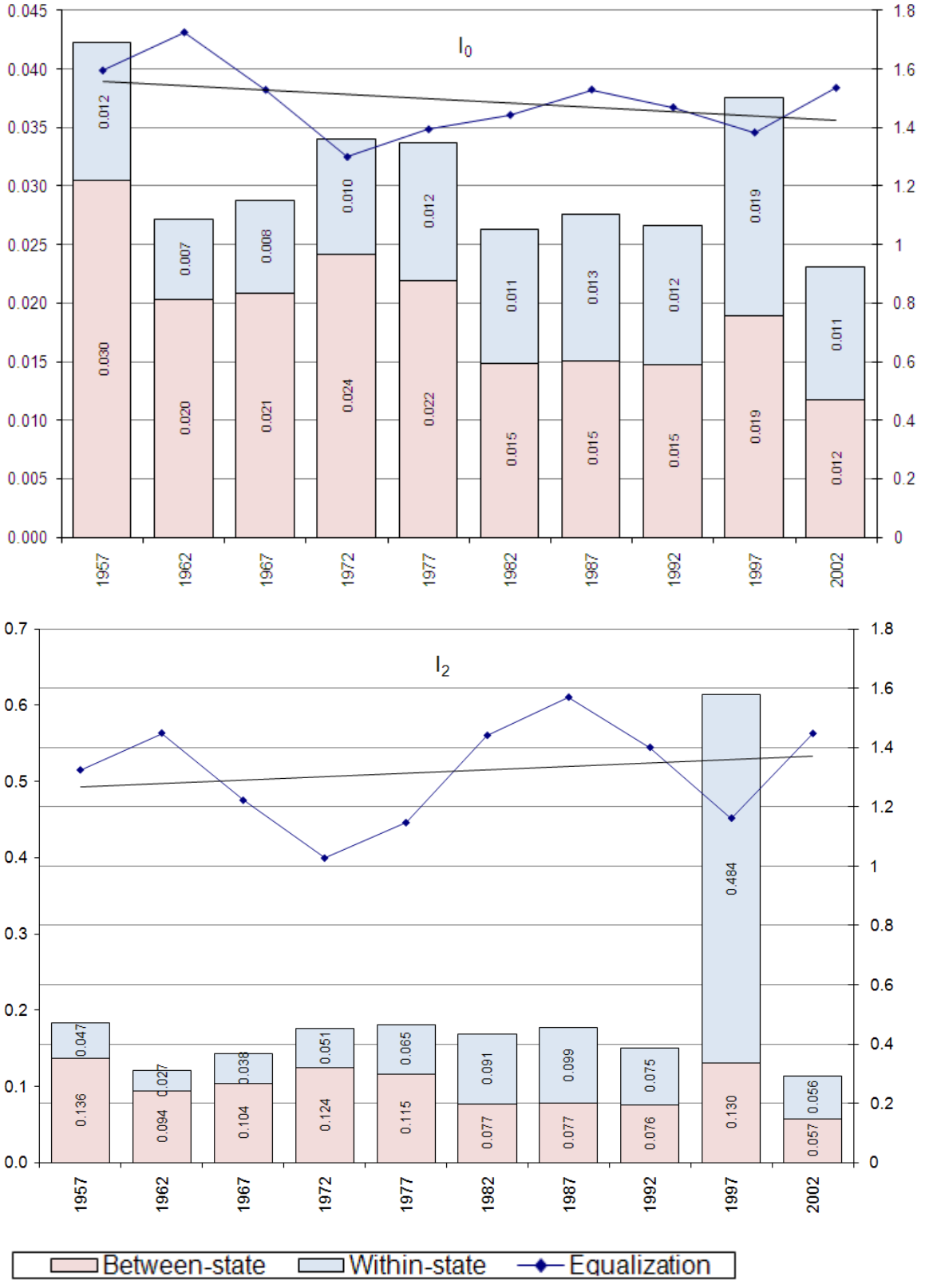
Figure 5. Evolution of sectoral composition of state grants, 1972-2002



Source: Prepared by authors based on data from the Census of Government.

The interplay of the evolution of own-source revenues and intergovernmental grants is depicted in Figure 6 as: (i) the inequality in local finances after the allocation of state and federal grants (bar charts), and (ii) the ratio of inequality measures before and after the allocation of state and federal grants (line graph) along with the fitted trend line. As suggested by Figure 6, one can distinguish four distinct phases in the development of fiscal equalization in the United States: (a)

Figure 6. Equalization outcome of state and federal grants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0.104
0.051
0.124
0.065
0.115
0.091
0.077
0.099
0.077
0.075
0.076
0.484
0.130
0.056
0.057
1957
1962
1967
1972
1977
1982
1987
1992
1997
2002
Between-state
Within-state
Equalization

Note: Our sample excludes Alaska in 1957 but includes it thereafter

Source: Prepared by authors based on data from the Census of Government.

up to 1962 of equalizing growth in revenues; (b) from 1967 to 1972 of un-equalizing growth in revenues; (c) from 1977 to 1987 with a big burst and final phasing out of federal transfers; and (d) from 1992 onwards with instability in fiscal equality driven by the dotcom bubble.

[FIGURE 6 ABOUT HERE]

The period up to 1962. During this period local finances experienced significant growth both in own-source and intergovernmental revenues with the share of local finances relative to GDP increasing by almost one-fifth (or by one percent of GDP) between 1957-1962. At the same time disparities in own-source revenues were narrowing both between and within states. The latter combined with an increasing equalization impact of intergovernmental transfers led to a drop of inequality in local fiscal outcomes both between and within states.

The period from 1962-72. During this period both own-source and intergovernmental revenues continued to grow relative to GDP gaining two percentage points between 1962-1972 (or a third of the 1962 share). However, unlike before 1962, the growing own-source revenues were becoming more unequal both between and within states. This growth was driven by revenue sources other than property taxes, which saw an increase in their contribution to the disparity of own-source revenues of local governments during this period. This, in combination with a decrease in the equalization impact of intergovernmental transfers, led to an increase of inequality in local fiscal outcomes both between and within states.

The period from 1972-87. This period witnessed doubling and eventual phasing out of federal grants to local governments. Most of the increase and eventual phase-out of federal

grants occurred in the education sector and general revenue sharing. Furthermore, the share of state grants in school financing increased from 40 percent in 1970 to 50 percent in 1980, in part representing passing on of federal moneys.[10] The increase in revenues from federal and state grants was largely offset by a drop in property tax revenues relative to GDP so that the overall increase of local resources relative to GDP was less than four percent (or 0.33 percentage points of GDP). As a result, the share of the property tax in own-source revenue had declined from 64 percent in 1972 to 46 percent by 1987. At the same time, the share of non-tax revenue, increased from 24 percent in 1972 to 37 percent in 1987, mostly driven by user charges, which more than doubled in real terms over that period.

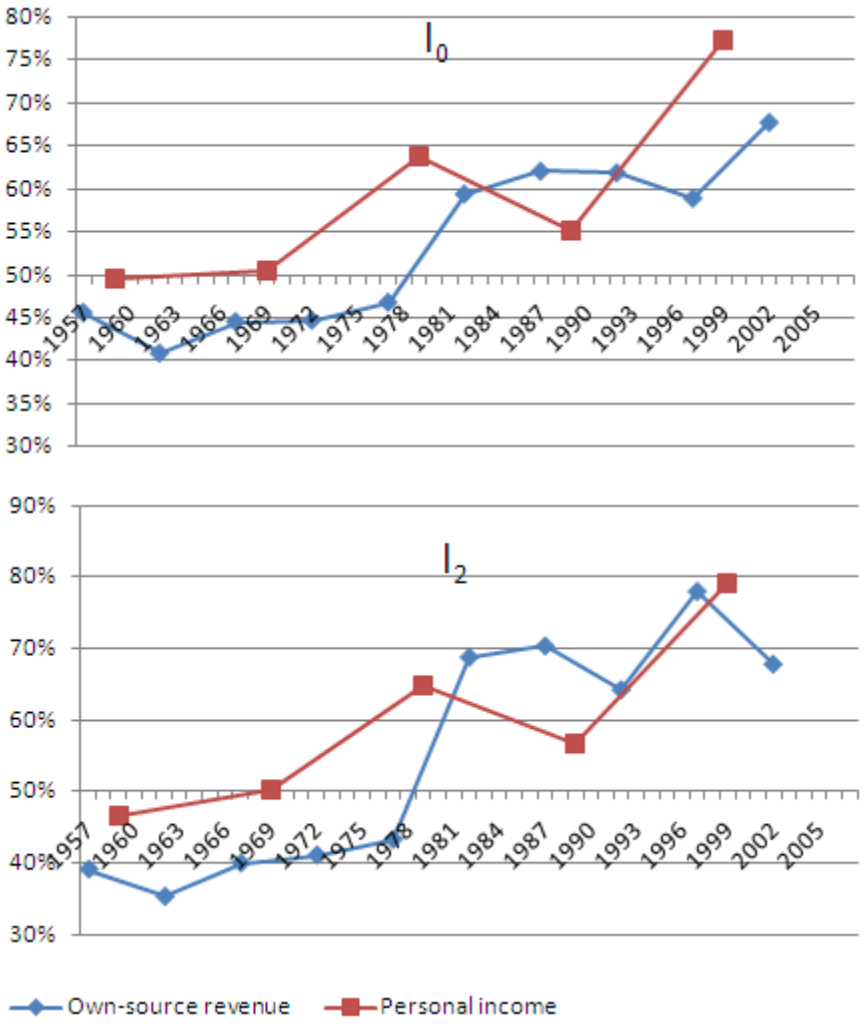
This period was characterized by the narrowing of between-state inequality in own-source revenues but increasing within-state inequality and, as a result, increasing overall inequality in own-source revenues, especially at the upper tail (I_2). This period also experienced an inflection point for the composition of inequality: while in 1977 about 55 percent of own-source inequality and 67 percent of property tax inequality occurred between states, in 1982 only 35 percent of own-source inequality and 38 percent of property tax inequality occurred between states.

A similar inflection for the inequality in personal income occurred in the late 1960s (Figure 7). However, the relationship between household income inequality, inter-county disparities in average personal income, and inter-county disparities in local government revenue are more complex. All three inequalities had been declining before the late 1960s (Jones and Weinberg 2000). Thus, the within-state disparities in personal income started to dominate when

[10] Reportedly, the increase in state education grants was primarily driven by rising income inequality and to a lesser extent by court-ordered reforms of school financing (de Bartolome 1997)

the between-state disparities dropped more dramatically than the within-state disparities. Furthermore, while the household income inequality started to increase in 1968, the inter-county inequality in average personal income did not start to increase until the 1989 Census. Finally, the rise in the household income inequality has been continuous since 1968 while inter-county disparities in local government revenues have been exhibiting a saw-tooth pattern since 1982.

Figure 7. The share of the within-state inequality in the overall inequality



Note: Our sample excludes Alaska and Hawaii in 1957 but include them thereafter

Source: Prepared by authors based on data from the Bureau of Census

Because state grants appear to be the most potent equalization tool in the U.S. budgeting system, but they are only effective for addressing within-state disparities, the shift of the bulk of nationwide disparities in own source-revenues into within states resulted in increasing equalizing effects of intergovernmental grants, especially at the upper end of distribution (I_2). However, this rise of within-state equalization was barely enough to mitigate the rise in within-state inequality in own source revenues, leaving the overall fiscal outcome intact apart from a one-time drop in the lower tail resulting from the inflection of the composition of own-source inequality between 1977 and 1982.

The period from 1987 onwards. During this period the own-source revenues of local governments started to grow again, mostly through user charges. This led to an increase of the contribution of user charges to own-source disparities both between and within states.[11] However, the dominant role of within-state inequality for all sources of own revenues has persisted. In the middle of this period, the own-source inequality has experienced an explosive rise both between and within states especially at the upper tail. This was driven by the inequality in non-property taxes due to explosive growth of income tax revenues during the dot-com boom in the late 1990s. However, as the bubble burst, the inequality indices for local government revenues returned to where they were in 1992. This all has happened against the backdrop of rising inequality in household income driven by the highest quintile, and in particular by the top five percent of income distribution (Jones and Weinberg 2000).

[11] While Murray et al. (1998) find that the withdrawal of federal grants led to a sharp increase in the between-state inequality in education expenditures by 1987, which in turned led to an increase in the within-state inequality by 1992 (as the states responded by decreasing grants to constituent localities), we do not find this development for all local expenditures combined. The between-state inequality in total local expenditures remained flat throughout this period while the within-state inequality increased only marginal in 1987.

Trend in equalization within states

We need to begin by noting that the aggregate measure of the within-state equalization does not show us the entire picture. First, we need to note that states start with different levels of disparities in own-source revenues among their local government (Table 3). Hawaii has the lowest level of inequality in own-source revenues, with the coefficient of variation equal to 0.08.[12] This is quite likely associated with the fact that Hawaii has a single state-wise school district, which is financed from the state general fund.[13] By contrast, in Alaska, where some counties collect record high per capita revenues from property taxes on oil and gas facilities, the coefficient of variation for own-source revenue is 1.63, the highest in the nation.

Table 3. Squared Coefficients of Variation of Local Revenues in 50 States, 2002

Name	*# of counties*	*Own-source*	*+ State Grants*	*+ Federal Grants*	*Own Source / After state*
Alabama	67	0.2477	0.0985	0.0966	2.5151
Alaska	26	2.6673	1.2307	1.1299	2.1673
Arizona	15	0.0261	0.0068	0.0061	3.8593
Arkansas	75	0.1667	0.0434	0.0448	3.8427
California	58	0.0574	0.0207	0.0231	2.7779
Colorado	64	0.2211	0.1290	0.1302	1.7136
Connecticut	8	0.0256	0.0053	0.0064	4.7917
Delaware	3	0.0255	0.0014	0.0005	18.5024
Florida	67	0.0874	0.0464	0.0504	1.8844

[12] To allow decomposition, table 3 reports squared coefficients of variation while the discussion of disparities refers to the square root of the reported values.

[13] Lower disparities in own-source local revenues in Hawaii and the New England can be also due to the fact these states have larger counties effectively achieving equalization by better pooling resources from different localities into a larger county-level pool.

Name	*# of counties*	*Own-source*	*+ State Grants*	*+ Federal Grants*	*Own Source / After state*
Georgia	159	0.2025	0.0957	0.1046	2.1153
Hawaii	4	0.0072	0.0246	0.0208	0.2926
Idaho	44	0.1705	0.0662	0.0641	2.5771
Illinois	102	0.0677	0.0291	0.0345	2.3237
Indiana	92	0.0692	0.0402	0.0415	1.7233
Iowa	99	0.0529	0.0257	0.0258	2.0609
Kansas	105	0.1090	0.0465	0.0454	2.3448
Kentucky	120	0.4015	0.1192	0.1177	3.3690
Louisiana	64	0.1087	0.0480	0.0458	2.2655
Maine	16	0.0296	0.0110	0.0117	2.6782
Maryland	24	0.0863	0.0304	0.0320	2.8440
Massachusetts	14	0.0460	0.0561	0.0728	0.8199
Michigan	83	0.0634	0.0364	0.0396	1.7414
Minnesota	87	0.0730	0.0336	0.0431	2.1722
Mississippi	82	0.3335	0.1451	0.1437	2.2992
Missouri	115	0.1828	0.1015	0.1310	1.8017
Montana	56	0.1236	0.0906	0.0976	1.3638
Nebraska	93	0.0616	0.0377	0.0345	1.6343
Nevada	17	0.0209	0.0067	0.0061	3.1046
New Hampshire	10	0.0121	0.0086	0.0066	1.3995
New Jersey	21	0.0388	0.0207	0.0180	1.8685
New Mexico	33	0.0904	0.0285	0.0458	3.1733
New York	62	0.0702	0.0466	0.0556	1.5057

Name	*# of counties*	*Own-source*	*+ State Grants*	*+ Federal Grants*	*Own Source / After state*
North Carolina	100	0.3302	0.1169	0.1145	2.8244
North Dakota	53	0.0693	0.0311	0.0365	2.2305
Ohio	88	0.0890	0.0360	0.0418	2.4723
Oklahoma	77	0.1340	0.0448	0.0449	2.9952
Oregon	36	0.1291	0.0517	0.0575	2.4982
Pennsylvania	67	0.0791	0.0717	0.0980	1.1028
Rhode Island	46	0.0185	0.0032	0.0017	5.8097
South Carolina	46	0.2135	0.0825	0.0811	2.5870
South Dakota	66	0.0839	0.0382	0.0328	2.1968
Tennessee	95	0.2847	0.1276	0.1293	2.2315
Texas	254	0.1012	0.0398	0.0399	2.5448
Utah	29	0.0810	0.0369	0.0354	2.1969
Vermont	14	0.0308	0.0033	0.0037	9.4169
Virginia	142	0.2311	0.1140	0.1232	2.0271
Washington	39	0.1134	0.0445	0.0461	2.5476
West Virginia	55	0.2051	0.0592	0.0577	3.4639
Wisconsin	72	0.0310	0.0146	0.0186	2.1165
Wyoming	23	0.2265	0.0647	0.0618	3.5006
Mean	64	0.1680	0.0742	0.0750	2.8859
Median	63	0.0869	0.0418	0.0449	2.3115
Coefficient of Variation	0.72	2.2174	2.3040	2.0957	0.9111

Name	*# of counties*	*Own-source*	*+ State Grants*	*+ Federal Grants*	*Own Source / After state*
Minimum	3	0.0072	0.0014	0.0005	0.2926
Maximum	245	2.6673	1.2307	1.1299	18.5024

Source: Authors' calculation based on data from the Census of Government.

Second, comparing the inequality measures before and after "equalization" (effected through state grants) for individual states shows a dramatic decrease in local fiscal disparities in some states while almost no equalization results are achieved in others. We can measure the extent of equalization undertaken by state governments by using the ratio of the inequality measures before and after allocation of the state grants. Some interesting results follow. Hawaii and Massachusetts appear to counter-equalize as, after the allocation of the state grants, the coefficient of variation increases compared to the value for own-source revenues. At the same time, Delaware appears to over-equalize as the coefficient of variation drops by more than a factor of four after the allocation of state grants. It should be noted that all three states, Hawaii, Massachusetts and Delaware, have a below average inequality in own-source revenues so that the opposite approaches to equalization they follow do not seem to stem from differences in inequalities that the states have to address. This leads us to our next question.

Why does the extent of equalization vary across the states?

Since the extent of within-state equalization varies significantly, we ask in this section what may help explain these differences. With that purpose we look at the role that state characteristics capturing political, economic, demographic, and geographic differences may play. As we argued above, state governments pretty much determine the ultimate fiscal outcomes in individual localities through the allocation of state grants. We are interested, therefore, in finding

out what set of state characteristics can potentially explain the differences in decisions made by state governments about allocation of grants that ultimately impact on the level of per capita resources local governments have access to.

First, initial inequality in own-source revenue can potentially determine both the need for and political feasibility of an equalization policy; thus that is our first explanatory variable. A second variable that *a priori* may be expected to have an impact on disparities in local government revenues is the relative level of devolution of fiscal responsibilities within states. When local governments are assigned a *de facto* larger share of responsibility for sub-national public services, other things being equal, local fiscal outcomes have a greater impact on the well-being of the local population, which in turn prompts more equalization by the state government. Thus, we use the local government's share in the state-local expenditures to account for varying concern of state governments with local fiscal outcomes. Third, we use the local government's share in the state-local tax collections to account for state government leaning toward financing local governments through giving them larger taxation powers as opposed to financing them with grants. The decentralization of taxing powers strips the state government of resources to perform intra-state equalization and thus may lead to lower levels of achieved equalization.

Fourth, an important potential determinant of the extent of intra-state equalization is the relative dependence of the state government on federal transfers, which on average is about 30 percent of state revenues or 20 percent of state-local revenues. As local governments account for a considerable portion of the state-local expenditures (almost forty percent), a share of federal grants is likely to be passed on to the local level and thus dilute disparities in own-source revenue of local governments.

Fifth, we employ the level of personal income to approximate the elasticity of local tax instruments with respect to the level of economic activity. In addition, the income level should capture the income elasticity of state redistribution policies. We also include the median household income, which when controlling for the mean personal income, should capture the extent of income inequality. On the one hand, by contributing to the population heterogeneity, income inequality can be associated with less public support for redistributive programs, including inter-county equalization. On the other hand, under majority rule, falling median income relative to the mean income, can lead to more redistribution due to a smaller tax price to the representative voter (Corcoran and Evans 2010).

We also make an attempt to take into account the role of politics at the state level. We use the following variable which attempt to capture various political angles: political and racial fractionalization,[14] urban homogeneity,[15] and the percent of adults with a college degree. Population heterogeneity is commonly found to be inversely related to the level of redistribution (Corcoran and Evans 2010). We measure fractionalization as a probability that two randomly selected residents of the same state belong to different groups. The demographic data derive from the U.S. Census Bureau.[16] Our political fractionalization variable is constructed from

[14] The index of racial fractionalization is calculated using the formula: $1-\sum p_i^2$, where p is equal to the percent of the given racial group (white, black, Asian, and other) in the total. A fractionalization measure equal to zero means the state is completely homogeneous.

[15] Urban homogeneity is calculated using the formula: $4*(p-0.5)^2$, where p is equal to the percent of urban population in the total. A homogeneity measure equal to one means the state is completely urban or completely rural.

[16] Data on population and households derive from decennial censi of population produced by the U.S. Census Bureau. For inter-census years, the average of the two adjacent censi is used.

Gallup data. [17]. Finally, because education accounts for almost forty percent of local expenditures in the USA, we include a dummy variable for a court-ordered reform of education finance.[18]

Preliminary empirical results

As a first approach, we employ these variables in an attempt to explain intra-state equalization in 1992–2002 for a sample of 46 contiguous states, excluding Delaware and Maine as outliers in terms of the extent of equalization, observed over three censi of government. Descriptive statistics for our explanatory variables are reported in Appendix II.

The estimates for the impact of the potential determinants on I_0 and I_2 measures of equalization are reported in Tables 4 and 5 respectively. The equalization policy for each state is modeled with cross-sectional and panel-data regressions, seeking to identify the determinants of equalization undertaken by different states. Many of the conjectured determinants of equalization turned out to be of little statistical significance and thus were omitted from the final regressions without substantial impact on the fit of the model or the estimates of the impact of remaining variables.

[17] While there are currently no official government statistics on party identification in the United States, Gallup has been consistently surveying this characteristic as part of their regular polls of households. However, because this question is usually situated at the end of the survey instrument, responses can be affected by the substantive policy questions polled in that specific survey. Secondly, while the sample of about one thousand households can be representative for the country as a whole, for some smaller states it can include only a few observations. These issues are somewhat ameliorated by averaging across all households polled in the course of the year in each state.

[18] Data on state supreme court rulings on constitutionality of school finance systems are updated from Murray et al. (1998).

As can be seen from the first three columns of Tables 4 and 5, for both measures of equalization as the dependent variable, the results from the cross-sectional estimation are qualitatively similar across the three time periods. This allows us to pool the observations from the three censi of governments and perform a panel-data analysis. The fourth column of Tables 4 and 5, reports the results of the "between estimation," which essentially takes the mean of each variable for each state across time and runs a regression on the collapsed dataset of means. These results are consistent with those obtained for individual time periods.

Table 4. Regression of the within-state equalization (I_0)

	1992 OLS	1997 OLS	2002 OLS	Between estimation	Fixed effects estimation
	(1)	(2)	(3)	(4)	(5)
Political fractionalization	-14.763	-16.054**	-18.187**	-24.003***	4.107
	(8.938)	(6.855)	(7.209)	(6.427)	(4.889)
Republican-Democrat gap	0.017	-0.007	0.023	0.014	0.020
	(0.020)	(0.016)	(0.016)	(0.015)	(0.011)
Court-ordered reform	0.825	0.378	0.463*	0.431	1.290***
	(0.512)	(0.299)	(0.265)	(0.298)	(0.366)
Revenue decentralization	-10.603***	-11.367**	-15.089***	-14.033***	-11.151***
	(3.818)	(4.380)	(3.726)	(3.406)	(3.327)
Expenditure decentralization	1.389	-3.762	4.587	1.114	7.917
	(4.474)	(3.752)	(3.818)	(3.117)	(5.012)
Per capita income	0.440*	0.453***	0.488**	0.534***	-1.225***
	(0.253)	(0.143)	(0.190)	(0.174)	(0.417)
Median	-0.178*	-0.168**	-0.222**	-0.193**	0.294***

household income	(0.098)	(0.081)	(0.096)	(0.077)	(0.156)
Urbanization	-23.796*	-16.405*	-42.469**	-26.350***	-22.394
	(12.395)	(9.520)	(17.771)	(7.792)	(15.979)
Urbanization squared	14.975	13.990**	31.506**	19.134***	17.687
	(9.341)	(6.882)	(12.031)	(5.721)	(13.215)
Population with a Bachelor's degree or higher (%)	0.106	0.016	0.052	0.050	0.573
	(0.069)	(0.082)	(0.093)	(0.056)	(0.238)
Constant	20.911*	20.673***	28.568***	27.029***	6.680
	(5.958)	(3.982)	(7.227)	(3.964)	(7.863)
R-squared	0.54	0.59	0.68	0.71	0.37

Note: Robust standard errors are provided in parentheses: * statistically significant at 10 percent; ** statistically significant at 5 percent; *** statistically significant at 1 percent.

Table 5. Regression of the within-state equalization (I_2)

	1992 OLS	1997 OLS	2002 OLS	Between estimation	Fixed effects estimation
	(1)	(2)	(3)	(4)	(5)
Political fractionalization	-10.573	-12.767*	-15.315**	-19.311***	3.994
	(6.724)	(5.783)	(6.071)	(5.200))	(3.813)
Republican-Democrat gap	0.012	0.0001	0.016	0.013	0.013
	(0.017)	(0.012)	(0.014)	(0.012)	(0.008)
Court-ordered reform	0.738*	0.422*	0.480**	0.500**	0.796***
	(0.408)	(0.247)	(0.229)	(0.241)	(0.286)

Revenue decentralization	-9.070***	-9.661***	-11.907***	-11.629***	-8.601***
	(2.935)	(3.113)	(3.093)	(2.755)	(2.595)
Expenditure decentralization	2.340	-2.527	3.250	1.337	7.325*
	(3.266)	(3.428)	(3.248)	(2.521)	(3.909)
Per capita income	0.239	0.307***	0.351**	0.362**	-0.701**
	(0.210)	(0.113)	(0.165)	(0.141)	(0.325)
Median household income	-0.107	-0.097	-0.168*	-0.130**	0.121
	(0.085)	(0.058)	(0.088)	(0.062)	(0.121)
Urbanization	-18.433*	-14.448*	-31.631**	-20.224***	-23.939*
	(10.266)	(7.628)	(12.339)	(6.304)	(12.462)
Urbanization squared	11.302	11.936**	24.017***	14.728***	17.997*
	(7.683)	(5.593)	(8.453)	(4.629)	(10.306)
Population with a Bachelor's degree or higher (%)	0.119**	0.005	0.061	0.057	0.382**
	(0.057)	(0.057)	(0.065)	(0.046)	(0.186)
Constant	15.749***	17.143***	22.678***	21.507***	7.685
	(4.672)	(3.120)	(5.214)	(3.207)	(6.132)
R-squared	0.54	0.63	0.68	0.71	0.36

Note: Robust standard errors are provided in parentheses: * statistically significant at 10 percent; ** statistically significant at 5 percent; *** statistically significant at 1 percent.

Variables capturing socio-political cleavages (political fractionalization, urban/rural heterogeneity) have inverse association with the extent of intra-state equalization.[19] However,

[19] The quadratic specification for urbanization implies that equalization is increasing with urbanization after the share of urban population has exceeded sixty percent.

lower median income relative to the mean income is associated with more equalization, which is consistent with the hypothesis of a smaller tax price to the representative voter. In addition, the dummy indicating a court-ordered reform of education finance has a positive association with intra-state equalization, which has higher statistical significance for the equalization in the upper tail (I_2). Also, states giving localities more revenue-raising powers seem to achieve less equalization.[20] The sign and statistical significance of the estimates are roughly the same for both measures of inequality (i.e. I_0 and I_2).

For both measures of equalization, the employed regressors explain more than 50 percent of cross-sectional variation. The highest explanatory power is shown by the level of personal income so that one standard deviation in that explanatory variable translates into one standard deviation in the extent of equalization. The second highest explanatory power is shown by revenue decentralization so that one standard deviation in that explanatory variable translates into 0.86 standard deviation in the extent of equalization. One standard deviation in political fractionalization and urbanization translates into about 0.40 standard deviation in the extent of equalization. Successful litigation of school finance translates into an increase in the extent of equalization by 0.45 standard deviation.

The last column of Tables 4 and 5 reports results of the estimation performed on the pooled sample after demeaning of all variables with the inclusion of state dummies as the so-called "fixed effects.[21]" The only determinants of equalization that have the same direction of impact in both cross-sectional and fixed-effects analyses are court-ordered reforms, revenue

[20] This is consistent with Martinez-Vazquez and Timofeev's (2008) findings for Russia, where regions allowing localities on average to retain more tax revenue at the point of collection achieve less equalization. At the same time, regions where local governments play a larger role in the provision of public services exert more equalization effort.

[21] We have also performed OLS regressions on the pooled sample of three time periods including dummy variables for the eight geographic regions as additional regressors. It produced estimates very similar to those for the between estimation. The positive and statistically significant estimates for the New England, South East and South West dummy variable suggest a higher extent of equalization in those regions compared to the default region comprised of Washington, Oregon, and California.

decentralization, and rural/urban heterogeneity. Also, the positive impacts of expenditure decentralization and the level of education become statistically significant in the fixed-effect estimation. By contrast to the cross-sectional estimation, fluctuations in equalization over time are negatively associated with fluctuations in real average personal income and positively associated with fluctuations in real median household income. For both measures of equalization, the employed regressors explain about a third of variation around state means, which in turn accounts for about twenty percent of the total variation in the pooled sample.

The difference in results between the cross-sectional and fixed-effects estimations can be due to two main reasons. First, the cross-sectional estimation cannot control for unobserved state-specific factors, which might lead to a spurious correlation between observed variables that are in fact driven by those lurking factors. Thus, the inverse association between equalization and political fractionalization, which disappears in the fixed-effect estimation, could be due to something unobserved about states, which makes them both to equalize and to polarize along the political dimension. The second challenge in examining changes over time is that measurement errors— inevitable as our indicators are imperfect proxies for socio-economic processes—may dominate the changes in slowly-evolving institutional variables. Under the fixed-effect estimation this measurement error problem often leads to econometric results that are "unsatisfactory, with 'too low' and insignificant coefficients" (Griliches and Hausman 1986, p. 93). A related problem with slowly-evolving variables is that past shocks fade out slowly over a number of subsequent periods, which may violate the assumption of independently distributed disturbances and may lead to misleading inferences due to autocorrelation of the disturbances.

In our future research, we intend to deal with both the measurement errors and autocorrelation of disturbances by using the instrumental variable estimation proposed within the

general method of moments (GMM), which allows for a large number of—as is often the case—weak instruments. An additional advantage of the use of instrumental variables is that it allows parameters to be estimated consistently even when some of our explanatory variables are endogenous.

Conclusion

Among the decentralized countries in the world, be federal or unitary system, the United States is an exception because of the on and off, mostly off, presence of explicit equalization grants from the national level. At the same time within the U.S. federal system, the state level has historically become a strong champion of equalization much in the same sense that is pursued in many other countries. In this paper we take a retrospective view to analyze the evolution of fiscal equalization in the U.S. at the local (county) level within states and between states.

Our empirical analysis documents significant developments in the extent of revenue disparities among U.S. counties and the equalizing effects of intergovernmental grants on these disparities over the last fifty years. Over this time span, there have been some ups and downs in the extent of inequality and equalization within and between states. However, the trend lines in Figure 6 suggest that, after filtering out the cyclical swings, the system of transfers appears to change little over the long term.

Thus, it is remarkable that the overall level of inequality in 2002 was only marginally lower than in 1962. For international comparison, the squared coefficient of variation for per capita local expenditures is less than one third of that in China (Tsui, 2005) and less than one tenth of that in Russia (Martinez-Vazquez and Timofeev 2008). However, the makeup of inequality in the United States has changed dramatically over these past decades with the bulk of

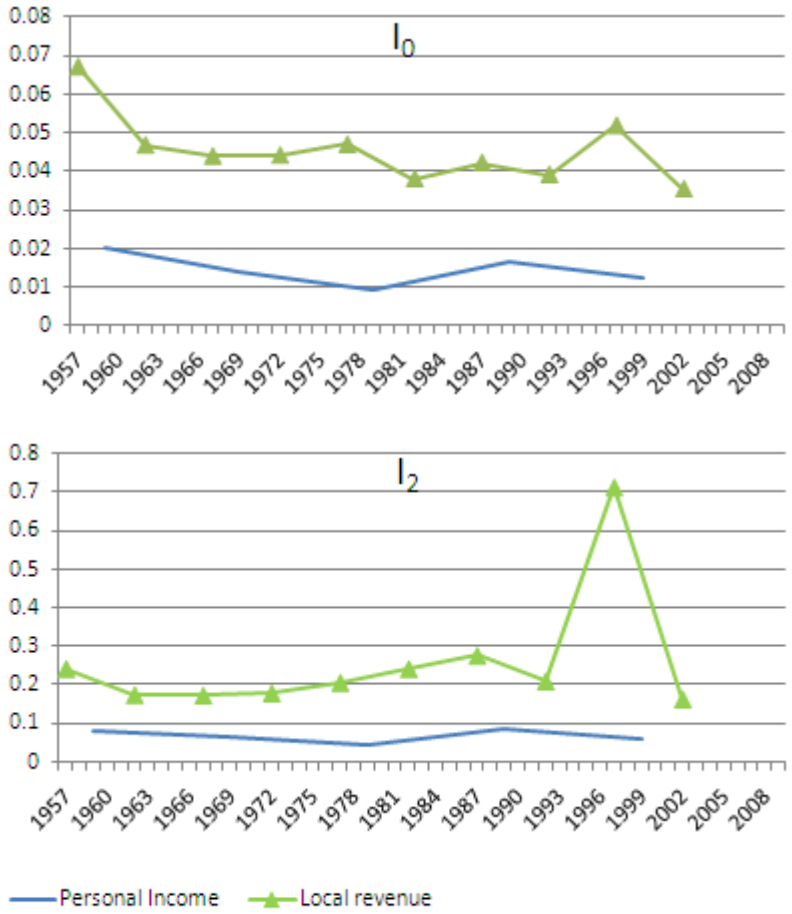
own-source inequality observed within states today as opposed to between states before 1982. Considerable reduction of the within-state disparities through intergovernmental transfers makes the unmitigated between-state disparities account for just over half (50.4 percent) of total inequality in 2002, which is still down from three quarters in 1952. This should be compared to 61 percent of inequality accounted for by the between-state disparities in China and 55 percent of inequality accounted for by the between-state disparities in Russia. At the same time between-state disparities account for 59 percent of inequality in own-source revenues in China and 49 percent in Russia compared to 32 percent in the United States.

To some extent these changes in the United States mirror the evolution of economic disparities across localities, for which the within-state inequalities became dominant in 1960s. However, fiscal policies play some role. Thus, geographic inequalities have always been higher for local government finances than for personal income (Figure 8).[22] Furthermore, it took twenty years for the rise in the share of within-state inequality in personal income to translate into a similar shift in the local finance disparities. This could have been due to the proliferation of federal grants in the 1970s.

Some interesting turns happened on the way. For example, the two-fold increase in federal grants between 1972 and 1977 was off-set by property tax revenues falling disproportionally in worse off counties. This resulted in growing inequality in own-source revenues both between and within states. However, when the federal grants were phased out by 1987, the worse-off states had to raise more revenues from own sources (from user fees and to a the reduction in between-state inequality was offset by an increase in within-state inequality during that period.

[22] This is consistent with the prior empirical finding that variation across school districts is larger for property wealth (the main local tax base) than for personal income (Corcoran and Evans 2010).

Figure 8. Evolution of the overall inequality in personal income and own-source revenue



Note: Our sample excludes Alaska and Hawaii in 1957 but include them thereafter

Source: Prepared by authors based on data from the Bureau of Census

lesser extent property taxes) to compensate for the loss of federal moneys. At the same time within each state, better-off counties were more successful in mobilizing own-source revenues. All in all, this led to an increase in within-state inequality accompanied by a decrease in between-state inequality. As a result, the present picture of inequality driven by within-state disparities is quite different from the one before 1982. It should be noted, that the federal grants, despite their multifold increase in 1972-1977, had virtually no impact on the overall inequality as

The differences in within-state equalization are also notable. While the aggregate measure of the within-state inequality is reduced by half due to state grants, we find a dramatic decrease in local fiscal disparities in some states (e.g. in New England states) while almost no equalization is achieved in others (e.g. in Pennsylvania). States showing more equalization are those with less socio-political fractionalization, higher income inequality, and less decentralization of revenue. Remarkably, the positive impact on equalization of court decisions overturning the state system of school financing carries to the total local finances. It should be noted that the median level of reduction in within-state inequity achieved with state grants is very similar to that found in Russia (Martinez-Vazquez and Timofeev 2008). However, because Russian regions start with ten times higher inequality in own-source revenues across constituent localities, the resulting inequality in local expenditures is also ten times higher than in the United States.

An important policy issue for the federal authorities is whether to rely on a hierarchical transfer scheme channeling resources to local budgets through state governments or on a bifurcated scheme by directly transferring federal resources to local governments. The hierarchical scheme has the potential advantage of utilizing the knowledge of state governments about local government circumstances but it requires alignment between state and federal policy objectives. Thus, for example, during the War on Poverty by President Johnston in the late 1960s, the federal administration created direct grants to cities in order to by-pass state legislatures dominated by politicians from rural areas, which were unresponsive to the urban poor (Lee et al., 2004). However, as our data show, these transfers actually coincided with increased within-state inequality. When designing its equalization policies—either in a bifurcated or hierarchical manner— the federal government needs to take into account the

possible offsetting effects of policies implemented by state governments and possibly embed incentive mechanisms for aligning the preferences of the state governments with the federal equalization objectives.

The importance of state-local relations for the success or failure of national equalization policies has been identified in the literature but it remains relatively little studied and understood (Bahl and Wallace, 2003). The analytical framework proposed in the paper could become a useful tool for different types of policy analysis at the federal and state levels. For example, the quantification of fiscal equity aspects is likely to feature prominently in the policy debate on sharing revenues from a nation-wide consumption tax that is being proposed as a response to increasing role of inter-state e-commerce and other fiscal pressures facing the federal and state governments.

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Appendix I
Decomposing the aggregate inequality by factor components and subgroups

In mathematical terms, the total variation computed for the entire sample comprises the sum of the squared deviations of a locality level variable y_i from the grand mean $\bar{y}$ of this variable:

$$\sum_i \sum_j n_{ij} \left(y_{ij} - \bar{y} \right)^2 .$$

This total sum can be rearranged into two components:

$$\sum_i n_i \left(\bar{y}_i - \bar{y} \right)^2 + \sum_i \sum_j n_{ij} \left(y_{ij} - \bar{y}_i \right)^2$$

Here, n_i and n_{ij} denote population of region *i* and locality *j* in that region respectively, $\bar{y}_i$ stands for region *i's* mean value of variable y_{ij}. Further, if we divide this expression by ($\Sigma n_i - 1$), we get the total variance, which is again a sum of two components. The first component, called "between-group variance," characterizes the average dispersion of regional means from the grand mean. The second, component, called "within-group variance," characterizes the average dispersion of data points from the corresponding regional means. Note that the "between-group variance" weights regions in proportion to their population, unlike the variance computed over the sample of regional means equally weighing all regions. To make this measure mean independent, we can divide the variance by the square mean $\bar{y}^2$ and thus obtain the square coefficient of variation $I_2 = I_2^b + I_2^w$, which is a sum of its between-region and within region components.

In a similar manner we can decompose the mean log deviation $I_0 = I_0^b + I_0^w$:

$$\sum_i \sum_j n_{ij} \left(\ln \bar{y} - \ln y_{ij} \right) = \sum_i n_i \left(\ln \bar{y} - \ln \bar{y}_i \right) + \sum_i \sum_j n_{ij} \left(\ln \bar{y}_i - \ln y_{ij} \right).$$

In addition, all general entropy measures, including I_0 and I_2, are also amenable to decomposition by various components of our variable of interest y_{ij}. Thus, if $y_{ij}=\Sigma y^k_{ij}$, than we can express $I_c = \sum_k s_k I_c$,

where $s_k = \frac{COV(y^k, y)}{VAR(y)}$.

Note that

$$s_k = \frac{COV(y^k, y)}{VAR(y)} = CORR(y^k, y)\sqrt{\frac{VAR(y^k)}{VAR(y)}} = CORR(y^k, y)\sqrt{\frac{I_2(y^k)}{I_2(y)}}\frac{E(y^k)}{E(y)}.$$

Therefore, the contribution of a revenue component to the total inequality is above its share in the total revenue, that is $s_k > E(y^k)/E(y)$, if it is more unequally distributed than the total revenue, that is $I_2(y^k) > I_2(y)$. On the other hand the contribution of a revenue component is below its respective share in the total revenue, $s_k < E(y^k)/E(y)$, when it is either weakly correlated with the total revenue or it is more evenly distributed than the total revenue, that is $I_2(y^k) < I_2(y)$.

Moreover, the relative contribution of each component of ***y*** can be further broken down into a between-region subcomponent and a within-region subcomponent: $s_k = s_k^b + s_k^w$, where

$s_k^b = \frac{COV(\bar{y}_i^k, y)}{VAR(y)}$, $s_k^w = \frac{E[(y^k - \bar{y}_i^k)(y - \bar{y})]}{VAR(y)}$, and

$\bar{y}_i^k$ stands for region *i's* mean value of variable y^k_{ij}.

Appendix II Summary statistics for the 1992-2002 variables

Variable		Mean	Std. Dev.	Min	Max	Observations
Within-state equalization (I_2)	overall	2.626	1.227	0.395	8.449	144
	between		1.113	0.400	6.512	48
	within		0.533	-0.062	4.562	3
Political fractionalization	overall	0.583	0.026	0.499	0.639	138
	between		0.022	0.531	0.627	46
	within		0.014	0.543	0.648	3
Republican-Democrat gap, %	overall	-3.136	13.258	-30.000	42.100	138
	between		10.991	-23.500	23.433	46
	within		7.532	-26.869	20.531	3
Court-ordered reform	overall	0.361	0.482	0.000	1.000	144
	between		0.434	0.000	1.000	48
	within		0.216	-0.306	1.028	3
Revenue decentralization, share	overall	0.410	0.077	0.185	0.561	144
	between		0.074	0.211	0.548	48
	within		0.022	0.314	0.483	3
Expenditure decentralization,	overall	0.527	0.093	0.208	0.705	144
	between		0.092	0.213	0.693	48

Variable		Mean	Std. Dev.	Min	Max	Observations
share	within		0.016	0.468	0.577	3
Per capita income, US$ thousand	overall	19.213	3.205	12.522	28.766	144
	between		2.952	14.188	27.485	48
	within		1.297	16.807	21.620	3
			0.000	0.000	0.000	
Median household, US$ thousand income	overall	39.589	6.947	26.270	55.146	144
	between		6.795	28.413	54.271	48
	within		1.654	35.649	43.530	3
Urbanization, share	overall	0.704	0.144	0.322	0.944	144
	between		0.144	0.352	0.935	48
	within		0.020	0.654	0.753	3
Urbanization squared, share squred	overall	0.516	0.199	0.104	0.892	144
	between		0.198	0.124	0.875	48
	within		0.027	0.444	0.589	3
Population with a Bachelor's degree or higher, %	overall	21.754	4.383	12.300	33.190	144
	between		4.072	13.565	30.195	48
	within		1.693	18.759	24.749	3