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INEQUITY IN AMERICAN SCHOOLS: A NEW PERSPECTIVE ON THE DISTRIBUTIONAL EFFECTS OF SCHOOL EXPENDITURES ON ECONOMIC WELL-BEING

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This article explores how inequities in public K-12 school spending impact the distribution of economic well-being across American households with public school students in 1989 and 2000. Adapting concepts from the public finance literature, I explore the impact of school spending on the *vertical* and *horizontal equity* and its impact relative to other types of public spending on social programs and taxation. Conventionally, vertical equity refers to the size of the income gaps between households. Horizontal equity refers to the ranking of households along the income distribution with any change in ranks producing horizontal inequity. My main findings show that school spending, when converted into a component of income, served to reduce extended-income inequality through improvements in vertical equity without the discriminatory implications of exacerbating horizontal inequity across households. Additionally, this impact was at least as large as that of spending on other social programs. This finding bolsters standard arguments for equity and progressivity of school finance across students.

JEL Codes: H23, H52, I22

Keywords: education expenditures, education finance, redistributive effects

1. INTRODUCTION

The belief that every citizen deserves a fair and equal opportunity to a quality education runs deep in the American psyche. However, gaps in the provisioning of public K-12 schooling across the nation as well as a growing body of research on how pervasive inequity impacts student learning opportunities, have called this core part of our national identity into question. For decades education researchers have taken a strong interest in such inequities for the purpose of understanding links between financial "inputs" and student performance (Coleman *et al*., 1966; Wolfe and Summers, 1977; Hanushek, 1986, 1998; Card and Krueger, 1992; Greenwald *et al*., 1996; Bowles and Gintis, 2002; Kozol, 2005). This article takes a different approach to the subject of inequity and school spending by looking at what disparities in school spending mean in the very homes and neighborhoods where students live. More directly, how do school funding decisions in local public schools impact the economic well-being of individual households? And, how do these school-spending patterns exacerbate or ameliorate the problem of income equity across households?

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I begin to explore these questions by looking at how school spending, when incorporated into an income measure, interacts with other components of household income to affect the distribution of economic well-being across households with students. School spending in this construct is considered as a type of government social expenditure that expands the consumption possibilities of households with children attending public schools. Like other types of social expenditures, such as Temporary Assistance for Needy Children (TANF) and the Earned Income Tax Credit (EITC), school spending has a likely effect on the distribution of income across American households.

In addition to exploring how school spending impacts overall inequality of economic well-being, I also look at the impact of selected income components on inequality. Using a decomposition of the Gini coefficient, I show contributions to overall inequality made by horizontal and vertical equity. The concepts of vertical and horizontal equity have been explored for decades in the public finance literature, beginning with Musgrave (1959). (For more recent research, see, for example, Plotnick, 1981; Lerman and Yitzhaki, 1995; Lambert, 2001.)

Horizontal equity (HE) refers to the equal treatment of equally situated households, or households characterized by the same initial level of welfare. In practice, HE is generally measured in terms of how government policy impacts the ranking of households across the income distribution.[1] A tax or transfer policy, in this construct, maintains HE if it does not reverse the pre-policy ranking of households. Vertical equity (VE), on the other hand, refers to the appropriately unequal treatment of unequal households. Public finance economists studying VE generally focus on the gaps in income between households. A policy promotes VE if it reduces income gaps between households. In this view, progressive taxation would improve VE since taxes increase proportionately with the level of income. The result of this increasing proportion is a reduction in after-tax income gaps. In a similar vein, a government transfer that provides income support only to individuals below the poverty line will also promote VE across the population.

Much of the existing public finance literature explores similar questions related to how government policy affects income distribution through taxation and transfer spending (see, for example, Lerman and Yitzhaki, 1985, 1995; Lerman and Lerman, 1989; Karoly, 1994). To cite an example, Lerman and Yitzhaki (1995) consider the redistributive effects of major sources of disposable income in terms of their impacts on vertical and horizontal equity. They found that changes in vertical equity—measured by the narrowing of family income gaps—accounted for more than two-thirds of the total impact of taxes and transfers on income inequality in 1991. Changes in horizontal equity—measured by the reranking of individuals along the family income distribution—contributed the remaining share.

A second strand of literature goes beyond taxes and government transfers—including wages and salaries, property income, cash and non-cash transfers—to explore the effects of less-conventional income components, such as the value of

[1]The validity of defining HE in terms of rank reversals has been a subject of debate in the literature (Gordon, 1972; Atkinson, 1981; Musgrave, 1990; LeGrand, 1982; Lerman and Yitzhaki, 1995; Auerbach and Hasset, 2002).

public consumption spending, education included—and household production on economic inequality (see, for example, Gillespie, 1965; Ruggles and O'Higgins, 1981; Wolff and Zacharias, 2007). Wolff and Zacharias (2007), for example, find that total education spending (i.e., elementary, secondary, and higher) has a significant inequality-reducing impact on income and that the majority of this reduction can be seen in changes in vertical inequity across households.

These studies however have not adequately addressed the specific impact of public K-12 school spending on the distribution of economic well-being across households. Where school spending is incorporated in the research, it generally has been examined in conjunction with other components of government spending, such as higher education (as in Wolff and Zacharias, 2007) and/or highway spending. In such cases, the individual impact of K-12 school spending on income distribution cannot be isolated from that of other types of government spending. As such, it is difficult for policymakers to interpret its individual impact.

Additionally, measures of the income value of school spending employed in previous studies have not accounted for intrastate disparities in spending. Typically, extended income measures incorporate school spending by assigning to each student the state-wide average expenditure in the state of their residence.[2] However, district-level differences in school expenditures within a given state are indeed significant and thus important to account for. Corcoran *et al*. (2004), for example, found that intra-state difference in spending accounts for over 30 percent of the disparity in school spending across districts. In the research presented in this article, I use the new estimates of school spending, which account for intra-state spending inequalities.

In addition to looking at the impact of school spending on horizontal and vertical equity in the income distribution, I examine the relative impacts of taxes, transfers, and school spending on income inequality across households with students. This evaluation enables better contextualization for the redistributive effect of school spending by providing comparative estimates with other major instruments of redistribution, such as federal individual income taxes and public assistance payments. The resulting information can provide important insights into the relative impact of public school spending as a policy tool for fighting income inequality among households with children in the United States. Finally, I also estimate the incremental effect of each component on income inequality, that is, the impact on inequality of an incremental, proportionate increase in household income from each component.

The full analysis is conducted for 1989 and 2000—years marking the peak of two economic expansions in the U.S. This period also saw key changes to public assistance, the EITC, and school finance policy—three programs that strongly impact households with children and thus their economic well-being. Changes to

[2]Per student expenditures by district are available. Ideally, they would be matched to students and households living in those school districts. This task is tricky because there is no publicly available nationally representative household-level dataset with information on school district. Ideally, I would match expenditures with the Census Bureau's Annual Demographic Survey (ADS) since this is the household survey used in the official estimates of household income. However, the publicly available ADS has no information on school district. Alternatively, it may be possible to devise some method of distributing per pupil expenditures to districts by county. However, this method is also problematic since 60 percent of household records are missing information on county in 2000.

the welfare system with the introduction of TANF tightened eligibility and work requirements and limited federal funding for the program with the imposition of fixed block grants to state. These changes coupled with the growing strength of the labor market decreased welfare numbers and the average size of benefits over the period (Blank, 2002). The EITC, on the other hand, is a refundable tax credit available to low-income families with children since 1975. The 1993 doubling of the credit under the Clinton Administration complemented the implementation of TANF by further encouraging work among low-income workers. By 1996, the EITC exceeded total government spending on TANF (Holt, 2006).

School finance reform, on the other hand, sought to equalize spending across school districts. The 1971 ruling of Serano v. Priest in California established spending equalization as a relevant policy variable or school finance reform cases across the United States. The prevailing school finance regime in California, as in most states, relied heavily on the local property tax base. The plaintiffs in the case successfully argued that this type of system was innately discriminatory and that equal protection under the California constitution required a prohibition on providing public school resources based on the location and community status. By 1999, courts in 19 states overturned their school finance systems by ruling for wealth neutrality of funding across districts (Corcoran *et al*., 2004, p. 23). Legislative responses to the court rulings varied by state but generally involved both caps on property taxes and revenue-equalizing funding grants from state governments.

Economists have shown that the movement toward equal funding across school districts was achieved by boosting spending in lower-spending districts. The result was an increase in total spending over the period (Murray *et al*., 1998). These policy changes regarding government transfers and school finance will impact relative and absolute contributions of government transfers and school spending to extended income and, as such, the distribution of economic well-being across households over the period.

The rest of the article is structured as follows. In Section 2, I describe the rationale and construction of the income concept employed in the subsequent sections. In Section 3, I present and analyze the results emphasizing how school spending relates to other income sources among households with students. I also estimate and analyze the incremental effects of various instruments of redistributive policy in this section. I review the main findings for this article in Section 4.

2. Income Definition

Table 1 shows the derivation of the income concepts used in my research. All variables, with the exception of school spending per student, are available in public-use data files of the Current Population Survey's Annual demographic supplement (ADS) developed by the U.S. Bureau of the Census. I will describe briefly the approach used for placing value on school spending. The full strategy for estimating school spending per student is described in detail in the data appendix.

The first measure in Table 1 is money income (MI), which has served as the standard yardstick for measuring a household's command over goods and

TABLE 1

Derivation of Extended Income

Money income (MI)
Less: Government cash transfers
Plus: Employer contribution for health insurance
Plus: Income from wealth
Realized capital gains (losses)
Imputed return on home equity
Equals:
Pre-fiscal income (PI)
Less: Taxes
Income taxes
Payroll taxes
Property taxes
Plus: Cash transfers[a]
Plus: Non-cash transfers[b]
Equals:
Disposable income (DI)
Plus: School spending per student
Equals:
Extended income (EI)

Notes: [a]Includes Social Security, unemployment compensation, workers' compensation, Veteran's payments, railroad retirement, education assistance, supplemental security income, public assistance, and the Earned Income Tax Credit (EITC).

[b]Includes Medicare, Medicaid, school lunches, food stamps, housing subsidies, and energy assistance. The U.S. Census Bureau follows a variety of methods for attaching an income value to non-cash transfers. The two largest components here—Medicare and Medicaid—are valued using the fungible value approach. It is a function of a household's income and mean expenditure in a particular risk class (such as children, elderly, or disabled). This is explained fully in the body of the text. The income value of food stamps is equal to their face value in the ADS. The income value of the school lunch program was calculated by determining the annual subsidy received by each child depending on whether they paid the entire amount of the subsidized price, reduced price, or nothing. Information on the amount of subsidy per meal was obtained from the USDA. Since the ADS does itself does not collect much information on housing itself, data are taken from the American Housing Survey, which collects information on actual rents and characteristics of dwellings. The actual value of the housing subsidy is calculated as the difference between the rent paid by families in subsidized housing and the potential rent that would have been paid in the absence of the subsidy. The potential rent of a subsidized unit is estimated using the coefficients of a statistical model (hedonic regression) that relates actual rent (inclusive of utilities) paid by tenants in no subsidized two-bedroom housing units to certain housing characteristics, such as the number of bedrooms, appliances etc.

Source: U.S. Bureau of the Census (1993).

services. MI has several shortcomings for adequately gauging household economic well-being, most notably failing to measure the impact of taxes and non-cash transfers (including school spending) on household income. An income measure that accounts for the latter allows a fuller examination of the impact of redistributive policies on economic inequality.

To arrive at such a measure, I first eliminate government cash transfers from MI, which will reduce the household's economic status. These components are subtracted to arrive at a "pre-government" measure of income. I also add realized capital gains (losses) and imputed return on home equity, which increase economic status of households by accounting for the resources available to these households through these components. The result is "pre-fiscal income" (PI), a measure of the household's command of resources before the intervention of government through taxes and spending.[3]

Next, I reduce income by subtracting taxes and expand it by adding cash transfers and imputed values of government non-cash transfers. The result is disposable income (DI)—the most detailed income measure developed by the Census Bureau in response to several critiques of MI (U.S. Bureau of the Census, 1993, p. xiii). MI, as described in Table 1, has several shortcomings for adequately gauging household economic well-being, most notably failing to measure the impact of taxes and non-cash transfers on household income. An income measure that accounts for the latter allows a fuller examination of the impact of redistributive policies on economic inequality. As such, rather than comparing MI and DI, my study compares PI and DI. This methodology allows me to better describe the impact of total taxes and transfers on the distribution of income since PI provides a useful pre-government benchmark. MI, on the other hand, includes cash transfers, which complicates the analysis.

The final definition of income derived in Table 1 adds school spending to DI. I call this measure extended income (EI). School spending logically increases the consumption possibilities of households with children in public schools. The amount of school spending per household differs based on certain factors, such as location, school-district wealth, and household size.

Determining spending among students (and thus households) requires information from government budgets on the amounts spent in a particular school year in addition to information about the students for whom the costs are incurred. The pattern of spending differs across students based on their location in particular districts. Since neither district of residence nor students are identified in the ADS, I have devised a method for identifying students in the microdata and distributing school spending among them based on a detailed set of their demographic characteristic.

The amount of school spending is constructed in three steps:

(1) District-level per pupil expenditures in each state are estimated from administrative data on expenditures and demographic characteristics using regression analysis.[4]
(2) Estimates of per pupil expenditure for specified school-districts types or synthetic districts (to be described below) are computed from the regression results.

[3]Pre-fiscal income is an accounting construct. The government can impact the distribution of income through other methods, such as monetary policy and affirmative action legislation.

[4]School expenditures and enrollments by district are from the 1989–90 Education Finance Survey and 1999–2000 Public Elementary and Secondary Education Finance Data. Demographic information by district is from two data sources: Census Special School District Tabulation (1990 and 2000) and the Common Core of Data Local Education Agency Universe Survey (1990 and 2001).

(3) Students are identified in the ADS and assigned to the synthetic school districts (and are thus allocated a certain amount of per pupil expenditure) according to their demographic characteristics, and the values are summed across households.

Each of the three steps is described in detail in the data appendix.

EI provides a broader look at the impact of government policy on household economic well-being by including school spending in addition to net government transfers (transfers less taxes). It also allows us to look at the relative impacts of these three policy instruments of government on the distribution of economic well-being across households.

Additionally, EI brings us closer than DI to the comprehensive definition of income recommended by the Canberra Group's Expert Group on Household Income Statistics (Canberra Group, 2001). The Canberra Group suggests including additional social transfers in kind or public spending—such as public education—and income values for household production of goods. Attempts at a more extensive measurement of income like that recommended by the Canberra Group have been made by Smeeding and Weinberg (2001) and Wolff and Zacharias (2003).

Economists have frequently used the government-cost approach to valuing and distributing non-cash transfers and government spending in their analysis of economic welfare (see, for example, Ruggles and Higgins, 1981; Shaikh and Tonak, 1987; Wolff and Zacharias, 2007). Following this approach, I assume that the total income value of school spending is equivalent to the total cost to government of providing schooling for students and, moreover, that these expenditures are incurred on behalf of students in public schools.

Alternative assumptions for valuing benefits are plausible since it can be argued, for example, that school spending benefits not only students, but also the wider community and economy. Bowles and Gintis (1976), for example, argue that public spending on schooling also benefits business owners because it helps produce a literate and compliant workforce. Using this analysis, one could allocate a portion of school spending to business owners in accordance to how much they benefit from this given spending. Additionally, there is a human capital argument for differentiating spending among students since some may benefit more in terms of future earnings from school spending then others (see, for example, Peppard, 1976; Wolff *et al*., 2004).[5]

Wolff *et al*. (2004), for example, look at the effect of two alternative assumptions on the distribution of school spending across households. First, they split spending between all students and households that receive most of their income from "capitalist" activities, i.e. property sources or non-farm self-employment. The distribution of spending across the latter group is further refined so that households with more capitalist income get more in spending. Second, spending is differentiated between students expected to graduate from high school and those who are not. The former get a larger share since they arguably benefit more from

[5]A general equilibrium approach to allocating public consumption spending is also not conducted in this analysis.

school spending as a result of higher expected future earnings. They find that school spending at the top and bottom of the income distribution changes significantly under the new assumptions. Additionally, the positive relationship between school spending and income is less pronounced under the new assumptions except at the highest end. This is due to the concentration of capitalist income in the higher deciles.

3. Results

3.1. *Size and Composition of Government Expenditures and Taxes*

Table 2 shows the average values of government spending in 1989 and 2000 for households with students in public schools. Government expenditure is defined as the sum of transfers and school spending. This measure allows us to consider jointly the relative size of transfers and school spending and their impact on extended income at the average.

Total transfers are split into three groups. Social insurance includes Social Security, Medicare, unemployment compensation, Veteran's payments, railroad retirement, and workers' compensation. Cash assistance includes cash public assistance, education assistance, and Supplementary Security Income (SSI). Non-cash assistance includes the EITC, Medicaid, Food Stamps, school lunches, energy assistance, and housing subsidies.

School spending is by far the largest component of government spending, contributing over 75 percent in both years. Transfers, by definition, account for the

TABLE 2

Taxes and Government Expenditures, 1989 and 2000 (households with students)

	Mean (2000$)			Shares (in percent)		
	1989	2000	Change	1989	2000	Change
Taxes	12,536	15,910	26.9%	100	100	0
Income tax	8,091	10,654	31.7%	65	67	2
Payroll tax	3,478	4,102	17.9%	28	26	–2
Property tax	967	1,154	19.4%	8	7	0
Government expenditures	14,376	16,800	16.9%	100	100	0
Transfers	3,306	3,576	8.2%	23	21	–2
Social insurance	1,383	1,585	14.5%	10	9	0
Cash assistance	904	528	–41.6%	6	3	–3
Noncash assistance	1,019	1,463	43.6%	7	9	2
School spending	11,070	13,224	19.5%	77	79	2
Addendum:						
Net expenditures	–9,230	–12,335	33.6%			
Net expenditures plus school spending	1,840	890	–51.7%			

Notes: The share of households with students was about 28% in 1989 and 2000. The average number of students in households with students was just over 1.5 in both years.

Net expenditures are the difference between transfers and taxes.

Source: Author's computations from the U.S. Bureau of the Census from the Current Population Survey's Annual Demographic Supplement (ADS); the Education Finance Survey; the Public Elementary and Secondary Education Finance Data; Census Special School District Tabulation (STP); and the Common Core of Data Local Education Agency Universe Survey (CCD). See Appendix A for details. (Unless otherwise noted, this is the source for each figure and table in this article.)

remainder of government expenditures in both years. School spending grew at a faster pace between 1989 and 2000 than transfers, suggesting it might continue to surpass them in magnitude and as a share of government expenditures in the future for this group of households.

Social insurance accounts for the largest share of total transfers in 1989 (42 percent), followed by non-cash assistance (30 percent) and cash assistance (27 percent). In 2000, social insurance continues to contribute the largest share to transfers (44 percent). However, in 2000, non-cash assistance follows closely (41 percent), as a result of its faster pace of growth over the period (43.6 percent versus 14.5 percent for social insurance).

The contribution of cash assistance to transfers, on the other hand, declines dramatically over the period. The reason for this decline is that the average size of the benefit decreases by over 40 percent on average between 1989 and 2000. The decline in cash public assistance contributed the most to the overall decline of this benefit over the period. As a share of total cash assistance, cash public assistance decreased from 59 percent in 1989 to 31 percent in 2000.

The growth of social insurance for households with students is driven largely at the average by the rise in Social Security (about 46 percent) and Medicare (136 percent) over the period. The dramatic growth in the average EITC (over 300 percent, from 17 percent of non-cash transfers to 37 percent) and Medicaid (146 percent), on the other hand, contributes to the increase in non-cash assistance. These results showing the decline in cash transfers and growth in non-cash transfers highlight the interplay of changes to welfare and the EITC—two policies directed toward households with children—in the 1990s.

On the other side of the balance sheet, total income taxes make up the largest component of taxes paid by the average household with students in 1989 and 2000. They accounted for nearly 65 percent of total taxes in both years. Payroll taxes make up about 25 percent of total taxes paid by households with students followed by property taxes, which make up the remainder.

The appendix shows net government expenditures (government spending minus taxes) with and without school spending. Without school spending, households with students are net taxpayers on average—they receive less in government transfers than they pay in government taxes. The net fiscal burden on households increased between 1989 and 2000 since taxes paid increased faster than transfers received (26.9 percent versus 8.2 percent).

The addition of school spending changes the net benefit for households with students. In both years, these households are net beneficiaries from the government. The size of the net benefit is larger in 1989 and 2000 since the increase in government expenditures (16.9 percent) was less than the increase in total taxes.

3.2. *Transfers, School Spending, and Taxes by Income Decile*

In this section, I look at the distribution of government expenditures and taxes across deciles of income. Figure 1 shows government expenditures and its components as shares of EI by EI decile for households with students in public schools in 1989 and 2000, respectively.

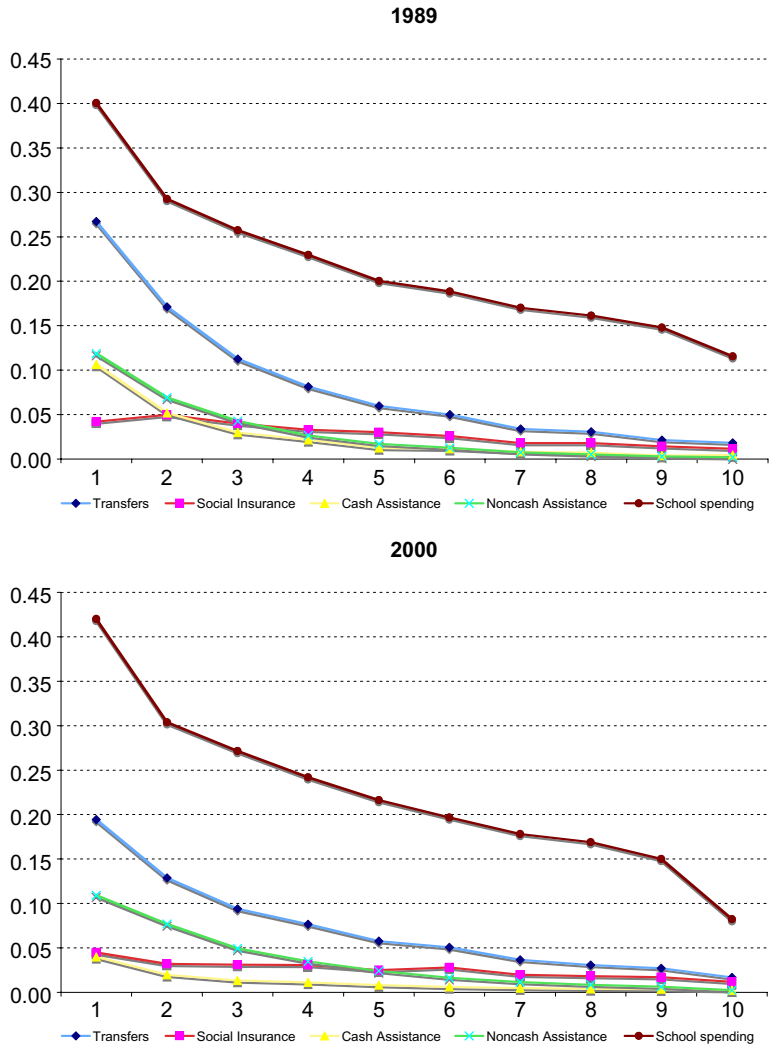

Figure 1. Government Expenditures (Transfers and School Spending) as a Share of Extended Income, 1989 and 2000 (households with students)

Total transfers are progressive in 1989 and 2000. In 1989, they fall from 27 percent of EI in the lowest decile to 2 percent in the highest. The pattern is similar in 2000, although transfers contributed less to EI in the lowest two deciles of income than in 1989. In 1989, the share of transfers in EI was about 8 percentage points larger in the lowest decile and about 5 percentage points larger in the second decile. The contribution to EI is nearly the same in the upper eight deciles in 1989 and 2000.

The major factors behind the curvature of total transfers with respect to EI are the progressive distribution of cash and non-cash assistance. The reduction in the contribution of cash assistance to EI is also a major factor in the drop off in the

contribution of all transfers to EI between 1989 and 2000.[6] The contribution to EI from social insurance is small in both years. Social insurance is slightly progressive, contributing more to EI in the lowest decile (about 4 percent) than in any other.

I would expect the contribution to EI from social insurance to be relatively small for households with children since the largest components of this category are Social Security and Medicare (combined they account for nearly 80 percent of social insurance in both years). The expected contribution from Social Security and Medicare—two programs designed to benefit older persons—would be small since the beneficiaries of these programs are less represented in the population of households with students than among the total population.[7] In 2000, for example, the average number of persons aged 65 and over was 0.05 in households with students and 0.3 in all households. Within the full sample of households, for comparison, social insurance accounted for about 85 percent of all transfers in 1989 and 2000.

On the other hand, I would expect the contribution from cash and non-cash transfers to be larger for households with children since many of the items categorized under these two groups are likely to benefit these households, especially on the lower end of the income distribution. In 2000, Medicaid income, for example, was allocated to 15.7 percent of households with students and 10.4 percent of all households. In 1989, these figures were 9.6 and 6.7, respectively. This discrepancy can be explained by the fact that eligibility requirements tend to include households with children and pregnant women. Subsequently, Medicaid's share in total transfers is larger in households with students than in the full sample. In the full sample, its share was less than 5 percent in both years. Among households with students, it was 9 percent in 1989 and 15 percent in 2000. The other large components of cash and non-cash transfers, such as the EITC and school lunches, follow a similar logic since the corresponding programs specifically benefit households with children.

Significantly, school spending contributes more than transfers to EI at every decile in both years. The pattern is progressive and the contribution to EI is similar in both years.[8] In the lowest decile, school spending accounted for about 40 percent of EI in both years. However, in the highest decile, the overall impact on EI is substantially less, amounting to 8 and 12 percent in 1989 and 2000, respectively.

[6]The fall in income from cash assistance was driven by a decline in cash public assistance between the two years. Cash public assistance decreased by $220 per household with students or 57 percent. There are at least two reasons for this decline. First, the decline in public assistance resulted from welfare reform in the late 1990s. Second, the labor market was stronger in 2000 than in 1989 both in terms of the unemployment rate (4.0 versus 5.6 percent) and average household income. As a result of this interaction, households were less likely to have received assistance from the government in the later year.

[7]For example, 62 percent of Social Security beneficiaries were aged 62 and over in 1990 and 2000 (U.S. Census Bureau, Statistical Abstract 2010).

[8]Ruggles and O'Higgins (1981) also found that school spending as a share of household income before taxes and benefits declined dramatically across income deciles in 1970 for all households. My analysis shows the same trend in 1989 and 2000 if I use money income and prefisc income, respectively. This is true when I use average state spending (as is used by Ruggles and O'Higgins) as well as when I use my estimates of school spending per student. Wolff and Zacharias (2007) find that total education spending (all levels of education) declines as a share of household income as well as their broadest measure of household income (wealth-adjusted comprehensive income). It is not possible to compare this finding to my results since I cannot isolate school spending in the analysis they provide.

The distribution of school spending across the deciles of EI for households with students depends on two factors: the average number of public school students per household, and the per-pupil spending in each decile. The data in Table 3 show that the average number of students per household increases with the income distribution in both years as does average spending per student. As a result, average school spending per household is larger at higher deciles. The progressivity of school spending shown in Figure 1 is thus a function of the increase in EI across deciles and not of the progressivity of absolute dollars of school spending. This shows that the disparity of income is larger than the disparity in school spending across deciles. In contrast, the progressivity of cash assistance and non-cash transfers is a function of their progressive distribution in absolute terms combined with the increase in EI from the lower to the higher deciles.

The difference in the distribution of the components is driven by the fact that school spending tends to have a positive correlation with income, while cash and non-cash transfers tend to have a negative correlation. This finding is partially a function of how the benefits are distributed across households. Eligibility for school spending is not based on an income threshold as it is for other government programs, such as public assistance. While income thresholds play some role in the allocation of school spending, such as through compensatory grants for poor school districts, like Title I or Headstart, a substantial portion of school spending is funded by local tax revenue.[9] With a larger tax base, affluent communities are able to spend substantially more directly on their schools. Cash and non-cash assistance, on the other hand, include items—such as public assistance, school lunches, food stamps, housing subsidies, and energy assistance—which provide benefits mostly to lower-income rather than higher-income households.

Figure 2 shows the distribution of taxes by EI decile for households with students in 1989 and 2000. Taxes increase dramatically as a share of EI by decile in both years. Households at the top pay over 30 percent of EI to the government. Those in the lowest decile pay about 5 percent. A principal factor behind the curvature of taxes with respect to EI is the progressive distribution of income taxes. Payroll and property taxes contribute far less to total taxes as a share of EI than income taxes. Payroll taxes are slightly progressive up to the middle of the income distribution in both years. The schedule then flattens out and declines slightly at the very top.

Property taxes are a relatively small share of EI—less than 2 percent—and the differences in their shares of EI across deciles are negligible. Moreover, my figures show that differences in tax effort across these deciles, defined by average property taxes paid as a share of average income are also negligible. This finding is interesting considering the research showing tax effort in low-income districts to be higher than that found in high-income districts. The U.S. GAO used this measure in a comparative assessment of poor and wealthy school districts in the U.S., finding that poor school districts in the 35 states put forth more tax effort than affluent districts in 1991–92. It is important to note, however, that even when

[9]In 1989, Federal sources contributed 6 percent to total school revenue, state sources contributed 49 percent, and local sources contributed 45 percent. In 2000, these contributions were 7 percent, 50 percent, and 43 percent, respectively (U.S. Census Bureau, Statistical Abstract 2010, table 253.)

TABLE 3

SELECTED STATISTICS ON THE DISTRIBUTION OF SCHOOL SPENDING AND TRANSFERS, 1989 AND 2000

	1989				2000			
EI Decile	Average Students per Household	School Spending per Student	School Spending per Household	Cash and Noncash Assistance per Household	Average Students per Household	Spending per Student	School Spending per Household	Cash and Noncash Assistance per Household
First	1.18	6,214	7,342	2,969	1.25	7,611	9,485	3,372
Second	1.38	6,287	8,696	2,596	1.39	7,819	10,829	3,453
Third	1.51	6,439	9,719	1,973	1.55	7,701	11,971	2,769
Fourth	1.54	6,695	10,333	1,570	1.60	7,835	12,575	2,391
Fifth	1.54	6,779	10,423	1,110	1.62	8,053	13,010	1,961
Sixth	1.59	7,041	11,196	1,039	1.65	8,150	13,455	1,544
Seventh	1.60	7,221	11,551	774	1.66	8,357	13,890	1,299
Eighth	1.64	7,690	12,599	718	1.72	8,810	15,147	1,128
Nineth	1.63	8,398	13,699	459	1.76	9,140	16,112	1,071
Tenth	1.70	8,928	15,141	638	1.70	9,255	15,771	923

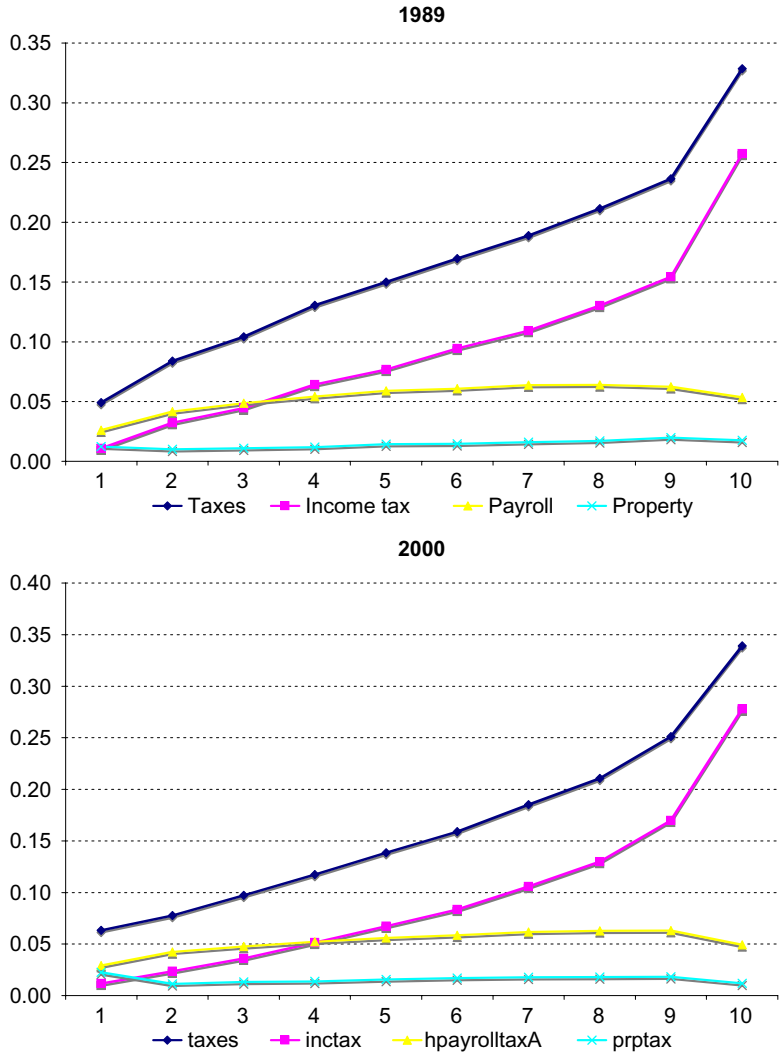

Figure 2. Taxes as a Share of Extended Income, 1989 and 2000 (households with students)

tax effort remains similar across deciles, wealthier districts continue to have an absolute advantage in terms of overall spending (U.S. GAO, 1997).

Figure 2 shows the distribution of net government spending (transfers less taxes) as a share of EI with and without school spending across deciles of EI for households with students in 1989 and 2000.

When school spending is not included in net government spending, the distribution is strongly progressive across deciles in both years. Only households in the bottom two deciles of EI are clear net beneficiaries from government expenditures. Households in the lowest decile of EI received about 22 percent of EI in net

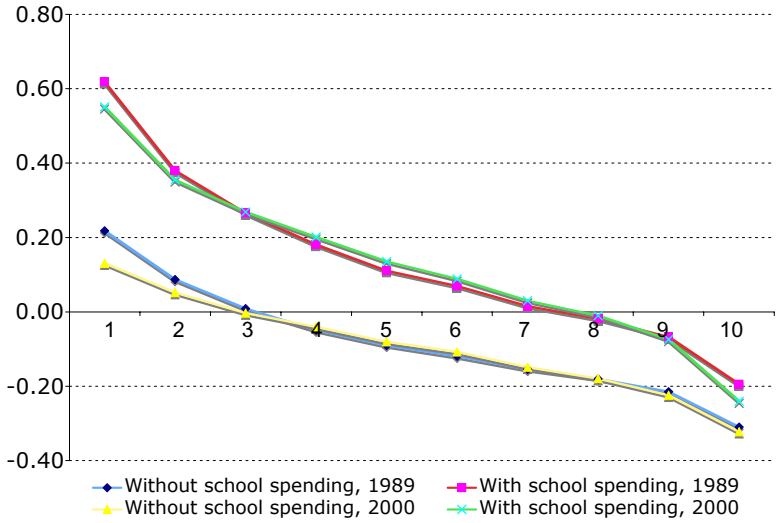

Figure 3. Net Expenditures (Transfers Less Taxes) as a Share of Extended Income, 1989 and 2000 (households with students)

TABLE 4

Median and Mean Values by Income Measure, 1989 and 2000 (2000 dollars, households with students)

Income Measure	Median			Mean		
	1989	2000	Change	1989	2000	Change
PI	51,730	57,334	10.8%	59,335	74,065	24.8%
DI	44,924	51,082	13.7%	50,105	61,731	23.2%
EI	55,628	64,179	15.4%	61,175	74,955	22.5%

transfers in 1989 and about 13 percent in 2000. Much of the decline in the share of EI is driven by the reduction in other transfers as a share of EI in the lowest decile (Figure 3). At the top end of the distribution, households paid about 30 percent of EI in net taxes to the government.

The addition of school spending to net transfers shifts the curve upwards in both years. As such, this addition increases the net benefit for the lower six deciles of EI in both years and lessens the net tax burden among households at the highest end of the EI distribution. The distribution remains progressive across deciles at 62 and 55 percent of EI respectively in the lowest decile in 1989 and 2000. The top decile paid 19 percent of EI in net taxes in 1989 and 24 percent in 2000.

3.3. *Level and Distribution of Economic Well-Being by Income Measure*

Table 4 shows mean and median values of PI, DI, and EI for households with students in 1989 and 2000. Median PI increased by about 11 percent between 1989 and 2000, while the mean increased by over twice this rate. These changes illustrate

TABLE 5
INEQUALITY BY INCOME MEASURE, HOUSEHOLDS WITH STUDENTS
(GINI COEFFICIENT × 100)

Income Measure	Gini		
	1989	2000	Change
PI	41.2	45	3.8
DI	33.4	37.8	4.4
EI	28.8	32	3.2

a polarization of PI over the period, with pre-fiscal income becoming more concentrated among households toward the top of the distribution. To a slightly lesser degree, a similar pattern is seen for disposable income and extended income between the two years.

The shift from PI to DI shows the impact of taxes and transfers on economic well-being. When accounting solely for DI, the average economic well-being of households is lower than PI at the mean and median in both years. At the median, this reduction is about 15 percent of PI in 1989 and 12 percent in 2000. At the mean, the reduction in income is slightly larger—about 18 percent in 1989 and 20 percent in 2000. The reduction in income at the mean is the direct result of the net impact of taxes and transfers. In 1989, for example, net expenditures excluding school spending were –9230 dollars, which is the difference between PI and DI.

By adding school spending to DI, I arrive at the final measure of economic well-being used in my analysis, EI. Households appear to be relatively better off using EI than DI at the median and the mean. They are also better off at the mean and median than using PI. The increase in mean income is the result of the addition of school spending to net expenditures. In 1989, net expenditure plus school spending was 1840 dollars or the difference between PI and EI.

The improvement in measured economic well-being from PI to EI is somewhat stronger at the median (7 percent in 1989 and 11 percent in 2000) than at the mean (3 percent or less in both years). This suggests that government policies—through taxation, total transfers, and school spending—played some role in ameliorating the polarization of income at the top end of the income distribution between 1989 and 2000.[10]

Table 5 shows overall inequality by income measure for households with students in 1989 and 2000 respectively as measured by the Gini coefficient. PI has the highest degree of inequality in both years followed by DI and EI. The reason for these differences is the progressive distribution of both net transfers and school

[10]Using the three-parameter equivalence scale applied by the U.S. Census Bureau to their experimental poverty measures, I also assessed the distributions of equivalent-income variations of PI, DI, and EI (Short, 2001). The results are similar to those with the unadjusted measures. Briefly, while the levels of economic well-being are not surprisingly higher using the equivalent measures, the patterns for the rate of increase between 1989 and 2000 are unchanged for each measure. Across the economic well-being measures, the reduction in economic well-being between equivalent PI and equivalent DI and equivalent PI and equivalent EI is slightly smaller at both the mean and median in both years than what is exhibited by their non-equivalent counterparts.

spending. Adding these components to PI considerably lowers the measured inequality across the income distribution in both years (12.4 Gini points in 1989 and 13 in 2000).

The difference in inequality between income measures is sizable in both years. The distance between PI and DI (7.8 Gini points in 1989 and 7.2 in 2000) is somewhat larger than between DI and EI (4.6 Gini points in 1989 and 5.8 in 2000), suggesting that the net impact of taxes and transfers had a greater downward pull on income inequality relative to school spending. The relative inequality-reducing impact of the two constructs, however, decreased between the years because the impact of school spending increased as the impact of net transfers decreased.

Inequality increased markedly in each income measure between 1989 and 2000. It increased most substantially for DI, followed by PI and EI. The larger increase in inequality between years for DI than PI illustrates a reduction in the inequality-reducing impact of net taxes and transfers. The smaller growth in inequality for EI suggests that the distribution of school spending helped ameliorate the downward impact of net transfers on income inequality though it did not reverse the growth in inequality over the period.[11]

3.4. *Reranking and Gap Reduction*

In this section I look at the distinct impact of taxes, transfers, and school spending on horizontal and vertical equity. As discussed in the introduction, the concept of HE refers to the equal treatment of equals, whereas the concept of VE refers to the appropriately unequal treatment of non-equals. Here, I focus on these two types of equity by assessing the reranking of households along the income distribution (for HE) and the reduction in gaps in economic well-being (for VE), respectively. Thus, I look at whether government impacts inequality through a reranking of households across the income distribution or by shrinking income gaps between them. These two effects can be assessed using a decomposition of the difference in the Gini coefficients of original and final income, such as PI and DI.

In the analysis that follows, I use a decomposition of the Gini coefficient proposed by Lerman and Yitzhaki (1995) (LY, for short).[12] Assuming that the subscript *f* represents a measure of final income (EI, for example) and subscript *o* represents a measure of original income (MI, for example) and that the two

[11]Briefly, the level of inequality measured by the Gini coefficient is somewhat higher using the equivalent-income measures of economic well-being in both 1989 and 2000 as compared to the unadjusted values (about 2 Gini points greater in both years for equivalent PI and DI, 3 Gini points greater in 1989, and 4 Gini points greater in 2000 for equivalent EI).The pattern of change between the two years, however, is nearly the same. Like the unadjusted measures of economic well-being, equivalent PI has the highest degree of inequality in both years and equivalent EI has the least. The reduction in inequality across the concepts of economic well-being, however, is slightly dampened using the equivalent measures (about 0.5 Gini points less moving from equivalent PI to equivalent DI, and 1 Gini point less from equivalent DI to equivalent EI). This suggests that the income-inequality reducing impact of taxes, transfers, and school spending is reduced to a small degree when the size and needs of the households are taken into account.

[12]Lambert (2001) illustrates an alternative methodology for decomposing the Gini coefficient, which, in comparison, uses the concentration coefficient of final income with respect to original income or $G_o - G_f = (C_{fo} - G_f) + (G_o - C_{fo})$, where Cfois the concentration coefficient of final income with respect to original income.

measures of inequality are related to each other through the addition or subtraction of income components, the decomposition of the change in inequality between final and original income can be represented as

$$G_o - G_f = (G_o - C_{of}) + (C_{of} - G_f) \tag{1}$$

where G_o is the Gini coefficient for original income, G_f is the Gini coefficient of final income, and C_{of} is the concentration coefficient[13] of original income with respect to the rankings of households by final income. The first term on the right hand side of the equation, $G_o - C_{of}$, represents the impact of the reranking of households on inequality; the second term, $C_{of} - G_f$, represents the effect of reductions of the income gap.

The gap-narrowing component shows the impact of additions and subtractions of income components on vertical equity or the relative income differences between households while maintaining the final rankings. The reranking component reflects the impact of additions and subtractions to income on horizontal equity or the ranks of households in the distribution while holding the original income constant.

The LY method is preferable in this study for two reasons. First, it uses the final income rankings rather than the original income rankings. For policy purposes, reliance on original income rankings can encourage less progressive tax and transfer recommendations that inadvertently transfer resources away from the final income poor. Reliance on final income rankings, on the other hand, focuses on the outcome of policy changes and, as such, is a better gauge for further policy recommendations.

Consider, for example, an increase in public school spending. This can impact the rank of households along the income distribution when it is added to a measure of income, especially considering that school spending can be large and many households in the U.S. do not contain any students attending public school. A policy maker interested in the impact of changes in school spending on horizontal equity would learn more from the ex post ranks since these show the impact of the changes in spending. If the policy maker, on the other hand, focused on the ex ante ranks, he or she may inadvertently reduce horizontal equity. Future policy changes, in this case, may be directed wrongfully in favor of households whose original ranks may have been significantly improved by the initial policy change.

Second, in the LY method, the reranking term is always positive and the gap-narrowing component is usually positive. In the conventional method, $C_{fo} < G_f$ by construction, so the reranking effect (first term on right) will always be negative and, as a result, the gap narrowing effect (second term on right) will always be greater than the Gini coefficient. Thus, for given a difference in the Gini, the gap-narrowing effect will always be larger for a larger effect of reranking. The

[13]The concentration coefficient is a summary measure similar to the Gini coefficient except it is derived from the concentration curve as opposed to the Lorenz Curve. The concentration curve represents the distribution of one measure of income with respect to the rankings of households by another income measure. In this analysis, the concentration coefficient is employed to isolate the impact of HE and VE.

TABLE 6

Decomposition of the Changes in Gini Coefficient (×100) from MI to DI and DI to EI, 1989 and 2000 (LY Method) (households with students)

	1989			2000		
	Total Effect	Reranking	Gap-Reduction	Total Effect	Reranking	Gap-Reduction
PI to DI	7.8	1.3	6.5	7.2	0.9	6.3
DI to EI	4.6	0.7	3.9	5.8	0.8	5
PI to EI	12.4	2.3	10.1	13	2	11

Note: The values for the total effects indicate the difference between the Gini coefficient for the first income measure and the second. Thus, a positive value indicates are reduction in inequality between the two measures. The derivation of the reranking and gap-reduction components is shown in equation (1).

LY method, in contrast, has the convenient feature that the two positive components sum up to the total change in inequality and the gap-narrowing effect is not inflated by negative value of the reranking effect (Lerman and Yitzhaki, 1995, p. 51).

The results of the LY decomposition for the movement from PI to DI and DI to EI are shown in Table 6 for 1989 and 2000. The total effect column indicates the impact on inequality that occurs from moving from one income definition to another. The effect is shown as the difference in the Gini coefficients between the first income measure mentioned and the second. For example, the total effect from PI to DI illustrates the Gini coefficient for PI less the Gini coefficient for DI. The differences in inequality by each income measure shown in Table 6 are substantial. The movement from PI to DI reduced income inequality by about 8 Gini points in 1989 and 7 in 2000, while the addition of school spending to EI reduced income inequality by about 4.5 Gini points in 1989 and 6 in 2000.

The second and third columns for each year show the impact of reranking and income-gap reduction on income inequality, respectively. Income-gap reductions contributed more to the decline of inequality than did the reranking effect in each scenario depicted above. From PI to DI and DI to EI, the gap-reduction component contributed around 85 percent to reduction in inequality between the income measures. Thus, the distribution of net government transfers and school spending, respectively, promoted vertical equity substantially across the households with schoolchildren with a relatively small negative impact on horizontal equity in both 1989 and 2000. Notably, the size of the income-gap component increased between 1989 and 2000 from 10.1 to 11 Gini points. This finding may be indicative of the impact of school finance reform in the states over the time period, which sought to delink spending from household wealth and income and thus equalize spending across households. The impact of net transfers (PI to DI) on HE and VE is dependent on the interplay of taxes and transfers. Taxes may preserve HE since the amount a household pays is a function of its income. However, the degree of preservation is dependent on the treatment of different sources of income by the tax code and the impact of tax deductions.

Among the entire population, transfers are likely to increase horizontal inequity (HI) since the majority of public programs are available only to subsets of the

TABLE 7

Decomposition of the Changes in Gini Coefficient (×100) from PI to DI and DI to EI, 1989 and 2000 (LY Method) (all households)

	1989			2000		
	Reranking	Gap-Reduction	Total	Effect	Reranking	Gap-Reduction
PI to DI	10	2.2	7.8	10	2.2	7.8
DI to EI	0.8	0.7	0.1	0.9	0.7	0.2
PI to EI	10.8	2.8	8	10.9	2.9	8

Note: The values for the total effects indicate the difference between the Gini coefficient for the first income measure and the second. Thus, a positive value indicates are reduction in inequality between the two measures. The derivation of the reranking and gap-reduction components is shown in equation (1).

population. Adding transfer income to some households and not others is likely to impact the initial rankings by income. However, since my focus is a subset of the population defined by households with students, the impact of transfers on HE may be milder than among all households.

Households with children may be more similar in terms of eligibility for certain programs—many of which aim directly at households with children (though not exclusively), such as Medicaid, the school lunch program, the EITC, and TANF. In such cases, receipt of transfer income will be less a function of non-income characteristics—like different household types or ages of head—and more a function of income. The impact of net transfer income is therefore more likely to reduce income gaps between rich and poor households with students than to change their ranking along the income distribution. The results of moving from PI to DI as discussed above suggest that this is indeed the case. School spending is also not likely to have a large impact on HE among households with students because they all receive some benefit. However, some degree of HE may occur because of the variations in the amount of school spending across public school districts. The results in Table 6 confirm this interpretation.

Comparing the results in Table 6 to those for all households is revealing. While school spending benefits only households with students, it can also affect the distributional picture for all households. Reranking of households might be extensive when school spending is added to income, since many households in the United States do not have children attending public schools. Thus, adding school spending, which is quite large in some cases, could easily move one household ahead of another along the income distribution. Table 7 shows the results of the LY decomposition for the movement from PI to DI and DI to EI for all households in 1989 and 2000.

The inclusion of net transfers in income (PI to DI) had a larger income-inequality reducing impact among all households than among households with students (10 Gini points in both years versus 7 to 8). The impact on horizontal equity was somewhat larger and on vertical equity somewhat smaller in both years among all households than among households with students.

The discrepancies between all households and households with students in public school are likely a function of two factors. First, pre-fiscal income is

distributed more unequally among the total population than households with children in both years. Second, total transfers are larger on average among all households and are dominated by Social Security and Medicare. These two programs aid the elderly, who are more represented among all households and more likely to be income poor. As a result, net transfers in favor of the elderly are likely to increase the downward pull on inequality beyond what we see for households with students.

The impact of school spending (DI to EI) on income inequality was very small among all households, and significantly smaller than among households with children. It is notable, however, that among all households reranking contributed more to the decline in inequality than income-gap reduction. Thus, while school spending reduces inequality among all households to a small degree, it does so by increasing HE and not by significantly reducing VE. In other words, while school spending reduces income gaps among households with students with little impact on HE, it has the unintended consequence of reranking some households with children in public schools above others who do not. We would expect some reranking across all households given the magnitude of school spending on households with students and the differential treatment regarding school spending between households with students and those without students.

The results in Table 7 also suggest that, unlike among households with students in public schools, school finance reform over the 1990s had little impact on income inequality among all households since the effects of moving from DI to EI are very similar in 1989 and 2000. Since over 70 percent of households in the U.S. did not have children attending public schools in 1989 and 2000, we might expect that a reranking of households will contribute more to a reduction of inequality when school spending is added to the full sample rather than limiting it only to households with students.

One can also isolate the global effects of selected income components on the reduction of inequality between PI and DI. This exercise helps show the contributions of select income components to overall inequality. The results are shown in Table 8. The effects are shown as the difference in the Gini coefficients between the first income measure indicated and the second. As a result, a positive value indicates a reduction in inequality between the two income measures.

The movement from PI to y1 shows the impact of taxes on economic inequality. Subtracting taxes reduced inequality by a little over 3 Gini points in both years, mainly through the reduction of income gaps (or improvement in vertical equity) between households. The overall change in inequality is somewhat larger (by about 0.6 Gini points) than LY's findings for the impact of taxes on income inequality individuals in 1991. However, they find that the overall contribution from reranking is far larger (41 percent) than what I find in either year (13 percent in 1989 and 3 percent in 2000).

This discrepancy could be a function of a number of differences in the data used, including: the years examined; the unit of analysis—I look at the households with students in public schools whereas LY look at the individual; and the income measure—I use household income whereas LY use family income. Additionally, my income measure imputed return on home equity, which is missing from the standard definition of family income used by LY.

TABLE 8

Decomposition of the Changes in Gini Coefficient (×100) for Selected Income Components (households with students)

	1989			2000		
	Total	Effect Reranking	Gap-Reduction	Total	Effect Reranking	Gap-Reduction
PI to y1	3.1	0.4	2.7	3.3	0.1	3.2
PI to y2	4.5	0.8	3.7	4.6	0.5	4.1
PI to y3	6.1	1	5.1	5.3	0.7	4.6
PI to DI	7.8	1.3	6.5	7.2	0.9	6.3
PI to EI	12.4	2.3	10.1	13	2	11

Key: PI = prefisc income; y1 = prefisc income less taxes; y2 = prefisc income less taxes plus social insurance; y3 = prefisc income less taxes plus social insurance and cash assistance; DI = disposable income or prefisc income less taxes plus social insurance, cash, and non-cash assistance; EI = extended income or DI plus school spending.

Note: The values for the total effects indicate the difference between the Gini coefficient for the first income measure and the second. Thus, a positive value indicates are reduction in inequality between the two measures. The derivation of the reranking and gap-reduction components is shown in equation (1).

The next four income definitions in Table 8 show the impact of government transfers on income inequality. Total transfers further reduced income inequality in both years by 4.7 Gini points in 1989 (7.8 less 3.1) and 3.9 Gini points in 2000 (7.2 less 3.3). The movements from y1 to y2, y2 to y3, and y3 to DI show the impact of social insurance, cash transfers, and non-cash transfers, respectively, on income inequality. In 1989, the contribution to the reduction in inequality was similar with the addition of each type of transfer at about 1.5 Gini points, respectively. Income-gap reductions accounted for the majority of the impact in both years (over 80 percent in all cases).

Comparing these findings with LY, the latter find that the addition of social insurance and cash assistance has a larger inequality-reducing impact in 1991than shown by my 1989 estimates. The impact is nearly twice as large in the case of social insurance and 25 percent larger in the case of cash assistance. The contribution from reranking is similar for social insurance and cash assistance in both analyses.

The inequality reducing impact from non-cash transfers, on the other hand, is very similar to what LY report, but the contribution from reranking is larger in their analysis (44 percent versus 22 percent). The findings, however, may not be inconsistent given the difference in assessed populations. Their findings resonate well with what one would expect from an analysis of all individuals—as discussed above—since most non-cash benefits aid only subsets of the population and will likely move some beneficiaries ahead of non-beneficiaries on the income distribution. However, since many of these programs target families with children (and thus students in public schools), I would also expect the reranking effect to be smaller among my subset of the population.

In 2000, the contribution from social insurance is very similar to what I find in 1989. The contribution from non-cash transfers increased by 0.3 Gini points between 1989 and 2000, mostly through reduction in the income gap. In contrast, the contribution to inequality from cash transfers decreased by nearly 1 Gini point

through a reduction in the income-gap component. The reduction in the impact of cash assistance on income inequality over the period is likely the result of welfare reforms in the late 1990s, which contributed to the decline in benefits and welfare rolls between 1989 and 2000.

Next, I look at school spending. School spending reduced income inequality by 4.6 Gini points in 1989 and 5.8 Gini points in 2000.[14] In 1989, school spending and total transfers accounted for an equal share of the total impact of net government spending (transfers plus school spending less taxes) on the reduction in income inequality.[15] In 2000, the contribution of school spending was higher than transfers: 5.8 versus 3.9 Gini points.[16] This change was the result of a reduction of the inequality-reducing impact of cash assistance combined with the increase of the same for school spending. Gap narrowing or the promotion of vertical equity dominated the movements for both.[17] The increase in the contribution from gap narrowing for school spending between the two years is likely the result of progressive school finance reform initiatives in the 1990s, which sought to equalize spending across students. This policy effort had the effect of improving vertical equity across the EI distribution.

In conclusion, the results in Table 8 suggest that equitable school spending is at least as effective at reducing inequality as transfers net of taxes for households with students. This capacity as an income-inequality fighting tool provides an additional argument in favor of equitable school spending, which will be discussed further in the conclusion.

3.5. *Incremental Effects*

I also explored the incremental effects of each component on income inequality of EI as measured by the Gini coefficient. The incremental effect shows the impact that an incremental, proportionate change in the value of a single income component of EI for all households will have on the total income inequality of EI (Wolff and Zacharias, 2007). There are a number of reasons why I added this discussion of incremental effects. First, the global effects discussed above may be sensitive to the ordering by which components are added or subtracted from each other (Lerman and Lerman, 1989). Second, since marginal changes do not affect the ranks of households, the incremental effects isolate the marginal impact of income components on gap narrowing (Lerman and Yitzhaki, 1985). Third, while the global method used in the previous sections gives us an important sense of the

[14]See Table 8. The impact of school spending on the total reduction in income inequality between the two measures is isolated by subtracting the total effect from PI to EI from the total effect from PI to DI, or 12.4 Gini points less 7.8 Gini points in 1989, and 13.0 Gini points less 7.2 Gini points in 2000.

[15]See Table 8. The impact of net government spending on income inequality is computed as the difference between the total effect from PI to EI and PI to y1 (since this computation nets out the impact of taxes between the two measures). Thus, in 1989, the impact of net government spending was 9.3 Gini points or 12.4 Gini points less 3.1 Gini points. As noted in footnote 14, school spending accounted for 4.6 Gini points or roughly half of the overall impact of net government spending.

[16]See Table 8. The impact of transfers on income inequality is computed as the difference between the total effect from PI to DI and PI to y1 (since this computation nets out the impact of taxes between the two measures). Thus, in 2000, the impact of net government spending was 3.9 Gini points or 7.2 Gini points less 3.3 Gini points.

[17]This discussion does not have corollary in the LY study since they do not account for school spending.

impact on equality of each income component in total, they may be less relevant for policy makers. Policy is enacted at the margin and rarely does it dictate the addition and subtraction of whole income components (Lerman and Yitzhaki, 1985).

I use a "natural decomposition" to estimate the incremental effects (Lerman and Yitzhaki, 1985; Lerman, 1999; Yao, 1999; Wolff and Zacharias, 2007). I begin with the covariance-based definition of the Gini coefficient for total income, defined as

$$G_Y = \frac{2\,\mathrm{cov}(Y, F_Y)}{m} \tag{2}$$

where Y is total income (EI for my purposes below), F_Y is the cumulative distribution of total income, and m is average total income. From this equation, Lerman and Yitzhaki (1985) redefine the Gini as the following product:

$$G_Y = \sum\nolimits_k R_k G_k S_k \tag{3}$$

where G_k is the Gini coefficient for each income source k, $S_k = (Y_k/Y)$ or the total amount of income source k as a share to total income, and R_k is the Gini correlation term, defined as $R_k = \frac{Cov(Y_k, F_Y)}{Cov(Y_k, F_k)}$. From these relationships, I derive the variables necessary to compute the marginal impact of each income component k on inequality of total income including:

$$\text{Amount of inequality} = R_k G_k S_k \tag{4}$$

$$\text{Share of inequality} = \frac{R_k G_k S_k}{G_y} \tag{5}$$

$$\text{Incremental effect} = \frac{R_k G_k S_k}{G_y} - S_k \tag{6}$$

Thus, the incremental effect for each income component is measured by the difference between its share of total income inequality and its share of total income.

The results for S_k, amount of inequality, share of inequality, and the incremental effect 1989 and 2000 are shown in Tables 9 and 10 respectively. The income-inequality reducing effect of school spending at the margin is larger than that of total transfers (and thus other transfers) in both years. The distance between these two is larger in 2000 than 1989. This is the result of two factors. The incremental effect of transfers decreased between 1989 and 2000 from –0.087 to –0.062. The majority of this decrease is due to the decline in the effect of cash assistance transfers, which is driven by the fall in its share of EI between the two years. This fall in share of EI indicates, at least in part, the impact of welfare reform and the subsequent decline in the size of cash assistance transfers. Between

TABLE 9

DECOMPOSITION OF THE CHANGES IN GINI FOR EI, 1989 (HOUSEHOLDS WITH STUDENTS)

Variable	Share of Income	Amount of Inequality	Inequality	Incremental Effect
Prefiscal Income	0.97	0.377	1.31	0.34
Taxes	–0.205	–0.1	–0.348	–0.143
Income tax	–0.132	–0.076	–0.263	–0.131
Payroll tax	–0.057	–0.019	–0.065	–0.008
Property tax	–0.016	–0.006	–0.021	–0.005
Transfers	0.054	–0.009	–0.033	–0.087
Social Insurance	0.023	0.001	0.003	–0.02
Cash Assistance	0.015	–0.004	–0.014	–0.029
Noncash Assistance	0.017	–0.006	–0.021	–0.038
School spending	0.181	0.021	0.072	–0.109
EI	1	0.288	1	0

TABLE 10

DECOMPOSITION OF THE CHANGES IN GINI FOR EI, 2000 (HOUSEHOLDS WITH STUDENTS)

Variable	Share of Income	Amount of Inequality	Share of Inequality	Incremental Effect
Prefiscal Income	0.988	0.425	1.327	0.339
Taxes	–0.212	–0.116	–0.361	–0.148
Income tax	–0.142	–0.092	–0.287	–0.145
Payroll tax	–0.055	–0.019	–0.059	–0.005
Property tax	–0.015	–0.005	–0.014	0.001
Transfers	0.048	–0.004	–0.014	–0.062
Social Insurance	0.021	0.002	0.007	–0.014
Cash Assistance	0.007	–0.001	–0.003	–0.011
Noncash Assistance	0.02	–0.006	–0.018	–0.037
School spending	0.176	0.015	0.048	–0.128
Extended Income	1	0.32	1	0

1989 and 2000, average cash assistance across households with students in public schools declined from 904 dollars to 528 dollars. In addition, the marginal effect of school spending increased between the two years from –0.109 and –0.128. Taxes also had an income-inequality reducing effect at the margin in both years, with the majority of this effect due to income taxes.

4. CONCLUSION

My results indicate that school spending and transfers—such as cash public assistance and the EITC—significantly impact the distribution of income among American households with students in public elementary and secondary schools. The inequality-reducing impact of public school spending, however, is greater than transfers in both years and this impact increased over the 1990s.

These findings illustrate that school spending is effective at fighting economic inequality across households with children attending public schools in the United States, when economic well-being is viewed broadly to also include public resources devoted to schooling. In addition, the results in Table 8 show that school

spending does not have an undesirable impact on horizontal equity or reranking for this population. Rather, the decrease in income inequality results mostly from a desirable improvement in vertical equity—or the shrinking of income gaps between these households.

It is important to note that these findings do not suggest any substitutability between school spending and transfers. The intention of each benefit is different and they meet different types of household needs. For example, whereas school spending provides education for children in public schools, Food Stamps provide access to groceries and related household items to any eligible household. Additionally, school spending, unlike some income components such as cash public assistance, cannot be diverted to meet other household needs at the discretion of its members or in response to certain scenarios, such as to help support someone in ill health. My findings do, however, contribute to the overall case for progressive school spending, which is built on its potential positive impacts on student outcomes and future labor market outcomes. These points are especially relevant for low-income households and disadvantaged groups—such as inner-city African-American communities—that suffer the economic, educational, and spiritual costs of a long legacy of underfunded schools.

To conclude, it is interesting to speculate how school spending equity and thus extended economic well-being may be impacted by economic pressures in the coming years. First, equality of school spending across students is likely to be negatively affected by the fiscal crisis in the states in the absence of any substantial federal aid to minimize budget cuts. The Center for Budget and Policy Priorities reported at least 30 states and D.C. have cut funding for schools as of May 25, 2010 (Johnson *et al*., 2010). These cuts are likely to impact state-level compensatory grants that aid poorer school districts. These districts typically lack the donor base or tax base that more affluent communities often tap to replace lost school services, such as computers, team uniforms, or French lessons, in times of austerity.

Second, these cuts will pose an additional challenge to the well-being of communities and households who are already facing economic hardship in recessionary conditions. Poorer districts that respond to budget cuts with tax increases or bonds place new financial burdens on households. Districts that are unable to raise such funds are likely to suffer the variety of social costs associated with underfunded schools.

Third, school budget cuts will have a direct impact on the economic well-being of laid off or underemployed teachers and their families. In 2010, an estimated 100,000 teachers are to be impacted by budget shortfalls through layoffs or attrition (Anderson, 2010). In the absence of significant federal aid to compensate cash-strapped districts, this situation is unlikely to be rectified soon. As such, laid-off teachers face either long periods of unemployment or must seek career changes and the education that accompanies such changes.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix A: Data Appendix
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Table C5: Correlation Coefficient Matrix for All Explanatory Variables in Exploratory Regression, 1989