# Are Efficiency and Equity in School Finance Substitutes or Complements?

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Since desegregation, the most important changes to American elementary and secondary schooling have almost certainly been in the realm of school finance. This is not only because dramatic changes have occurred in school finance; it is because these changes have deep implications. Changes in financing affect the fundamental incentives schools face and, thus, over the long term, the goals they pursue. However, no consensus exists on a preferred system of school finance. The United States has a hodgepodge of systems that combine local, state and federal funding. Some reforms attempt to expunge local control, which has been the traditional basis of school finance in America, by measures including (state-level) centralization of finances, district consolidation, and equalization aid from richer districts to poorer. Other reforms attempt to extend the power of local or even individual decisions; for instance, vouchers and charter schools. Michigan recently went both directions by simultaneously introducing charter schools and shifting much of the financial support for schools from local property taxes to a statewide sales tax.

School finance is contentious because it raises the classic economic debate between efficiency and equity. People often equate local systems of school finance with efficiency and centralized systems with equity. It is true that local school finance tends to minimize the problems of underprovision and waste that plague publicly provided goods. It is also true that centralized intervention is needed to tackle problems such as liquidity constraints and human capital spillovers. As this paper will explain, however, equating local finance with efficiency and centralized finance with equity is incorrect and greatly exaggerates the real efficiency-equity tradeoff

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that faces us. Local finance actually resolves much of the efficiency-equity problem, cutting it down to a manageable size. Moreover, the centralized interventions prescribed for solving the remaining problems do not include centralized finance and are compatible with local finance.

I will begin by laying out a few points about American school finance that frequently cause confusion. Next, I take a step back and review the problems an optimal school finance system *should* solve. Often, this step back is omitted, but it turns out that it is the key for avoiding confusion between the problems and for keeping track of the relative sizes of the problems. In the following section, I subject the four major arguments about local and centralized finance—that is, productive efficiency, allocative efficiency, fiscal spillovers and human capital spillovers—to theoretical and empirical scrutiny. Building on this analysis, I then evaluate some of the most popular modifications to local finance: centralization, categorical aid, vouchers, and equalization aid. I conclude by arguing that the real difficulties that exist need not involve us in endless debate between local and centralized finance: they can be substantially mitigated by reforms that have already been proposed.

## Some Things You Ought to Know about American School Finance

In local finance, a school district decides how to spend the money that it has raised from its own tax base. In centralized finance, a school district gets some share of monies raised on a statewide (or possibly nationwide) tax base, where the share is determined by a central policy and is *not* just set so that the district gets exactly those monies raised from its own tax base. This last point is key. *The meaningful difference between local finance and centralized finance is a difference of control, not a difference of accounting.*

Not distinguishing between meaningful centralization and the mere accounting form of centralization can cause confusion. For example, people sometimes argue that centralized finance can duplicate the fiscal behavior of local finance. While it is true that a higher level of government can act as the tax collector and then hand back to each school district all funds raised on the district's own tax base, the meaningful arguments for centralized finance require redistribution across districts, and they would not be satisfied simply by having the state serve as tax collector. A related confusion results when the state's share of funding is used as a measure of centralization, since the state's share may reflect either real centralized control or accounting. California offers a particularly plain example of such confusion. Individual school districts act as the primary tax collectors in that state, which could lead the unwary to think that the state contains some local finance. But in terms of control, California has nearly complete centralization, since the local districts have no control of how much revenue they raise and almost no control of how much they spend. Analogous problems arise in many other states because of the accounting used for state aid. European systems also sometimes confound real and accounting forms of school finance centralization.

To keep the distinction between local and centralized control clear, think of

local finance as a school district spending the amount generated by a property tax whose rate is chosen by the district's median voter and centralized finance as a state spending the amount generated by a tax whose rate is chosen by the state's median voter. In American school finance, the usual tax base is property. *If you think about local school finance depending on income taxes rather than property taxes, your analysis is likely to be wrong.* The characteristics of the property tax and its connection with housing prices are crucial for understanding local school finance. Yet perhaps because people with higher incomes tend to own more property, the unwary may think that it makes little difference whether one thinks of an income tax or a property tax. This paper will offer examples of the mistakes that result if one substitutes income taxes for property taxes in one's mind or one's model.

Another popular misconception is that per-pupil spending is very low in urban school districts with poor residents. As a statement of fact, this is just not generally true: for the 50 school districts in the United States that best fit this characterization, the ratio of the school district's per-pupil spending to its state's median spending averages more than one.[1] *If central city school districts were to spend (per pupil) what typical school districts spend, they would spend less on average.* This is so partly because urban school districts with poor residents have commercial property that generates revenue but no additional students, and also because most of the state and federal modifications to local school finance in the past 25 years have had the effect of increasing spending in districts with poor residents.

*The most important trend in school finance in the past 25 years is the decreased reliance on local property tax–based funding and increased reliance on state funding.* Not only has the proportion of state funding risen, but its mechanism has changed. State funding used to be focused more on categorical aid, which is revenue aid directed toward students who fit into a defined category, such the blind or the poor. However, categorical aid has been displaced to some extent by equalization aid, which is revenue aid directed toward districts with low property value per student. I will explore this point in some detail later. The federal role in school finance has been relatively constant, and federal funds are almost exclusively devoted to categorical aid.

Those are the most important trends in school finance laws. The most important trend in the problems facing school finance is that most states have experienced fast growth in per-pupil spending but rather stagnant student achievement for the last 25 years (Hanushek and Rivkin, 1994). This disjunction between spending and student achievement is the reason that so much interest is focused on explaining why the same school quality might cost more or less under different systems of school finance. *The current "predicament" of school finance is a failure of productivity rather than a failure of spending—for most states.* One important exception

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[1] Author's calculations using United States Department of Education (1994). State medians are pupil-weighted. The school districts include many that receive popular notice: Hartford, Atlanta, Chicago, New Orleans, Boston, Minneapolis, St. Paul, St. Louis, Philadelphia, Memphis, Salt Lake City, Milwaukee, Gary, Kansas City, Baltimore, Detroit, Newark, Camden and New York City.

is that California has experienced a failure of spending—relative to all other states—since about 1978, the time when it effectively centralized school finance.[2]

## The Schooling Investment Problem: What School Finance Should Solve

The job of a school finance system is to create an environment that induces people to invest in the amount of schooling that is socially optimal. Society wants each person to get as much education as will benefit that person and may want people to get even more education than is privately beneficial if education provides public benefits. Allocative efficiency is getting the *amount* of education right. Productive efficiency is getting it at the least cost. Equity is applying this standard of optimality to everyone, regardless of family background or income.

In the classic statement of how much schooling an individual should choose, an individual should invest in the level of schooling that equates that individual's personal discount rate to the internal rate of return from the marginal year of schooling (Becker, 1964; Rosen, 1977). In deciding on the privately optimal investment, an individual will mainly think of the returns to schooling due to higher lifetime earnings. For the socially optimal investment, the individual should also internalize any additional returns that may occur if that person's decision provides positive spillovers for others. For instance, human capital might provide positive spillovers if people learn from one another in the course of everyday contact or if people who are more educated are better citizens.

School finance faces three challenges in getting people to make such optimal investments. The first challenge, and by far the most serious, is to motivate people to make privately optimal investments in the face of a severely imperfect capital market. A small child cannot commit to repaying debts assumed for investments in schooling, and parents cannot commit a child's future earnings to repay debt they might assume for investments in that child's schooling. Even if family relationships could be used to enforce repayment, liquidity constraints would likely prevent many parents from making optimal schooling investments using their own funds. Children are biologically timed to need schooling when parents' income and wealth are low, and much value would be lost if parents were forced to spread schooling out in smaller chunks over more years.

This complex capital market failure is the most important source of tension between equity and efficiency. Overcoming the capital market failures will require some type of government intervention in funding. This is not only necessary for efficiency (for instance, to prevent parents from inefficiently spreading

schooling over a large number of years), but is crucial for equity, since children from poorer households would be more likely to end up with a suboptimal level of schooling if household liquidity constraints were not relaxed. However, with government intervention come two classic problems of publicly financed goods. First, we should expect schooling to be underprovided because of the free rider problem—why should households without children pay to make the optimal investment in others' children? Second, we should expect schooling to be produced inefficiently due to the classic problems that plague government procurement: producers who pad costs, shirk, or provide quality below that contracted for. In short, solving the capital market failure will improve equity and some efficiency problems, but the fact that the solution requires public financing jeopardizes other conditions for efficient allocation and production because it breaks the link between the marginal costs and marginal benefits of schooling.

Capital market failures are the most important source of tension between efficiency and equity because they potentially affect every student and can drive many students far from their optimal schooling. In comparison, the second and third challenges for school finance are smaller. The second challenge is a moral hazard problem: school finance should force households to invest in a minimum level of human capital for their children because the government will have to provide income support to adults whose human capital is insufficient for their own support. The third challenge is caused by the difference between private and social benefits of schooling. School finance should induce people to invest as though they were internalizing the human capital spillovers associated with their education.

The moral hazard problem—that people will underinvest in schooling because social insurance protects them against the worst consequences of that decision—affects only a minority of people, because most people's marginal investment in schooling will be well beyond the point where relying on social insurance is a prominent alternative to more schooling. Nevertheless, an optimal school finance system may include minimum schooling and minimum spending provisions to address moral hazard.

I also claim that the challenge posed by human capital spillovers is relatively small, simply because spillovers are small relative to the private benefits of schooling—not insignificant, but small in a relative sense. This view is so well ensconced in labor economics, and so well supported by theoretical and empirical work on education, that it is often taken for granted. The opposing argument, that spillovers are large relative to private benefits, comes mainly from work that has no interest in schooling itself but simply invokes human capital externalities to "grease the wheels" of a model that serves a different purpose. This opposing argument seems to gain support from the fact that schooling is so ubiquitously public around the world. While I support the idea that a universal institution is likely to exist for cause, this is nevertheless a leap of logic. My own belief, more in keeping with what we know about the schooling investment problem, is that once we set up the apparatus to collect, distribute and account for public *funding*, then a relatively low

level of human capital spillovers can tip the balance toward public *provision* of schooling.[3]

In summary, the goal of school finance is to ensure that individuals realize the costs of schooling in such a way that they equate the true marginal cost of schooling with its true marginal benefits, private and public. This is difficult to achieve, primarily because by using public funding to solve capital market failures, we introduce the classic problems that plague public goods: underprovision (private allocative inefficiency) and productive inefficiency. In addition, school finance must face the challenges of moral hazard associated with the social safety net and human capital spillovers not internalized by others.

## The Arguments

### Allocative Efficiency

The strength of local, property tax–based school finance is its ability to achieve a high level of allocative efficiency, even though schools are publicly provided. This ability is due to the Tiebout (1956) process in which people move to another school district if, in their district, the marginal utility of school spending gets out of balance with its price. Intuitively, the combination of local finance and the Tiebout process provides a mechanism that, despite using public funding, relinks the marginal costs and marginal benefits of schooling. The most realistic versions of this mechanism that achieve allocative efficiency are those in which public schools are financed by a property tax and the Tiebout process capitalizes the value of local public schools into local house prices.[4] In such models, inequality between the intrinsic value of a district's schools and the per-household cost in property taxes induces movement between districts, until the households within each school district have the same demand for schooling and all households consume the amount of schooling they find (privately) optimal.

Local school finance greatly reduces the capital market failure, because it allows households to spread schooling costs over their lifetime, while still schooling their children over 12 years and circumventing the underprovision problem that plagues public goods. Consider a school district that contains households whose

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[3] See also Stiglitz (1974) and Poterba (1996a). It is worth emphasizing that government intervention through school finance is not needed to account for *all* human capital spillovers: many human capital spillovers are properly internalized without intervention. This is particularly true for contracts between people that need to be mutually agreed upon, such as employer-employee contracts. For example, employers will bid up the wages of highly educated workers if they provide spillovers, making the capital and unskilled workers around them more productive. Except in firms that are small relative to individuals' ability to scatter spillovers, wages will internalize the spillovers, thus providing the correct incentives to acquire schooling. College scholarships can play a similar internalizing role for human capital spillovers among fellow college students (Rothschild and White, 1995).

[4] Other key assumptions are that the supply of housing is inelastic and that zoning restrictions may be invoked to solve potential free rider problems. A number of strong assumptions are needed for exact efficiency: see Hamilton (1976), Brueckner (1979) and, more recently, Epple, Filimon and Romer (1993).

demand for schooling is homogeneous in a lifetime sense, but some of whom are past the age in which school-aged children are household members. This age dispersion allows households to spread schooling costs over time—if they could not, many would be liquidity constrained. Yet age dispersion also raises the concern that older households will want to underprovide schooling, because they derive no direct benefits, and that parents of school-aged children will want to overprovide schooling, because most of the current cost is born by others. This concern is largely overcome if households make their choices among districts when their children reach schooling age, remain in the district until at least retirement age (because of moving costs) and sell their properties to incoming households with school-aged children. Since the typical home buyer has school-aged children, the desire to maximize property values gives older households an incentive to maintain the current schools for incoming buyers. Thus, the linkage among school finance, property taxes and property values provides a mechanism that allows households to spread schooling costs, while still giving an incentive to those without school-aged children to support a close-to-optimal level of school spending.[5] Of course, capital market failures are not completely solved, because some households will remain liquidity constrained, but local finance does reduce the number of households that are liquidity constrained to just those who are constrained because lifetime income, not merely current income, is too low.

The point to take away is not that local finance actually achieves allocative efficiency, whereby each household purchases the precisely correct amount of schooling, but that it makes a sizable dent in the greatest challenge for school finance: allowing people to invest in their privately optimal levels of schooling despite the presence of severe capital market failures. The liquidity-constrained poor are an issue that must be addressed by modifications to local finance, and I will return to it later.

A few other points should be made about local finance. Children acquire more human capital if their parents do not depend entirely on the school's efforts, but make complementary efforts themselves. Some research suggests that parents increase their effort when their choices affect the schools their children end up attending (Coleman and Hoffer, 1987). This phenomenon would tend to support systems of school finance in which parents' choices matter a lot, which could include local finance, private schools, charter schools and intradistrict choice plans. However, empirical research on this phenomenon is only suggestive. For instance, since more active parents are probably more likely to send their children to private schools, econometric estimates that compare private

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[5] *This scenario goes awry if some cohorts are much larger than others (the baby boom) or if costs to mobility of older households fall substantially (for instance, if newcomers have racial characteristics older households do not like). Both these examples have probably occurred in the United States. Cutler, Elmendorf and Zeckhauser (1993) and Poterba (1996b) provide evidence that school spending is low where the elderly make up a larger share of the population and where the race of the elderly and school-aged differs. In the future, it will be interesting to learn whether the baby boomers, who are currently parents of school-aged children, have compelled overprovision of schooling.*

schools to public schools to demonstrate that the availability of private schools will increase parental participation can never be fully satisfying. More convincing empirical strategies (see below) have not yet been used to address this issue.[6]

Also, private schools are much more likely to enhance allocative efficiency if the public schools operate under local finance rather than under centralized finance. The potential for private schools cannot but improve the utility of households who actually take advantage of them. But what about households whose children remain in the public schools? On the one hand, the existence of private school parents will tend to depress the spending preferred by the median voter because they prefer to spend less on local public schools than they would if their own children attended the schools. On the other hand, the existence of private school parents raises the spending preferred by the median voter because they swell the pool of "exploitable" taxpayers who pay for public schools without consuming services and thus lower the median voter's cost of achieving any level of spending.

The balance between these two phenomena will be decided by whether private school parents are a small or big minority. If they are a small minority, they must remain quite concerned about public school spending to preserve their property values, since the typical home buyer will still be the parent of public school students. Also, their small minority would make them unlikely to shift the median voter from a public school parent to a member of the exploitable pool. Under local finance, private school parents will nearly always be a small minority of voters and home buyers, partly because they must want to spend enough on schools to pay private school tuition on top of property taxes (Peltzman, 1993), and partly because local finance makes private schools less attractive by minimizing the number of households who are far from their optimal schooling choices. In a centralized system, more parents will be unable to satisfy their demands for education through a location decision, and instead will seek out private schools. In this scenario, it is more likely that private school parents could tip the balance and cause underprovision of public schooling.[7]

Does local school finance actually lead to allocative efficiency? First, I think we must try to appreciate the scale of Tiebout's (1956) insight in explaining the United States to itself. When he wrote his article in the mid-1950s, there were more than

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[6] Evidence based on randomized lotteries for admission to charter schools may soon provide evidence on parental participation. Notice that before-after comparisons of districts that have decided to allow charter schools or intradistrict choice (for instance, Boaz, 1991; Somanathan, 1995) are also problematic because the fact that a district decides to make such a policy change may indicate a change in management or the recognition of a bad trend in student achievement. Either could have effects that would be confounded with the effects of the policy change.

[7] While it is theoretically possible for private school parents to depress the demand of the median voter enough that their presence decreases the utility of public school households, models that demonstrate this possibility do not start from the basis of local, property-based finance with a well-functioning Tiebout process. See Glomm and Ravikumar (1994) and Epple and Romano (1996). Nechyba (1996), using simulations based on a fairly realistic local finance equilibrium, finds that the potential for private schools raises the utility of public school parents in many cases.

85,000 school districts (Kenny and Schmidt, 1994), and the degree of homogeneity among households in each district was striking.[8]

Much of the recent evidence on allocative efficiency comes from looking for changes in a school district that should be capitalized into home prices if the Tiebout process works. Research has focused on the passage of state laws that affect school finance, which can be taken as exogenous to the behavior of the district. For example, Rosen (1982) and Bradbury, Case and Mayer (1995) find that property values capitalize differences across school districts in the impact of property tax limitations. Hoxby (1996a) finds that property values capitalize the impact of school finance equalization laws, which have a differential effect on districts' marginal tax price of school spending.

A second type of evidence for allocative efficiency begins with the insight that in metropolitan areas with many school districts of similar small size, mobility costs between districts are low. Allocative efficiency should be higher in these areas if the Tiebout model works. Hoxby (1994), building on work by Borland and Howsen (1992), finds that student performance is better in metropolitan areas that naturally have many such districts,[9] which implies that they are better at addressing the allocative efficiency issue of assuring that schooling is not underprovided.

### Productive Efficiency

The implications of different school finance systems for productive efficiency have often been ignored. In some cases, producers of schooling, like administrators, teachers and other staff, were implicitly characterized as passive inputs, indifferent to the incentives created by school finance. Alternatively, they have been characterized as monopoly bureaucrats, whose pursuit of status, salaries, job security and leisure is constrained only by voting (Niskanen, 1975; Romer and Rosenthal, 1978). This characterization also neglects the implications of school finance, because it overlooks the constraints that the Tiebout process imposes on rent-seeking behavior.

However, recent research using principal-agent models has linked school finance to productive efficiency, treating school producers as agents and households in a school district as principals (Hoxby, 1995). The core of the problem is that households are able to verify student outcomes and costs, but unable to verify producers' effort, input quality and students' ability. Households thus have difficulty writing a contract with producers that prevents the extraction of rent, either in the form of padded costs or in the form of shirking. In a system of centralized finance, households vote on the budget but can only make the budget contingent on student outcomes and/or costs. Crowding out of either quality or cost-efficiency can result:

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[8] Author's calculations based on the 1952 City and County Data Book. See Eberts and Gronberg (1981) for later evidence on homogeneity.

[9] It is important to look for metropolitan areas that *naturally* have many school districts, since the United States has experienced a lot of school district consolidation since 1950, implying that current district boundaries are potentially endogenous. Hoxby (1994) uses geological variation among metropolitan areas to find exogenous differences in the number of districts.

if the rewards for cost reduction are even a little too strong relative to those for quality, producers will sacrifice quality to reduce costs (and vice versa).

In a system of local school finance, however, property values are a direct measure of demand for the local school. Demand will reflect the unverifiable effort, student ability and input quality that determine school quality at a given level of cost, as households balance the benefits they observe themselves derive from the local schools with the amount they pay for the schools through property taxes. Households can vote on how the budget should reward demand for the local schools—by voting on the property tax rate—and thus reward unverifiable effort and input quality using only verifiable information on property values. For example, consider a school district whose quality-for-cost rises, resulting in increased demand and property values. Higher property values either bring an automatic increase in school budgets as the property tax collects more money, which rewards school producers directly, or allow a reduction in the rate of the property tax, which offers potential political rewards to school administrators.

Local school finance can be viewed as a real-world version of the optimal mechanism for maximizing the productive efficiency of schools. In fact, what is prescribed is not just local property tax–based finance, but also a structure of local politics that causes budgets to increase semiautomatically with contemporary increases in property values and that rewards school administrators for lowering property tax rates.[10]

It is worth emphasizing the ability of local school finance to make use of the information generated by the Tiebout process. Local finance is ingenious because it gets marginal incentives right without costly attempts to gather scarcely knowable information or make complex forecasts. Moreover, as long as local finance is left to govern the marginal incentives, modifications to solve market failures can be accommodated. That is, although local and centralized finance are incompatible, local finance can be successfully combined with centralized redistributions as long as they do not alter the incentives faced by individual schools districts. As I will discuss further when I deal with possible reforms, these redistributions should be categorical (that is, focused on students who fit into defined categories) and funded with broad-based taxes that do not depend on the school district's choices.

Do school finance systems closer to the prescribed system actually have higher productivity? Answering that question requires evidence of variation in the degree

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[10] Hoxby (1995), building on Epple and Zelenitz (1981), shows that the combination of politics with the Tiebout process is actually crucial for making local school finance a mechanism that maintains productive efficiency. The logic is as follows. Tiebout himself gave no role to politics and characterized local public goods producers as entrepreneurs, forced to minimize costs by competition among themselves. This characterization ignored the fact that competition for the marginal home buyer would not prevent entrepreneurs from "holding-up" inframarginal homeowners in their school districts. These homeowners would be vulnerable because moving is costly and no court could enforce a long-term contract that promised school quality without verifiable information on the student's own ability and the quality of school inputs. Local politics provide the crucial mechanism: an annual contract that is driven by the marginal home purchase (through its effect on market property values) yet covers everyone in the school district.

of finance centralization or the degree to which the Tiebout process functions. The variation should be independent of school productivity, so that it can be usefully contrasted with productivity. One approach is to use changes in a state's degree of centralization over time, while controlling for state fixed effects along with state characteristics such as the distribution of income and education among adults. In work along these lines, Peltzman (1993, 1996) finds evidence that states with more centralized school finance systems are less cost-effective in educating students.[11] Hoxby (1994) uses the variation among metropolitan areas in the available degree of choice among districts due to variations in natural boundaries and finds that metropolitan areas that have many small-sized school districts—and thus more potential for a Tiebout process—also are more cost-effective.

### Fiscal Spillovers

Fiscal spillovers have recently regained notice as an argument for centralized school finance (Fernandez and Rogerson, 1996). To understand the intuition behind the argument, suppose that every school district has heterogeneous housing—for simplicity, two types of houses where better houses are always in the majority. Then, if each district sets a proportional property tax rate, the people who live in the worse houses in each district can free-ride on the taxes paid by the people in the better houses. When voting, the median voter (who lives in a better house) chooses a level of school spending that is lower than the level that would have been chosen if the district were homogeneous, because the median voter must expect to pay more for any given level of school spending owing to the presence of the worse houses. If every district is in this situation, school spending will be lower in every district than it would be if the districts were homogeneous. Because of these fiscal spillovers, it is even possible that average school spending across the state will be lower than the median voter in the state would choose to spend if the state were one large school district.

Fiscal spillovers seem unlikely, as least to me, to be a major problem in practice. There is no empirical evidence on their occurrence. Moreover, even if fiscal spillovers do exist, it is a trivial matter to suggest remedies that are superior to centralized finance. For instance, zoning restrictions, the traditional remedy, can do much to prevent the development of school districts with the characteristics needed for fiscal spillovers (Rubinfeld, 1987). Redistricting or adding districts are other alternatives. Or school districts could use a head tax equal, say, to some percentage of the value of the median house in the district. Any of these alternative remedies would greatly limit fiscal spillovers, without losing the advantages of local finance.

### Human Capital Spillovers

Advocates of centralized school finance often use arguments based on human capital spillovers. Such spillovers are important, but it is easier to praise the

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[11] Notice that most recent changes in states' shares have been due to real centralization, not mere accounting, so that using *changes* in a state's share of funding as an indication of *changes* in centralization is more acceptable than using states' shares at a point in time to indicate levels of centralization. Results (like Peltzman's) based on changes in states' shares, while still imperfect, are currently our best evidence.

literature that attempts to link centralized finance to human capital spillovers for its insights into the problem than for its insights into the solution.

Let us allow that people can benefit from being around students or neighbors with higher human capital; for example, a student may end up with higher lifetime income if that student attends school with children from highly educated households. It is often tacitly assumed that centralized school finance will lead to schools that are almost perfectly integrated with respect to human capital. Sometimes centralized finance is even modelled as perfect integration of human capital (Bénabou, 1996b).

But centralized school finance does *not* imply that schools will be perfectly integrated with respect to human capital. In a world with human capital spillovers, the first item to note is that households will do Tiebout-style sorting on the basis of their demand for spillovers (that is, on their ability to benefit privately from spillovers). *It is essential to recognize that households will sort this way regardless of whether the system of school finance is local or centralized.* Consider a household offered the choice between two identical houses in a statewide school district where school spending and productive efficiency are uniform across the state. If one house is surrounded by neighbors and students who have higher human capital, the household will be willing to pay more for it.

As a result of this sorting, there is actually not much difference between local finance and centralized finance, so far as human capital spillovers go. In fact, for the highly stratified case that the literature considers most interesting, where human capital, demand for school spending and demand for spillovers are assumed to be highly correlated (more on this in a moment), local and centralized finance will generate almost identical human capital spillovers. Therefore, a desire to change human capital spillovers—laudable though it may be—cannot generally form the basis of an argument for centralized school finance. However, a desire to change human capital spillovers may form the basis of an argument for forced busing or categorical aid to districts with many students who have low human capital (the idea is to make school spending such a bargain in these districts that high human capital students are attracted). I will take up this last point again when I discuss categorical aid.

When people sort themselves, Tiebout-style, on the basis of their private benefits from human capital spillovers, the same problems arise as for local school spending: capital market imperfections and moral hazard. For instance, a poor family with a high demand for human capital spillovers may be liquidity constrained from living in a school district or neighborhood where substantial spillovers are available. This argument is perfectly valid, but it is a much better justification for means-tested vouchers than for centralized school finance. Therefore, I will take it up again when I discuss vouchers.

I have skipped over the question of whether the allocation of schooling and spillovers will be efficient in the presence of human capital spillovers. It will not be; two problems will occur. First, a household will choose among neighborhoods on the basis of its demand for spillovers without internalizing the effect it will have on the neighborhoods' levels of human capital. For example, a household with low

human capital but high demand for spillovers will want to live near households with high human capital, depressing the level of human capital available to neighbors without compensating them. Second, when someone decides how much schooling and how many human capital spillovers to demand, the positive effect that this individual's human capital will have on others will not be taken into account. Consider a person who can either become a thief or acquire more human capital (through spending more on schools or moving to live with educated neighbors). Suppose that the job this person could get after acquiring the human capital would give exactly the same income as thievery. Since society must bear the costs of thievery, this person will not acquire the human capital, even though it would be socially efficient.

Both ways in which people fail to internalize their spillovers on others will cause the equilibrium to have an inefficient amount of human capital segregation and school spending. However, without knowing how spillovers work, we do not know whether the equilibrium has too much or too little segregation. Consider the "one bad apple" scenario. If a single household with low human capital in the district could make everyone else learn substantially less, yet would only experience small human capital gains itself, there would obviously be too little segregation. The converse scenario might be called "one shining light." If a single household with high human capital could make everyone else learn substantially more, yet its own children would not learn any less (despite being surrounded by children from deprived backgrounds), there would obviously be too much segregation.

As noted earlier, the literature tends to focus on highly stratified cases where human capital, demand for human capital spillovers and demand for school spending are highly positively correlated.[12] This case is useful because it offers an equilibrium that is simultaneously perfectly segregated on the bases of school spending and human capital (and human capital spillovers, of course). This equilibrium has no possibility of too little human capital segregation: being perfectly segregated, the equilibrium must have an amount of segregation that is greater than or equal to the optimal amount. Though this case rules out interesting possibilities, it would seem to be interesting in itself until we recall that in this case especially, the choice between local and centralized school finance will not affect the degree of segregation.

Still, the weakness of centralized finance as a tool for addressing human capital spillovers does not mean that such spillovers are unimportant. Remember, the equilibrium in a world of spillovers is inefficient. How might a school finance system address these inefficiencies? First, whatever modifications we make to the school finance system should actually affect individuals' sorting behavior, since the problem is rooted there. Second, since we cannot make a blanket statement about whether the equilibrium is too segregated or not segregated enough, we should not use a "blanket" policy. Rather, we should target identifiable market failures.

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[12] For instance, see de Bartolome (1990) and Bénabou (1996a,b). Both Bénabou papers contain good surveys of the related literature.

For example, a student who is unusually expensive to educate cannot help but impose a negative spillover on schoolmates by consuming a disproportionate share of the budget. Local finance will not internalize this spillover, so centralized categorical aid for students who are disabled or come from educationally impoverished backgrounds can be justified on this basis. Similarly, we may wish to avoid situations like that of the thief, exemplified above, by mandating minimum schooling.

There are good reasons to think that human capital spillovers are a real phenomenon. Nevertheless, with the exception of a few readily identifiable spillovers, like the extra cost of educating a disabled child, we know very little about their magnitude and how they work. For example, we need to know whether people learn the most from those who have most education or whether too great a gulf in education impedes the transfer of human capital. Perhaps isolated high-ability students hide their ability or neglect their schooling to escape social ostracism. Either of these cases could mean that certain spillovers are less than expected, or nonexistent.

The reason we have only shaky empirical evidence on the magnitude and technology of human capital spillovers is that nonexperimental evidence faces a very difficult selection problem.[13] The observation that students with high human capital are grouped together does not necessarily imply that human capital spills over from one student to another. After all, Tiebout-style sorting creates exactly this grouping in a world of no spillovers. To measure spillovers while addressing the selection problem, we need to find some way that an individual selects into peer groups that is independent of the peer groups' expected effects on that individual. This requirement pertains because a peer group's expected effect on the individual is a function of that individual's characteristics, which are also likely determinants of his achievement. This very stringent identification restriction is the reason why econometric estimates on this issue are rarely convincing. Controlling for an exhaustive list of observable characteristics is helpful, but unlikely to solve the problem: what are we to think if two observationally identical families send their children to two different schools, one where peers are good and one where peers are mediocre? Surely, the most obvious explanation is that some unobserved variable is causing the difference. Some studies have attempted to identify the peer effect using households that move, so that one child attends a school with better peers than another child. In this case, the difficulty is that most moves are not exogenous. If parents have moved to a better school district, some unobserved characteristic of the household may have changed, like parental concern about their children's education, particularly if an older sibling's achievement was disappointing.

An alternative is to seek a natural experiment. Perhaps the best evidence along these lines is from the Gautreaux program, which drew participants from Chicago's public housing population and somewhat arbitrarily assigned them to housing in one of several neighborhoods. Rosenbaum (1995) finds that children achieved

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[13] Recent good econometric work in the area includes Evans, Oates and Schwab (1992) and Case and Katz (1991).

more in school if they were from households that were placed and chose to remain in one of the better neighborhoods. The results are probably overstated by attrition bias, since we do not observe student achievement for households who left their program housing and returned to public housing. Unfortunately, the program offers no evidence about what would happen to a child with high human capital who was placed in a significantly worse peer group: all the participants moved to neighborhoods that were at least as good as their initial neighborhood.

My purpose in this discussion is not to dismiss human capital spillovers but to expose how much more needs to be learned. Until we know more, it would be wise to stick to policies that are likely to improve spillovers, yet almost certain not to harm private allocative efficiency and productive efficiency.

## Modifications to Local School Finance: Centralized Finance, Categorical Aid, Vouchers and School Finance Equalization

This section examines four of the most popular reforms to local finance. I will focus on which reforms solve which problems that are left unremedied by local finance and whether any of the reforms are strictly superior to others.

### Centralized School Finance

Neither fiscal nor human capital spillovers end up being a good justification for centralized school finance, though each argument did suggest the usefulness of other reforms, from zoning restrictions to categorical aid. Here, I wish to make a few additional points concerning the implementation of centralized finance and its popularity as a reform.

Unless each person's optimal investment in schooling is very similar to every other person's, centralized finance must necessarily prevent many people from investing in their optimal amount of schooling. Centralized finance cannot handle anything beyond a few readily identifiable differences in demand, because it has no means of eliciting true demand information from households. Since centralized finance necessarily prevents many households from investing close to their private optimum, it gives them a strong incentive to evade the system, either overtly by sending their children to private schools or covertly by rephrasing some school spending as "off-the-budget" activity fees or private lessons. California schools, which experienced a centralization of school finance following a 1978 court decision, have experienced both types of evasion (Downes, 1992). Not only will high-demand households evade the system, but the incentives for households without children to support the system are small, since they no longer have the incentives created by local finance that ties their property values to local school spending. In most states, the sustainability of well-funded public schooling under centralized finance is doubtful. California's spending slump since its centralization in 1978 is especially ominous.[14]

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[14] I do not find the sustainability of centralized finance in some European countries reassuring on this point, since their populations are so much less heterogeneous and mobile than the American population.

Given the questionable benefits and assured costs of centralized finance, the appeal of the idea is curious. I suspect that much of the appeal of centralized finance grows out of the combination of an instinct that not enough is currently done to help students from central city households with low human capital, the misconception that such students typically experience unusually low spending so that they would be better off with their state's median spending, and the mistaken instinct that centralized finance implies perfect integration of human capital. The belief that students from disadvantaged backgrounds ought to end up with more human capital may well be correct, but this should be all the more reason to refocus the school finance debate on more likely remedies than centralization.

**Categorical Aid**

Categorical aid—that is, funds from the state or federal government disbursed to schools for each student who fits into a defined category, such as the low income or visually impaired—is an appropriate response to two disadvantages of local school finance: identifiable spillovers and liquidity constraints. We currently have federal categorical aid for low-income students, and many states also have categorical aid based on household income. Connecticut, for instance, sends money to school districts for every student whose family depends on Aid to Families with Dependent Children.

Categorical aid should be designed so as not to upset the marginal incentives created by local finance. This means that categorical aid should be financed by taxes, such as statewide income taxes, that have no marginal price effect on the spending decisions of individual school districts. Moreover, the boundaries of the categories should be prohibitively costly to manipulate relative to the benefits of being in the category. Until recently, this second requirement has seemed almost unnecessary to state, but there are currently claims that some schools and parents manipulate the boundaries of the special education and bilingual education categories.

The limitation of categorical aid is that it only provides money for the district in which the student is currently enrolled. Households cannot use the aid associated with their children to support their move to another district, even if this is the most cost-effective way of obtaining a better school experience. For households who are liquidity constrained in their purchase of better peers and neighborhoods for their children, categorical aid that only relaxes liquidity constraints for spending within the current school district is of little help.

**Vouchers**

Several of the problems left unsolved by categorical aid can be solved by vouchers. Because vouchers can be categorical—for instance, means tested—they can address the same problems as categorical aid. However, since vouchers can be transferable between districts or schools, they can also help households demand optimal peers or cost-effective schools by sending their children to preferred school districts.

Consider what the ideal voucher would look like.[15] The hardest part is getting the incentives right for productive efficiency, so I will set up a basic voucher with that goal in mind (I will discuss categorical vouchers in a moment). The key for productive efficiency, remember, is that the school budget should be penalized when a high-demand household leaves and is replaced with a low-demand household, and the school budget should be rewarded when the reverse occurs. This implies that the voucher should be financed from the sending district's revenues and that the sending district's budget should fall by more than the cost of schooling the marginal student. Also, the receiving district should get more than enough revenue to compensate it for the costs of schooling the voucher-carrying student. To keep "sending" households from free-riding on households in the receiving district, the household of a voucher-carrying student should pay at least as much it would pay in property taxes if it were to buy property in the receiving district. This implies that the "sending" household will typically pay a supplement on top of its own district's property taxes.

To create a voucher program that gets the incentives for productive efficiency exactly right, we would need knowledge of the marginal costs of schooling a student in each district. However, a reasonable voucher that would be practical to administer would be one that paid the receiving district its average per-pupil spending and financed this by 1) taxing the sending district its average per-pupil spending; 2) taxing the sending household the difference between average property taxes in the receiving district and its own property taxes; and 3) splitting equally the responsibility for any remaining voucher amount between the sending district and household.

A categorical voucher composed of the basic voucher plus categorical aid can solve the same problems as categorical aid, and it can do more. Categorical vouchers can relax liquidity constraints that prevent households from moving to better districts. They encourage the household of, say, a disabled child to get the most for its money by taking the voucher to the most efficient provider of schooling for the disabled. Also, categorical vouchers do not give schools as much incentive to manipulate categories as categorical aid does. This is because a school that obtains a larger categorical voucher for a student cannot guarantee that the student will not take the voucher elsewhere, resulting in a decrease rather than an increase in the school's budget.

To this point, the discussion of vouchers has assumed that they would only be used for public schools. Extending vouchers for use in private school requires some additional arguments. For example, private school vouchers can be justified as a way of allowing households with unusual tastes to make better schooling choices. Private school vouchers can also be justified as a way of intensifying the incentives for productive efficiency in certain situations; for example, where the structure of public school districts is unlikely to support a strong Tiebout process; or when inner-city households cannot use public school vouchers to use suburban, public districts

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[15] See Manski (1992) for a theoretical discussion of a variety of voucher structures.

because of prohibitive distance; or when the public sector needs to be pressured to make production decisions more like the private sector (for example, perhaps wages of unionized public school teachers have gotten too far out of line with those of nonunion private school teachers). Clearly, the optimal size and financing of a private school voucher would depend on which of these problems it was designed to address.

A full discussion of possible private school vouchers and their effects is beyond the scope of this paper, but two points should be noted.[16] First, since private schools can select their students more carefully than public schools, the voucher should be smaller than the per-pupil spending of the sending district. Second, since all the justifications for a private school voucher are even more likely to apply to poor households or households with disabled children, private school vouchers should be means tested and categorical. Means testing would have the additional benefit of making a private school voucher program less expensive, since fewer high-income families whose children already attend private school would be able to use it.

In terms of how private school vouchers actually affect school finance, the direct evidence is very slight, largely because private voucher experiments are typically small or recent, or both. For example, studies of the Minneapolis voucher experiment focus on how the students who choose to use vouchers are affected (Martinez et al., 1995). Since this experiment had only 1,000 vouchers, available only to low-income households, the public schools were unlikely to be much affected. Hoxby (1996b) obtains indirect evidence on the effect of private school vouchers by looking at variation among metropolitan areas in the average tuition subsidy offered by Catholic schools, which can be taken as exogenous since it is based on historical differences among metropolitan areas in the density of the Catholic population. The parallel between vouchers and tuition subsidies at private schools financed by donations is that, from the household's point of view, both function as discounts off private school tuition. The findings are that areas with larger tuition subsidies have higher private school attendance and significantly better public school productivity.

Because several states have recently enacted public school vouchers on a statewide basis, additional direct evidence will be available in a few years. Current anecdotal evidence suggests that administrators in districts that lose students almost immediately feel consequences (Massachusetts Executive Office of Education, 1994). Relatively few households are likely to change their behavior when vouchers are available, especially among suburban residents who are already well sorted. However, many city residents are likely to use vouchers to exercise the degree of self-sorting that suburban residents already exercise. Evidence from the five states with public school vouchers indicates that low-income households account for much of the use of public school vouchers (Martinez et al., 1995).

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[16] A reader interested in this debate might begin with Epple and Romano (1995) and Nechyba (1996).

In concluding this analysis of vouchers, it is worth emphasizing that discussion of vouchers has been badly confused in the past because people often analyze them relative to a theoretical world in which the public schools are perfectly integrated with respect to income and human capital. Instead, they should be analyzed relative to our real world, where many people already live in quite homogeneous school districts and school finance cannot prevent people from sorting on the basis of their demand for human capital spillovers. Essentially, vouchers bring the forces of the Tiebout process to areas where it does not provide much discipline, such as in central cities and the productive efficiency of public schools relative to private schools. Where the Tiebout process already functions strongly, vouchers could be almost irrelevant.

**School Finance Equalization**

Equalization aid comes in two main varieties. Foundation aid guarantees districts a per-pupil spending floor; power equalization guarantees districts a certain per-pupil revenue for every percentage point of their tax rate on property, regardless of their tax base.[17] For this discussion, the key thing to understand about equalization aid is that these guarantees are funded by taking revenue from districts with high property value per pupil and giving it to districts with low property value per pupil.

The undesirable consequences of such redistribution stem from the difference between property tax bases and income tax bases. Property values partly reflect households' ability to pay, but also reflect households' schooling demands. If two households have identical income but one household has higher demand for schooling that is capitalized into its house price, the high-demand household is taxed more. Families who have made unusual sacrifices of consumption to get their children into school districts that spend more will suffer most. This differential treatment is highly undesirable and always makes equalization aid inferior to the parallel type of categorical aid funded with a statewide income or sales tax. For instance, foundation aid is inferior to a mandatory spending floor combined with categorical revenue aid for households with low income.

Most foundation aid programs do not actually generate high enough marginal tax prices on high-demand households to have much discouraging effect on spending, so the gain from replacing them with categorical aid would probably be small (Hoxby, 1996a; Downes and Shah, 1994; Evans, Murray and Schwab, 1995). However, some power equalization programs actually do impose a high marginal tax price on high-demand households and really do discourage families who would like to devote an unusually large portion of their incomes to education (Hoxby, 1996a). Of course, the crucial problem with equalization aid is that it is not inframarginal

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[17] For the purposes of this discussion, "guaranteed tax revenue" equalization programs are sufficiently similar to power equalization to require no separate analysis. See Gold, Smith and Lawton (1995) for a detailed description of different types of equalization aid.

to individual and local spending choices: local spending affects property values, which affect equalization aid.

## Conclusion

Local school finance makes decentralized use of information generated by household choice to improve allocative and productive efficiency in a public school system. Several of the problems left unsolved by local finance can be greatly mitigated by modifications that need not upset its good marginal incentives for efficiency. I do not mean to imply that society is likely to engineer a perfect school finance solution, but only that we could be much worse off than with our current hodgepodge system, and we could be much better off if by making the best use of the means available. This, in fact, is my main conclusion: the efficiency-equity trade-off in school finance is not nearly as stark as it is portrayed in the contentious debate about centralized and local finance.

I think the two biggest concerns about public schools right now are the fact that rising spending has not brought higher average student performance and worry about students from disadvantaged backgrounds, who have not benefitted as much as was hoped from the increased spending on their schooling. The remedy that best suits both these concerns is categorical (that is, means tested and disability tested) vouchers for public and, possibly, private schools. It is essential, however, that vouchers not only have the right monetary values but have the appropriate finance properties. It is a shame that so much of the energy for school reform appears to be focused on two reforms with inferior properties: centralized finance and power equalization/guaranteed tax revenue aid. Finally, though educational spending levels have not generally failed, they are at risk in states that have completely centralized or gone too far in substituting power equalization aid and guaranteed revenue aid for categorical aid. Such trends in school finance should be reversed.

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