

Chicago Fed Letter

Resources, outcomes, and funding of public schools

On June 7–8, the Federal Reserve Bank of Chicago held the second of three conferences on education reform. Conference participants discussed and evaluated the degree to which school spending and financial reform affect student outcomes, comparing school effects with the influence of home, peer groups, and community.

Returns to education

James Heckman, Henry Schultz Distinguished Service Professor of Economics, University of Chicago, believes that current policies regarding education and job training are based on fundamental misconceptions about the way socially useful skills are produced and precisely what those skills are. An undue emphasis on formal schooling arises from three blind spots. The first is a failure to recognize that learning is a lifetime affair; early learning begets later learning and early success breeds later success. Thus, policies directed toward families more effectively improve school performance than expenditures on teacher salaries or new computers. Heckman noted that current funding availability for low-income students is not an impediment to college enrollment. Rather, pre-adult preparation and socialization should be the focus. A second blind spot is the belief that achievement tests and various measures of cognitive abilities indicate the success of educational intervention. This ignores the full array of socially and economically valuable noncognitive skills produced by schools, families, and other social institutions. For example, enriched early intervention programs do not substantially alter IQ. However, they substantially raise noncognitive skills and the social attachments of participants.

A third blind spot is the failure to recognize that parents can choose wisely if offered choices about their children's education. An emerging body of evidence indicates that competition and choice improve the quality of schools, as measured by test scores and parental and student satisfaction. Heckman further contrasted the poorly performing U.S. public school system—characterized as local monopolies with few competitors—with the competitive U.S. university system, which attracts students from around the world.

Resources and outcomes

One of the first topics tackled at the conference was the resources devoted to and outcomes emanating from public education. Using information from Wisconsin public schools during the 1950s, Craig Olson and Deena Ackerman of the University of Wisconsin–Madison find that the level of high school inputs for males is strongly related to their level of earned income in their mid-thirties. Overall, Olson and Ackerman find a positive relationship between the earned income of male students 17 years after graduation and the length of the school year, the average education level of teachers, the level of teacher experience, and teacher salaries when they were in high school. Olson and Ackerman encountered an unexpected positive relationship between the pupil/teacher ratio and earnings. They attribute this phenomenon, however, to the strong positive correlation between the pupil/teacher ratio and the variables of teacher quality and school district size. Additionally, their results suggest that larger districts tend to hire a high-quality work force before lowering class size. Finally, Olson and Ackerman examined how a parent's education or income affects the earned income of students.

They find that a parent's level of education or income augments students' earned income by a factor 50% larger than the effect of school resources. They conclude that the parental education and income variables serve as indicator variables to other important background variables in how we measure the resources and outcomes of a student's education.

Continuing this discussion, Jeffrey S. Zax, University of Colorado at Boulder, and Daniel I. Rees, University of Colorado at Denver, explored how background variables, such as peers, friends, and family characteristics, individual ability, and individual effort, affect the earned income of males at ages 35 and 53.

Zax and Rees find that parental occupation and education have a small impact on earned income and sibling structure is relatively unimportant. The level of earned income is positively related to cognitive ability, family material resources, parental aspiration, and even socialization through exposure to some parental occupations. Parental educational credentials, however, appear to have little influence on the level of earned income. As for community variables and earned income at age 35, Zax and Rees find that the average parental income of high school peer households is positively related to individual earned income. This may be due to the fact that these incomes represent both the level of community inputs devoted to education and the socialization that occurs as students are exposed to successful individuals in the work force. The characteristics of high school peers appear to have little influence on earned income. One exception is that earned income tends to decline as the proportion of peers who plan to engage in farming increases. The ambitions and attitudes of friends have a stronger effect on earned income at age 35. Zax and

Rees find that the size of the town of high school attendance bears no relationship to income but that income increases with the size of the high school attended. This may indicate economies of scale in the production of education. Students' effort is positively related to earned income and accounts for a good deal of IQ's effects on earned income. Overall, Zax and Rees find that additional schooling and effort could compensate for a deficient environment and family structure. At age 53, these variables affect the level of earned income in much the same way but with a lesser degree of reliability. Importantly, at least 85% of the variation in earnings at age 35, and at least 75% at age 53 remains unexplained by the statistical analysis.

Thomas F. Pogue and Chia-Hsing Lu, University of Iowa, and James Maxey, American College Testing, attempted to determine whether school spending affects achievement as measured by American College Testing (ACT) Assessment scores. Controlling for influences of family, peers, and community, Pogue, Lu, and Maxey find that ACT scores are positively related to per-pupil expenditures. Spending matters more when devoted to at-risk students and when overall school spending is lower. The effect of spending on test scores, however, is much weaker than other factors. Minority students score lower than similar white students, with African American students being at the greatest disadvantage. Furthermore, both white and minority students who attend schools that are segregated (more than 50% of minority students in the sample) have significantly lower scores than otherwise similar students. The test score differential between white and minority students is reduced when various environmental variables are accounted for. Students from low-income families and high-poverty school districts (poverty rate of 25% or more) score lower than similar students from middle-income families and low-poverty school districts. Additionally, test scores are lower for students from families in which English is not the primary language. Pogue, Lu, and Maxey find that even when students choose the most academically demanding courses, their ACT scores continue

to depend on the positive and negative consequences associated with their environment. Their results affirm a widely held conclusion that educational outcomes are not equalized across income classes and ethnic groups. Furthermore, they find that schools fail to achieve equalization of educational outcomes for even the most successful students—those who not only complete high school, but also choose a more rigorous curriculum and plan to attend college.

Outcomes of school finance reforms

Sheila Murray, University of Kentucky and Northwestern University, addressed parental choice between public and private schools to estimate the value families place on school quality. If families believe that money matters, then we would expect them to choose public schools when public spending is high and private schools when it is low. Thus, a test of the hypothesis that money matters to parents is a test of whether school spending in a community is negatively related to the fraction of families that elect private schools. One analytic problem is that numerous factors are involved in community choice; school spending is dependent on these factors, which could bias the analysis. To control for possible bias, Murray (in joint work with Bill Evans and Bob Schwab, University of Maryland) uses an independent shock to school spending—court mandated school finance reform. By 1998, 43 state supreme courts had heard cases on the constitutionality of school finance systems. The courts overturned systems in 18 states and upheld them in 20; cases are pending in the remaining five. Murray, Evans, and Schwab's research shows that as a result of court ordered reforms, spending rose by 11% in the lowest spending school districts, by 7% in the median district, and remained roughly constant in the highest spending districts. They also find that court-ordered reform does not increase (and may well decrease) private school enrollments. An increase in per-pupil public school resources of \$2,000 would decrease the share of private school enrollment by 1.5 percentage points.

David Figlio, University of Florida, examined the effects of the degree of competition among public schools and pupil-teacher ratios on student enrollment in private schools. A high degree of competition may serve to drive up quality within public schools, lessening parental demand for private schools. Similarly lower pupil-teacher ratios are taken as signs of quality, which should reduce private school enrollment. Figlio finds that increased competition in public schools serves to reduce private school enrollment, and pupil-teacher ratios serve to increase the probability of private school enrollment. Highly educated and high-income families are most sensitive to these changes. The aim of public school finance reforms has been to reduce the differences among residents. However, in joint research with Thomas Downes, Tufts University, Figlio concludes that court mandated school reforms do little to reduce stratification across schools by race, income, or parental education, nor do they effect much change in the distribution of student outcomes. However, a growing body of research suggests that the imposition of tax and expenditure limits results in long-run reductions in the performance of public school students.

Daniel Aaronson, Federal Reserve Bank of Chicago, examined the effect of school finance reform on the composition of communities. Prior to such reforms, communities competed for residents by offering different packages of services (schools, property taxes, etc.). Individuals effectively "voted with their feet" and resided where they received the most benefits. Under these circumstances, communities can become quite disparate with respect to public services, such as educational spending. School finance reforms aim to equalize school resources across communities. The packages offered by communities are constrained by the legislative mandate. Individuals may attempt to circumvent such mandates by providing resources to schools in an indirect fashion. This "bake sale" effect allows schools to draw resources from beyond the standard pool. Using a national dataset of school districts, Aaronson finds that

school finance reform does affect households' choice of residence. Among low-income communities, there appears to be an increase in the share of low-income households in states that uphold the constitutionality of public school financing. Among high-income communities, school funding reforms matter only in low property value school districts.

Funding and tax reforms in the Midwest

Larry DeBoer, Purdue University, discussed the dynamics of school finance in Indiana. Since the early 1980s state-wide enrollment has been almost constant. Total spending has grown with the national average. The shares of property taxes and state aid in local revenues are nearly unchanged. The current regime began with legislative change in 1963 and 1973. DeBoer argued that the established legislative majority was uprooted by changes in the funding environment at the time—such as rapid enrollment growth, property tax reassessment, and legislative district reapportionment. The current funding scheme grew from the preferences of the new legislative majority. DeBoer noted that school finance was very stable until exogenous changes to the funding environment forced the disbanding of old political coalitions in favor of new ones. He added that the existing school reform regime supported by the majority will continue until a new shift in the funding environment occurs.

One such change may be on the horizon. In December 1998, the Indiana Supreme Court found the state's property assessment regulations unconstitutional. The state is considering new assessment procedures that, if enacted, will drastically reorder the tax bills of homeowners, businesses, and farmers and may require legislators to reassess the current school funding mix of state aid and property taxes.

Richard F. Dye, Lake Forest College, and Therese J. McGuire, University of Illinois at Chicago, discussed the impact of funding reform on schools in Illinois. Significant changes in Illinois's school aid formula were enacted in December 1997, but the new law provided no property tax relief. Overall,

state formula-based aid increased by around 20%. The "foundation level" of aid was increased to \$4,225 per pupil. The preexisting practice of giving disproportionate aid to high school students was eliminated and the practice of directing extra aid to low-income students was replaced with a new formula for supplemental grants based on the percentage of low-income pupils in the district. While the amount of poverty-based funding has increased, there are problems with distribution. The use of floors for eligibility means there are similar districts receiving different amounts of aid. Second, the formula creates an undercounting of low-income high school age pupils within districts.

Dye and McGuire also examined the effects of a property tax limitation measure imposed by the state on several jurisdictions in the Chicago metropolitan area in 1991. They find that the "cap" on property taxes slows their growth and the growth rate of operating expenditures of school districts. However, the growth rate of instructional spending (operating expenditures minus administrative and staff support expenditures) is unaffected. Dye and McGuire (in a joint paper with Downes) find slightly lower third-grade math scores in school districts subjected to the cap, but third-grade reading scores are largely unaffected.

Researchers Jennifer Imazeki and Andrew Reschovsky, University of Wisconsin-Madison, explored the link between school finance and the achievement of student performance goals. They argued that the key to linking educational outcomes to school financing is the integration of cost considerations into school financing formulas, where costs are defined as the minimum amount of money that a school district must spend in order to achieve a given education outcome. Examining data from all K-12 public school districts in Wisconsin, they find that costs vary substantially. Imazeki and Reschovsky developed a school aid formula designed to guarantee that each school district has sufficient resources to provide its students with an adequate education.

The results using 1996-97 data indicate that the state could finance adequacy by increasing aid to local school districts by approximately 6%. Adjusting the formula for cost differences increases aid for the 130 of 368 K-12 districts that have above-average costs and decreases aid for districts with below-average costs. The simulations show that the occurrence of high costs is not closely correlated with school district property wealth. Of course, providing enough resources does not guarantee that students will be provided with an adequate education. Additional financial resources must be accompanied by strict accountability.

Aftermath of Michigan's "Proposal A"

Julie Berry Cullen, University of Michigan, and Susanna Loeb, University of California at Davis, discussed their research on the effects of federal spending grants and mandates on local school systems. They argued that the effects of such policies are mitigated by the responses of local government. For example, a mandate that imposes a floor on spending on a specific activity can be "undone" by the local government through reductions in spending on activities that either benefit the same population or rely on the same inputs. Thus, fiscal substitution at the local level can undermine state and federal

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policy goals of school finance equalization. Many states have recently implemented reforms intended to reduce variation in per-pupil spending across districts by constraining high-spending districts from above, constraining low-spending districts from below, or simultaneously constraining both types of districts. Cullen and Loeb focused on Michigan's Proposition A, a 1994 reform that imposed strict spending floors and ceilings on operating expenditures for public school districts, replacing a matching grant system that had allowed local discretion in determining spending on education. They find preliminary evidence for fungibility within the education budget. Districts that are constrained to spend "too much" on operating expenditures report lower per-pupil capital expenditures and lower community service expenditures, and are less likely to approve levying taxes to support capital projects, holding all else equal. Residents of constrained districts may vote to reduce spending on activities that either otherwise benefit school-age children or could use the "reduced-price" school facilities, such as parks or community centers.

Leslie E. Papke, Michigan State University, discussed the effects of Michigan's K-12 school finance reform. In 1994, the state dramatically changed K-12 school funding from a system

that allowed large differences in per-pupil spending to one that guarantees a basic foundation and sets spending limits on higher-spending districts. The reform was driven by hopes that increased spending in formerly low-spending schools would improve student performance. However, Papke finds mixed results. Her preliminary estimates, using data from 1991 to 1997 published by the Michigan Department of Education, indicate that a 10% increase in last year's per-pupil instructional spending increases the fourth-grade math, reading, and fifth-grade science pass rates this year by about 0.4 percentage points. She finds no effect of spending on the pass rates for the seventh-grade math test and increases in the seventh-grade reading and science pass rates this year by about 0.3 percentage points. Using another statistical approach, the coefficient increases to 0.85 percentage points for science, but is small and statistically insignificant for the reading test. A possible criticism of this approach is that low-spending, low-performance schools experience both the greatest growth in spending and the easiest path to higher pass rates.

Jeffrey Guilfoyle, Michigan Department of Treasury, presented his research on housing prices in Michigan, which reflect school spending and property taxes. Houses in communities with low property taxes are expected

to be priced higher, all other things equal, than houses with higher property taxes. Similarly, houses within higher-spending school districts should sell at higher prices than low-spending districts. Generally, the effect is difficult to decompose, given that houses with lower property values require higher property taxes to fund basic public services. Current school reforms in Michigan have provided a natural experiment to decompose the effect of school spending and property tax rates on housing prices. Property tax rates were exogenously cut by differing amounts across communities. School spending also changed in many of the communities. Guilfoyle argued that the exogenous change in property tax rates and school spending solves the causality problem. Examining house sales in Oakland County, Michigan, both prior to the reform and after, He finds a \$1.00 tax differential, leading to a price differential of \$4.25 to \$9.93. Guilfoyle estimates a \$100 difference in school spending leads to a price differential ranging from zero to 0.5%.

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