Two opposing camps dominate contemporary discussions of how to improve America's schools. One identifies as the central problem the limited resources currently available, while the other contends that entirely new systems of school choice and accountability are needed to promote the efficient use of resources.

These issues are among those Princeton economist Alan Krueger addresses in *Education Matters*, a collection of influential essays on the economics of education. Krueger is among the most prominent academic researchers advocating an increase in resources within the existing system of public schooling.

In this regard, Krueger's essay on Tennessee's experiment in class-size reduction, reprinted from the *Quarterly Journal of Economics* (1999), stands out as one of his more important contributions. The STAR experiment, which ran from 1985 through 1989, involved more than 11,000 elementary-school children in 80 Tennessee public schools. Each school assigned students to one of three types of classrooms: 1) small classes, with enrollments of 13 to 17 children; 2) regular classes with 22 to 25 children; and 3) regular classes with 22 to 25 children and a full-time teacher's aide in the room. STAR is significant in that it is the only large-scale experiment in the United States involving the random assignment of students to classrooms of various sizes—a design rarely found in research on class size.

The results showed sizable jumps in achievement associated with the first year in a small class, but only weak evidence that additional years in a small class further enhance achievement. These results contrast with the results of nonexperimental studies, which often find no benefit from reducing class size.

It is important to note that the STAR program did not generate perfect data. Attrition rates from the study were high, and baseline test scores were not available. The experimental design was compromised on other dimensions as well. That said, Krueger does a good job of explaining the patterns in the data and placing the results in context.

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Spending and Wages

Another set of papers, written with economist David Card, also finds positive relationships between education spending and economic outcomes, this time by focusing on the effect of expenditures on a person's earnings rather than test scores. The idea is that schooling imparts a range of skills that may not be revealed by standardized tests but will show up in students' later performance in the marketplace, a point that is certainly well taken.

Such analyses nonetheless confront a difficult statistical problem. Wages for workers of a given skill and occupation vary among different geographic labor markets. Thus levels of school spending may be correlated with wages for reasons that have nothing to do with individual skill levels.

Card and Krueger adopt a creative strategy in attempting to circumvent this dilemma. They examine how wages vary among people who currently reside in the same labor markets, but they look only at workers who live in a state other than the one in which they were born. Card and Krueger first measure the percentage increase in earnings associated with an additional year of schooling for each group of migrants who were born in the same state and in the same decade. They then examine the relationship between these rates of return to education attainment and the levels of school resources devoted to various cohorts born in a particular state. In a paper published originally in 1992 in the *Journal of Political Economy*, Card and Krueger report that the rate of return to an additional year of schooling was higher among men born between 1920 and 1949 in states that provided longer school terms, higher teacher salaries, and lower ratios of students to teachers.

However, a subsequent paper by economist James Heckman and his col-
leagues raised doubts about the assumptions in Card and Krueger’s empirical model. They showed that the Card and Krueger results were driven primarily by the high payoff of a college degree among students who attended elementary and secondary schools in states with high levels of school resources. The return to finishing high school was not higher among workers from states with well-funded high schools. I do not know exactly why this pattern of correlations emerges, but it does raise questions about the correct interpretation of Card and Krueger’s results.

Using similar strategies, Card and Krueger also examined the relationship between black-white earnings differences and black-white differences in measured school quality. These analyses are particularly interesting because they cover time periods in which many southern states provided far more resources for white schools than for schools attended by black children. The analyses used earnings data from the 1960, 1970, and 1980 Census files as well as data on school inputs in 18 segregated states from 1915 to 1966. Card and Krueger pieced together data on term length, teacher pay, and student-teacher ratios from several sources and examined whether differences in school resources among states and within states over time help to explain the variation in black-white wage differences among adults born in different states.

One set of analyses involved only blacks born in southern states who moved to specific metropolitan areas in the North. The results indicated that better-funded schools are associated with higher returns from schooling. It is possible that these analyses were compromised by nonrandom patterns of migration. However, given the low rates of college completion among southern blacks during the period they looked at, I doubt that the earnings of college graduates contribute much to the results.

As a whole, the paper provides considerable evidence that, in many southern states, the practice of separate and unequal schooling for blacks and whites during the first half of this century contributed significantly to the economic deprivation of southern blacks. Furthermore, the overall improvement of black schooling relative to white schooling, even before the integration of schools in the 1960s, contributed to the economic progress of southern blacks. These results may not speak directly to current education policy debates because no group in our society attends schools that are as poorly funded as those attended by many southern blacks before the Civil Rights Movement. However, the results are a noteworthy addition to a significant literature that documents the historical role of education policy in denying opportunity to black Americans.

Off the Table
In his final chapter, originally written for a Federal Reserve Bank of New York conference, Krueger maintains that there is no immediate need for dramatic reforms in the school system. He writes:

My personal view is that policymakers should be risk-averse when it comes to changing public school systems. To alter the institutional structure of U.S. schools radically without sufficient evidence that the “reforms” would be successful is to put our children at risk. . . . careful experimentation and evaluation should proceed on a limited basis before wide-scale institutional changes are introduced, such as vouchers, magnet schools and charter schools.

I’m sympathetic to Krueger’s position that small experiments, evaluation, and incremental implementation are the prudent course with respect to school vouchers and related reforms. However, a similar argument can be made concerning reductions in class size, although Krueger generally treats reducing class size as a straightforward reform within the existing system of public schools. For example, in his paper on the STAR experiment Krueger argues that reducing class size by roughly seven students may be expected to enhance future earnings by an amount greater than or equal to present value to the current costs of smaller classes. Krueger admits that his calculations are rough and that it is hard to place a dollar value on the potential gains from reduced class sizes, but I am equally concerned that we do not really know how much it would cost to fund a large-scale reduction in class size while maintaining the current level of teacher quality.

Recent evaluations suggest that California schools did compromise teacher quality when they were forced to reduce class sizes dramatically in a short time period, and this result is expected. Good teaching requires skills that many people do not possess, and large-scale reductions in class size require large increases in the stock of teachers. Thus, significant reductions in class size cannot likely be accomplished over a short time horizon without compromising teacher quality. Furthermore, unless there is a much larger pool of potential elementary-school teachers than I imagine there is, a large expansion of the elementary-school teaching force would likely result in a long-run reduction in average teacher quality or require significant increases in salaries. Finally, given the wage schedules in public schools, any salary increases for elementary-school teachers would likely be enjoyed by secondary-school teachers as well, even if secondary-school class sizes remained unchanged.

As it stands, a thorough analysis of these issues would have nicely complemented Krueger’s work on the STAR experiment and the other papers in Education Matters. Krueger’s research provides some of the most credible evidence that small classes yield higher achievement, but more work is needed to demonstrate that the benefits of smaller classes outweigh the likely costs.

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