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The Economic Payoff to Investing in Educational Justice

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The quest for educational equity is a moral imperative for a society in which education is a crucial determinant of life chances. Yet whether there is an economic return to the taxpayer for investing in educational justice is often not considered. It is possible that the economic benefits of reducing inadequate education exceed the costs, returning a healthy dividend to the taxpayer. This article addresses a four-decade quest to ascertain the fiscal consequences of investing in effective approaches to reduce inadequate education in the United States. It uses economic analysis to calculate both the costs of effective strategies to raise high school graduation rates and their benefits to the taxpayer in higher tax revenues and reduced costs of criminal justice, public health, and public assistance. The results suggest that improving educational justice provides substantial returns to taxpayers that exceed the costs.

Keywords: benefits; costs; economics of education; educational equity; educational finance; educational investments; return on investment

Educational equity is a moral imperative for a society in which education is a crucial determinant of life chances. Yet there is reluctance by some authorities to invest in our most needy populations and even a skepticism about whether money makes a difference in educational results for such students (e.g., Hanushek, 2002). Fairness in access to good education is a matter of justice rather than simple economic rationality as measured by investment returns. Yet one can also ask whether there is a positive economic return on this investment, even beyond the issue of educational fairness. We know that inadequate education affects not only the poorly educated individual but also the society because of lost productivity, lower tax revenues, and higher costs of public services. Therefore, it is useful to consider not only the important issue of educational justice but the question of whether seeking such justice through greater educational investment in at-risk populations provides an overall economic payoff to the public that exceeds the costs. This issue, specifically as it applies to the United States, has been a preoccupation of mine from my early career to the present, where I am now of a certain age.

My attempt to address this question began almost 40 years ago in the early autumn of 1970, when I received a call from a staff member of U.S. Senator Walter Mondale's Select Senate Committee on Equal Educational Opportunity asking me to testify on how the federal government might improve equality of educational finance. The Committee was established to buttress the momentum of the major civil rights victories and the War on Poverty reforms of the 1960s. It was also charged with addressing the surprising finding, asserted by the Coleman Report (Coleman, 1966), that improved educational finance could not benefit poor and minority students who remained in schools with high concentrations of similar classmates. Only since 1968 had serious desegregation gotten under way, and the Committee sought to set out an agenda of what should follow.

I trekked to Washington from San Francisco and delivered my prepared testimony before the Committee on October 1, 1970, responding to questions from Senator Mondale and his colleagues and staff members of the Committee on ways to improve equity in educational finance (U.S. Senate, Select Committee on Equal Educational Opportunity, 1970, pp. 3503–3538). Upon completion of my testimony, the head of the staff approached and asked if I would have dinner with Senator Mondale. I was taken aback by the suddenness of the invitation, but, of course, I accepted. The dinner was palatable, although I knew that this was not a culinary event. At dessert and coffee, the senator turned to me with a formal challenge: "Our committee has entertained considerable testimony, all telling us that if we do not improve the education of the poor and minorities now, it will cost us far more later in terms of public assistance, crime, and lost productivity and taxes. But, when I ask these witnesses how much it will cost us, they all tell me they don't know. I want you to do a study

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FIGURE 1. *Henry Levin and Senator Walter Mondale, c. 1972.*

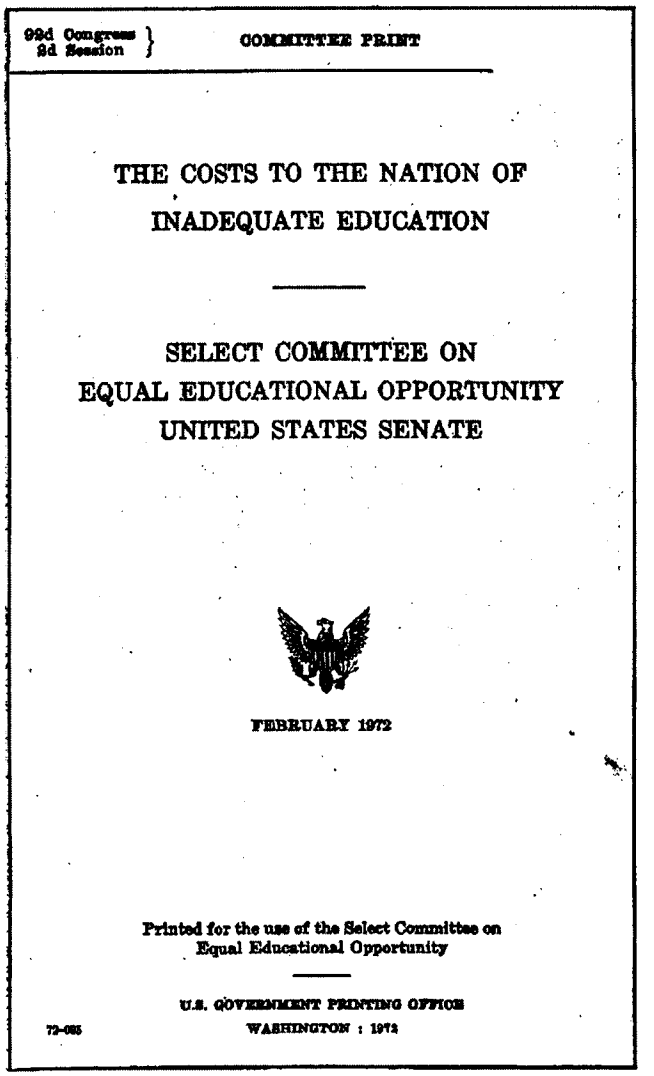
that tells us just what educational neglect will cost us, and how much we need to spend to prevent it."

I uttered a polite protest, telling him that such a study was too ambitious in scope and too ambiguous in precision to be done and that data did not exist linking educational attainment to the sources of these costs, and what did exist could not establish a causal connection. He smiled and asked me to have a scotch for contemplation, to consider the urgency of greater equity, and added that they had budgeted $10,000 for the study, an amount equal to about $50,000 at today's prices. As the scotch went down and my bravado went up, I agreed. (Figure 1 portrays the distinguished Senator Mondale and the upstart professor at the time that they met.) In the fall of 1971 I delivered the study to the Committee: "The Costs to the Nation of Inadequate Education." The report was published in May 1972 (Levin, 1972; see Figure 2).

The bulk of the study considered the effects of failure to attain a minimum of high school completion among men 25–34 years of age in 1970. Using lifetime income patterns by race and education level and adjusting for the presumed lower ability of the high school dropouts, I calculated estimates of the additional earnings associated with an increase in the number of high school completers, including the value of additional postsecondary education for the small number expected to continue at that level. On the basis of this analysis, I concluded that about $237 billion in lifetime income in 1970 dollars (about $1.2 trillion in 2004 dollars) was lost by failing to ensure that all persons in this cohort attained a minimum of high school completion. And there was a loss of about $71 billion ($350 billion in 2004 dollars) in government tax revenues. I also reviewed the effects of inadequate education on the costs of public assistance and crime, as well as evidence of the effects of poor education on reduced political participation, intergenerational mobility, and health costs.

Cost estimates for how to reach universal high school graduation were unavailable, so we proceeded on the assumption that schools would have to increase spending on compensatory resources by 50% for each at-risk student over all the years of schooling, a very large increase. The overall cost of this investment for the 25–34-year-old men in 1970 would have been about $40 billion in 1970 dollars ($200 billion in 2004 dollars). When I compared this apparently generous estimate of costs with the higher tax revenues that were expected to be generated, the public benefits were expected to be almost twice as large as the costs. I found that under a wide range of assumptions, a reduction in the number of poorly educated persons in the population would yield benefits well in excess of the costs—a worthy public investment.

The Senate Committee published its report and recommendations in 1972, and the report highlighted my economic analysis (U.S. Senate, Select Committee on Equal Educational Opportunity, 1972, chap. 13). But the report received little public or political attention, overlooked by a public outraged over the Vietnam War and exhausted by the struggle for civil rights and the War on Poverty of the 1960s. So the fact that we had found that the moral argument for educational equity was strengthened politically by the economic evidence did not attract much attention.



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THE COSTS TO THE NATION OF INADEQUATE EDUCATION

SELECT COMMITTEE ON EQUAL EDUCATIONAL OPPORTUNITY UNITED STATES SENATE

FEBRUARY 1972

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FIGURE 2. *Title page of 1972 version of* The Costs to the Nation of Inadequate Education.

Research Limitations in 1970

As a scholar I was both excited by our empirical findings and disappointed by the gaps in the data and in our knowledge base that might be used to challenge the findings. What were some of the gaps?

- Other than the income data from the Census that might be used to estimate tax losses from those with inadequate education, we had little information on the links between education and participation in public services. Even the suggestive data that were available could not reveal the causal relationship between poor education and the costs of criminal justice, public assistance, and health care. At best we had access to statistical associations without adjustment for a third set of factors associated with education, such as socioeconomic status, that might also account for the use of these social services independent of education. Thus there was a need for better data and social science models that would connect low levels of education with these outcomes.
- Although many interventions were promoted to reduce school dropouts, none had been subject to rigorous evaluations through experimental, quasi-experimental, or high-quality econometric studies. Thus we lacked specific interventions with reasonably predictable consequences for increasing high school completion, our criterion for a minimally adequate education.
- The lack of evaluation results also meant that we could not estimate costs directly, and what accounting data did exist on school interventions were not appropriate for estimation of the actual costs of interventions. Financial accounting practices for education had been developed primarily for public accountability on spending, not for determining the costs of specific programs or interventions. Indeed, school accounting procedures were antithetical to accurate cost accounting, with many conventions that violated the acceptable estimation of costs (Levin & McEwan, 2001).
- More specifically, the knowledge base on the consequences of education on life outcomes, evaluations of school interventions, and an understanding of school costs were woefully thin and, in some cases, nonexistent. This meant that much of the work that I had prepared for the Committee reflected calculations based on the "best" assumptions at the time, such as the cost of gaining high school completions. The result was that I and others were stimulated to focus on improving and refining the components of evaluation of educational investments for those at risk of failure.

Overcoming the first of these three major limitations—the lack of data linking public services to the education of clientele—would depend on government and other agencies having the motivation and resources to collect the necessary information for further analysis. However, the questions of which interventions "worked" and their costs were areas of inquiry that could be addressed by researchers. Those were the questions that I decided to pursue.

Improved Knowledge of Costs and Effects

My earlier work had focused on cost-effective selection of teachers. I compared the costs and apparent impacts of various teacher characteristics on student achievement by combining coefficients from educational production functions with costs obtained by estimating earnings functions for those characteristics in teacher labor markets (Levin, 1970). This early work found that selecting teachers who were more intellectually able, as measured by a vocabulary test, was 5 to 10 times as effective per unit of cost in raising student achievement as selecting more experienced teachers. Interestingly, this finding is reinforced by more recent findings on teacher test scores and recruitment of teachers from more academically selective undergraduate institutions (Wayne & Youngs, 2003). Although this type of analysis could point to general guidelines for selecting better teachers, it was not appropriate for ascertaining the effectiveness of specific instructional approaches and the costs of replicating them.

As information was sought from other researchers' early evaluations of the effectiveness of instructional strategies such as computer-assisted instruction and class size reduction, I began to devote myself to developing methods of estimating the costs of educational interventions. Using the most direct approach, I set out four stages of analysis: (1) accounting for the specific resources that needed to be used to obtain the effectiveness results, such as personnel, facilities, materials, and so forth; (2) using market and quasi-market or shadow prices to place costs on these resources; (3) obtaining total costs for the intervention as well as average costs and marginal costs per student; and (4) analyzing the distribution of cost burdens among governmental and nongovernmental entities and clients to find out who was paying for the intervention (Levin, 1975).

This approach had two benefits for evaluators. First, most of the basic construction of the cost modeling for an intervention could be carried out by the developers or implementers of the intervention rather than requiring a cost accountant or economist. Data could be gathered through reports, observations, and interviews. Second, the data could be assembled on a spreadsheet, even prior to the availability of computerized financial spreadsheets such as Excel, which would enable an overall picture of costs and their determinants, as well as easy modification for hypothetical changes in assumptions. Of course, later development of computer spreadsheets not only facilitated the data assembly but also expanded the possibilities for analysis.

I was fortunate in being asked to develop methodologically the chapter on cost effectiveness for the first *Handbook of Evaluation Research* (Guttentag & Struening, 1975), a publication of the fledgling Evaluation Research Society. My chapter, "Cost-Effectiveness Analysis in Evaluation Research," presented the initial framework in the literature for implementing cost analysis and combining it with effectiveness and benefit results to choose among alternatives. We applied these procedures to a study of the costs of emerging computer-assisted instruction (Levin & Woo, 1981), which showed cost components and their consequences for this new instructional strategy. The experience from these and other empirical studies using the cost model was incorporated into a book-length treatment of cost-effectiveness analysis for

evaluators (Levin, 1983), a volume that went through 13 printings before being replaced by a second edition (Levin & McEwan, 2001).

At this point, the famous *Nation at Risk* report (National Commission on Excellence in Education, 1983) was released, proposing a wide range of educational reforms. We decided to investigate which of these reforms had credible evaluations that we might use for a cost-effectiveness study. The search yielded only 4 reforms of the 20 or so that had been proposed that also had useful evidence on educational effectiveness, specifically on mathematics and reading gains in the elementary grades. With Gene Glass focusing on the effectiveness side of interventions, we compared the cost effectiveness for increasing reading and mathematics achievement of peer and adult tutoring, computer-assisted instruction, class size reduction, and longer school days (Levin, Glass, & Meister, 1987). Surprisingly, we found that peer tutoring had one of the highest costs because of the need for adult supervision, but it also had such large effects that it showed the highest cost effectiveness for improving student achievement in both subjects. This was followed at a distance by computer-assisted instruction (standard application of drill and practice), reduced class size, and a longer school day. The cost model was also adopted for other cost-analytic evaluations, such as Barnett's (1985) classic benefit–cost study of the Perry Preschool project. The model was also applied to health topics such as a World Bank study to ascertain the economic returns to investing in strategies to reduce iron deficiency anemia, a serious but preventable scourge in industrializing societies (Levin, 1986).

Calculating the Returns to Investing in Educational Equity

While developing the cost analysis in the 1980s, I developed a strong interest in educational reform for students who were at risk of educational failure. On the basis of research in the early 1980s on the growing student populations of immigrants, minorities, and the poor, I became convinced that the solution to improving the education of such students was acceleration, not remediation. Educational remediation was based on repetition through reducing the pace and challenge of instruction, a strategy that had the predictable consequences of increasing the achievement gap as other students followed a more challenging instructional experience. The Accelerated Schools Project adopted the opposite strategy of enriched instruction for all students, with the goal of bringing all students into the mainstream of learning. Although running counter to the dominant philosophy at that time, this approach was attractive to many teachers and schools and showed results in pilot programs.

For the next decade, my focus on cost-effectiveness and cost-benefit analyses was placed in abeyance and was displaced by my obsession with the Accelerated Schools Project, which grew to become one of the largest national educational reforms, with more than 1,000 schools in 41 U.S. states and in Hong Kong, Australia, and Brazil. To the degree that I was able to undertake research, much of it was evaluation research on Accelerated Schools as well as continuing work on issues of school choice and educational vouchers, movements that had emerged strongly in the latter '80s and early '90s. My leadership of the Accelerated Schools Project came to an abrupt end when I encountered a life-threatening health situation in the late 1990s that resulted in a plea by my physician to return to a normal academic life instead of one that combined teaching and other academic activities with a frenzy of travel, fundraising, personnel, and managerial responsibilities. After 31 years at Stanford, I took early retirement and moved to Teachers College, Columbia University, with the intention of returning to my previous field of research, the economics of education.

My first priority was to revise the earlier book on cost-effectiveness and cost-benefit analysis and an edited collection of applications of these tools to education (Levin & McEwan, 2001, 2002). But I also began to revisit the possibility of redoing the Mondale study. In the intervening three decades, many improvements had taken place in data availability, statistical models and computation, and understanding of the underlying relations between educational attainment and life chances. I kept wondering whether the earlier study from 1970 might be replicated at a more refined level some three and a half decades later, such that it could be used to guide public educational investment. More specifically, what was the economic payoff to the public for investing in an adequate education for all children? Did the costs exceed the fiscal gains to the taxpayer? And what proportion of the investment would be repaid through higher tax revenues and reduced demands for public services?

Fortunately, funding for the study was generously provided by two champions of greater educational equity, Lilo and Gerry Leeds. Because of the highly specialized knowledge required for various aspects of the study, I convened a team of highly regarded colleagues. They included Clive Belfield, an economist at the City University of New York; Cecilia Rouse, a Princeton University labor economist; and Peter Muennig, a faculty member and health economics specialist at Columbia University's Mailman School of Public Health. Together, this team planned and undertook the research.[1]

High School Completion as a Minimum

We began by setting the goal of high school graduation as the minimum standard for adequate education. High school graduation captures both the cognitive and the noncognitive attributes that are important for success in adulthood (Heckman, Stixrud, & Urzua, 2006), and it is usually a minimum requirement for engaging in further training and higher education. Most important, we focused on high school graduation because, for the population as a whole, the United States is far from meeting this standard. Moreover, international comparisons show the United States lagging behind a substantial number of industrialized countries in the rate of high school completion (Organisation for Economic Co-operation and Development, 2006).

Much attention has recently been devoted to determining rates of high school graduation but with no agreement on the exact numbers.[2] Some students may complete 4 years of high school but not graduate. Others graduate late. A nontrivial proportion obtains a General Educational Development (GED) diploma, which has been found to be inferior to graduation in terms of earnings and human capital (Cameron & Heckman, 1993). Nevertheless, there is general agreement on two facts.

Table 1
Educational Attainment of U.S. Population Aged 20 (in Thousands)

Population Group	Under Grade 9	Grades 9–11 (or GED)	High School Graduates	College Level	Total	High School Dropout (%)
Male	63	450	638	1,101	2,252	23
White	18	194	402	749	1,362	16
Black	6	69	99	127	301	25
Hispanic	38	168	104	48	358	58
Other	1	19	33	177	230	9
Female	33	259	508	1,183	1,983	15
White	6	100	297	822	1,225	9
Black	0	71	96	129	296	24
Hispanic	25	63	81	114	283	31
Other	2	26	33	118	179	16

Note. "Grades 9–11" includes persons with a GED. "College Level" includes those with some college and those with at least a B.A. degree. Dropout percentages include all persons with less than a complete high school education. From Current Population Survey of the U.S. Census (March 2005). Race-specific adjustments for rates of institutionalization to take account of incarceration are from Raphael (2004): The average rate of incarceration for Black, male high school graduates is 9%; for Black males with less than a high school education it is 23%. Race-specific adjustments for the GED that are shifted to the dropout category are from Rumberger's (2004) analysis of NELS 2000: Of all graduates, 15% of Blacks are GED holders, as compared with 8% of Whites.

First, U.S. graduation rates are low in absolute terms. On-time public high school graduation rates are approximately 66%–70%, meaning that approximately 3 in 10 students do not graduate through the regular school system within the conventional time allotted. Second, graduation rates vary by sex and race/ethnicity. On-time public high school graduation rates for Black male students are as low as 43%. This compares with 48% for Hispanic male students and 71% for White male students. Female graduation rates vary similarly across race and ethnicity but are higher overall. Thus, although a large proportion of each cohort meets conventional educational expectations, a significant number have not received an adequate education.

Table 1 shows the distribution of educational attainment for those aged 20 in 2005. These figures are based on the Current Population Survey of the U.S. Census but are adjusted to include those who are institutionalized (whom the survey does not count), to take account of those who are incarcerated; GED holders are treated as dropouts because as Cameron and Heckman (1993) show, their economic outcomes are much closer to dropouts than to high school graduates. The first two columns show that, from a cohort of 4.2 million persons, almost 100,000 have less than a 9th-grade education, and 709,000 are educated to a 9th–11th grade standard. Almost 1 in 4 men and 1 in 6 women are not high school graduates; and the proportions are significantly higher for Hispanics and African Americans.[3] We focus on the 709,000 persons with at least some high school education. With enhanced educational investments, these persons might graduate from high school.

Increasing the numbers of high school graduates will enable and motivate more individuals to attend college. We have modeled progression to college—conditional on high school graduation—in terms of attendance and completion at 2-year and 4-year colleges. We calculated rates separately by sex and race/ethnicity, assuming that new graduates are from relatively disadvantaged backgrounds, reflecting the fact that only education and not family resources is being changed. Using conservative progression rates we construct an "expected high school graduate," that is, a person who probabilistically either terminates education after high school or attends college or completes a degree. Speaking approximately, each new high school graduate has a probability of 0.8 of terminating his or her education after high school, a probability of 0.14 of attending but not completing college, and a probability of 0.06 of attending and completing a 4-year college degree.[4] Thus the "expected high school graduate" is the appropriate metric; inducing dropouts to graduate will automatically result in a modest increase of enrollment in postsecondary education, resulting in an extra set of economic benefits and costs.

Educational Interventions

To carry out the benefit–cost analysis for increasing high school graduation, we undertook a survey of more than 200 articles and unpublished papers to seek interventions that showed evidence of success. From this database we found only five interventions that we believed met reasonable evaluation standards using experimental, quasi-experimental, or rigorous econometric designs and showing convincing results on increasing high school graduation. The first column of Table 2 describes the five interventions. Two of the interventions focus on preschool, one on elementary school, one on high school, and one covering the K–12 years.

The preschool programs involved intensive educational programs with small group sizes and parental involvement. The Perry Preschool is a high-quality preschool program for 3- and 4-year-olds that was the focus of an experimental study using random assignment of applicants to the intervention or to a control group (Belfield, Nores, Barnett, & Schweinhart, 2006). The program was center-based for 2.5 hours each weekday morning, with a child-to-teacher ratio between 5:1 and 6.25:1, teachers trained in special education and early childhood development, home visits by teachers for 1.5 hours a week to work with parents, and

Table 2
Education Interventions and Costs in Present Values at Age 20

Intervention	Extra Graduates if Intervention Is Given to 100 Students	Present Value Cost per Student[a]	Present Value Cost per Expected High School Graduate[b]
Perry Preschool			
1.8 years of a center-based program for 2.5 hours per weekday, child/teacher ratio of 5:1, home visits, and group meetings of parents	19	$12,500	$90,700
First Things First			
Comprehensive school reform of small learning communities with dedicated teachers, family advocates, and instructional improvement efforts	16	$5,500	$59,100
Class size reduction			
Four years of schooling (Grades K–3) with class size reduced from 25 to 15	11	$13,100	$143,600
Chicago child–parent centers program			
Center-based preschool program with parental involvement, outreach, and health/nutrition services; based in public schools	11	$4,700	$67,700
Teacher salary increase			
10% increase in teacher salaries for all years K–12	5	$2,900	$82,000

Note. Data are from Belfield, Nores, Barnett, and Schweinhart (2006); Quint, Bloom, Rebeck Black, and Stephens (2005); Finn, Gerber, and Boyd-Zaharias (2005); Reynolds, Temple, Robertson, and Mann (2002); Loeb and Page (2000). Cost calculations are either from original sources or available from the authors of these works (for details see Levin, Belfield, Muennig, & Rouse, 2006).

[a]The unit cost of delivering the intervention.

[b]The cost of delivering the intervention to 100 students and the induced extra attainment in high school and college for the new high school graduates. Discount rate is 3.5% (see endnote 6).

parent group meetings. The Chicago child–parent centers (CPC) provided early childhood education and family-support services emphasizing mathematics and reading skills, using high staff-to-student ratios. (The CPC preschool program included both a preschool and a school-age program, but we focus on the preschool program because of its higher effectiveness.)

The class size reduction intervention is based on Project STAR, a 4-year randomized field trial in Tennessee. Students were randomly assigned to larger classes of 22–26 students or smaller ones with 13–17 students for up to 4 years' duration, from kindergarten to third grade (Finn, Gerber, & Boyd-Zaharias, 2005).

The high school intervention is known as First Things First, a comprehensive school reform (Quint, Bloom, Rebeck Black, & Stephens, 2005). First Things First is an example of the current wave of urban high school reform, with an emphasis on small learning communities, instructional improvement, and teacher advocacy for each student. Small learning communities require that schools or subunits of schools are limited to no more than 350 students. In addition, key teachers work together for several years. Each student is matched with a staff member who meets with the student regularly, monitors student progress, and works with parents to support student success. Instructional improvement focuses on high expectations and rigor in the curriculum, as well as engaging approaches that focus on state standards.

Finally, the teacher salary increase proposal evaluates the impact on graduation rates of a 10% increase in wages across all K–12 years. Increasing pay would motivate existing teachers and attract higher quality workers to the teaching labor force. The teacher salary increase study by Loeb and Page (2000) estimated the effects of raising teacher salaries on graduation rates using state data with a 10-year time lag for assessing the impact of higher salaries on graduation rates.

Table 2 shows the effects of these interventions in terms of increasing the number of high school graduates per 100 students. Since most students would have graduated anyway, the effectiveness of each intervention was measured only by the additional number of graduates it yielded from 100 students receiving the intervention. The Perry Preschool was the most effective, with 19 new high school graduates; at the opposite end of the spectrum, increasing teacher salaries by 10% would be expected to yield 5 new graduates.

Public Costs of the Interventions

Each of the interventions requires an investment of resources as well as the costs of additional years of schooling for the successful graduates.[5] The third column of Table 2 reports the costs per participant receiving the intervention, based on the inputs or ingredients needed in each case, using economic cost accounting

(Levin & McEwan, 2001) rather than school accounting procedures, which do not provide accurate cost estimates. When summarized as a present value at age 20 using a 3.5% interest rate, the cost per student ranges from $2,900 to $13,100.[6]

However, the total public cost must include two additional components. First, increasing the number of high school graduates will mean extra costs from extended attendance in secondary school as well as in college for those who are newly motivated to continue their educational careers. We include extra high school costs on the (conservative) assumption that only 2 extra years are needed to graduate. Additional costs for the small number of students who continue to 2-year and 4-year colleges is based on National Center for Education Statistics (2003) data and our expected progression rates. Second, although much of the investment is spread over a larger pool of potential noncompleters, we divide them only by the much smaller number of additional or "new" graduates, that is, the additional "successes," rather than those who would have graduated anyway. We do not know a priori who, specifically, would or would not have graduated, and it is not possible to perfectly target the interventions only to those on the margin of graduation. Thus the interventions are provided to a large population of students who are educationally at risk, but it is only the additional graduates yielded that are the focus of the costs and benefits of the investments.[7]

The total public cost per new expected graduate, measured in present value at age 20, is given in the final column of Table 2. This cost includes several components. The first is delivery of the intervention to all students in the vulnerable group, which of necessity includes many who would graduate regardless. The second is provision of extra years of high school for each new graduate. The third is provision of postsecondary education for those who go on to further study. The cost total is divided by the expected increase in high school graduates. In total, these costs are considerably higher than the unit cost of delivering the interventions. They range from $59,100 for First Things First to $143,600 for an intervention to reduce class size. Expressed in this way, it is clear that a significant investment is required to generate and support each new high school graduate. At issue is whether this investment is worth making.

Public Benefits of the Interventions

We have divided the fiscal benefits to the taxpayer into four categories: (a) additional tax revenues, (b) reductions in the public costs of criminal justice, (c) reductions in the costs of public assistance, and (d) reductions in the costs of public health. With additional education, it is expected that employment, productivity, and earnings of recipients will increase, generating growth in tax revenues. Additional education is also associated with declines in crime, public assistance, and dependence on the public health system. Rather than relying on simple statistical association, we tried to estimate the net effect of education on each outcome by following the evidence from the best causal estimates of others or from our own statistical estimations.

Education and Increased Tax Revenues

As reviewed by Rouse (2007),[8] empirical research establishes that the earnings benefits from education are genuinely causal rather than just correlational. That is, they are not attributable to unmeasured characteristics such as ability or aptitude. Nor are they attributable to "sheepskin" effects. The earnings premium for each additional year of education is substantively important, perhaps as high as 17%–20% (Carneiro & Heckman, 2003, pp. 148–149). Consequently, when individuals are not adequately educated, the state is losing potential income tax revenues.

We calculate earnings by education level from the 2003 and 2004 March Current Population Surveys of the U.S. Census, which covers households across the United States.[9] The surveys have many advantages. They contain individual reports of many kinds of income (such as that derived from wages and interest), in addition to social insurance (such as unemployment insurance) and transfer payments. They also have a measure of annual earnings based on an individual's hourly wage, the number of hours worked per week, and the number of weeks worked per year.

There are significant cross-sectional differences in employment, unemployment, and earnings by education level. These translate into large differences in lifetime earnings, which are reported in present value terms at age 20 in the top panel of Table 3. These figures include all persons, not just those earning an income; so they account for the effect of education on labor force participation rates and job stability. Over a lifetime, each White male high school dropout earns a total income of $627,000 calculated in present value at age 20; for high school graduates with no further schooling, the figure is $949,000; for college graduates it is $2,014,000. Black male dropouts earn $339,000, which is only one fifth of the earnings of a Black male college graduate. Hispanic and other non-White male dropouts do relatively well, earning more than $600,000. But they, too, earn considerably more if they graduate from high school or progress on to college. For females, the absolute differences in lifetime earnings are lower, but the disparities across education levels are equally strong. High school dropouts earn $235,000–$300,000 over a lifetime, as compared with approximately $1,000,000 for college graduates.

Tax revenue gains associated with higher earnings from high school graduation are estimated using the TAXSIM computer program administered by the National Bureau of Economic Research (Version 6). TAXSIM is a set of programs and data sets that allow for simulation of an individual's U.S. federal and state income taxes. We used the tax calculator, a program that recreates each year's federal and state tax law, and the March Current Population Survey of the U.S. Census to obtain a sample of individuals and their income sources. Finally, we included property and sales tax differences by education, although they contribute only slightly to our overall estimates.[10]

The bottom panel of Table 3 reports the differences in total income tax payments calculated in present values at age 20. These mirror the differences in earnings. Over a lifetime, a male dropout pays $130,000–$212,000 in income taxes. A male high school graduate pays $232,000–$358,000, and a male college graduate pays $610,000–$854,000. For female students, the effect of education is equally strong, but the absolute values are lower. Female high school dropouts contribute $73,000–$82,000 in income taxes. High school graduates contribute $139,000–$156,000 and college

Table 3

Total Lifetime Earnings and Tax Revenues in Present Values at Age 20

Population Group	High School Dropout	High School Graduate	Some College	B.A. Degree or Above
Earnings				
Male				
White	$627,000	$949,000	$1,164,000	$2,014,000
Black	$339,000	$637,000	$896,000	$1,485,000
Hispanic	$602,000	$719,000	$826,000	$1,552,000
Other	$618,000	$862,000	$1,036,000	$1,839,000
Female				
White	$235,000	$479,000	$604,000	$986,000
Black	$300,000	$420,000	$576,000	$1,150,000
Hispanic	$272,000	$416,000	$558,000	$1,088,000
Other	$249,000	$455,000	$587,000	$1,025,000
Income tax payments				
Male				
White	$212,000	$358,000	$462,000	$854,000
Black	$130,000	$232,000	$338,000	$610,000
Hispanic	$184,000	$256,000	$346,000	$751,000
Other	$201,000	$319,000	$418,000	$815,000
Female				
White	$77,000	$156,000	$234,000	$425,000
Black	$82,000	$145,000	$217,000	$470,000
Hispanic	$73,000	$139,000	$176,000	$405,000
Other	$75,000	$150,000	$212,000	$417,000

Note. Figures are in 2004 U.S. dollars, corrected for incarceration probabilities. We assumed 1.5% productivity growth in earnings and a discount rate of 3.5% (see endnote 6). Income tax payments are averaged from two estimates, one in which taxes are filed by households and one in which taxes are filed by single persons. Education categories reflect highest education level completed. Data are from 2003 and 2004 March Current Population Surveys of the U.S. Census.

graduates $405,000–$470,000. In our overall calculations we add sales and property tax payments, such that the disparities widen.[11]

Health Benefits

Increased educational attainment reduces mortality, changes health behaviors, and improves health outcomes[12] (Cutler & Lleras-Muney, 2006). The cumulative effects on health may be substantial: As a sharp reminder of differences in health status, Wong, Shapiro, Boscardin, and Ettner (2002) found that high school graduates live about 6 to 9 years longer than dropouts. We therefore anticipate significant government savings as education levels rise because of the direct impact of education on health and the indirect impact through gains in income and private insurance coverage.

Medicaid eligibility is based on income rather than on health status (Iglehart, 1999), so those with more education are less likely to qualify. They are also more likely to have higher quality jobs that provide health insurance. All citizens are eligible for Medicare at age 65. But persons under 65 who are on social security disability income also qualify for Medicare, and their per enrollee costs are three times those of nondisabled enrollees (Keehan, Lazenby, Zezza, & Catlin, 2004). So, to the extent that education reduces the probability of disability, it should also proportionately reduce Medicare enrollment and therefore reduce public costs.

We use data from the Medical Expenditure Panel Survey (MEPS; U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality, 2006), a nationally representative sample of more than 40,000 noninstitutionalized civilian subjects. Information is available on health-related quality-of-life scores and public insurance enrollments, as well as personal characteristics and medical expenses.[13] All analyses control for the highest educational level completed, sex, ethnicity, and age. Public sector costs data are from the National Health Accounts, which is generally thought to be more comprehensive than MEPS (Selden et al., 2001).[14]

Logistic analysis of the MEPS data shows significant lifetime differences in Medicaid and Medicare coverage across education levels. Across ethnic groups, dropouts enroll in Medicaid at rates of 15%–32% for men and 28%–51% for women. Graduates enroll at rates that are half this size, and those with college degrees enroll at rates of 1%–3%. A similarly strong relationship is found for Medicare coverage, although enrollment rates are lower (at 8%–13% for male dropouts and 6%–10% for female dropouts). Moreover, we believe that these enrollment differences reflect genuine differences in health status, not reverse causation (Cutler & Lleras-Muney, 2006).

These differences in coverage rates translate into differences in annual per capita costs and thus into lifetime costs. Table 4 shows the predicted total present value lifetime costs per member of each education category (not per enrollee). High school dropouts use government health insurance programs at much greater rates than graduates do, such that costs are much higher. The costs vary by sex, race, and ethnicity, but the educational impacts are significant. For example, a typical White female dropout will receive $60,800 in Medicaid and Medicare payments or services

Table 4
Total Lifetime Public Health Costs per Capita in Present Values at Age 20

Population Group	High School Dropout	High School Graduate	Some College	B.A. Degree or Above
Male				
White	$43,500	$17,000	$12,900	$3,100
Black	$82,400	$34,200	$25,100	$6,000
Hispanic	$59,000	$23,300	$16,700	$4,000
Other	$61,600	$24,800	$18,200	$4,400
Female				
White	$60,800	$23,200	$15,900	$3,600
Black	$107,200	$48,500	$33,500	$7,800
Hispanic	$73,700	$29,200	$19,600	$4,400
Other	$80,500	$33,600	$23,000	$5,300

Note. Costs include Medicaid and Medicare. Discount rate is 3.5% (see endnote 6). Education categories reflect highest education level completed.

up to age 65. A White female high school graduate will receive $23,200, and a White female college graduate, only $3,600. The result is a significant lifetime public savings per expected graduate. The savings are greater for women, but they are also substantial for men.[15] The average savings per expected additional graduate is about $25,600 when expressed in present value at age 20.

Crime Benefits

Greater educational attainment is associated with lower criminal activity[16] (Farrington, 2003; Lochner & Moretti, 2004; but see Bernburg & Krohn, 2003; Grogger, 1998). The effect may be attributed to the rise in legitimate earnings associated with greater education, as well as to a lower tendency to engage in crime. Empirically, the association between education and crime is clearest when we examine rates of incarceration (Arum & Beattie, 1999). Although dropouts make up less than 20% of the overall population, they represent 37% of federal prison inmates, 54% of state prison inmates, 38% of local jail inmates, and 33% of probationers (Harlow, 2003). The educational patterns are stronger for men than for women, and they vary by race and ethnicity, but the correlation holds for each subgroup of the population. Important to note, crime imposes a significant and lasting public economic burden (Anderson, 1999). This burden includes costs for the criminal justice system (policing, trials, and sentencing); for incarceration, parole, and probation; for public restitution to victims (including medical care); and for government crime prevention agencies.[17]

We examined the relationship between high school graduation and five types of crime: murder, rape/sexual assault, violent crime (robbery and aggravated assault), property crime (burglary, larceny-theft, motor-vehicle theft, and arson), and drug offenses (separate from the violent crimes associated with drug trafficking).[18] These crimes impose high costs and are strongly influenced by education levels. Data on specific crimes are taken from the annual *Uniform Crime Reports* (Federal Bureau of Investigation, U.S. Department of Justice, 2004) and *Sourcebook of Criminal Justice Statistics* (U.S. Department of Justice, Bureau of Justice Statistics, 2002a).

Table 5 shows the absolute level of annual criminal activity by type of crime for the cohort of 20-year-olds. Row 1 shows annual arrests for 602 murders, 868 rapes, 17,522 violent crimes, 53,686 property crimes, and 75,054 drug-related crimes. Of these arrests, almost half (48%) involve individuals who have less than a high school education. Given the population of high school dropouts, it is possible to calculate the number of arrests per dropout each year; these are given in row 2. Crime/arrest ratios are given in row 3, which allows for calculation of crimes per dropout (row 4).[19] The next two rows report the average sentence per arrest and the average months of parole per arrest. Sentences vary from 233 months for murder to 52 months for property crime; parole rates are proportionately lower.

To estimate the impact of high school graduation on rates of arrest (by crime type) and incarceration probabilities, we rely on the empirical modeling of Lochner and Moretti (2004). Using pooled 1960–1980 Census and FBI data, their identification strategy is to relate the change in compulsory schooling laws to educational attainment. Using National Longitudinal Survey of Youth and Census data, they control for a rich set of background variables. The relationships appear consistent across the data sets. We note, however, that much of the information is more than 20 years old (such that incarceration rates are below current rates); there is no adjustment for underreporting of crimes by dropouts; and the results for rape are not consistent with those for other violent crimes (such that we apply estimates from the latter). Also, we could not estimate separate effects by race, ethnicity, and sex. Despite these caveats, Lochner and Moretti's evidence clearly suggests that increased rates of high school graduation would significantly lower criminal activity. As itemized in the final row of Table 5, we estimate the effect at 10%–20% per expected graduate.

The reduction in crime will, in turn, yield fiscal savings to the public.[20] We distinguish costs per arrest from costs per crime, using criminal justice system expenditures adapted from Belfield et al. (2006) and the U.S. Department of Justice, Bureau of Justice Statistics (2002a, 2002b). Costs per arrest are trial and sentencing costs (not all arrests result in convictions, but the costs of a trial are still incurred). Unit costs per arrest range from $917 for drug-related crimes to $12,991 for rape. We also include the costs to the government in payments to victims, including medical expenses not covered by the victim's insurance, losses arising directly from the crime (e.g., injury-related absence from work), and losses from time spent engaging with the criminal justice system.[21] These public-funded victim costs range from $33,415 for murders to $555 for drug-related offences. There are also costs of government programs specifically intended to prevent crimes (particularly for violence against women and for drugs).[22] We assume that these expenditures (for rape and drug-related crimes) will be reduced in proportion to the reduction in the numbers of crimes committed. Finally, incarceration costs must be added. The average monthly cost per inmate for incarceration is $2,500 and for parole is $155 (U.S. Department of Justice, Bureau of Justice Statistics, 2002a). Because there is no empirical evidence on the relationship between education and probation rates and their associated costs, they are excluded from the analysis.

Table 5
Annual Criminal Activity by Persons Aged 20

Category of Crime Statistics	Murder	Rape	Violent Crime	Property Crime	Drug Offenses
Total arrests	602	868	17,522	53,686	75,054
Arrests per high school dropout	0.000482	0.000694	0.014018	0.042949	0.060043
Crime/arrest ratio	1.7	3.5	2.3	6.5	10.0
Crimes per high school dropout	0.000819	0.002430	0.032240	0.279167	0.600432
Average sentence per arrest (months)	233	157	78	52	56
Average parole time per arrest (months)	90	48	35	23	48
Impact per new expected high school graduate	–19.6%	–19.6%	–19.6%	–10.4%	–11.5%

Note. Violent crime includes robbery and aggravated assault. Property crime includes burglary, larceny-theft, arson, and motor vehicle theft. The share of total arrests by high school dropouts is 0.48, based on incarceration rates. Data are from Federal Bureau of Investigation, U.S. Department of Justice, 2004 (Tables 39, 42, 43a), adjusted for undersurvey; the *National Crime Victimization Survey* (U.S. Department of Justice, National Archive of Criminal Justice Data, 2003); Harlow, 2003; Federal Bureau of Investigation, U.S. Department of Justice, 2004 (Table 1). Details of the calculations can be found in Levin, Belfield, Muennig, and Rouse, 2006 (pp. 43–49). Impact figures are from Lochner and Moretti, 2004, adjusting for effects of college progression rates (1.27 for some college and 1.64 for B.A. degree holders) and assuming effects of rape equivalent to those of violent crime.

The largest proportion of potential public savings attributable to higher graduation rates derives from reducing violent and drug-related crimes, leading to lower rates of incarceration. There are significant differences by sex, race, and gender in the effects of high school graduation on reducing public costs, with female graduation rates imposing considerably smaller cost savings than male rates. The differences arise because of differences among population groups in criminal activity, in arrests, and in the effect of education on crime. The present value of lifetime costs for crime at age 20 associated with a typical dropout averages about $26,600.[23] We believe that this is a very conservative estimate of cost savings because we have not included crimes perpetrated below the age of 20, and our incarceration rates by education are limited to data that are two decades old and considerably lower than the rates today.

Welfare Benefits

Greater educational attainment is associated with lower receipt of public assistance payments or subsidies.[24] The relationship may be caused directly by lower rates of single motherhood or teenage pregnancy or indirectly through higher incomes that reduce eligibility for means-tested programs. The impact of education on welfare payments may be significant. Annually, the federal government spends $168 billion and state governments spend $25 billion on the following need-tested benefit programs: cash aid, food benefits, housing aid, training, and energy aid (U.S. Congress, Congressional Research Service, 2004). As incomes rise with education, eligibility for these payments will be reduced.[25]

To estimate welfare costs, we adopt a model derived by Waldfogel, Garfinkel, and Kelly (2007) for analysis of single mothers, using the Current Population Survey data of the U.S. Census. First, we identify the impact of education in reducing nonelderly welfare receipt from three sources: Temporary Assistance for Needy Families (TANF), food stamps, and housing assistance. We also include state-level payments on a proportionate basis. Second, we calculate the monetary savings from reductions in welfare receipt over the lifetime for those who are new high school graduates.

There are 1.3 million TANF recipients aged 21–64 annually. Caseloads are predominantly female (approximately by a factor of 10), with Black and Hispanic ethnic groups disproportionately represented. Notably, almost half are high school dropouts, with persons with some college representing less than 3% of recipients (U.S. Department of Health and Human Services, Administration of Children and Families, 2004). A similar pattern is assumed for housing assistance, of which there are 1.6 million recipients annually, according to the 2003 Current Population Survey of the U.S. Census. Finally, the most extensive program is food stamps, in which 9.6 million nonelderly adults participated in 2004. Again, education is important, with 30% of recipients being high school dropouts (Waldfogel et al., 2007, Table 8–2). Over a lifetime, these differences add up: Rank and Hirschl (2005) report that 64% of dropouts will use food stamps during adulthood, compared with 38% of high school graduates (p. 142).

According to Waldfogel et al. (2007), high school graduation is associated with a lower probability of TANF receipt by 40%, of housing assistance by 1%, and of food stamp use by 19% (controlling for personal characteristics). For those with some college or above, welfare receipt is even more sharply reduced: by 62% for TANF, by 35% for housing assistance, and by 54% for food stamps.[26] We apply these effects to the unit costs of welfare. The average monthly benefit is approximately $355 for TANF and $85 for food stamps, to which we add administrative costs (Barrett & Poikolainen, 2006; U.S. Department of Health and Human Services, Administration of Children and Families, 2004). For housing assistance, annual spending is $3,100 per person (U.S. Congress, Congressional Research Service, 2004). We apportion the costs to states proportionate to the federal cost allotments. Total costs per year are calculated as the impact times the unit cost.[27]

Table 6

Total Lifetime Public Savings per Expected High School Graduate in Present Values at Age 20

Population Group	Extra Tax Revenues	Health Savings	Crime Savings	Welfare Savings	Total
Average	$139,100	$40,500	$26,600	$3,000	$209,100
Male					
White	$202,700	$27,900	$30,200	$1,200	$262,100
Black	$157,600	$52,100	$55,500	$3,300	$268,500
Hispanic	$119,000	$37,800	$38,300	$1,200	$196,300
Other	$168,600	$39,000	$30,200	$1,200	$239,000
Female					
White	$109,100	$39,600	$8,300	$5,000	$162,000
Black	$94,300	$62,700	$8,600	$9,000	$174,600
Hispanic	$85,000	$46,500	$8,300	$3,100	$143,000
Other	$96,700	$49,200	$8,300	$3,100	$157,300

Note. An expected high school graduate is one who probabilistically terminates education after graduation, completes some college, or completes a B.A. degree. Gender- and race-specific probabilities are applied. Benefits are gross; that is, they do not count for additional educational costs. Discount rate is 3.5% (see endnote 6). Numbers are rounded to the nearest $100.

Annual figures are extrapolated to calculate lifetime effects of increasing educational attainment. The average cost savings per expected new graduate is $3,000 over a lifetime. As with the other costs, the amounts are calculated as an average across the total population of dropouts, of whom only a portion actually receive public assistance. The largest proportion of the savings comes from reductions in TANF payments, although there are nontrivial savings in housing assistance and food stamps as well. The total figure is relatively low (compared with the other domains) for the following reasons: Welfare is time-limited; children and the elderly receive high proportions of welfare funds; and men do not receive much welfare (but they constitute a large proportion of all high school dropouts).[28] Nevertheless, the cost savings are noteworthy, particularly for female dropouts.

The Returns on Investments in Adequate Education

High school graduation is associated with higher incomes, better health, lower criminal activity, and lower welfare receipt. This has private benefits to the better educated individuals, but it also produces significant public benefits. Table 6 shows the value of the lifetime economic benefits to the public per expected high school graduate. Each new graduate will, on average, generate economic benefits to the public sector of $209,100. These benefits are composed of additional tax revenues of $139,100, health savings of $40,500, crime savings of $26,600, and welfare savings of $3,000. These are gross benefits and do not account for what it costs for the necessary educational interventions to raise the graduation rate or fund college progression contingent on graduation. The amounts vary by sex, race, and ethnicity, with high school graduation providing a gross public saving of $196,300–$268,500 for male graduates and $143,000–$174,600 for female graduates.

It is important to note that we are not proposing that policy be based separately on net present values for each sex, race, or ethnicity, but on the overall finding that the benefits to the taxpayer exceed fiscal costs for all groups. We present disaggregated figures to show that the conclusions are not in fact driven by one group and that population-wide interventions are easily justified. A broader perspective must be adopted to decide where the most urgent investments should be made. As noted above, both "levels" and "differences" are important, and it is necessary to understand the causes of any fiscal differences. These causes might include the potency of education's effects based on the quality of available schools, the progression rates to college, the extent of involvement in the labor market (and society's valuation of nonparticipation), and the receipt of public services, as well as factors such as labor market discrimination. Investigation of all these factors is beyond the scope of this article, and so we emphasize that—as shown the row labeled "Average" in Table 6—the gross public benefits from graduation are very large for all cases.

The net public benefits of high school graduation are substantial. Table 7 shows that the benefits easily exceed the costs for each intervention. The first row shows the educational cost per new graduate, that is, the sum of intervention and attainment costs for each of the five interventions that have been shown to increase graduation rates. These costs range between $59,100 and $143,600 (see Table 2). The second row shows the average lifetime economic benefits per expected high school graduate (see Table 6). The last two rows show the benefit/cost ratio (the factor by which the benefits exceed the costs) and the net present value (the difference between the benefits and the costs). Taking the median intervention—a teacher salary increase—the benefits are 2.55 times greater than the costs, and the net present value from this investment is $127,100 per additional high school graduate. For the intervention with the highest net return—First Things First—the benefits exceed the costs by a factor of 3.54. For the intervention with the lowest net return—class size reduction—the benefits exceed costs by a factor of 1.46, still a substantial bonus.

The aggregate consequences of raising the high school graduation rate for each age cohort are economically large. Each cohort of 20-year-olds includes more than 700,000 high school dropouts. If this number were reduced by half through successful implementation of the median educational intervention, the net present value economic benefit would be $45 billion. This

Table 7

Net Public Investment Returns per Expected High School Graduate in Present Values at Age 20

Per Additional Expected High School Graduate	Interventions to Raise High School Graduation Rates				
	First Things First	Chicago Child–Parent Centers Program	Teacher Salary Increase	Perry Preschool	Class Size Reduction
Costs (C)	$59,100	$67,700	$82,000	$90,700	$143,600
Benefits (B)	$209,100	$209,100	$209,100	$209,100	$209,100
Benefit/cost ratio (B/C)	3.54	3.09	2.55	2.31	1.46
Net present value (B – C)	$150,100	$141,400	$127,100	$118,400	$65,500

Note. Numbers are rounded to nearest $100. Costs include delivering the intervention and any subsequent public subsidies for high school and college. Discount rate is 3.5% (see endnote 6).

figure is an annual one because each cohort is assumed to include the same number of dropouts in the absence of powerful interventions. And it does not count the private benefits of improved economic well-being that accrue directly to the new graduates themselves. If we were able to obtain these fiscal benefits over a decade, we would approach fiscal savings of about half a trillion dollars.

Sensitivity Tests

The net economic benefits of investments to raise high school graduation rates appear to be very large. We suspect that this conclusion is unlikely to change if alternative assumptions are applied. Our economic analysis, based on the best available evidence, has used conservative assumptions for each domain. Clearly, if we can identify more effective interventions or if these interventions are less effective when brought to scale, net benefits will be affected. But these influences are not easily measured.

A number of other assumptions may affect the results positively or negatively.[29]

First, by looking at 20-year-olds, we have excluded any prior benefits such as reductions in juvenile crime or teenage pregnancy, both of which are associated with attainment. We have also not calculated the additional benefits to students who prospered from a more enriched education if they would have graduated anyway. They may have benefited from the enrichment, but we have only accounted for effects of increased graduation rather than academic enrichment of existing graduates.

Second, because of insufficient data, we have not counted any intergenerational, family, or civic benefits from graduation.

Third, because sample surveys undercount those in poverty, benefits would likely increase if more accurate data were available (Schmitt & Baker, 2006). In contrast, factors that would reduce the return include the following: a fall or slowdown in market wages as more graduates enter the labor market; an increase in the average cost of delivering each intervention; no progression to college by new high school completers; and a higher discount rate. We test the two most conservative assumptions (no college progression and a discount rate of 5%) and find that the net economic benefits are still strongly positive. The overall trend for several decades has been that demand for skills has been rising faster than supply, countering a tendency for the relative earnings of high school graduates to fall as their numbers increase (Autor, Katz, & Kearney, 2008; Juhn, Murphy, & Pierce, 1993).

Conclusions

In this study we have found that the monetary value of the public benefits of reducing the number of high school dropouts exceeds considerably the required public costs of successfully validated educational interventions.

Three aspects of this investigation are worth noting. First, a large fraction of the total public benefit is a result of the higher earnings of those with more education. The earnings effect is both direct, in raising tax revenues, and indirect, in reducing reliance on public services. Second, we express our figures as totals across all levels of government. But the benefits from and the costs of high school graduation are not spread evenly across federal and state or local governments. The federal government receives most of the income tax benefits and recoups the larger proportion of health and welfare savings but the lesser proportion of criminal justice system savings. In contrast, state and local governments incur most of the educational costs, including the extra years of high school. Thus our findings have implications for the just distribution of the burden of funding for educational interventions.

Third, we selected only those interventions for which rigorous and credible evaluations were available and which showed positive impacts on reducing the dropout rate. Although this process is supported by mainstream authorities in evaluation (Mervis, 2004), only five interventions met these criteria. Given the clear economic benefit of raising attainment levels, it is imperative to seek more new ways to effect such change. New interventions that appear promising include combinations of features such as small school size, high levels of personalization, high academic expectations, strong counseling, extended-time school sessions, and competent and appropriate personnel (Quint, 2006). But one effective strategy that could cut the cost considerably would be targeting interventions to those students most likely to drop out or most likely to benefit from them. When an intervention is targeted to an entire school (including those students who would have graduated anyway), it requires more resources than if it were more finely targeted to a particular group of the most vulnerable students. Thus targeting the intervention or portions of the intervention, if possible, represents a way of reducing the cost for each additional student who graduates. However, such practices may also have negative consequences through greater segregation and stigmatization (Oakes, 2005).

Overall, investment in adequate education for all children is more than just good public investment policy with high monetary returns. A society that provides fairer access to opportunities, that is more productive, and that has higher employment, better health, less crime, and lower dependency is a better society in itself. That the attainment of such a society is also profoundly good economics is simply an added incentive.

NOTES

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[1]Although the main findings of the research will be reported here, more detail can be found in Levin, Belfield, Muennig, and Rouse, 2007.

[2]See, among many, Swanson (2004), Greene (2002), Warren (2005), Kaufman (2004), and Mishel and Roy (2006). Studies typically use the same method of measuring: the number of completers divided by the student population for a given age or grade cohort. Except in the study by Mishel and Roy, calculations are based on the Current Population Survey or the Common Core of Data, both of which have shortcomings in terms of misreporting, incomplete coverage, and classifications. Studies also vary in how they account for private school enrollments, special education students, and migration.

[3]Many Hispanic and other non-White persons are immigrants, some of whom did not attend U.S. schools. Although a large fraction of the immigrant population has less than a ninth-grade education or did not complete high school, this circumstance cannot be fully addressed by educational reforms within the United States. However, the benefits and costs are not affected by whether the dropout was an immigrant.

[4]These rates of continuation and college completion are based on a relatively disadvantaged population in which continuation rates are for the bottom quartile in reading on the National Educational Longitudinal Study of 1988 (known as NELS 88), a data set of the U.S. Department of Education that follows eighth graders into adulthood. The completion rates are based on the bottom third of students in socioeconomic status in the NELS 88 data set. See Levin, Belfield, Meunnig, and Rouse, 2006 (pp. 7–8).

[5]More detail on costing procedures is found in Levin et al., 2006 (pp. 14–20).

[6]Present value refers to a single number that summarizes the value of a stream of costs disbursed over time where an annual rate of interest (3.5%) is applied to take account of the time pattern of spending (Moore, Boardman, Vining, Weimer, & Greenberg, 2004). In this case, the present value of the costs and benefits of the investment will be summarized at age 20 (Levin & McEwan, 2001, pp. 90–94). For the Chicago child–parent center program we use the cost estimates reported in Reynolds, Temple, Robertson, and Mann (2002). For the Perry Preschool project we use cost estimates reported in Belfield, Nores, Barnett, and Schweinhart (2006). For both of these programs we deduct the cost savings from special education and grade retention. For the intervention to increase teacher salaries we base our calculations on the average teacher salary in 2004 of about $46,000 (U.S. Department of Labor, Bureau of Labor Statistics, 2004) and class sizes of 25. Because there are no reported costs of the resource requirements for class size reduction used in Project STAR, we estimate the costs in terms of extra teachers and classrooms per 100 students expected from reducing the median class size from 24 pupils to 15. Finally, First Things First is a bit more complex because it requires a range of additional resources. These include reducing class size from 26 to 20 students and adding a counselor, a technical assistant, and a special education teacher for every 350 students. The cost of these resources is estimated using the ingredients approach in Levin and McEwan (2001).

[7]For example, to effectively target the intervention, teacher pay would have to be raised only for classes with high numbers of dropouts.

[8]The analysis of additional education and tax revenues was carried out by Cecilia Rouse (2007). Also see Levin et al. (2007) and the technical detail in Levin et al. (2006, pp. 24–30).

[9]The Current Population Survey provides information on income and wages for a national sample of households and individuals over the previous year. Data from 2003 and 2004 are combined to ensure a sufficient sample size and are weighted using BLS weights. The sample includes only those who completed at least ninth grade. We start calculating earnings as of age 20; earnings at younger ages typically are low and sporadic, with very high proportions of dropouts not in the labor force. The March Current Population Survey does not distinguish high school graduates from GED holders, and it includes only the civilian, noninstitutionalized population (persons in the military or in jail are excluded). Below, we adjust for differences in incarceration rates by race, ethnicity, and sex, although this adjustment affects the final figures only slightly.

[10]We assume sales tax at 5% of income. To calculate the effect on property taxes, we use the 5% sample of the 2000 Census. We estimate that households headed by a dropout contributed about $150 less in property taxes in 1999 (in 2004 dollars) than households headed by high school graduates and about $570 less than those with at least a college degree. That said, these estimates for property taxes must be interpreted cautiously. First, the causality between education and property tax payments is unknown. Second, property taxes are based on housing values, and we can only determine payments made jointly by the household. Third, renters pay property taxes indirectly. Fourth, many states offer property tax relief for low-income homeowners, which may not be included in the Census figures.

[11]We also calculate lifetime earnings with different assumptions about productivity growth and the discount rate. We assume a productivity growth rate of 1.5%, which follows convention; of course, the rate may be higher or lower over the following decades. These calculations are available from the authors.

[12]The value of health benefits from additional education was calculated by Peter Muennig (2007), with details of the calculations in the technical report (Levin et al., 2006, pp. 31–39).

[13]After eliminating non-U.S.-born subjects, who typically are ineligible for Medicaid and Medicare, those aged under 25 and over 65, and subjects with missing values, the sample is 12,299.

[14]On average, MEPS figures are about 7% lower than similar costs from the National Health Accounts. Also, the MEPS excludes Medicaid payments to hospitals that disproportionately serve Medicaid patients.

[15]We test for sensitivity. If the discount rate is raised to 5%, savings will be somewhat lower. If there is no survival advantage to extra education, the incremental returns increase very slightly. The savings also increase if all subjects are assumed to survive until age 65, a scenario compatible with no account for premature mortality. The tests provide a boundary of +/–20%.

[16]The calculation of benefits from reduced costs of criminal justice due to increased education was carried out by Clive Belfield.

[17]The social burden of crime will also be significant, including costs directly imposed on victims (such as lower quality of life); transfers of assets from victims to criminals; avoidance costs by potential victims; and productivity losses from participation in criminal activity rather than work.

[18]These five crime types make up approximately 30% of all crimes, but most other crimes are misdemeanors. A sixth crime—child abuse—should be considered because of the significant burden it imposes.

However, data are inadequate to permit an accurate costing exercise. Data limitations also preclude analysis of white-collar crimes such as fraud.

[19]Official crime rates are considerably lower than victim-reported rates because many crimes are not reported to the authorities. Also, there is no information on whether crime/arrest ratios vary by ethnicity. Finally, the *Uniform Crime Reports* do not report crimes for 100% of the population; coverage is typically 93%–96%. Table 5 uses a conservative estimate of the crime rate. Thus the calculations are likely to be conservative, not least because they also exclude juvenile crime impacts (for our cohort, these are in the past).

[20]Throughout, the model parameters are conservatively derived. Notably, recent cost estimates by Cohen, Rust, Steen, and Tidd (2004) are considerably above those applied here; and no juvenile crime effects are counted (because for our 20-year-old-cohort, these are in the past).

[21]These losses are calculated directly from the National Crime Victimization Survey. This survey is the only data set available, but it, too, significantly understates victim costs. Only expenses incurred within 6 months of the crime are reported; hospital bills are sent to insurers, and mental health costs are not included (Cohen, 2005). Therefore, we add two additional costs. Cohen estimates that the average amount paid to each victim from the Crime Victims Fund is $2,000 (p. 63); we apply this for murder, rape, and violent crimes. Macmillan (2000, Table 1) estimates annual earnings losses for victims at 13%; we apply this to rape and violent crimes, and for murder victims we assume 10 years of lost earnings and tax revenues at a high school graduate level.

[22]Excluding child juvenile services and education costs, the federal government commits almost $8 billion annually to the war on drugs, with 60% routed through the Departments of Homeland Security and Justice; in addition, state governments commit $2.1 billion.

[23]We take account of the decay rate of crime according to age, based on the pattern of criminal activity reported by age (Federal Bureau of Investigation, U.S. Department of Justice, 2004, Table 1). Criminal activity peaks around age 20 and decays by a few percentage points each year.

[24]Calculated by Clive Belfield, based on analysis by Waldfogel, Garfinkel, and Kelly (2007).

[25]However, better educated persons are better able to navigate the welfare system and claim benefits to which they are entitled (Osborne Daponte, Sanders, & Tayor, 1999). This offsets somewhat the gains from reducing welfare entitlements through increased educational attainment.

[26]Pre-welfare-reform figures reported by Jayakody, Danziger, and Pollock (2000) are not significantly different. Grogger (2004) finds very strong effects for females across all types of welfare: High school graduates are 68% less likely, and those with some higher education are 91% less likely, to enter welfare rolls than are high school dropouts.

[27]Because TANF is time limited, we assume no receipt after the cohort reaches the age of 40. The method used here is annualized, so durations of welfare receipt are not important.

[28]The estimates are conservative. Grogger (2004) reports larger effects of education. We do not count any welfare receipt before age 20. We omit welfare benefits from other programs (mostly at the federal level) where we have insufficient evidence as to the influence of education. Finally, we do not count any cross-family effects such as welfare receipt for children of dropouts.

[29]Details on a sensitivity analysis are found in Levin et al., 2006, pp. 59–63.

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