K–12 Education in The U.S. Economy

Its Impact on Economic Development, Earnings, and Housing Values

nea NATIONAL EDUCATION ASSOCIATION nea.org

Great Public Schools for Every Child

K–12 Education in The U.S. Economy

Its Impact on Economic Development, Earnings, and Housing Values

Thomas L. Hungerford
Levy Economics Institute, Annandale-on-Hudson, New York

and

Robert W. Wassmer
California State University, Sacramento

Contents

Tables

Preface

Residents of the United States recognize the value of publicly provided K–12 education and are quick to express outrage when they feel it is not being offered at an acceptable level of excellence. Although not often discussed as such, this outrage is generated in large part by concerns that have economic roots. Parents worry over the quality of the schools their children attend because a good primary and secondary education is essential to the success of their child's transition from high school to higher education or the labor market. Homeowners, even if they do not have children in public schools, are anxious about the quality of local public schools because they know the direct positive effect it has on the resale value of their property. Finally, business owners recognize that a quality K–12 education makes the workers they employ more productive. Federal, state, and local politicians comprehend these concerns and have consequently placed maintaining and improving the quality of primary and secondary public education at, or very near, the top of their policy agendas.

At the same time, state politicians throughout the United States currently face projected budget deficits. Even if budget deficits are not on their horizon, state policymakers are under constant pressure to reduce the tax "burden" within their state. To balance state budgets without raising taxes, or to pursue a more tax-friendly climate, state officials are forced to consider cutting expenditures. A reduction in state support of K–12 public education has not been exempt from consideration.

When faced with budget deficits, lobbyists claiming to represent the state's business and economic interests have argued that revenue enhancement to balance a government budget is a less-preferred option than cutting state expenditures, including support for primary and secondary education. They cite the possible detrimental effects a tax increase would have on the state's economic development. The argument, which is theoretically correct, is that higher taxes will discourage businesses and entrepreneurs from locating in the state and, consequently, reduce the amount of income and employment generated there. Often left out of this lobbying cry is the fact that a reduction in the quality of K–12 public education will also induce a decline in a state's long-term economic vitality. The question, then, is whether the negative economic effects of raising taxes to support quality K–12 public education are greater or less than the alternative of cutting statewide public support for primary and secondary education. This monograph offers evidence on the economic benefits of a quality K–12 public education.

Overall, we conclude from our literature review that if faced with the choice of (1) increasing revenue statewide to continue supporting the provision of quality public K–12 education or (2) cutting support statewide to public K–12 education to forestall a tax increase, a state's long-term economic interests are better served by increasing revenue. We have reached this conclusion by examining the evidence on the large spillover benefits of a quality public education beyond the direct benefit to those who receive it, the direct data-based evidence of the influence that various taxes and fees and K–12 education expenditures have on economic development, and the empirical evidence on how a quality public education influences an

individual's lifetime earnings and the value of homes in the school district where it is provided.

Every child and young adult has surely heard the following: "To get ahead in life, get an education." The evidence suggests that many students take this advice and that it is correct. The provision of a quality K–12 public education plays a crucial role in the individual and economy-wide acquisition of "human capital." The economic payoff to individuals of increased schooling is higher earnings throughout their lifetime—a market-based individual benefit. In addition, a considerable number of benefits from a quality K–12 public education—the spillover effects—extend beyond individuals. Wolfe and Haveman (2002), economists noted for their efforts to put a monetary value on some of education's spillover effects, argue that the value of these spillovers for individuals and the economy is significant and that it may be as large as education's market-based individual benefits.

Economic development, as used in this report, is any dollar-based increase in economic activity within a state. Such increased economic activity can occur through two channels. First, a given economy (with a fixed number of workers, land, raw materials, machinery, and other physical inputs) is able to produce a greater dollar value of output because of the increased productivity of one or more of the existing inputs. Second, an economy produces a greater dollar value of total output by adding more inputs to its production processes. Improving the quality of a state's public K–12 education can result in greater economic development through both of these channels. Improving public education costs money and often results in increasing taxes, however, which depresses economic development. Our review of the research indicates that in most circumstances the negative influence of cutting K–12 public education expenditure by an amount that forestalls a statewide revenue increase of an equivalent amount exerts a greater negative influence on the state's economic development than if the revenue increase were put in place to maintain educational expenditures.

Although the literature is divided, we conclude that school resources can lead to improved student outcomes and higher-quality schools. Additional funding for public primary and secondary schools, however, will not generate greater student achievement unless the funds are used wisely. Furthermore, it must be recognized that other factors—such as student, parent, and neighborhood characteristics—also influence student outcomes and, hence, school quality. Many of these factors are outside the control of teachers, school administrators, and school boards.

The preponderance of statistical evidence shows a positive correlation between the quality of local public K–12 education and the value of homes in that neighborhood. This finding is important because it demonstrates yet another way that the provision of a quality elementary, middle, or high school education yields a tangible economic impact that would be lost with a decline in the quality of this service. The empirical findings in this literature reinforce the notion that spending per student, in itself, is not how parents identify a quality public K–12 education. But the findings presented here do not dismiss the possibility that higher spending is necessary for the provision of quality education.

Most states have had to deal with a projected budget deficit for fiscal 2003–04 and beyond. Many states, including California and New York, have wisely addressed this revenue shortfall by avoiding significant decreases in public K–12 education spending that could compromise educational quality. Even so, we believe that pressure to deal with projected budget deficits through decreases in state expenditures, which could include K–12 education, will continue. Furthermore, the pressure to cut taxes in good times could cause state and local politicians to question the merits of increasing or even maintaining primary and secondary education spending at current levels.

The evidence presented in this monograph suggests that reduced public spending on primary and secondary education could have an array of consequences in several economic areas. Here are some examples of the type and magnitude of the effects, as derived from the studies reviewed.

- **Economic development decline caused by a decrease in in-migration of potential laborers (short run), loss of productivity of future laborers (long run), or both.** Cutting statewide public K–12 expenditure by $1 per $1,000 state's personal income would (1) reduce the state's personal income by about 0.3 percent in the short run and 3.2 percent in the long run, (2) reduce the state's manufacturing investment in the long run by 0.9 percent and manufacturing employment by 0.4 percent. Cutting statewide public K–12 education per student by $1 would reduce small business starts by 0.4 percent in the long run. Cutting statewide public K–12 expenditure by one percentage point of the state's personal income would reduce the state's employment by 0.7 percent in the short run and by 1.4 percent in the long run.

- **Reduction in a state's aggregate home values if a reduction in statewide public school spending yields**

a decline in standardized public school test scores, if in the long run people leave or do not enter the state because of test-score declines. A 10 percent reduction in various standardized test scores would yield between a 2 percent and a 10 percent reduction in aggregate home values in the long run.

- **Reduction in a state's aggregate personal income, if a reduction in statewide public school spending yields a decline in "quality" of public education produced and a long-run decrease in earning potential of the state's residents.** A 10 percent reduction in school expenditures could yield a 1 to 2 percent decrease in postschool annual earnings in the long run. A 10 percent increase in the student–teacher ratio would lead to a 1 to 2 percent decrease in high school graduation rates and to a decrease in standardized test scores.

Given these possible consequences, we believe that the federal government, which, unlike most state governments, is not prohibited from running an annual budget deficit, is best suited to help state and local governments maintain educational funding during cyclical downturns. We suggest that the National Education Association (NEA) adopt a policy of advocating the preservation of public K–12 education funding using the long-run economic benefits cited here. The NEA can work to strengthen the tie between greater K–12 public education spending and these economic benefits by stepping up its advocacy of the implementation of progressive education programs that can lead to a higher quality of educational output for a given level of education spending.

***

Executive Summary

This report introduces, analyzes, and summarizes for policymakers an extensive and diverse economics literature on the effects of public K–12 education spending on local, regional, and state economies. The effects of education spending appear in indicators ranging from economic development to employment rates, small business starts, personal income, and housing values. The report offers real-world evidence that providing a quality K–12 public education for all is one of the best investments that governments can make. Therefore, policymakers should engage in serious thought and analysis before taking cost-saving steps that reduce the quality of public education to solve a local, state, or even federal budget shortfall.

The paper looks at the effects of education spending and educational quality—as distinct from education spending—on economic indicators such as an individual's lifetime earnings, residential property values, manufacturing activity in a state, and small business start-ups in a state. The studies the paper discusses are for the most part regression analyses, which allow a researcher to determine the expected effect of a change in a single causal variable (e.g., education spending) on a specific dependent variable whose value is in part determined by it (e.g., student achievement) while holding constant the other relevant causal variables also thought to influence the dependent variable (e.g., race, poverty level, and parents' education). The study concludes by discussing recent controversies in California and New York that illuminate the real-world complexities of dealing with education funding during a state budget crisis. The study also offers some conclusions and policy recommendations for advocates of public education.

As an introduction to the review of specific studies, the study discusses the need for education investments. It also outlines the role of more and better education in producing direct and "spillover" (indirect) effects on human and social capital. Such effects can include benefits for productivity and economic growth, earned income, social stability, and quality of life. An important theme in the review is the difficulty of increasing or even preserving K–12 education investment within the constraints of a balanced budget, which most state constitutions require. Typically, then, states wishing to increase education spending must counterbalance these additional investments with increases in state revenue, decreases in other state expenditures, or a combination of the two.

But which strategies for coming up with funding for education are best for a state's economy? Researchers have examined several approaches to education investment in a balanced-budget environment. These include making changes in business property tax rates, personal and corporate income taxes, sales taxes, and spending on public services other than education. The authors report that negative economic effects are likely if the financing for K–12 education comes from an increase in the state's deficit or from decreases in higher education or health expenditures. But they also note that most other means of financing public education spending have statistically significant, positive economic effects at the regional, state, and local levels. These include benefits for personal income, manufacturing investment and employment,

number of small business starts, and the residential labor force available in a metropolitan area.

Another focus of the literature, and of the review, is the effect of education spending on educational quality. Here, the authors explore two types of approaches. One is the *production-function approach*. This methodology takes a given level of education resource "input" and determines the maximum level of educational quality "output" achievable from it. The other is the *cost-function approach*. This takes a given or targeted level of educational quality and finds the level of resources needed to produce it (this is also called the *adequacy approach*). Both types of studies seek to control for other factors that may influence school quality, such as differences in students' ability or environment. In that way, they hope to identify the relationships between resources and quality. The authors find this literature divided. Some of the most recent production-function approaches, however, have found innovative ways of controlling for unobserved variables to determine more reliably whether particular education strategies help maximize the "output" of quality. For example, some of these studies have found that being in a small class as opposed to large one (13–17 vs. 22–25 students) yielded an increase in standardized test scores by about 4 percentile points in the first year and by about 1 percentile point in subsequent years. Studies also noted positive effects of small classes on likelihood of taking college entrance examinations (SAT and ACT) and on increased scores on these tests. Research suggests as well that part of the reason for an African American–white differential in educational outcomes may stem from the fact that African American students tend to be in larger classes. Similarly, some of the best-designed cost-function analyses have estimated, for example, that large city schools such as New York's have low outcomes despite high spending not because they are inefficient in the production of education quality but because they face high costs in dealing with student and social situations that are out of the school's control. Overall, the authors feel, the most reliable evidence suggests that school resources—if used appropriately—do make a difference in advancing quality education. On a less-studied subject, the authors also note some evidence that the negative effects of cuts in education funding may be of even greater magnitude than the positive effects of increases in funding.

The authors continue by examining the relationship between school quality and home values. A number of studies have tackled this question, each using data from a different city or metropolitan area (e.g., Cleveland, Dallas, Gainesville, and Chicago). Again, the studies filtered out other potential factors affecting home values to pinpoint the relationship between school quality and home sales price. Of the nine studies reviewed, all indicated positive effects. In general terms, the conclusions of the analyses are as follows. Presuppose two homes that are identical in all characteristics except that one of them enables the children who live in it to attend a K–12 public school in which standardized test scores are 10 percent higher than the other. The studies indicate that buyers will be willing to pay anywhere between 2 and 10 percent more for the home that confers access to higher-quality education. That is, that home will have a 2 to 10 percent higher value.

In a similar way, the authors examine studies of the effects of school quality on earnings. These effects might reflect a correlation between higher earnings and increased years of education, a premium on earnings for those who attended higher-quality schools, or both. In addition, the quality of schooling might not directly affect earnings, but a positive correlation of quality education with increased years of education and with graduation (the "sheepskin effect") might produce a gain in earnings. For example, studies have looked at the relationships between such factors as student–teacher ratios and teacher pay and students' later earnings. Most of the literature suggests that school quality has significant positive effects on students' earnings as well as on their likelihood of pursuing a higher education. Education beyond a high-school diploma, in turn, confers distinctive earnings advantages—a 9 percent gain for attendees of two-year colleges and a 23 percent gain for attendees of four-year colleges.

The authors' own case studies of California and New York suggest the distance that remains between the worlds of economic analyses and state policymaking. In California, which faced a projected accumulated budget deficit of more than $38 billion in 2003–04, the state government deadlocked over how to reduce the deficit. The Democratic governor, Gray Davis, proposed a combination of fund shifts, revenue measures, borrowing, and transfers of program responsibilities from the state to counties (funded in turn by increasing the state sales and cigarette taxes and by reinstating the top brackets in the state's personal income tax). Even this mixed package envisaged reducing K–12 public school spending per student by about 2.5 percent. The Republican minority in the legislature, however, united behind using expenditure cuts alone against the deficit. The successful recall of Governor Davis—in part because of his failure to cope expeditious-

ly with the deficit—and his replacement by a Republican, Arnold Schwarzenegger, has pushed California farther down the path of expenditure cuts. The new Republican budget plan includes efforts to fund some of the deficit through bond issues, but because of a strong commitment not to impose new taxes, it also depends on economic growth and expenditures cuts. Most believe that the former, however, will not be sufficient to remedy California's persistent structural deficits. And the latter, to the extent that it requires cuts in public K-12 education spending, is likely to have precisely the wrong economic effect.

In the state of New York, the direct and indirect effects of the 9/11 attacks include the loss of 100,000 jobs, damage to thousands of small and medium-sized businesses, and a loss of almost 30 million square feet of office space. In all, New York faces a fiscal 2003–04 gap of more than $9 billion. New York's Republican governor, George Pataki, proposed closing about 60 percent of the fiscal gap through expenditure cuts, with 25 percent more coming from financing, and the final 15 percent from revenue enhancement. Among the governor's proposed expenditure cuts was a $1.2 billion decrease in state education aid to localities. After vigorous protests from parents, teachers, and school administrators, however, the New York legislature passed a budget that will ultimately reduce those cuts, on a school-year basis, to $185 million.

California and New York are certainly at the high end of the deficit problem. But the authors' key point is that many states would risk significant adverse economic effects by cutting public K–12 education spending. This conclusion goes against the argument that the preferred response to an economic crisis is to cut taxes, on the theory that higher taxes are disincentives to business in-migration and growth and will therefore harm employment and income in the state. Within a balanced budget environment, cutting taxes would likely require cutting spending as well. But just as increasing education spending has largely positive economic effects, cutting education spending would have negative effects.

The authors illustrate the type and magnitude of these negative effects by using the statistical findings of earlier studies. For example, with regard to effects on economic development, one statistical study found that cutting statewide public K–12 expenditures by $1 per $1,000 of state personal income would reduce the state's personal income by about 0.3 percent in the short run and by 3.2

percent in the long run. They also note that another study found that such a cut would reduce the state's manufacturing investment in the long run by 0.9 percent and manufacturing employment by 0.4 percent. Similarly, another researcher found that a decline in educational quality, as measured by a 10 percent drop in standardized test scores, would lead to a 2 to 10 percent reduction in home values. They also cite a study that found a 10 percent reduction in school expenditures could yield, in the long run, to a 1 to 2 percent drop in postschool annual earnings.

What, then, are the alternatives to cutting state education spending? The paper contains a table showing options that would actually be less detrimental to a state's economy. Most involve raising one or another state tax or cutting expenditures other than for education or health. The authors believe that these studies provide reliable indications that many alternatives to cuts in education spending would have less damaging effects on factors such as statewide personal income, manufacturing employment, residential labor force, small business starts, and employment.

The authors recognize, of course, that state and local policymakers, when faced with a current-year budget deficit, often face difficult decisions over what to cut. But they are confident in advising states to think long and hard about cutting educational spending that results in a reduction in educational quality even in times of fiscal crisis because the adverse short- and long-term economic effects are evident in the economics literature. The authors believe that because of the states' limited resources and constitutional constraints against running a deficit, the federal government is best suited to help state and local governments maintain public K-12 educational funding during cyclical economic downturns.

The import of the studies cited in this paper, the authors contend, is that the long-run economic benefits of education spending that produces quality educational outcomes—and the potential damage of cuts in that spending—need much greater attention among proponents of public education, policymakers, and the public. The authors suggest that the economics literature on the whole provides a sound basis for the NEA to advocate for preserving public K–12 education quality through adequate funding and through promoting and implementing progressive education programs that can raise education quality even further.

1

Introduction

Residents of the United States recognize the value of publicly provided K–12 education. The provision and "quality" of public primary and secondary education in the United States is probably discussed as much as the weather. However, most Americans feel that unlike the weather, education is susceptible to swift human intervention—in particular to the adoption of private- and public-based reforms that will improve the "quality" of K–12 public education services. Not surprisingly, the media frequently spotlights K–12 educational issues and generally purveys bad news. For example, in the final two weeks of June 2003, the *New York Times* reported as follows: on the release of the Nation's Report Card reading scores (National Center for Education Statistics 2003) "4th Grade Readers Improve, but 12th Grade Scores Decline" (Schemo 2003a); on the high failure rate on the New York State Regents math exam, "This Year's Math Regents Exam Is Too Difficult, Educators Say" (Goodnough 2003); and on the problems of New York City schools, "New York State Failing City Schools, Court Says" (Winter 2003). Federal, state, and local politicians accept these concerns and have placed improving the "quality" of K–12 public education at, or very near, the top of their policy agenda. [1]

Although often not discussed as such, much of this angst can be traced to worries that have economic roots. Parents raise concerns over the quality of the schools their children attend because a good primary and secondary education is absolutely essential for success in their children's transition into either higher education or the labor market after high school. Homeowners, even if they do not have children in public schools, are concerned about the quality of local public schools because they know from experience of the direct positive effect it has on the resale value of their property. Because the largest financial asset held by most Americans is their home, a decline in the perceived quality of education provided locally exerts important financial consequences. Finally, the business community recognizes that publicly provided K–12 education is an investment in human capital and makes workers more productive. [2] Important job skills are acquired in elementary, middle, and high schools. The most obvious are learning to read and write and quantitative skills (math). Future workers also learn specific skills that will help them in their chosen occupations (e.g., sciences, art, and vocational training). A K–12 education also establishes essential social and productivity skills, such as showing up for work on time, staying at work for the requisite time, and working with others.

The U.S. Department of Education estimated that total primary, secondary, and higher education expenditures in 2001 amounted to more than $700 billion, or 7 percent of U.S. gross domestic product (GDP; NCES 2002, Table 29). [3] Of this amount, more than half (56%) was devoted

---

[1] Many knowledgeable observers such as Bracey (1994) argue that the media focus mainly on bad news about the U.S. educational system and often ignore or downplay good news.

[2] In addition, a large literature argues that education does not necessarily make people more productive; it just distinguishes the more productive ones (e.g., graduates) from the less so (e.g., high school dropouts).

[3] This includes public and private elementary, secondary, and postsecondary educational expenditures.

to public elementary and secondary school expenditures. Since 1955, the percentage of total state and local government revenue in the United States devoted to the provision of K–12 public education has remained fairly constant, at about one-third—the largest percentage spent on any category. Given that parents, homeowners, and the business community recognize the economic importance of providing quality K–12 public education in the United States, and that expenditures on public primary and secondary education account for a significant share of the economy and state and local government spending in the country, it would be extremely useful to have a better understanding of the economic returns generated from these expenditures. Therefore, the goal of this monograph is to explore the economic thought and literature on this issue and to quantify, to the extent possible, the measurable returns to public primary and secondary educational expenditures in the United States.

Current Issues Affecting the Delivery of Quality K–12 Public Education

At least two current issues can be expected to have a large impact on the ability of U.S. school districts to provide a quality education in the upcoming years. The first is the current fiscal crisis that most states face. As Finegold, Schardin, and Steinbach (2003) discuss, this crisis is attributable to the recent unexpected recession, subsequent weak recovery, increased public safety spending as an aftermath of 9/11, and the unwillingness of politicians in previous fiscal years to take the necessary steps of raising taxes, cutting expenditures, or both. Reschovsky (2003) estimates that the sum of reported fiscal shortfalls expected at the end of fiscal 2004 for the 50 states will exceed $100 billion, or about 14 percent of current spending levels, if taxes are not raised or expenditures lowered. Although some states have responded by raising taxes, most states plan to address their fiscal crises by cutting spending—including, in many cases, their expenditures for locally provided elementary and secondary education (National Governors Association and NASBO 2003; Dillon 2003; Finegold, Schardin, and Steinbach 2003).

Given this situation, and that in 2000 about 17 percent of state government expenditures were direct transfers to local school districts, states are likely to deal with their current budget shortfalls by cutting aid to local public school districts. A lesson on how this may play out in the future can be drawn from the recession most states experienced in the early 1990s. In fiscal 1990, aid to local school districts as a percentage of total state spending in the United States was about 17 percent—similar to what it was in fiscal 2003. By fiscal 1994, the trough of the last recession, this figure had fallen to just above 15 percent. But Reschovsky believes that the relevance of this bit of history needs to be tempered by the fact that the budget gaps that most states currently face (as a percentage of state spending) are greater than they were in the early 1990s. In addition, most states appear less willing to raise taxes than they had been earlier. California, for example, has an astounding $38 billion cumulative budget gap for fiscal 2004 and requires Republican votes in the legislature to achieve the two-thirds majority to pass a state budget. Yet California's Republican legislators took a vow not to vote for any new taxes in future budgets. The state's budget for 2003–04 does not contain any "new" revenue enhancements. In one of his first acts after gaining office by recall election, Governor Schwarzenegger cut the state's vehicle license fee and created a $4 billion yearly loss to a state treasury already in a projected deficit.

If many school districts across the country are expected to experience a reduction in state aid in the coming fiscal years, the important question in regard to the production of quality K–12 education services is: How will districts respond? One bright side is that local property tax revenue over the last year has continued to increase, and some school districts will be able to absorb a cut in state revenue sharing in this manner. But in the many states that have restrictions on the rate at which the local property tax revenues that school districts collect can rise (e.g., California, Michigan, and Massachusetts), cuts in per student spending will be the only alternative available. Reschovsky (2003, p. 13) believes that this is likely to result in "a significant rise in the number of 'failing' schools and students receiving inadequate educations." In addition, because politics will likely require an equal distribution of state aid reductions to local school districts, Reschovsky believes that school districts in the weakest fiscal condition to deliver a quality public education will be hurt the most.

The second issue that could exert a large impact on the ability of U.S. school districts to provide a quality education in the upcoming years is the No Child Left Behind Act of 2001. This federal act stresses the accountability of elementary and secondary schools through mandated annual testing. It also requires schools to make annual progress toward meeting student performance goals. The increased accountability may improve educa-

tional quality, but it will almost certainly require increased spending to meet the performance goals (Reschovsky 2003).

Using test score improvements to enforce the accountability of school districts may also have some drawbacks. First, many of the factors that influence test scores can be outside the control of teachers, schools, and school districts—for example, concentrated poverty (Duncombe and Yinger 1999). This could lead to labeling of school districts as failures through no fault of their own. Second, schools and teachers may respond to the imposition of standards based on test scores by "teaching to the test," which often emphasizes rote memorization rather than development of reasoning ability. Long-term pursuit of such a teaching strategy could harm work skills, and the quality of the workforce could decline. Third, performance standards may provide an incentive to "cook the books" in much the same way as Enron did. For example, the Houston school district was reported to be altering data related to high school dropout rates (Schemo 2003b). The so-called Texas miracle in education may thus be partly "smoke and mirrors."[4] Clearly, performance standards should maximize accountability and minimize incentives to cheat. Designing them that way is difficult, however.

We expect that in the foreseeable future these two issues, along with the perennial pressure to cut state and local taxes in good times, are likely to cause state and local politicians to question the merits of increasing primary and secondary education spending and even of maintaining current levels of per student spending. For this reason, this report offers relevant and much needed counterarguments and evidence on the economic benefits derived from providing a quality K–12 public education.

What Follows

The plan for the rest of this paper is as follows. The next chapter characterizes the public primary and secondary sector. Chapter 3 describes the spillover effects of education and reviews the justifications for government intervention in education. Chapter 4 reviews the role played by state policies and expenditures in economic development. In chapter 5, we review the literature related to primary and secondary school resources, school performance, and the economy (specifically, earnings and housing values). We turn in chapter 6 to California and New York State to quantify the effect of school expenditures on the economy. We conclude in chapter 7 with a summary and discussion of the policy implications of our findings.

---

[4] It should be noted that Rod Paige, President Bush's secretary of education, is the former superintendent of the Houston school district. Also see Lewin and Medina (2003).

2

The Public Elementary and Secondary Educational Sector

For a full understanding of the economic benefits that are derived from the provision of a quality K–12 public education and how to preserve these economic benefits, it is helpful to begin with three useful observations about the provision of this government service in the United States. The first is that, in the aggregate, public elementary, middle, and high schools in the United States no longer receive the majority of their funding at the local level (primarily from property taxes), although considerable variation exists among the states. From the 1980s onward, state revenue sources have provided a larger percentage of the total money needed for K–12 public education in America. This shift of reliance for funding from the local to the state level has not eliminated the funding inequities that naturally arise from local funding for local schools.

Second, it is instructive to think of the provision of primary and secondary education in the same manner as do most economists—as a process of production with well-defined inputs and measurable outputs. Inputs include the characteristics of the students and their parents, the type and amount of purchased inputs provided by the schools themselves, and the social and community environment in which the school operates. Measurable outputs can include such things as standardized test scores, graduation rates, the results of parental and student surveys on the quality of education provided, future earnings of graduates, and so on.

The third and final observation is that many Americans are losing faith that the current system of public K–12 education is providing the level of quality education that they believe it is capable of. In this chapter, we examine each of these observations under a separate section. But before doing this it is important to note that the total educational sector in the United States consists of elementary and secondary education (K–12), special education, vocational education, and the components of higher education (i.e., community colleges, four-year colleges, and universities). There are private and public schools as well as nonprofit and for-profit schools. As noted above, our purpose is only to describe and account for the public primary and secondary education sector. Throughout this chapter, the data used to describe the educational sector in the United States come from a variety of sources and may not be fully comparable among the various sources. Also, over the years, data collection procedures and definitions may have changed. Consequently, even data from a single source may not be entirely comparable from one year to the next.

K–12 Revenue Sources and Spending Levels

As Table 2.1 shows, total government (federal, state, and local) spending on elementary and secondary education has increased in inflation-adjusted terms, as a proportion of GDP and as a proportion of total government spending. Total K–12 educational spending in the United States increased from $71 billion (2.6% of GDP) in 1955 to more than $370 billion (4.2% of GDP) in 2001. Public spending on primary and secondary education as a share of total government spending almost doubled over the

TABLE 2.1 Government Expenditures on Primary and Secondary Education, 1955–2001

	Total government spending (federal, state, and local) for primary and secondary schools			State and local government spending for primary and secondary schools	
Year	Billions of 1996 $	As % of GDP	As % of total government spending	As % of total state & local government spending	As % of total state & local government education spending
	(1)	(2)	(3)	(4)	(5)
1955	70.9	2.6	12.2	33.2	86.2
1965	124.7	3.4	15.7	33.8	79.6
1975	181.8	4.1	19.3	33.2	75.5
1985	203.4	3.6	17.1	32.2	75.3
1995	296.0	3.9	21.0	33.9	77.5
2001	371.9	4.2	22.7	34.2	78.3

Source: Bureau of Economic Analysis (2004) and authors' calculations.

same period, from about 12 percent to 23 percent.

Since 1955, primary and secondary education spending in the United States at the state and local level has remained stable at about one-third of subnational government spending. However, as a share of total state and local educational spending, state and local spending for public K–12 education fell from about 86 percent in 1955 to 78 percent in 2002. This decline was caused primarily by increased state spending on higher and vocational education.

Providing public education at the primary and secondary level in the United States has traditionally been considered a local responsibility. For selected years between 1955 and 1999, Table 2.2 shows the division of revenue sources for public K–12 education between federal, state, and local government (school district) levels. Over the past half-century, the federal share of revenues

for public elementary and secondary education almost doubled from 4.6 percent in 1955 to nearly 9 percent in 1975, but it then fell back to 7.3 percent in 1999. As Table 2.2 demonstrates, the bulk of the financing effort for public elementary and secondary education has always fallen on state and local governments.

In 1955, local revenues—primarily from property taxation—accounted for about 56 percent of public elementary and secondary education revenues, whereas state revenue sources—primarily from personal and corporate income taxation, along with sales taxation—accounted for almost 40 percent. Note that a half-century ago, state and federal governments contributed less than half of the revenues necessary for public elementary, middle, and high schools. By 1999, however, the federal and state governments together contributed about 57 percent of the revenue for K–12. State governments alone accounted for

TABLE 2.2 Revenue Sources for Public Primary and Secondary Education (%)

Year	Federal	State	Local
	(1)	(2)	(3)
1955	4.6	39.5	55.9
1965	7.9	39.1	53.0
1975	8.9	44.4	46.7
1985	6.7	49.4	43.9
1995	6.6	47.5	45.9
1999	7.3	49.5	43.2

Source: National Center for Education Statistics (2002, Table 156).

about half of all public primary and secondary educational revenues. Revenues from local sources have always been important, but their share has decreased almost continually over the past 50 years. Furthermore, elementary and secondary education is one of the largest items in state budgets. In fiscal 2001, for example, 22 percent of total state spending went to primary and secondary education in the United States (NASBO 2002).

Academics, practitioners, policymakers, and many parents recognize that financing education at the local level inevitably leads to unequal funding of schools at a per student level. This can occur for at least two reasons that are related to the fact that the primary local source of revenue for public schools is the property tax. Local property taxes are usually a voter-approved percentage of the market value of property in a school district. Because voters' desired per student spending on public education in their district is expected to rise with their income and wealth, districts with a larger share of rich voters are likely to assess a higher rate of local property taxation for school services than are districts with a greater percentage of poor residents, other things equal. But other things are rarely equal, and many districts with a large proportion of poor residents are often "property poor" and may have high tax rates to compensate for the low assessed values of their property holdings. The rate of property taxation translates into actual spending per student in the district based on per student property value in the district. Thus, school districts dominated by high-income voters, high property values, or both, are very likely to have greater revenues than are less-well-off school districts.

Revenue sharing from a state to its local school districts has been designed, in part, to overcome the funding inequities that arise from the reliance of local school district funding on local property taxes. Fisher (1996, chapter 19) provides a concise summary of the two basic forms of equalizing aid used by most states. The first is *foundation aid*, a lump sum per student grant given to all districts independent of their chosen expenditure level. The second is *power-equalizing aid*, which is designed to guarantee an equal per student property tax base to each district in the state on which to level a voter-chosen level of property taxation for K–12 public education. As Fisher described them, both forms of equalizing aid have weaknesses in trying to overcome the inequalities that arise from school districts in a state relying on local property taxation as a primary source of revenue. Evans and others (1999) offered empirical proof of this failure in their finding that in 1992 per student spending in school districts across the United States at the 95th percentile was 2.4 times greater than at the 5th percentile. They also found, however, that two-thirds of this disparity was the effect of *between-state* variation in per student school district spending, not of *within-state* variation. As a result of the disparities generated from reliance on property taxation, states such as California (through the *Serrano v. Priest* decisions of 1969 and 1976) and Michigan (through a 1993 legislative action) have instead chosen to rely primarily on state-based revenue sources to fund locally provided primary and secondary public education (state revenues account for 64 percent and 69 percent of total K–12 educational revenues, respectively; see "Quality Counts 2003" 2003).

K–12 Educational Inputs and Outputs

As Table 2.3 shows, on the input side of U.S. public primary and secondary education production, the number of full-time-equivalent public elementary and secondary

TABLE 2.3 Number of Public Primary and Secondary Teachers, Students, and Schools

Year	Number of teachers (FTE)*	Number of students*	Students per teacher (FTE)	Number of schools
	(1)	(2)	(3)	(4)
1955	1,141	30,680	26.9	—
1965	1,710	42,173	24.7	—
1975	2,198	44,819	20.4	87,034
1985	2,206	39,422	17.9	82,190[†]
1995	2,598	44,840	17.3	84,958
2000	2,953	47,223	16.0	91,691

Source: Cols. 1 and 2, NCES (2002, Table 65); col. 4, NCES (2002, Table 87). * In thousands; † for 1986.

school teachers has steadily increased over the past few decades. In 1955, teachers numbered about 1.1 million. By 2000, that number had increased to more than 2.9 million. The number of students also increased during this time from 30.7 million to 47.2 million. But unlike the steadily upward trend of teachers, the increased trend in the number of students has not been consistent. Rather, after the "baby boom" cohort finished high school in the mid-1980s, a dramatic dip in the pace of enrollments took place. The number of public elementary and secondary schools followed a similar trend to that of enrollments, showing a dip after the baby boomers finished school and then an increase. Still, the student–teacher ratio has steadily declined. The change from 26.9 students per teacher in 1955 to 16.0 students per teacher in 2000 represents nearly a 41 percent drop in this measure.

As described earlier, economists like to think of elementary, middle, and high schools as production facilities that take given student inputs and combine them with chosen school-provided inputs in a given social environment to produce a measurable education output. However, the application of this economic production analogy to what really goes on public schools presents some problems. For example, how are the inputs and outputs measured? Clearly, just counting the number of students and teachers, as in Table 2.3, is not an adequate way to capture educational input differences across time and across school sites. Given the available data, researchers have used a variety of other measures that attempt to capture quality differences in school-provided inputs more

effectively. Some of the more common input measures, as well as their trends, appear in Table 2.4.

It is important to keep in mind that the numbers in Table 2.4 are national averages. Each measure varies from state to state, from school district to school district, and from school to school. Even so, each of these measures does show what could be defined as a steady improvement in the quality of school-provided inputs. Average teacher salaries have been trending upward in real constant-dollar terms. Between 1965 and 2000, the average annual real teacher salary in the United States increased nearly 22 percent. In contrast, between 1955 and 2000, real school district expenditures per student rose 300 percent. As indicated by the near doubling of average teacher experience over this period and the more than doubling of the percentage of teachers with a master's degree, it can be argued that the salary increases have bought more experienced and educated teachers.[5] In addition, the overall increase in current real expenditures per student must have been used to fund increases in school-provided inputs other than just more teachers (as the fall in student–teacher ratio illustrates) and more experienced and educated ones.

Turning to the output side of the K–12 public education process in the United States, Table 2.5 offers three commonly available measures. One is the dropout rate, defined here as the percentage of 16- to 24-year-olds who are not enrolled in high school and have not finished it. Table 2.5 indicates that the *dropout rate* has steadily declined from about 15 percent in 1971 to about 11 percent in 2001.

TABLE 2.4 Various Input Measures for Public Primary and Secondary Education

Year	Real annual teacher salary ($)*	Real current expenditures ($)* per student (ADA)	Median teaching experience (years)	Percentage of teachers with at least master's[†]
	(1)	(2)	(3)	(4)
1955	—	1,950	—	—
1965	36,216	3,003	8	23.3
1975	40,485	4,831	8	37.5
1985	41,264	6,150	15	51.4
1995	43,414	7,090	15	56.2
2000	44,102	7,789	—	—

Source: Col. 1, NCES (2002, Table 77); col. 2, NCES (2002, Table 166); cols. 3 and 4 (NCES 2002, Table 70).
* In constant 2001–02 dollars; † for 1966, 1976, 1986, and 1996.

[5] When interpreting this evidence, however, it is important to note that the evidence is mixed on whether teachers with more experience or education, or simply greater expenditures per student, produces better K–12 education outcomes. We address this evidence in later chapters.

TABLE 2.5 Various Output Measures for Primary and Secondary Schools

| | | NAEP test score (17-year-olds) | |
| | Dropout rate* | NAEP Reading | NAEP Math |
Year	(1)	(2)	(3)
1971	14.7	285.2	304.0†
1980	14.1	285.5	298.5‡
1990	12.1	290.2	304.6
1994	11.4	288.1	306.2
1999	11.2	287.8	308.2
2001	10.7	—	—

Source: Column 1, NCES (2002, Table 108); column 2, NCES (2002, Table 111); and column 3, NCES (2002, Table 123).
* Percentage of 16-24-year-olds who were not enrolled in school and had not completed high school when they left school; † for 1973; ‡ for 1982.

However, the dropout rate only indicates secondary school attendance and completion. It provides no information on the quality of high school graduates. One way to measure quality is through the test scores of public high school seniors. Columns 2 and 3 of Table 2.5 show the trends in average National Assessment of Educational Progress (NAEP) test scores in reading and math. What is disappointing, given the documented per student expenditure increases over this period, is the failure of test scores to improve over the 30 years since the early 1970s. Scores in 1999 were almost at the same level as in the early 1970s. It should be noted, however, that overall average scores paint a misleading picture. Reading scores, for example, increased between 1971 and 1999 for all racial subgroups—especially black and Hispanic students. The reason the overall average did not increase over this time is because the racial composition of the student body changed. Minorities (with lower reading scores than whites) make up a larger percentage of the total in 1999 than they did in 1971.

Another often-used output measure is wages. On average, high school graduates earn less than college graduates but more than high school dropouts. In 1994, the ratio of average annual earnings (for full-time, full-year workers of both sexes between the ages of 25 and 34) of college graduates to high school graduates was 1.47. The ratio for high school dropouts (9 to 11 years of schooling) to high school graduates was 0.78. By 2001, those ratios were 1.65 and 0.94, respectively. Clearly, the college premium has grown over the past decade. Yet while high school graduates have been losing ground compared with

college graduates, high school dropouts have been closing the earnings gap with high school graduates.

Tables 2.3 through 2.5 indicate that U.S. public K–12 schools probably provided increased inputs in the last half-century but produced little gain in the average measurable quality of outputs of America's public schools. Still, this finding does not necessarily invalidate the economic model of education production, in which greater inputs lead to greater outputs. Recall that this model also identifies student-provided inputs and the social environment in which education is produced as important factors in the quality of educational output that ultimately results. The likely reason that standardized test scores in the United States have shown little improvement while real teacher salaries (experience and education) and real expenditure per student have increased is that quality of student inputs and the social environment within education is produced—which public schools have no control over—have not improved and have likely decreased.

Public Support of K–12 Education

Perhaps it is not surprising that at the same time that reliance on local property taxes to fund local public schools has led to inequities in per student spending in the United States (even after state revenue-sharing efforts to correct), and that increased public resources devoted to K–12 education have resulted in little perceived change in the average quality of education output, the trend in public confidence in the people who run educational institutions in the United States has declined.[6]   As Table 2.6

---

[6] The media bias for bad news about the U.S. educational system is probably another factor contributing to this decline.

TABLE 2.6 Public Confidence in Education

Year	A great deal (1)	Only some (2)	Hardly any (3)
1975	31.5	55.5	13.0
1980	30.6	56.8	12.6
1986	28.0	61.2	10.8
1990	27.4	60.1	12.5
1996	23.2	58.4	18.4
2002	25.1	59.3	15.7

Source: Authors' analysis of data from the General Social Surveys responses to the question: "I am going to name some institutions in this country. As far as the people running these institutions are concerned, would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?"

shows, the proportion of people voicing "a great deal" of confidence in those running educational institutions has decreased by 6.4 percentage points since 1975, and those voicing "hardly any" confidence have increased by 2.7 percentage points. These results suggest that the people running the U.S. educational system have suffered some loss of public confidence. But even given this steady 25-year decline, more than 80 percent of the Americans surveyed in 2002 had at least some positive feelings about educators, choosing "only some" or "a great deal" of confidence in educators.

Perhaps more interesting is a dramatic 22.6 percentage point increase in the proportion of people believing that we spend too little on education in America. Furthermore, the proportion believing that we spend too much on public education in 2002 is half what it was in 1975. This sentiment was echoed most recently in California, where 67 percent of survey respondents in the summer of 2003 said they would be willing to pay higher taxes to maintain funding for K–12 public education (see Baldassare 2003). The results presented in Tables 2.6 and 2.7 suggest that the American public is concerned about our educational institutions (hence the decline in confidence) but feels that money matters for the improvement of our elementary and secondary educational system.

TABLE 2.7 Public Attitude toward Spending on Education

Year	Too little (1)	About right amount (2)	Too much (3)
1975	51.3	37.0	11.7
1980	54.9	34.2	10.9
1986	62.3	33.5	4.2
1990	73.1	23.8	3.1
1996	70.2	23.5	6.3
2002	73.9	20.7	5.4

Source: Authors' analysis of data from Davis, Smith, and Marsden (2003), responses to the question: "We are faced with many problems in this country, none of which can be solved easily or inexpensively. I'm going to name some of these problems, and for each one I'd like you to tell me whether we're spending too much money on it, too little money, or about the right amount."

Summary

This brief review has sketched some basic facts about public primary and secondary education in the United States: (1) The burden of financing public K–12 education is now about equally shared by both the state and local governments, even though local reliance on the property tax to local school district expenditures has

resulted in per student spending differences that have not been fully overcome by state revenue sharing. (2) Educational inputs and outputs are difficult to measure, but the U.S. average student–teacher ratio has decreased, teachers are more experienced and are better educated, high school dropout rates have declined, but test scores have remained essentially unchanged. (3) Typical Americans are concerned about the quality of public education, but they also believe that money matters and that educational spending should be increased.

3

Public Education,
the Economy, and "Spillovers"

Every child and young adult has surely heard the following: "To get ahead in life, get an education." The evidence suggests that many students take this advice and that it is correct. U.S. high school completion rates have increased over the past several decades. College attendance rates of high school graduates have also increased. Data reported in the previous section show that those with more education earn more money (and are more likely to be covered by employer-sponsored health and pension plans). But does a quality education have effects beyond a lifetime of higher-paid employment for those completing it? That is, does it have other effects for the more educated individuals, for others, or for both? This chapter examines this question and describes the case in which taxpayers in a school district pay for the public education of children in their jurisdiction but these children move out of the district after being educated. The chapter shows that benefits in addition to those of higher lifetime earnings exist and can "spill over" school district and even state boundaries.

Returns Gained from K–12 Education

Economists divide the impacts of a person earning a high school degree, or getting a higher-quality public primary and secondary education, into *private returns* and *social returns*. Private returns are those captured directly by the educated individual. They may include, in addition to a lifetime of higher earnings, greater fringe benefits and perhaps a greater sense of self-worth and accomplishment.

Economists also refer to these benefits as "internal" to the person who earned them. But some benefits are "external" to the individual. That is, the better-educated individual does not capture them. Such social returns, or "positive externalities," can include the individual's payment of higher taxes to support public projects that benefit everyone, the smoother operation of the democratic process through a more informed electorate, the lower likelihood of educated individuals being involved in criminal activity, and even the more interesting conversations that may take place at cocktail parties. In fact, the high social return of universal, high-quality K–12 education is the reason most often cited for classifying this service as a "public good" that the government should provide to all and fund through general taxes.

Since the pioneering works of Schultz (1961), Becker (1964), and Mincer (1974), economists and other social scientists have thought about the role that education plays in the individual and economy-wide acquisition of "human capital." The economic concept of human capital is used to distinguish one laborer from another. A laborer with any or all of the attributes of greater education, higher-quality education, more accumulated skills, and greater natural ability is said to possess more human capital. Along with physical capital (e.g., buildings and machinery) and raw materials (e.g., land, oil, iron ore, and water), business firms need human capital as an input to what they produce. The typical economic model predicts that individuals are paid an hourly wage or yearly salary based on what their hiring contributes to the market value of the firm's final production. Basic economic theory predicts

that a profit-maximizing firm will never pay a worker more than what it can sell the worker's contribution to increased output for.

Understanding this, individuals make decisions about how much to invest in their human capital—or how much and what quality schooling to obtain. At the primary level of education in the United States, because attendance is mandated, the individual cost of further investment in human capital is likely to consist of leisure time lost to class attendance and after-school study. Beyond age 16, when individuals can drop out of high school, the added personal cost of attending secondary school is forgone earnings. The payoff for human capital investments is increased earnings in the future. The theory of human capital investment basically argues that individuals will invest in their human capital (e.g., attend school) up to the point where the cost of the last year of schooling equals the return on that year of schooling in higher earnings. Economic theory suggests that individuals will make rational decisions about their schooling as long as they bear the costs and reap the returns. In terms of K–12 education, however, it is important to recognize that without mandatory attendance laws, these decisions would be made by minors or parents who may not appreciate or understand the full personal economic benefits of achieving a high school diploma. That, of course, is the primary reason for mandatory attendance and age-of-dropout laws in the United States.

That education has social benefits is not a new concept. As Adam Smith (1776) argued, "the expense…for education…is likewise, no doubt, beneficial to the whole society, and may, therefore, without injustice, be defrayed by the general contribution of the whole society" (book 5, chapter 1). The presence of returns to education that are not captured by the individual making the investment decision creates problems for the simple market model of human capital investment. The individual makes his or her decisions based solely on the costs and benefits he or she confronts. If additional benefits accrue to other people besides the individual making the human capital investment decision, as described above, then the individual will tend to underinvest in education—that is, leave school too early. That creates a basis for an economic argument that a third party such as a government needs to decide both the quantity (i.e., the number of years) and quality of schooling a child receives.

Spillovers of K–12 Education

Haveman and Wolfe (1984; Wolfe and Haveman 2002) are noted for their efforts to put a monetary value on some of the nonmarket spillover effects of education.[7] Wolfe and Haveman (2002) argue that the value of these spillovers may be large and note that their effects "under certain assumptions may be as large as the market-based effects of education" (p. 98). Spillover benefits can be broken down into the broad categories of economic growth, quality of life, decision-making and choice, and social capital. These are all briefly described next. The section closes with a discussion of the implications that external and spillover benefits have for the public provision of K–12 education in the United States.

Economic Growth

A particularly important effect of these spillovers is on the economic growth of an entire country's economy. Early work by economists such as Schultz (1960) and Denison (1962) emphasized that an increase in overall educational attainment in a nation increased the nation's stock of human capital and thus increased its aggregate output and income. The productivity increase from the increase in the human capital or the ability of the same number of people in a country to produce more or to produce goods and services that are valued more highly in the market increases the amount of income earned in a country and thus makes all of the country better off.[8]

Denison (1985) updated his earlier 1962 growth accounting work and estimated that 13 percent of the growth rate of U.S. national income between 1929 and 1982 was caused by increases in the level of education obtained by U.S. residents. Other economists have found similar effects of increased educational attainment on growth rates in other countries. For example, Hanushek and Kimko (2000) reported in a cross-national study that labor force quality is an important source of economic growth and that schooling is associated with labor force quality. Furthermore, Foster and Rosenzweig (1996) found in an empirical study that investment in schooling is associated with a greater diffusion of technology. Responding to these studies and others, many in the international development community (e.g., at the World Bank and the International Monetary Fund) have recommended increasing human capital investment (education) as the major way to fight poverty in the developing world.

---

[7] Much of this section draws on the work of Haveman and Wolfe and the articles they cite in their studies.

[8] This refers to the size of the economic pie and not how it is sliced (inequality).

However, increasing the levels of education in a country does not necessarily lead to greater economic growth. For example, Easterly (2001) presents results for Sub-Saharan Africa that find no association between growth in education and growth in output per worker. He concludes that although an educated and skilled workforce is necessary for economic growth, it does not automatically lead to growth. Easterly states that "corruption, low salaries for teachers, and inadequate spending on textbooks, paper, and pencils are all problems that wreck incentives for quality education" (p. 83). Thus, it is not just the quantity of education achieved by a nation's residents that matters in determining the nation's path of economic achievement but also—and perhaps just as importantly—the quality of that education.

Quality of Life

Researchers have also offered empirical evidence that greater educational achievement is associated with an improved quality of life for those who achieve it and that this improvement offers benefits to all of society. Haveman and Wolfe (1984; Wolfe and Haveman 2002) summarize studies that find a positive link between the greater education of an individual and greater health and improved mortality of that individual. Some studies have also found that greater educational attainment positively influences the health and mortality of the individual's spouse and children. A few studies have found that a mother's education is related to a lower probability that her teenage daughter will have an out-of-wedlock birth.

Moreover, few dispute the notion that the educational levels of the people who surround them positively influence children's development. Studies have found that children's education and cognitive development are heavily influenced by their parents' educational level. Other studies provide evidence that grandparents' education and the educational level of adults in the neighborhood positively influence children's education and increase the likelihood that the children will graduate from high school. Borjas (1992) found that the skills and education of today's youth also depends on the average skills and education of their ethnic group in their parent's generation.

Decision-making and Choice

In addition, Haveman and Wolfe argue that a higher level of educational achievement is likely to lead individuals to make more efficient choices. For example, they cite evidence that schooling leads to more efficient consumer activities (e.g., shopping for quality goods at the lowest price). This offers a benefit to all because it encourages firms to produce only these types of goods and services. Increased education can also have a positive influence on the manner in which someone conducts a job search. Research has shown that job-search costs are reduced with greater education and that the socially efficient mobility of workers across regions in a country may be increased. Such mobility not only benefits the more educated job searcher but also spills over to others. For example, educated workers get back to work faster and thus produce more goods and services for all to consume. In addition, the educated and hence more mobile workers distribute themselves more efficiently to regions of the country where the residents and the economy most need them.

Besides purely economic choices, some social choices appear to reflect the influence of education. For example, evidence suggests that more education is a factor in better sorting or matching in the marriage market. That is, the more educated are more likely to find more compatible mates and are therefore more likely to avoid divorce and the negative externalities that it can generate. Furthermore, results from several studies suggest that more educated people are better able to attain their desired family size through more effective use of contraception.

Social Capital

Researchers also offer evidence linking education to the creation of social capital. Social capital is produced when individuals use membership in groups (e.g., networks, organizations, and communities) to secure benefits (Sobel 2002). Thus, although social capital can considered an attribute of the individual, it cannot be separated from the social context in which the individual lives. Coleman (1990) argued that social capital, like physical and human capital, facilitates productive activity in the economy. He stated that "a group whose members manifest trustworthiness and place extensive trust in one another will be able to accomplish much more than a comparable group lacking that trustworthiness and trust" (p. 304). Those with more education tend to donate more time and money to charity than do those with less education. Higher levels of education appear to be linked with reductions in crime and greater social cohesiveness. Education is positively linked to likelihood of voting, reduced alienation, greater trust, and greater involvement in community organizations.

Implications for Public Provision of K–12 Education

It should be clear that the acquisition of a quality elementary, middle, and high school education offers benefits to more people than just those who achieve the education. If all the benefits of an education do not go to an individual, yet the individual bears all the costs, then from society's perspective, the individual has an incentive to underinvest in his or her education. In addition, local communities and governments also have an incentive to underinvest in public primary and secondary education because educated people often move away from the jurisdiction in which they received that education. That is, people in a jurisdiction might balk at funding a person's public education if they had no firm expectation of receiving any benefits from doing so.

Poterba (1996) noted that the government uses three main instruments to provide public education: subsidies, mandates, and direct government provision. As a way to encourage more people to pursue a higher education (and thus generate more external benefits that all enjoy) than would if they had to pay the full costs, states and to an extent the federal government offer direct subsidies to state-run institutions of higher education. In addition, several different governmental programs offer tuition subsidies to students. Subsidies from state and federal revenue sources are in place not only because individuals' higher education generates external benefits but also because those external benefits are likely to extend to an entire state or even nation because of mobility and the spillover effects it generates.

In terms of the provision and funding of public K–12 education, government intervention generally takes the more intrusive form of required attendance and local government (school district) provision, which is subsidized from state and some federal sources. Most states require teachers to meet minimum competency standards, and most students have to meet certain requirements to graduate. In addition, the federal government, in the No Child Left Behind Act of 2001, has recently mandated that states and localities establish and meet student performance standards and place a highly qualified teacher every classroom. If the provision and funding of public K–12 education in the United States were left only to local governments, they would face the incentive to underinvest in this education because local communities do not reap the individual and social returns to education if the students educated in the district move out after high school graduation. The likely large external, boundary-crossing "spillover" benefits of a publicly provided K–12 education thus form the key argument for mandated attendance, quality standards, and subsidies that higher levels of government impose or provide.

Summary and Conclusion

This chapter has described both the private and public benefits that arise from providing a greater quantity and quality of primary and secondary education. The literature clearly shows the existence of external benefits and that these benefits spill over the boundaries of school districts. Haveman and Wolfe (1984; Wolfe and Haveman 2002) believe, through their reading of the literature, that the total returns (private market returns plus social market and nonmarket returns) may be twice as large as the estimated private returns. These large returns suggest that government intervention has a role to play in increasing access to education in the United States, in improving its quality, and in extending the level of education to which individuals can aspire.

4

Education's Contribution to Economic Development

The goal of this report is to describe current economic thought on the measurable returns that public primary and secondary education provide in the United States. The previous chapters offered the necessary background to do this. In chapter 1, we described the general contribution of public K–12 education, the public awareness of the importance of this contribution, and how current statewide budget crises and accountability movements could threaten the provision of quality K–12 public education in the United States. In chapter 2, we detailed three points about the nation's provision of primary and secondary education, noting that it is locally provided but less than half locally funded, modeling it as a production process, and observing that many Americans are losing faith in its quality. Chapter 3 described the external benefits and "spillovers" that arise from the individual consumption of a K–12 education and the implications of these for how education is provided and funded.

The next two chapters describe the economic literature on the measurable returns of public K–12 education in the United States. In this chapter we examine the theory and evidence offered by economists on the contribution that K–12 education offers to economic development. We begin with a definition of *economic development*, describe the channels by which the provision of quality public schools can affect economic development, and note that providing quality public schools may require higher taxation, which can exert its own measurable and negative impact on economic development. Furthermore, this chapter includes a description of the type of empirical study needed to discern the actual consequences of public K–12 education on economic development. We conclude by summarizing the results of previous data-based studies that satisfy these criteria. That summary offers the best information currently available on the quantifiable impact of providing public K–12 education on economic development in the United States. Here, however, we look only at the impact of government expenditures on economic development and not on other things such as quality of life. We describe such additional impacts in chapter 5.

Economic Development and K–12 Public Education

Economists recognize that the movement of an economy from an existing quantity and quality of public K–12 education to a higher level can result in greater economic development in the economy.[9] The first channel through which this could happen is if an improved quality of K–12 education results in an increase in the productivity of workers. This is only a possibility, because improvement of

---

[9] We use the term *economic development* to represent any dollar-based increase in economic activity. Such increased activity can occur through two channels. First, a given economy (with a fixed number of workers, land, raw materials, machinery, and other physical inputs) can produce a greater dollar value of output because of productivity increases in one or more of the existing inputs. For example, a productivity increase for workers would mean that the same number of laborers produced more of the same outputs, and hence greater dollar values of the outputs using the same other inputs. Second, an economy can produce a greater dollar value because it has added more inputs to its production processes. This could occur, for example, if the economy gained more residents and thus more potential laborers for employment by its firms.

education is not enough in itself: eventually it must enable employees to produce more output with the same amount of other inputs. If workers are able to do this, then the dollar value of their additional contribution to the firm will rise, and the profit-maximizing firm will then be able to pay the better-educated laborers a higher wage or salary. The aggregate effect of this is greater earned income in the entire economy and thus greater economic development. When considering this possible link between providing K–12 education and economic development, one must recognize that it could take years to take effect (i.e., until the better-educated products of the school system enter the labor force), and it will be diminished in a given regional or state economy if those better-educated workers migrate to a different regional or state economy to find employment.[10]

The second possible way that the movement of a regional or state economy from an existing quality level of public K–12 education to a higher level results in greater economic development is by generating an increase in the *number* of laborers in the economy. This occurs if potential migrants into an economy base their decision to migrate in part on the quality of the public elementary, middle, and high schools in the economy. An improvement in education quality would thus stimulate greater migration into the economy.[11] The increased numbers of workers in the economy are able to produce a greater dollar value of economic output with same amount of inputs previously used. In addition, the new migrants can raise the demand for goods produced in the economy, and this also works to raise the dollar value of the economy's output through both price and output increases. No wait for existing schoolchildren to become more productive workers is involved, and therefore the impact of an improvement in the provision of K–12 education on economic development is quicker through this channel than through the one previously described.

K–12 Public Education, the Balanced Government Budget, and Economic Development

For a fuller understanding of the economic development impact of an increase in the quality of K–12 public education in a regional or state economy, one must ask how this increase came about. If the increase came from a *shift* in the allocation of existing government spending (state, local, or both) on primary and secondary education and did not require any additional local or state resources, then the inquiry can end there. But if the increase in quality was generated through an *increase* in state or local government resources devoted to K–12 education (i.e., an increase in per student spending), then the inquiry must continue.

For example, consider a state that wishes to improve the quality of K–12 education offered by local school districts throughout its jurisdiction by mandating that local school districts undertake educational reforms that require *additional* resources (e.g., a reduction in student–teacher ratios, hiring of better-quality teachers, or encouraging better-quality teachers to teach in central cities). The costs of these reforms are covered by an *increase* in revenue sharing from the state to local school districts. An often-stated goal of such a policy change is to further the state's economic development through the productivity and migration channels just described. But because a state must maintain a balanced budget, this policy change will require one of three additional actions to fund: (1) an increase in the state's taxes or fees, (2) a cut in the state provision of a non–K–12 service, or (3) a combination of state revenue increases and state expenditure cuts.

Economists recognize that any of these three actions may also affect a state's economic development. An increase in state taxes (personal income, property, or sales) or fees paid by individuals can depress migration into the state and increase out-migration. These occurrences reduce the state's aggregate income and thus its economic development.[12] An increase in state taxes (corporate

---

[10] However, out-migration is likely to be less of a factor in diminishing the impact of providing higher-quality K–12 education versus providing higher-quality higher education because people with K–12 educations only are comparatively less mobile than those with higher educations.

[11] Migrants are also likely to be better educated than the average current resident in the economy because of the positive correlation between an individual's education and the value that he or she places on primary and secondary education. If so, an increased productivity effect, as just described, could take place.

[12] Californians recently debated this idea in the context of establishing a more progressive income tax to solve the state's budget woes. The notion posed was that if tax increases hit higher-income—and arguably more productive—workers harder, the increases might be self-defeating by driving those workers out of the state.

income or property) or fees paid by business can also depress migration into the state, slow the construction of physical capital (buildings and machines) in the state, and reduce the state's aggregate income by reducing its output or the productivity of its workers. Alternatively, a cut in a state-provided service that is valued by individuals or businesses can discourage the migration of people and firms into the state, accelerate their out-migration, or both. The net result is possibly less economic development than if the improvement in statewide education quality were generated in a way that did not require additional resources. Good empirical research must try to account for this theoretical possibility.

Necessary Qualities of Empirical Studies to Discern Economic Development Impacts

The previous discussion clearly points researchers toward taking a "balanced budget" approach when trying to determine the local or state impact of increased K–12 public education services on economic development. This is particularly important considering that most data-based studies of education quality and economic development use some form of K–12 public education expenditure as a proxy for the quality of primary and secondary education provided.[13] Using such a proxy, and understanding that local or state governments in the United States must run a balanced budget, we see that education quality can improve only if taxes are raised or other government expenditures are cut.

Helms (1985) produced the first empirical study to model the impact of K–12 education expenditure on economic development in the appropriate balanced-budget fashion that accounted for other forms of government expenditure and the ways that government revenue is raised. Later, Mofidi and Stone (1990) did the same and offered an extensive discussion and demonstration of why this is necessary.[14]

Data-based studies that try to discern the impact of K–12 public education spending on economic development use multiple regression analysis as the appropriate statisti-

cal tool.[15] This involves the choice of a dependent variable of interest (some measure of economic development), the choice of a unit of analysis by which the dependent variable exhibits significant variation (usually by state), and the choice of explanatory factors expected to cause the observed differences in the magnitude of the dependent variable.

As Mofidi and Stone (1990) pointed out, the researcher who uses regression analysis to examine the impact of government fiscal activity on economic development cannot include a comprehensive accounting of all forms of government expenditures and revenues. The reason is that if one expenditure measure is to increase, and the subnational government must still maintain a balanced budget, then a different expenditure measure must decrease, a revenue measure must increase, or both. Consequently, one category of expenditure or revenue must be left out. The revenue or expenditure measure left out of the regression analysis (e.g., transfer payments in Helms [1985] and Mofidi and Stone [1990]) becomes the measure that is expected to change to allow the impact on economic development to be calculated within a regression. Helms calculated that the long-term influence of raising K–12 educational expenditures by \$1 relative to \$1,000 of state personal income, with the money for this increase coming from an equivalent decrease in transfer payments in the state, would raise the state's personal income by about 3.2 percent in the long run.

Mofidi and Stone (1990) also offer other compelling reasons why the accurate determination of the impact of government fiscal activity on economic development requires a sensible breakdown of all government expenditure and taxation categories. Different forms of taxation are expected to have different impacts on generating economic distortions in the economy. These differences need to be accounted for separately to determine the impact of any one tax measure on economic development. On the expenditure side, different forms of government expenditure exhibit different degrees of public good and have different influences on economic development. Thus they need to be accounted for separately in the regression analysis.[16]

---

[13] See chapter 5 for an extended discussion of the relationship between per student K–12 education spending and education quality.

[14] We draw the following discussion of the necessary elements of a quality empirical study on this issue from Mofidi and Stone (1990).

[15] Regression analysis allows the researcher to determine the impact that changing an explanatory variable by one unit, holding all other explanatory variables constant, has on the dependent variable in the units that it is measured in. For a full presentation of the basics of regression analysis, see, for example, Stock and Watson (2003).

[16] A pure "public good" can be consumed by all equally without reducing the consumption of any one. A partial public good only partially exhibits this quality. Thus, increasing the expenditure per person on a government provided partial public good does not increase the expenditure for all equally; whereas, with a pure public good it does. These distinctions can have important differential impacts when assessing the impacts of different forms of government spending.

**TABLE 4.1 Helms (1985) Regression Calculated Influence of
Raising Fiscal Variable By $1 Per $1,000 of State Personal Income on
State's Personal Income**

Statewide explanatory variable ($'000)	Influence (%)	
	Short-run	Long-run
	(1)	(2)
Property tax payments / personal income	−0.20	−2.45
Other tax payments / personal income	−0.16	−1.96
User fee payments / personal income	−0.14	−1.72
Deficit / personal income	−0.27	−3.31
Federal source revenue / personal income	−0.25	−3.06
Govt. health expenditure / personal income	0.36	4.41
Govt. highway expenditure / personal income	0.25	3.06
Govt. K–12 expenditure / personal income	0.26	3.19
Government higher education expenditures / personal income	0.27	3.31
Govt. other expenditure / personal income	0.21	2.57

Note: The results recorded in Table 4.1 are from a fixed effects (for time and state) regression that uses instrumental variables for endogenous explanatory variables. The excluded category is statewide transfer payments; therefore revenue increase results in equivalent transfer payment increase, and expenditure increase results in equivalent transfer payment decrease. The values in this table's cells represent the expected short-run (one year) and long-run (full adjustment) percentage change in the average state's personal income given an increase of $1 per $1,000 of state personal income in the fiscal variable provided in first column. These values are calculated as if the respective increase in taxes or expenditures is funded by the requisite increase or decrease (under a balanced budget) in state programs that directly transfer money to the poor. The net impact of instead funding a K–12 expenditure increase by a tax/fee increase or decrease in a different expenditure category can be found by adding the two relevant influences together.

Thus, one should only trust the results derived from regression-based studies of the influence of K–12 education spending on economic development if the following conditions obtain. First, the analyst must have made a reasonable effort to account for different expenditure and taxation categories. Second, all expenditures and all revenues must be accounted for in the categories included. And third, one expenditure or revenue category has been excluded. Using these criteria led us to choose to discuss only the selected regression studies described in the next section. That is, other studies in the literature on this topic do not meet the conditions fully, and we feel their results cannot be trusted.

Results of Previous "Quality" Empirical Studies

The Federal Reserve Bank of Boston asked Fisher (1997) to write a review article on existing regression research measuring the effects of state and local public services on economic development. Fisher concluded that

Of the three major public services categories reviewed here [public safety, transportation, and education], the evidence about a relationship between economic development and spending on education is least convincing. Of the 19 studies reviewed, 12 show a positive relationship, but only six studies report a significant positive relationship…. (p. 57)

Later in his summary, Fisher (1997) discussed the importance that incorporating the government budget constraint into the regression specification plays on the reported results. He mentioned the work of Helms (1985), Mofidi and Stone (1990), and Luce (1994) as examples of research using the appropriate methodology. The results relating to government fiscal activity and its impact on economic development derived from these studies, and results that we found from two more recent studies, Bartik (1989) and Harden and Hoyt (2003), are described next.

Helms (1985) used pooled (time series and cross-section) regression analysis on annual data from the 48 contiguous states for the period 1965–79 to examine the influence of statewide fiscal variables on a state's personal income. Like all the studies to be described here, he also

included other explanatory factors thought to be important to the determination of differences in a state's personal income. Helms applied a stock adjustment regression framework so the short-run (after one year) and long-run influences (after full equilibrium adjustment) of each fiscal factor on economic development can be calculated. Table 4.1 summarizes the fiscal variables included in Helms study and the statistically significant short- and long-run influences they exert on a state's personal income.[17]

Helms (1985) clearly and effectively showed that as long as an increase in public K–12 education expenditure is funded by any method except an increase in the state's deficit, or decreases in health expenditures or higher education expenditures, the expected result is an increase in the state's economic development as measured by personal income. Because Helms accounted for all revenue categories and excluded one expenditure category, the results recorded in Table 4.1 can also be used to simulate the expected average effect of a state raising its statewide expenditure on K–12 education by $1 (which increases personal income by 3.19% in the long run) and financing

it, for example, through an increase in other tax payments (which decrease personal income by 1.96% in the long run), for a net *increase* in personal income of 1.23 percent. Simulations of similar increases in K–12 education expenditure financed through revenue instruments other than tax payments, such as an increase in a state's short-term deficit (that under nearly all state constitutional rules would need to be paid off with an increase in revenue or decrease in expenditure), would result in a net *decrease* in personal income.

Another regression study of the influence of statewide spending on K–12 education on a measure of statewide economic development is that of Bartik (1989). Unlike the authors of the three previously described studies, Bartik used the change in the number of small business start-ups for 19 manufacturing industries for the 50 states over three time periods (1976–78, 1978–80, and 1980–82) and regressed these changes against the change in statewide fiscal variables and other explanatory measures expected to influence them. His statewide government expenditure measures included six different inclusive categories,

TABLE 4.2 Bartik (1989) Regression Calculated Influence of Raising Local Fiscal Variable by 1% (at mean value) Resulting in Given Percentage Change in Small Business Starts in a State

Statewide explanatory variable	Influence on number of small business starts (%)
Business property tax rate	−0.09
Personal income tax rate	−0.05
Corporate income tax rate	−0.12
General sales tax rate	−0.47
K–12 public school spending / pupil	0.35
Police spending / person	None
Fire protection spending / person	0.54
Higher education spending / person	−0.30
Welfare spending / person	−0.35
All other state and local spending / person	−0.22

Note: The excluded category is other state and local alternative revenue instruments (fees, charges, other taxes, etc.). Therefore, a given revenue increase results in an equivalent decrease in these alternative revenue instruments, and an expenditure increase results in an increase in these alternative revenue instruments.

The values in this table's cells represent the expected percentage change (after two years) in the number of small business starts in a state given a one-percentage-point increase in different fiscal variables provided in first column. These values are calculated as if the increase in taxes or expenditures was funded by the requisite decrease or increase (under a balanced budget) in alternative revenue instruments. The net impact of instead funding a K-12 expenditure increase by a different tax/fee increase or decrease in a different expenditure category can be found by summing the two relevant influences.

[17] Throughout this paper *statistical significance* is defined as 90 percent or greater confidence that a factor exerts a nonzero influence in a two-tailed test (or one that does not presuppose the sign of the regression coefficient).

TABLE 4.3 Mofidi and Stone (1990) Regression Calculated Influence of Raising Fiscal Variable by $1 Per $1,000 Personal Income on Given Measure of Manufacturing Economic Development

Statewide explanatory variable ($'000)	Influence on manufacturing variable	
	Investment (%)	Employment (%)
	(1)	(2)
Tax payments / personal income	–0.97	–0.50
Other revenues / personal income	–1.33	–0.61
Deficit / personal income	–1.21	–0.57
Government health expenditure / personal income	None	0.56
Government highway expenditure / personal income	None	0.38
Government education expenditure / personal income	0.93	0.43
Government other expenditure / personal income	None	0.55
Government unemployment benefits / personal income	None	–0.43

Note: The excluded category is statewide transfer payments. Therefore, a revenue increase results in an equivalent transfer payment increase, and an expenditure increase results in an equivalent transfer payment decrease.

The values in this table's cells represent the expected percentage change after five years in either the average state's manufacturing investment or manufacturing employment given an increase of $1 per $1,000 of state personal income in the fiscal variable provided in first column. These values are calculated as if the increase in taxes or expenditures were funded by the requisite increase or decrease (under a balanced budget) in state programs that directly transfer money to the poor. The net impact of instead funding a K-12 expenditure increase by a tax/fee increase or decrease in a different expenditure category can be found by summing the two relevant influences.

whereas his statewide revenue measures were not inclusive and only accounted for property, personal income, corporate income, and sales taxes. This regression specification satisfies the balanced budget requirement because it excluded other forms of taxes and fees. Bartik's results are shown in Table 4.2.

In addition to satisfying the balanced-budget requirement, the Bartik (1989) study should also be trusted because its technical execution is appropriate. It is valuable in showing the impact of a statewide increase in K–12 public education spending on a variable (small business starts) that is often of interest to politicians. As Bartik demonstrated, an increase in statewide spending on K–12 public education exerts a positive influence on the number of small businesses started in a state if it is funded by anything but an increase in the statewide general sales tax or a decrease in statewide fire protection. A 1 percent increase in public K–12 education expenditure in a state exerted a positive influence on small business start-ups in that state. Because Bartik's results in Table 4.2 are recorded in elasticities calculated at respective means (or the percentage change in business start-ups in a state that result

in a two-year period from changing a respective explanatory variable by 1 percent), it is not possible to use these results to simulate the effect of raising K–12 education expenditure and financing it any way but with nonincluded alternative revenue instruments. However, Bartik did report the results of a simulation he conducted using his regression results: a 10 percent increase in all statewide property, income, and sales taxation in which all the additional revenue was equally split between fire protection and K–12 public school spending would result in a 9 percent increase in the number of small business start-ups in the typical state.

The next regression study using the appropriate balanced-budget methodology was that of Mofidi and Stone (1990). Using an approach that differed slightly from that of Helms (1985), they used first-differenced logarithmic manufacturing employment and manufacturing net investment data from all 50 states for the years 1962, 1967, 1972, 1977, and 1982 as their choices for two dependent variables.[18] Mofidi and Stone did not use a stock adjustment regression framework, so the effects calculated are for a contemporaneous change over a five-year period. Table 4.3 summarizes

[18] The dependent variable is therefore the logarithmic rate of change over a five-year period. The first-differenced form controls for state fixed effects.

the fiscal variables included and the derived statistically significant influences they exert on either a state's manufacturing employment or net investment.[19]

The Mofidi and Stone (1990) regression study differed from that of Helms (1985) in that it did not break down statewide government expenditure on education between K–12 and higher education, and it measured economic development only in statewide manufacturing terms rather than in personal income.[20] The Mofidi and Stone results do show that a $1 increase in all public education expenditure in a state per $1,000 of personal income, if financed by a decrease in transfer payments, would result in a 0.93 percent increase in the state's net manufacturing investment and a 0.43 percent increase in its manufacturing employment over a five-year period. That is, an increase in statewide spending on all forms of public education (K–12 and higher) only exerts a positive influence on the state's manufacturing investment and manufacturing employment if it is funded by an equivalent *decrease* in state programs that transfer money to the poor. These results do not show a positive increase in manufacturing economic development in the state if the education expenditure increase is financed by an increase in taxes, other revenues, or running a single-year deficit. The reason for this is that tax payment, other revenue, and deficit effects are all greater in negative terms than the positive effect of increased education expenditure.

The regression study by Luce (1994) differs from both of the previously discussed studies in that it did not focus on economic development at the state level but instead looked at local economic development within a metropolitan area. For each of the 340 municipalities in the Philadelphia metropolitan area from 1970 to 1980, Luce examined total labor force by place of residence, total employment by place of work, and employment by place of work disaggregated by Standard Industrial Code. He regressed the logarithmic value of a chosen economic development measure in 1980 in a municipality against 1970 values of three per-household local and county expenditure categories (public safety, K–12 education, and

TABLE 4.4 Luce (1994) Regression Calculated Influence of Raising Local Fiscal Variable by 1 Percent (at Mean Value) Resulting in a Given Percentage Change in Measure of Local Economic Development

Explanatory variable	Short-run (long run) influence on total labor force by local residence	Short-run (long run) influence on total employment by local place of work
	(1)	(2)
Effective county, local, plus school property tax	none	−0.37% (−1.13)
Local earned income tax rate	none	−0.20% (−0.61%)
Local & county public safety spending / households	none	none
Local & county other govt. spending / households	none	none
K–12 education spending / pupil	**0.47% (1.84%)**	**none**

Note: Excluded category is local alternative revenue instruments (fees, charges, other taxes, etc.); therefore given revenue increase results in equivalent decrease in these alternative revenue instruments and expenditure increase results in increase in these alternative revenue instruments.

The values in this table's cells represent the expected short-run (one year) and long-run (full adjustment) percentage change in the average community in a metropolitan area's labor force or employment given a one percentage point increase in different fiscal variables provided in first column. These values are calculated as if the increase in taxes or expenditures is funded by the requisite decrease or increase (under a balanced budget) in a local alternative revenue instrument such as fees or other taxes. The net impact of instead funding a local expenditure increase on K–12 public education by a tax/fee increase can be found by adding the two relevant influences together.

[19] Recall from the earlier discussion of economic development that an increase in employment or physical capital investment will result in greater income generated in a state, or an increase in economic development (as defined earlier).

[20] Like Helms (1985), Mofidi and Stone (1990) is technically clear and correct. It is valuable in showing that an increase in education spending exerts different impacts on different sectors of the economy.

TABLE 4.5 Harden and Hoyt (2003) Regression Calculated Influence of Raising Local Fiscal Variable By One Percentage Point Resulting in Given Percentage Change in Employment in a State in Short and Long Run

Explanatory variable	Influence (%)	
	Short run	Long run
	(1)	(2)
Individual state income tax revenue as % personal income	none	none
Corporate state income tax revenue as % personal income	none	none
General state sales tax revenue as % personal income	none	none
Other state taxes and charges as % personal income	none	none
Local taxes and charges as % personal income	none	none
Change in state individual income tax revenue as % personal income	none	none
Change in state corporate income tax revenue as % personal income	1.95	4.02
Change in general state sales tax revenue as % personal income	–0.68	–1.40
Change in other state taxes and charges as % personal income	none	none
Change in local taxes and charges as % personal income	none	none
State and local public education expenditures as % personal income	0.66	1.36
State and local public hospital expenditures as % personal income	none	none
State highway expenditures as % personal income	–0.79	–1.63

Note: Excluded category is non-accounted-for state and local expenditures, therefore given revenue increase results in equivalent increase in these non-accounted for expenditures and given expenditure increase results in equivalent decrease in these non-accounted for state and local expenditures.

The values in this table's cells represent the expected short-run (one-year) and long-run (full-adjustment) percentage change in the average state's total employment given a one- percentage-point increase in the fiscal variable provided in the first column. These values are calculated as if the respective increase in taxes or expenditures was funded by the requisite increase or decrease (under a balanced budget) in unaccounted for state and local expenditures. The net impact of instead funding a K-12 expenditure increase by a tax/fee increase or decrease in a different expenditure category can be found by summing the two relevant influences.

all other); 1970 values of two tax measures (effective county/city/school district property tax rate and local income tax rate); and 1970 measures of other local variables expected to influence differences in his chosen measures of local economic development. The exclusion of local fees and other miscellaneous revenue instruments from Luce's explanatory fiscal variables is what makes it an appropriate balanced-budget specification. Like Helms (1985), Luce employed a stock adjustment regression specification, so both the short- and long-run influences of a local fiscal variable on local manufacturing economic development can be calculated.

As the regression results in Table 4.4 show, Luce found that greater K–12 education spending per student in a community exerts an impact on the total labor force *available from* the community but not on the number of people *employed in* the community. Luce also found (not

shown in the table) that local K–12 education spending in a community exerted no significant separate employment effects in manufacturing, services, retail, finance, wholesale trade, or "other industry." Considering that the people who work in a community need not reside in the same community and need not have benefited from the level of K–12 education that the community provided, it is not surprising that Luce found that local education spending per student exerts no measurable influence on local employment levels.

Luce provided an interesting insight, however, in finding that local education spending per student does exert a positive influence on the community's residential labor force—that is, on the number of people who live in that community who are working or looking for work somewhere in the metropolitan area.

Luce (1990) is an example of applied research on this

topic that takes the appropriate steps to present results that can be trusted. It is valuable in showing that the impact of a local increase in K–12 public education spending exerts a different impact in a metropolitan area than it does statewide. As demonstrated here, an increase in local spending on K–12 public education, financed through an increase in a local alternative revenue instrument, only exerts a positive influence on the total number of residents in a community that desire to be employed and not on the total jobs available in the community. The reason for this is that people in a metropolitan area often leave their city of residence for a job, and thus a strong local system of K–12 education does not necessarily mean a greater number of jobs in the community. This is an argument for the benefits of a K–12 public education flowing over local boundaries and the need for its support from state and national sources.

The final study of the influence of public K–12 education spending on a measure of economic development is that of Harden and Hoyt (2003). They utilize a data set containing 722 observations on state employment levels drawn yearly from the 48 contiguous states over the period 1980–94. Like Helms (1985) and Luce (1994), they employed a stock adjustment model that allows both a short run (one-year) and long-run (full-equilibrium) calculation of the influence of statewide fiscal variables. Their inclusive revenue measures are individual income tax revenue, corporate income tax revenue, general sales tax revenue, all other state taxes and charge revenue, and local taxes and charge revenue; all of these are measured as a percentage of a state's personal income. Their expenditure measures include all state and local public education expenditures, public hospital expenditures, and public highways expenditures; again, these are measured as a percentage of the state's personal income. The balanced-budget requirement is met by leaving out all other state and local expenditures aside from these three.

The theoretical model that Harden and Hoyt use to specify their regression calls for both the level of tax measures at the beginning of a year and the change in these tax measures over the year. We also discuss the results drawn from their preferred regression model, which does not include the state's average wage rate as an explanatory variable (see Table 4.5).[21]

Like the other regression studies cited that appropriately accounted for the balanced-budget constraint faced by state and local governments by excluding one category of expenditures or revenues, Harden and Hoyt found that education expenditures exert a positive influence on a state's economic development. If all public expenditures on all forms of education as a percentage of the state's personal income increase in the average state in the United States by one percentage point (i.e., from the mean of 4.37% they calculated for their sample to 5.37%), then employment in that state would eventually rise by 1.36 percent.

Summary and Implications

It is quite clear from our review of five different regression studies that measure the influence of public spending on primary and secondary education on economic development in the United States that this category of government expenditure exerts a measurable and statistically significant influence on it. Recall that this positive influence has been calculated by simulating an increase in per student expenditure that is funded by either raising a miscellaneous tax or fee or by cutting public expenditures on transfer payments. The study by Helms (1985) even shows that financing an increase in public K–12 education expenditure by any means except a state budget deficit or by cutting public expenditures on health or higher education will lead to both short- and long-run increases in a state's personal income.

So the reasonable question to ask, as Fisher (1997) does in his review of the literature on government spending and economic development, is why are state and local governments not spending more public dollars on K–12 education that are garnered through cuts in public transfer programs or increases in state taxes or fees? The results of this research indicate that on average these governments are providing less than the efficient amount of this service. One possible cause could be imperfections in the public choice process. A second cause—one that may be particularly relevant to why increased education expenditure is not financed through cuts in welfare and transfer payments or increases in taxes—is that Americans value more than economic development when expressing their choice of fiscal activity. If equity is also important, as it surely is in the political decision-making process that determines the mix of expenditures and revenue instruments in a state or local government, then many who vote may view a cut in transfer payments or an increase in taxes to

---

[21] The Harden and Hoyt (1985) study is executed in a statistically appropriate manner and again shows that as long as an increase in public K–12 education expenditure is associated with a decrease in state and local expenditure that is not accounted for in the study, the expected result is an increase in the state's economic development as measured by total employment.

finance K–12 education as unfair. Even so, this logic does not diminish the fact that the existing empirical evidence indicates that K–12 expenditures have the effect of increasing personal income, manufacturing investments and employment, number of small business starts, and the residential labor force available in a metropolitan area.

5

School Resources, Student Performance, Housing Prices, and Earnings

In any study that involves the data-based analysis of cause-and-effect relationships, the key issues involve identifying the variables of interest and measuring them with available data. For the subject under consideration here, researchers must identify and measure the resources used in the production of a K–12 education and the resulting degree of quality produced with these resources. For example, public resources devoted to providing primary and secondary education can be spent on capital (things) or labor (people). By *capital*, economists mean school equipment such as buses, athletic supplies, desks, books, and so on. By *labor*, economists mean the hiring of more or better-qualified teachers, teacher aides, support staff, and administrators. Any or all of these purchases can improve the schooling experience and result in an increase in school quality.

The variables that economists have used most frequently to measure greater school resources typically include some of the following: (1) expenditures per student, (2) student–teacher ratio, (3) class size, (4) average educational or experience level of teachers, and (5) average teacher salary. The expectation inherent in the choice of these measures is not simply that more money per student automatically equals higher-quality education. It is assumed, rather, that the additional money will be used to hire more teachers, higher-paid teachers, or both. These labor changes are reflected in smaller class sizes and higher average education and experience levels among teachers in the district. The strategies of augmenting the number of teachers per student and of hiring "better" teachers (i.e., those who are more experienced, better educated, or both) are considered

as *positive inputs* into the schooling process, in economic terms, and as raising the quality of the educational experience for public K–12 students.

The output of the public schooling process is difficult to define and measure. Although knowledgeable parents may even seek out information on the amount of money a district spends per student, they are more likely to be impressed by more outcome-based measures of school quality. Like economists, constituents are unlikely simply to assume that more per student spending necessarily produces a higher-quality educational experience. Instead, parents of school-age children usually base their judgments of educational quality on a variety of common benchmarks such as the physical appearance of school facilities, strength of athletic or other extra curricular programs, average scores on well-known standardized tests, high school graduation rates, college enrollment rates, and so on. In empirical studies, economists have also used many of these characteristics as measures of school quality.

This chapter examines the economic link between the resources available to a public school district or site (as usually measured in per student spending) and the resulting student performance. The first section of this chapter explores this link through the economists' traditional production and cost function approaches. The second section continues by looking for real-world evidence on what homebuyers value in a public school district. The premium that homebuyers are willing to pay for living in a particular public school district, once it is identified and measured, represents the value of that district's educational quality to parents. The final section discusses the economic literature

on the specific measures of public primary and secondary school quality that are most associated with higher earnings after students enter working life.

Production and Cost Function Approaches to School Resources and School Quality

As suggested above, establishing a causal link between educational resources (inputs) and school quality (output) requires more than just showing that educational resources and school quality are positively related. A researcher must further demonstrate that school quality improves in response to higher per student spending when all other production factors are held constant. Unless that additional link can be established, a simple positive correlation between spending and a measure of school quality provides little or no solid guidance for public policy.

If other K–12 education production factors are to be held constant, the researcher must determine and measure the other factors—aside from school inputs—that affect school quality. As described in chapter 2, these can be classified as student inputs and social inputs. Student inputs include student and parent characteristics that affect education outcomes; social inputs include characteristics of the students' environment that can affect education outcomes. Because spending per student usually increases as the student and social characteristics that improve education outcomes increase in a school district, a positive correlation between district spending and education outcomes may not come from the increased spending but instead from the favorable student and social characteristics of the district.

Two general approaches have been used to examine the link between school resources and school quality. The most common is the production function approach; the other is the cost function approach.

Production Function Approach

This approach starts from the premise that output (school quality) is a well-defined function of inputs. Thus, a school site takes the student and social characteristics that it has little control over and combines them with school- or district-chosen inputs, and the result is the production of a certain level of education quality. In economics, the production function is usually used to model the relationship between inputs and the maximum possible output achievable by profit-maximizing firms. Of course, public schools are not

profit-maximizing firms, and institutional or political constraints that do not affect competitive industries may prevent schools from yielding the highest degree of quality education production given the resources available to them. Nevertheless, it is useful to think of the relationship between school resources and school quality as a production process.

Over the last 30 years, several studies have appeared on the relation between public K–12 resources and quality. The results are sharply divided between those that find a positive, causal relationship between greater spending per student and education quality and those that find no statistically and economically significant relationship. On the no-relationship side, Hanushek (1996), in a literature review that updated his classic 1986 review, counted the number of studies finding a positive relationship and the number finding no relationship between spending per student and some measure of education quality (usually test scores). Hanushek argued that the preponderance of evidence indicates no relationship between school resources and student achievement. He concluded that "[t]he existing evidence simply indicates that the typical school system today does not use resources well (at least if promoting student achievement is their purpose)" (p. 69). In further research, Hanushek, Rivkin, and Taylor (1996) suggested that studies finding a positive relationship between spending per student and quality are often based on statewide data rather than school-level data and thus suffer from omitted-variable bias.

On the other hand, Hedges and Greenwald (1996), in a meta-analysis that updated an earlier study (Hedges, Laine, and Greenwald 1994), examined many of the same studies as did Hanushek (1996). The methodology of Hedges and colleagues was more sophisticated than that of Hanushek, and it allowed them to perform explicit tests of hypotheses based on the results reported in several studies. Unlike Hanushek, they found find statistically significant evidence that per student expenditures, more experienced teachers, and the numbers of teachers with master's degrees were all positively related to higher student achievement. They concluded, quite in contrast to Hanushek, "that school resources are systematically related to student achievement and that these relations are large enough to be educationally important" (Hedges, Laine, and Greenwald 1994, pp. 89–90).

More recent studies continue to yield results on both sides of the question, finding either a positive relation or no relation between spending per student and quality of public K–12 education. Harknett and others (2003), in a

regression-based analysis, found a positive relationship between resources and student achievement—that an increase in per student expenditures of $1,000 was associated with up to a 4 percentage point reduction in low scores on reading or math tests, and a 1.4 percentage point decrease in the high school dropout rate. However, their use of data from a single year and their lack of an explicit model did not allow them to establish a causal relationship.

Other recent studies have used some innovative ways to establish the causal relation between inputs and output, yet they still reach different conclusions. Hoxby (2000) used data from a "natural experiment" of elementary schools and school districts in Connecticut in the late 1980s and the 1990s. Her focus was on the relation between class size and test scores. Class size varied from year to year over this period not because of decisions made by administrators but because of differences in population or student cohort sizes. Hoxby found no evidence that reductions in class size resulted in improved student achievement. Natural experiments such as Hoxby's have some drawbacks, however. For example, it is difficult to control fully for the effects of changes in unobserved variables such as administration practices in school, home environment of students, and so on.

One method for controlling for unobserved student and social variables, and for isolating the effect of a single variable on student outcomes, is to assign students randomly to classes of different sizes. This is precisely what happened in the randomized experiment conducted in Tennessee in the Student/Teacher Achievement Ratio project (Project STAR). Krueger (1999) and Kruger and Whitmore (2001) analyzed the data from this experiment. They found that being in a small class (13–17 students) as opposed to a normal class (22–25 students) increased standardized test scores by about 4 percentile points in the first year and by about 1 percentile point per year in subsequent years. Furthermore, small class size increased the likelihood of taking the college entrance exams (ACT or SAT) by about 3 percentage points and increased the scores on these tests. The positive effects of small class size appear to be largest for African Americans and economically disadvantaged students receiving free lunches.

Boozer and Rouse (2001), using the National Education Longitudinal Survey of 1988, found that larger class sizes have a negative and statistically significant impact on test scores. Furthermore, they found that black students tended to be in larger classes and suggest that this might explain a large part of the black–white difference in educational outcomes.

Cost Function Approach

Studies employing the production function seek to determine the effect of school resources on student outcomes. The cost function approach seeks to answer a slightly different question: What amount of resources does it take to achieve a certain level in student outcomes or performance level? For this reason the cost function approach is sometimes also referred to the *adequacy approach*. The literature on the cost function approach is rather sparse. In our opinion, the research produced by Duncombe and Yinger is typical of the best that has been done.

In two papers, Duncombe and Yinger (1997, 2000) examined New York state school districts and created an elaborate model to estimate a cost function, a demand function (for educational outcomes), and an efficiency function. They found that large city schools were not relatively inefficient (compared with other school districts in New York State) and concluded that "the key reason why large cities have low outcomes despite their high spending is that…they face high costs" (1997, pp. 107–08).

Duncombe and Yinger (1997, 2000) cautioned that just spending more money is unlikely to improve school performance significantly in poorly performing large city school districts. After noting that boosting efficiency or increasing school resources can improve school performance (through increased funding from higher property tax rates or increased state aid), they suggested that just increasing state aid might induce school districts to reduce their tax effort or become less efficient.

Summary of Relationship between School Resources and Outcomes

The literature on the relationship between school resources and student outcomes is clearly divided. Some of the best available evidence (from meta-analysis and randomized experiments) shows that school resources do matter for improving student achievement. Yet a prestigious group of researchers gathered by the National Research Council (Ladd and Hansen 1999) concluded that additional funding for America's public primary and secondary schools will not automatically generate greater student achievement. Like them, we conclude that additional money can matter to improved education quality only if it is used in the appropriate manner. Perhaps most important for us to consider is the possibility that the *negative* effect on school quality of a *cut* in public money allocated to public schools may be far greater than the possible positive effect of an

increase. As Downes and Figlio (2001) have suggested, the negative effect could be significant because of union contract agreements that force budget cuts to fall disproportionately on the salaries of starting teachers. The hiring of less-qualified starting teachers could have profound long-term effects on the quality of education if such budget cuts were imposed statewide.

School Quality and Housing Values

This chapter has already described current economic thinking on the relationship between per student education expenditures and the quality of public K–12 education. The literature on this topic is fairly evenly divided between studies that have and those that have not found a link between higher primary and secondary education spending per student and education quality. Although our review here leaves us more firmly persuaded that such a link does exist, we must caution that this link can exist only if local schools make appropriate and efficient decisions in allocating the public resources they receive.

Let us now consider the finding of a positive statistical correlation between the quality of local public K–12 education services in a neighborhood and the value of homes in that neighborhood. This finding is important because it demonstrates yet another way that providing a quality public elementary, middle, or high school education yields a tangible, positive economic impact that would be lost if the quality of education declined. We again acknowledge that the findings of this literature reinforce the notion that parents do not identify a quality public K–12 education specifically with spending per student, in itself. But the findings also do not dismiss the possibility that higher spending is necessary for the provision of quality.

We begin by describing the economic theory behind the relationship between public school quality and higher home values. We continue by sketching the statistical technique that economists have used to investigate whether this relationship exists. We then summarize the research findings confirming this relationship and measuring its magnitude. Finally, we discuss the implications of these findings.

How Does the Quality of Local K–12 Public Education Influence Local Home Values?

Not too long ago, a *USA Today* story reported that two comparable houses sold at about the same time in the same Dallas neighborhood—one for $155,000, the other for $276,000. How could this be? The story (Jones 1996) indicates that the more expensive home is located in the Highland Park School District, where college entrance scores are in the top 1 percent in the United States. Although this simple anecdote does not fully control for other neighborhood characteristics that may differ between the two homes, it does illustrate the pecuniary impact that public school quality can exert on average Americans' most valuable asset. The *USA Today* story concluded that in city after city in the United States, a house in a high-quality school district is likely to be worth at least 10 percent more than a similar house, even one right across the street, whose residents must attend school in a lower-rated district (i.e., one rated lower on standardized test scores).

Because most parents value the quality of public schooling offered in a neighborhood, a key element in their search for housing in a metropolitan area is the quality of the neighborhood schools. Unfortunately, the numbers of places in high-quality schools in a U.S. metropolitan area are fewer than the numbers of children in families seeking these places and therefore desiring to live in the neighborhoods those schools serve. It is therefore not surprising that the price of housing in neighborhoods with quality public schools gets bid up by potential buyers. Even potential buyers of homes served by quality public schools who do not have and do not even intend to have school-aged children realize that strong demand for these homes contributes to their value. The economists' description of this increase in value is that the entitlement to partake in quality public school services is *capitalized* into the value of the home.

What is this capitalization worth? To begin, consider the proposition that the alternative to living in a home that entitles one's child to a high-quality public education is sending the child to a high-quality private school that costs $5,000 a year. In such a case, owning such a home is comparable to receiving a check for that $5,000 each year. A financial expert will say that the value of having such a $5,000 annuity over an extended period is its amount divided by the long-term interest rate. If the rate is 5 percent, then the home could sell for as much as $100,000 more (i.e., $5,000 divided by 0.05) than a comparable home that does not have access to the high-quality public school. In other words, saving the $5,000 a year is essentially equivalent to having $100,000 in the bank and earning interest payments of 5 percent (or $5,000) on it each year.

Statistical Determination of Increase in Home Value Attributable to Quality Schools

When asked to quantify their "willingness to pay" for a potential residence, people are likely to come up with a total value based on the component parts or characteristics of the residence. That is, people are basically willing to pay a certain amount for each bathroom and bedroom in the house and for specific desirable attributes of the house, such as brick construction, tile roofing, or proximity to their workplace. Each of these characteristics, along with access to high-quality schools, makes a marginal (positive or even negative) contribution to the house's total value and forms the basis of an economist's *hedonic* regression analysis approach to determining the house's value. That is, the analysis compares the sale price against each one of a comprehensive group of desirable attributes while holding the others constant.

To use this approach, a researcher would first gather recent sales price data for a sample of homes in a metropolitan area (or even state) that serves as the dependent variable in a regression analysis. The researcher would then regress that sales data against matching data of the characteristics for each house that are expected to determine its value. For example, Black (1999) collected information for each home in her sample, such as the number of bedrooms, number of bathrooms, age of structure, lot size, square footage, elementary standardized test score, per student spending, student–teacher ratio, presence of preschool, property tax rate, distance to central city, and many socioeconomic characteristics of the people residing in the neighborhood. With such a methodology, the regression coefficient of each of the school characteristics indicates the marginal contribution that a one-unit change in that characteristic makes on the average resale value of homes in the sample, assuming other explanatory variables are held constant. It is illuminating to see what such studies have identified as measures of school quality that raise home values and to get a sense of the magnitude of their contribution. If higher school quality is obtained by greater spending per student, it is also important to consider the influence that the local rate of property taxation exerts on home values because a high tax levy is often what is necessary to obtain it.

Public School Characteristics Valued by Homebuyers

The regression analysis of Jud and Watts (1981) was one of the earliest to use a hedonic regression analysis of home val-ues to assess the contribution of local public school quality (here measured as third-grade-level performance at a school site on standardized test of reading skills). Using data from more than 3,000 home sales in Charlotte, North Carolina, in 1977, and controlling for neighborhood socioeconomic composition and other local and physical characteristics known to influence differences in home values, Jud and Watts found that if third-grade students at a school scored one grade level higher on reading performance tests, holding other home characteristics constant, home values would rise by 5.2 percent. They noted that a half-grade increase in reading performance would result in a $675 increase in the average $35,000 home in their sample. Unfortunately, the authors did not include the local rate of property taxation as a determining factor in home values.

Wetzel (1983), in a comment on the policy relevance of Jud and Watts' (1981) results, noted that the effect they described of school quality on home value would only be relevant if a change in school quality occurred in one geographic area and not in all the others that potential homebuyers could consider. Even so, however, if an entire state improved (or lowered) its school quality, and other states did not, home values in that state could eventually rise (or fall) in response to the long-run mobility of families mobile between states. As we discussed in the previous chapter on the causes of statewide economic development, empirical evidence suggests that this is likely to occur in the long run.

Jud (1985) continued the Jud and Watts (1981) inquiry into the impact of school quality on home values by using 1980 data on local median value of owner-occupied homes in 138 Los Angeles area communities and 67 San Francisco Bay area communities. Like the Jud and Watts (1981) study, the Jud (1985) investigation measured quality of public schooling by the scores of third-grade students on standardized reading achievement tests. The new inquiry again controlled effectively for the racial and socioeconomic characteristics of the respective areas. Unlike Jud and Watts (1981), however, Jud (1985) included a measure of the effective property tax rate faced by the home. Because just as potential homebuyers desire quality schools, they do not desire to pay higher property taxes if they can get the first without the second. Jud estimated that a one-third standard deviation increase in third-grade reading test scores in a city resulted in an expected 1.6 percent increase in typical Los Angeles area housing prices and an expected 2.7 percent increase in Bay area housing prices.

Hayes and Taylor (1996), writing for the Federal Reserve Bank of Dallas, reported a hedonic regression that used July 1987 sales price data from 288 homes in the Dallas

Independent School District. To explain variations in these values, they used physical characteristics of the property, centrality of property's location, socioeconomic characteristics of residents in the property's neighborhood, and three measures of school quality (expenditure per student, sixth-grade achievement on a standardized math test attributable to school effects, and achievement on this math test attributable to student peer effects). The study excluded the local property tax rate as an explanatory variable, but that omission is mitigated by the inclusion of expenditure per student, which is a likely positive proxy for the property tax rate. Hayes and Taylor found that home buyers in the southern portion of Dallas were never willing to pay more for an increase in any of their three measures of school quality. In the northern portion, home buyers only paid more for an improvement in math test scores attributable to the school and not to peers. The researchers did find that a 10 percent increase in the marginal effect a school site had on math score was associated with a 2.6 percent increase in home values. Only the size, age, and distance from downtown had more influence on home prices.

Using Cleveland-area data from about 2,500 homes sold between 1976 and 1994, and city-established planning areas to define neighborhoods, Bogart and Cromwell (1997) used a hedonic regression analysis to look at houses that were in the same neighborhood but associated with different school districts. They used three pairs of school districts (1) Cleveland or Shaker Heights, (2) East Cleveland or Cleveland Heights–University Heights, and (3) Cleveland or Garfield Heights. In each of these three school-district pairings, the second district was widely perceived as offering a higher-quality public education experience than the first. Bogart and Cromwell controlled for all the characteristics of a home that could affect its selling price, including rate of property taxation but excluding any direct measure of school quality. Instead, they decomposed the difference in mean house value in the same neighborhood as that attributable to (1) differences in observable characteristics and (2) location in a widely perceived higher-quality school district. They equated differences in mean value attributable to differences in public schools to annual figures that ranged from $186 to $2,171, depending on the districts compared and the capitalization assumptions. These differences are significant, considering that average spending per student across the six districts was about $6,000.

In 1998, Crone surveyed the literature on the quality of public schools and house prices for the Philadelphia

Federal Reserve Bank. He judged that a large majority of the better statistical studies supported the idea that a quality neighborhood public school raises home prices, but he added that these studies disagreed on the size of the increase. Crone also concluded that home owners prefer more school services to fewer (in the form of higher spending per student) if their tax bill is held constant, but he could not say specifically that home owners would be willing to pay for increased school funding through higher taxes, cuts in other services, or both. Crone thus concluded that home owners are willing to pay more for a home if it is in a local public school district exhibiting higher academic achievement, but he cautioned that readers should only trust estimates of the extent of this effect if the studies extensively controlled for the socioeconomic characteristics of a neighborhood. (It is for just that reason that we chose to describe only studies that attempt to do this.) Otherwise, the performance premium on price might stem from student peer effects and not the school's own contribution.

Black (1999) and Brasington (1999) produced two additional hedonic-based regression studies of local public education quality and home prices that deserve mention. Black examined all home sales between 1993 and 1995 for three suburban counties that surround Boston where homes sit on an elementary school attendance boundary. Black did this under the reasonable assumption that the only neighborhood difference between such homes is that one is in one elementary school district and the other is in another. She found that parents were willing to spend about 4.2 percent more for a home for a 10 percent increase in 4th grade mean combined reading and math test scores. It is important to note that this is about half the increase reported in earlier studies that did not control as thoroughly for neighborhood effects. Black's findings led her to surmise that less than a one standard deviation increase in Massachusetts' standardized test scores could lead to $70 million long-run increase in the state's housing values, given the mobility of others from other states.

Brasington (1999) conducted another study that is relevant to measuring the tangible economic benefits of the quality provision of a K–12 public education. The study specifically investigated which measures of public school quality were valued in the housing market by using 37 different school performance measures. Brasington also compiled a large and highly useful data set of more than 27,000 home sales in 1991 in 128 different communities in Ohio's six largest metropolitan areas and ran more than

200 different regressions. After this extensive investigation, Brasington found that a traditional hedonic regression (like that of the previously reported studies) suggests that homebuyers value high standardized test scores, expenditures per student, and low student–teacher ratios. But he also pointed out that the traditional hedonic regression analysis does not control for the possibility that a particular home sale influences the values of surrounding home sales (this is the effect of *spatial autocorrelation*, an important neighborhood variable that previous studies did not control for). Brasington used an instrumental variable technique to correct this. The results of this additional step revealed that homebuyers value standardized test scores, student attendance rates, and graduation rates. He concluded that "[the following] measures of school quality are most consistently positively related to home prices: proficiency tests, expenditure per student and the student-to-teacher ratio" (p. 411).

Finally, studies by Figlio and Lucas (2000), Brasington (2002), and Downes and Zabel (2002) are worth describing. Figlio and Lucas are unique in looking at the impact of the state of Florida's program of assigning a letter grade to a school site. They did this by comparing repeat-sales transactions in the same Gainesville neighborhoods (199 subdivisions) five months before the state's first grade was given in 1999 and five months after. To receive an "A" rather than a "B" under the state's grading system, the school must increase student attendance, test 95 percent of the students, improve reading scores from the previous year, and keep math and writing from declining substantially. Figlio and Lucas found that the distinction between a local public elementary school site receiving an "A" and one receiving a "B" is valued at about $9,000—more than 6 percent of the average home's selling price.

Brasington (2002) conducted another traditional hedonic regression study of the relationship between house price and school quality, using the same data employed in his 1999 study. He found that house prices were more responsive to changes in school quality (as measured by the percentage of 9th graders at the home's neighborhood middle school that passed an overall proficiency test administered by the state) than to changes in other community characteristics. He found that a 10 percent increase from the mean in the pass rate on the test yielded a 2.1 percent increase in home value.

The Downes and Zabel study (2002) used nearly 1,200 home sales from the Chicago area between 1987 and 1991, along with numerous variations in regression specifications. Their study indicated that individuals would not pay more for homes when higher per student expenditures in the school their children would attend were the isolated variable. But they also concluded that individuals were willing to pay more for homes if it meant that their children would attend a local public school exhibiting higher standardized test scores (8th grade reading). Specifically, Downes and Zabel noted that a 10 percent increase in a middle school site's standardized 8th grade reading score resulted in about an equivalent 10 percent increase in the value of homes where children were eligible to attend that school.

Implications

Table 5.1 summarizes the findings of the previous studies in regard to their chosen measure of neighborhood school quality on neighborhood homes values. Our review of the empirical literature on neighborhood school quality and home values clearly shows that homebuyers value access to a quality public school education and are willing to pay more for a home that grants them access to it. It is also clear that the signal for a quality public school that parents are most likely to look for (or can most easily look for) is relative performance on standardized test scores, although some studies show that per student expenditures and student–teacher ratios can also influence housing prices. Regression studies have shown that if two homes are identical in all neighborhood and physical characteristics, but one home enables the children who live there to attend K–12 public schools in which standardized test scores are 10 percent higher than the other, then parents will be willing to pay anywhere from 2 to 10 percent more for that home.

School Quality and Earnings

Another way that public elementary and secondary school quality can have a tangible economic impact is through an effect on earnings. Mincer (1974), who developed the statistical earnings model that almost all researchers use, explicitly estimated such "returns to schooling." Since Mincer's original study, hundreds if not thousands of articles have reported estimates of returns to schooling from earnings equations for populations and various demographic groups in different countries. The direction and magnitude of these studies' results are generally in accord—more schooling leads to higher earnings, with an additional year of schooling in the United States typically ranging from about 4 to 8 percent, although some estimates are higher.

TABLE **5.1 Review of the Results of Hedonic Regression Studies on School Quality and Neighborhood Home Prices**

Author(s)	Measure of neighborhood's school quality (1)	Measured impact on neighborhood's home price (2)
Jud and Watts (1981)	3rd grade performance at a school site on standardized test of reading.	One grade level higher test performance at sample mean yields 5.2 percent increase.
Jud (1985)	3rd grade performance at a school site on standardized test of reading.	One-third of a standard deviation higher test performance at sample mean increase yields 1.6 (2.7) percent increase in L.A. (Bay) area.
Hayes and Taylor (1996)	6th grade performance at a school site on standardized test of math.	10 percent increase in test score at sample mean yields 2.6 percent increase.
Bogart and Cromwell (1997)	Widely accepted reputation that school district is better than alternative across street.	Better school district worth an annualized value of $186 to $2,171 depending on districts compared and capitalization assumptions.
Black (1999)	4th grade performance at a school site on combined standardized tests of reading and math.	10 percent increase in test scores at sample mean yields 4.2 percent increase.
Brasington (1999)	Various standardized test scores, attendance rate, and graduation rate at school site.	All exert a positive influence (specific values not reported in study).
Figlio and Lucas (2000)	School site receives an "A" grade rather than "B" from state authority.	$9,000 or over 6 percent of the average home's selling price.
Brasington (2002)	Percentage of 9th graders passed an overall proficiency test administered by the state.	10 percent increase in passage rate from sample mean yields a 2.1 percent increase.
Downes and Zabel (2002)	8th grade performance at a school site on standardized test of reading.	10 percent increase in test score at sample mean yields 10 percent increase.

The equations in the earlier studies estimating earnings had assumed that what was important was just the number of years of schooling and not whether the workers had a diploma or degree. Hungerford and Solon (1987) allowed for a more flexible relationship between schooling and earnings. They found that the returns to schooling were nonlinear (i.e., not constant at, say, 6 percent per additional year of schooling). Furthermore, they found "sheepskin effects" (i.e., that having a diploma or degree boosted earn-

ings above the return to an additional year of schooling by itself). In any case, the nonlinearities and sheepskin effects do not negate the broader judgment that more schooling leads to higher earnings.

The next question to ask is, Does school *quality* affect earnings? Part of the economics literature examines the link between school quality and postschool earnings. Through what mechanisms could school quality affect earnings, and what results have empirical studies reported?

How School Quality Could Affect Earnings

School quality could affect earnings in several ways:

1. **Through a discrete jump in earnings attributable to school quality.** All individuals would receive a return on an additional year of schooling, but those who attended a high-quality school would have higher earnings than some who had the same amount of education but attended a lower-quality school.

2. **Through a higher rate of return on additional years of schooling.** Individuals attending a high-quality school would receive a higher return on each additional year of education (say, 7 percent) than workers attending a low-quality school (say, 5 percent).

3. **Through a combination of 1 and 2.**

4. **Through an increase in educational attainment.** The quality of individuals' schooling would not directly affect their earnings, but those attending high-quality schools might get more schooling than those attending low-quality schools.

Two additional questions arise on how school quality affects earnings. Are the effects constant for each increment in school quality? Does school quality affect earnings for all levels of educational attainment? The quality of primary and secondary schooling may not become apparent unless the individual has attended or graduated from college. In addition, increases in school quality may be high when school quality is low and vice-versa—this pattern would imply that school quality has a positive but diminishing effect on earnings—that is, after some point, further improvements in school quality have no impact on earnings.

Estimated Effects of School Quality

Like the literature on the relationship between school resources and student outcomes, the literature on school quality and earnings is somewhat divided. On one side, researchers have argued that school quality does not affect earnings. Betts (1995) examined the roles of the student–teacher ratio, relative teacher salaries, and average teacher education on an individual's postschool earnings. He found that although the high school attended certainly affected a worker's earnings, the measures of school quality did not explain the differences between high schools. However, Betts used a rather homogeneous sample of white males.

Some studies have found positive but circumscribed effects of school quality on postschool earnings. Grogger (1996) found effects that were statistically significant, but "not by much" (p. 628). Similarly, Heckman, Layne-Farrar, and Todd (1996a, 1996b) found a positive effect only for those who attended college.

On the other side of the debate, an extensive literature has detailed uniformly positive school quality effects on earnings. In an early study, Johnson and Stafford (1973) found that a 10 percent increase in per student expenditures was associated with about a 2 percent increase in subsequent earnings, although the effect diminished at higher expenditure levels. They also estimated that doubling per student expenditures increased educational attainment by 0.6 years.

In several studies, Card and Krueger (1992, 1996a, 1996b) examined the effects of various measures of school quality on subsequent earnings using a variety of methods and data sources. They found that both student–teacher ratio and teacher pay affected the returns workers received from schooling. They estimated that a five-student decrease in class size would yield a 0.4 percentage point increase in the return to schooling. In addition, they associated a 10 percent increase in teacher salaries with a 0.1 percentage point increase in the return to schooling. Overall, they concluded from their work and others' that "a 10 percent increase in school spending is associated with a 1 to 2 percent increase in annual earnings for students later in their lives" (1996a, p. 133).

Altonji and Dunn (1996) used a different data source and an innovative method (using sibling pairs) for controlling for unobserved characteristics. They found that teacher salaries, per student expenditures, and a composite quality index all had a substantial positive effect on the wages of high school graduates.

Most recently, Strayer (2002) studied whether school quality has an influence on the likelihood of attending college and on the type of college (two-year vs. four-year). He reported three main findings. First, having a larger proportion of teachers with a graduate degree increased the likelihood that a graduating high school student would attend college (two-year or four-year). Second, participating in smaller classes increased the likelihood that a graduating senior would attend a four-year college rather than a two-year college. Third, students who attended a four-year college had a 23 percent wage gain, and those who attended a two-year college had a 9 percent wage gain, relative to having only a high school diploma.

Sander (1993), and Heckman, Layne-Farrar, and Todd

(1996a) found strong evidence that school quality affects educational attainment. In a study of Illinois school districts, Sander associated a 10 percent decrease in the student–teacher ratio with a 1- to 2-percentage point increase in the high school graduation rate. Heckman, Layne-Farrar, and Todd showed that a 10 percent decrease in the high school student–teacher ratio decreased the proportion of dropouts in a birth cohort by more than 20 percent (about 2 percentage points) and increased the proportion of college graduates in that cohort.

Summary

Although debate continues on whether school quality affects earnings, most of the literature provides fairly robust evidence that school quality has a positive effect on postschool earnings. It appears that school quality affects earnings by all the mechanisms listed earlier: boosting earnings, increasing the return to an additional year of schooling, and increasing educational attainment. Some of the evidence also suggests that school quality has a positive but diminishing effect on earnings.

We reach three main conclusions from our review of school resources, school quality, and economic development effects, each with some qualification. First, the evidence suggests a causal link between increased school resources and improved school quality, as measured by student achievement. However, some studies show no causal link. We are persuaded of the causal link but believe that more research, using innovative research techniques, is required to fine-tune the results and control for unobserved variables.

Second, the evidence indicates that local school quality is capitalized into local housing prices through increased demand for housing in high-quality school districts. Some of the literature has also found a statistically and economically significant link between local home prices and local public K–12 spending per student, although those findings are far less robust than those associating school quality and home value. It must be noted, from a national policy perspective, that improving quality equally in all school districts across America would have no impact on U.S. home values, in that housing demand in each school district would not change. Still, if only one or a few states increased the quality of public K–12 education enough to motivate residents from other states to migrate to them, then housing values in the areas of increased quality would rise.

Third, evidence suggests that resources and improved school quality increase postschool earnings of students. This link appears to stem from increases in economic return to a year of schooling and to the tendency of students at high-quality schools to receive more schooling. Again, the evidence is divided, but we are swayed by the studies showing a causal link.

Two points are particularly worth emphasizing. First, although researchers do not agree on whether more resources matter, most do agree that *how resources are used* does matter. Wasted resources cannot improve the quality of schooling; efficiently used resources probably can. Second, some evidence suggests that a decrease in school resources (e.g., as a result of state budget cuts) would reduce school quality to a greater extent than a similar increase in school resources would improve school quality.

6

Benefits of Preserving
K–12 Public Education Spending

Most states are grappling with how to deal with large, and in some cases unprecedented, projected budget deficits for the upcoming fiscal years. All states have or will have to close projected budget shortfalls of almost $100 billion for fiscal 2004. The decision politicians face in balancing a projected budget shortfall is not easy because it involves alternatives that few constituents desire: raising state taxes and fees or cutting state expenditures. A choice between undesirable alternatives often causes policymakers to avoid dealing with problems for as long as constitutionally possible. As in the current budget situation in California, this just leads to cumulative deficits that become increasingly more difficult to correct (see Krugman 2003).

Overall, the main cause of the current fiscal crisis is a steep drop in state revenues rather than profligate spending (McNichol 2003). Much of the revenue decline the states are facing results from (1) permanent tax cuts enacted in the 1990s in response to temporary revenue growth; (2) the 2001 recession and the subsequent anemic recovery; (3) the dramatic stock market decline, which led to a fall in tax revenues from capital gains; and (4) recent federal tax cuts, which have led to lower state revenues because of the linkages between state and federal tax codes. Among these, the main causes of budget shortfalls vary from state to state.

For an understanding of the dynamics of the deficits, it may be instructive to examine the current budget situations in particular states. The brief case studies presented here of California and New York include the events that generated the large deficits, the proposals to correct these deficits, and the current status of each state's fiscal 2003–2004 budget.

This chapter also uses information garnered in previous chapters to offer guidance to policymakers on the pros and cons of balancing state budgets by reducing statewide support for K–12 public education. That is, we compare the economic costs of cutting statewide resources devoted to public primary and secondary education with the economic costs of alternatives: raising various statewide taxes and fees or cutting expenditures on state services other than K–12 education. We measure economic costs in terms of the topics already covered: economic development, home values, and provision of a quality education that leads to higher future individual earnings.

California's Budget Situation
For Fiscal 2003–2004

In July 2003, California faced a total projected $38.2 billion budget shortfall for the upcoming fiscal year. This was nearly 43 percent of Governor Davis' proposed budget for 2003–04, or more than one-third of the aggregate value all other projected state budget deficits in the United States. This budget deficit is unprecedented in California and perhaps anywhere else in the United States. It reflects the rollover of two previous fiscal years' deficits (for a subtotal of about $14 billion) and a continuing structural deficit (for a subtotal of about $24 billion).

How did these massive budget deficits come about? First, about 40 percent of the state government's revenues come from a highly progressive personal income tax. Second, in the late 1990s, the state experienced a surge of realized capital gains and high incomes that resulted in

large increases in statewide tax revenue. Finally, Governor Davis and the primarily Democratic state legislature committed these personal income tax windfalls to ongoing expenditure programs and tax relief. According to a story in the *Sacramento Bee* (Bluth 2003) between fiscal 1998–99 and 2001–02, state spending rose by nearly $19 billion. About 41 percent of this spending went to further state support for K–12 education and brought California's spending per student to about the median in all 50 states (Bluth 2003). In addition, 31 percent of the spending increase went to increase state resources devoted to health and social service programs, 17.5 percent to state spending on other services, and the remaining 11 percent or so to tax relief.

As the state constitution required, Governor Davis released his proposed state budget for the upcoming fiscal year in early January 2003. His plan dealt with the then-projected revenue shortfall of $34 billion through $21 billion in spending reductions and savings, $2 billion in fund shifts, $2 billion in additional revenue, $1.7 billion in borrowing, and $8.3 billion in shifting program responsibilities from the state to counties. This realignment of program responsibilities was to be fully funded initially by the state through a 1 percent increase in the state's sales tax rate (from 7.25 to 8.25 percent), reinstatement of 10 and 11 percent personal income tax brackets on the wealthiest Californians, and a $1.10 per pack increase in the state's cigarette tax (California Budget Project 2003c). In response to the Democratic governor's proposal, the Republican minority in the legislature refused to support any new taxes intended to offset the state's budget deficit and instead united behind using only expenditure cuts to eliminate the projected 2003–04 gap. This minority bloc was of sufficient size to stymie budget proposals that contained tax increases because California is only one of three states that requires a two-thirds legislative majority to pass a budget.

In May 2003, a new state revenue forecast put the projected deficit at $38.2 billion. At that time, as allowed under state law, the governor drastically scaled back his proposed realignment of state services to counties, allowed for a doubling of the state's vehicle license fee, and proposed the borrowing of nearly $11 billion to be paid off with a half-cent increase in the state's sales tax. In late June and early July 2003, the California Senate voted on the governor's budget revisions but again failed to achieve the necessary two-thirds majority in the face of united Republican adherence to their no-new-taxes pledge (California Budget Project 2003a).

A breakthrough came on July 24, 2003, when the California Senate approved a fiscal 2003–04 budget that required no new taxes (but allowed the reinstatement of a previously higher vehicle license fee) and included $11 billion in proposed cuts to state services, the unparalleled issue of nearly $11 billion dollars in deficit bonds to be paid back over five years, and the rollover of the remaining cumulative deficit (about $16 billion) to the next fiscal year. The Senate budget plan contained no major cuts to state funding to K–12 public education. This budget did receive the necessary two-thirds approval by the state's more liberal Assembly, and then-Governor Davis signed its approval (Sanders 2003).

Of course, as many throughout the United States are aware, the aftermath of this was a recall of Governor Gray Davis in the fall of 2003. This recall effort and the eventual election of Governor Arnold Schwarzenegger succeeded in part because of Governor Davis' failure to lead in that year and past years in preventing and correcting continuing state budget shortfalls. On July 30, 2003, the *Sacramento Bee* reported that the approved budget would reduce K–12 public school spending per student in California from $7,067 in 2002–03, by about 2.5 percent to $6,887 in 2003–04 (Bluth and Delsohn 2003).

California's 2003–04 budget inherently assumes that an economic recovery will allow the state to grow its way out of continuing projected revenue shortfalls. But, according to the California Budget Project's Budget Watch (2003b), this grow-out strategy is very unlikely to work. Many believe that California still faces future structural deficits (or projected fiscal year revenues even in the best of possible good times that do not cover planned fiscal year expenditures) that will require future decisions on either revenue enhancements or expenditure cuts. Governor Schwarzenegger has publicly pledged to not support any new taxes to make up the projected annual future deficits of $6 to $15 billion. That leaves little doubt that most of California's future state deficit relief is likely to stem from expenditure cuts—cuts from which public K–12 education may not be immune.

New York's Budget Situation For Fiscal 2003–2004

Just as California has been facing a deficit of unprecedented size and intractability, New York State has also been confronting a unique and difficult fiscal problem—the exacerbation of 2001 economic downturn by the events of September 11th. Governor George Pataki's administration has estimated the "direct" results of the 9/11 attacks to include the loss of 100,000 jobs, significant economic dam-

age to thousands of small and medium-sized businesses; and the loss of almost 30 million square feet of office space. In all, Governor Pataki estimated that New York faced a fiscal 2003–04 gap of more than $9 billion.

In his proposed 2003–04 budget, Governor Pataki recommended closing the fiscal gap primarily through expenditure cuts rather than revenue increases. Expenditure cuts would fill 60 percent of the shortfall. Revenue enhancements—primarily modifications in sales taxes for clothing and footwear and increases in various fees and fines—would fill 15 percent. Transitional financing would fill the remaining 25 percent. Among the expenditure cuts, the governor recommended decreasing state education aid to localities by $1.2 billion. He justified this by arguing that New York led the nation in per student spending and that after the cut, the state's inflation-adjusted educational spending would be higher in 2003–04 than in 1994–95.[22]

The governor's proposed budget cuts in state educational aid brought protests from parents, teachers, and school administrators. On May 3, 2003, thousands traveled to Albany, the New York State capital, to protest against the cuts to K–12 education (see Kriss 2003). Ultimately, the state legislature passed a budget that included a small overall increase in state K–12 education spending of $34 million. However, it should be noted that revenues and expenditures are not uniform throughout the 12 months of the fiscal year. When the budget figures are converted to a school-year basis (important from the standpoint of school districts), the recently enacted New York state budget (New York State Division of the Budget 2003) actually imposes a $185 million decrease in the K–12 school aid budget from the prior school year.

Cutting State Support for Public K–12 Education versus Other Alternatives

The previous two sections of this chapter offered descriptions of the budget woes that California and New York have recently found themselves in. As Reschovsky (2003) has observed, other states may not be as fiscally bad off as these two large states, but most states have faced and will continue to face budget pressures that require politicians to make difficult fiscal choices. When measured by a dollar reduction in a state's budget deficit that must be eliminated, the benefit of a dollar gained in state revenue from either a tax or fee increase or an expenditure decrease is the same. But,

as every politician knows, the impacts of particular cuts may impose very different economic costs on individuals and the state. Therefore, a cost-efficient method for dealing with a state budget deficit is to choose cuts in state programs, increases in state taxes and fees, or some combination thereof, that minimize the total short- and long-term economic costs they impose on the state's residents and economy.

Let us first consider the economic costs that a cut in state support for K–12 public education imposes on a state (Table 6.1). For variables described in this report's earlier discussions (i.e., economic development, home prices, and personal income), the table shows the economic costs that must be borne under various scenarios if a state tackles its deficit by reducing its financial support for K–12 public education. We have derived the numbers in the table by using real-world data and the appropriate statistical techniques described earlier.

As the table shows, K–12 education cuts are likely to influence aggregate economic activity, home values, and individual earnings throughout the state in the near and distant future. The important question that policymakers must consider is whether these costs are greater or less than the costs imposed on the state by the alternate ways available to address a budget deficit. These alternatives include raising taxes and fees, cutting expenditures in a state service aside from K–12 education, or a combination of methods. Both options obviously impose immediate personal costs—on those paying higher taxes and fees or experiencing a decline in services other than K–12. But some who oppose employing these options argue that in addition to these direct constituent costs, strategies to preserve K–12 spending may have profound consequences for economic development. What light can the results of the regression-based economic development studies detailed earlier in this paper shed on that question?

Table 6.2 summarizes the results of the regression-based studies reviewed in chapter 4 as they relate to reducing a state's budget deficit by decreasing K–12 public education spending compared with alternative methods. The information in the table clearly demonstrates that cutting state support for public primary and secondary education imposes economic development costs that are very often *greater* than those that come from raising additional revenue through various statewide taxes and fees or cutting statewide expenditures on various alternate expenditure categories.

---

[22] Other large expenditure cuts included $1 billion from state programs and agencies that would include a workforce reduction and $1 billion from Medicaid and other health care programs.

TABLE **6.1 Possible Economic Costs of Reducing State Support for K–12 Education**

Economic effect	Specific measure and cost
Economic development decline caused by a decrease in in-migration of potential laborers (short run), loss of productivity of future laborers (long run), or both.	**Cutting statewide public K–12 expenditure by $1 per $1,000 state's personal income:** (1) reduces the state's personal income by about 0.3% in short run and 3.2% in long run, (2) reduces the state's manufacturing investment in the long run by 0.9% and manufacturing employment by 0.4%.
	Cutting statewide public K–12 education per student by $1: Reduces small business starts by 0.4% in the long run.
	Cutting statewide public K–12 expenditure by one percentage point of the state's personal income: Reduces the state's employment by 0.7% in the short run and 1.4% in the long run.
Reduction in state's aggregate home values if a reduction in statewide public school spending yields a decline in standardized public school test scores, and if in the long run people leave or do not enter the state because of test-score declines.	**A 10% reduction in various standardized test scores:** Yields between a 2% and a 10% reduction in aggregate home values in the long run.
Reduction in state's aggregate personal income if reduction in statewide public school spending yields a decline in "quality" of public education produced and long-run decrease in earning potential of state's residents.	**A 10% reduction in school expenditures** Could yield a 1% to 2% decrease in postschool annual earnings in the long run.
	A 10% increase in the student–teacher ratio: Leads to a 1% to 2% decrease in high school graduation rates and to a decrease in standardized test scores.

We hope that this scientifically researched information will help state policymakers make budget decisions that enhance the long-term quality of life and standard of living in their state. As we said earlier, we realize that many of the economic development, higher individual productivity, and higher home value benefits of preserving public K–12 quality in a state occur only in the long run. That period is likely beyond the time that the typical term-limited state politician is expected to serve. In contrast, the individual benefits from not raising state taxes, or not cutting other state services, are immediate and likely to be more politically attractive. It is precisely for this reason that state politicians have often chosen to cut public primary and secondary education expenditures. Our hope is that the evidence presented here may get them to reconsider this politically expedient, but ultimately economically detrimental, course of action.

TABLE 6.2 Economic Development Findings of Alternatives to Cutting K–12 Education Expenditure to Reduce a State's Deficit

Study	Finding/alternative to cutting K–12 education
Helms (1985)	**Less detrimental to statewide personal income.** The short- and long-run influences of raising statewide property tax payments, other tax payments, or user fees; or alternatively cutting statewide expenditures on transfer payments, highways, or other government expenditures are less detrimental to statewide personal income than an equivalent reduction in statewide expenditures on K–12 public education.
Mofidi and Stone (1990)	**Less detrimental to statewide manufacturing employment** The long-run influences of cutting statewide expenditures on transfer payments; unemployment benefits; or health, highway, or other government activities are less detrimental to statewide manufacturing investment than an equivalent reduction in statewide expenditures on K–12 education. However, the long-run influence of cutting statewide expenditures on transfer payments or highway activities is less detrimental to statewide manufacturing employment than an equivalent reduction in statewide expenditures on K–12 education.
Luce (1994)	**Less detrimental to total residential labor force available in a city in a metropolitan area.** The short- and long-run influences of raising local property taxes; raising earned income taxes; fees, charges, and other taxes; or cutting local public safety or other local government spending are less detrimental to total residential labor force available in a city in a metropolitan area than an equivalent reduction in local K–12 education spending.
Bartik (1989)	**Less detrimental to statewide number of small business starts.** The long-run influences of raising statewide property tax payments; raising personal income tax payments; raising corporate income tax payments; raising fees, charges, and other taxes; or cutting statewide expenditures on police, higher education, welfare spending, and other government expenditures are less detrimental to statewide number of small business starts than an equivalent reduction in statewide expenditures on K–12 education.
Harden and Hoyt (2003)	**Less detrimental to statewide employment.** The short- and long-run influences of raising state income tax payments, raising corporate income tax payments, raising sales tax payments, raising other taxes or charges; or of cutting statewide non-K–12, hospital or nonhospital and nonhighway expenditures are less detrimental to statewide employment than equivalent reduction in statewide expenditures on K–12 public education.

7

Policy Implications and Concluding Remarks

This paper examined the impact that primary and secondary public education has on the U.S. economy with special emphasis on its impact on economic development, earnings and housing values. We have summarized the extensive economics literature on these issues. Given the volume of the literature, we could not discuss every study, so we limited ourselves to reviewing what we felt were the best in terms of adequacy of the methodology used.

The main findings of our review are as follows:

- **Total government spending (federal, state, and local) on elementary and secondary education in 2001 accounted for more than 4 percent of gross domestic product (GDP).** In 1955, educational spending accounted for less than 3 percent of GDP. The federal share of this spending, however, amounted to less than 8 percent of the total. Clearly, the bulk of funding K–12 education is left to the state and local governments.

- **School resources, if used wisely, lead to improved student outcomes and higher quality schools.**

- **Other factors, such as student, parent, and neighborhood characteristics, also influence student outcomes and hence school quality.** Many of these factors are outside the control of teachers, school administrators, and school boards.

- **School quality has positive effects on economic development, postschool earnings, and local housing values.**

- **Many states are scaling back or considering scaling back funding for K–12 education in response to the current fiscal crisis the states are facing.**

These findings clearly suggest that in reducing educational expenditures, states and localities will likely face adverse consequences in short- and long-term economic development. Given the balanced-budget requirement that almost all states face, increasing or even maintaining educational spending at current levels during economic downturns requires spending cuts in other programs, revenue increases, or both. These could adversely affect economic development or the quality of life for some state residents. Overall, however, evidence is compelling that in most situations, the worst thing a state legislature and governor can do to deal with a short-term fiscal crisis is to make cuts in state-supported K–12 public education that result in the quality of the state's primary and secondary educational outputs declining.

These findings have several policy implications. The most obvious is the one just stated: not to cut educational spending even in times of fiscal crisis because of the adverse short- and long-term economic effects. Of course, at the state and local level, that is easier said than done. Needing to balance their budgets, state and local policymakers are often forced to make difficult choices over what to cut. We believe that because the federal government is not prohibited from running an annual budget deficit, it is best suited to help state and local governments maintain educational funding during cyclical economic downturns.

As we have said, increased funding alone does not guarantee an improvement in the quality of K–12 public education. Educational resources can be and sometimes are squandered through inefficiencies. To address this prob-

lem, parents, teachers, school administrators, and elected officials must work together toward improving the educational process. Last, some neighborhood characteristics, such as concentrated poverty, have an adverse impact on student outcomes and perceived school quality, independent of available resources. Community development programs designed to alleviate economic deprivation thus could also improve student outcomes.

We suggest that the NEA adopt a policy of advocating the preservation of public K–12 education funding based on the long-run economic benefits cited here and that the NEA become more active in the search for, and implementation of, progressive education programs that can lead to a higher quality of educational output.

References

Altonji, Joseph G., and Thomas A. Dunn. 1996. "Using Siblings to Estimate the Effect of School Quality on Wages." *Review of Economics and Statistics* 78(4): 665–71.

Baldassare, Mark. 2003. "PPIC Statewide Survey: Special Survey on the California State Budget." San Francisco: Public Policy Institute of California. June.

Bartik, Timothy J. 1989. "Small Business Start-Ups in the United States: Estimates of the Effects of Characteristics of States." *Southern Economic Journal* 55(4): 1004–18.

Becker, Gary S. 1964. *Human Capital: A Theoretical Analysis with Special Reference to Education*. New York: Columbia University Press for NBER.

Betts, Julian R. 1995. "Does School Quality Matter? Evidence from The National Longitudinal Survey of Youth." *Review of Economics and Statistics* 77(2): 231–50.

Black, Sandra E. 1999. "Do Better Schools Matter? Parental Valuation of Elementary Education." *Quarterly Journal of Economics* 114(2): 577–99.

Bluth, Alexa H. 2003. "Foes Say Davis Overspent and then Covered Up Shortfall." *Sacramento Bee*, August 13, pp. A1 and A6.

Bluth, Alexa H., and Gary Delsohn. 2003. "Final Round of Deal-Making Ends in Assembly's Approval." *Sacramento Bee*, July 30, pp. A1, A16.

Bogart, William T., and Brian A. Cromwell. 1997. "How Much More is a Good School Worth?" *National Tax Journal* 50(2): 215–32.

———. 2000. "How Much is a Neighborhood School Worth?" *Journal of Urban Economics* 47(2): 280–305.

Boozer, Michael, and Cecilia Rouse. 2001. "Intraschool Variation in Class Size: Patterns and Implications." *Journal of Urban Economics* 50(1): 163–89.

Borjas, George J. 1992. "Ethnic Capital and Intergenerational Mobility." *Quarterly Journal of Economics* 107(1): 123–50.

Bracey, Gerald W. 1994. "The Media's Myth of School Failure." *Educational Leadership* 52(1): 80–83.

Brasington, David M. 1999. "Which Measures of School Quality Does the Housing Market Value?" *Journal of Real Estate Research* 18(3): 395–413.

———. 2002. "The Demand for Local Public Goods: The Case of Public School Quality." *Public Finance Review* 30(3): 163–87.

Bureau of Economic Analysis. 2004. *National Economic Accounts: 2003 Comprehensive Revision of the National Income and Product Accounts*. Washington, DC: U.S. Department of Commerce. Retrieved March 2, 2004, from http://www.bea.gov/bea/dn1.htm

California Budget Project. 2003a. The 2003–04 Budget Gap. June. Retrieved from www.cbp.org

———. 2003b. "Can the Budget Be Balanced Without a

Tax Increase?" Budget Watch, June, retrieved from www.cbp.org

———. 2003c. The Governor's Proposed 2003–04 Budget. January. Retrieved from www.cbp.org

Card, David, and Alan B. Krueger. 1992. "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States." *Journal of Political Economy* 100(1): 1–40.

———. 1996a, "Labor Market Effects of School Quality: Theory and Evidence" In Gary Burtless, ed., *Does Money Matter?* (pp. 97–140). Washington, DC: Brookings Institution Press.

———. 1996b. "School Resources and Student Outcomes: An Overview of the Literature and New Evidence from North and South Carolina." *Journal of Economic Perspectives* 10(4): 31–50.

Coleman, James S. 1990. *Foundations of Social Theory*. Cambridge, MA: Harvard University Press.

Crone, Theodore M. 1998. "House Prices and the Quality of Public Schools: What Are We Buying?" *Federal Reserve Bank of Philadelphia Business Review* Sept/Oct: 3–14.

Davis, James A., Tom W. Smith, and Peter V. Marsden. 2003. General Social Surveys, 1972–2002 (Cumulative File [Computer file]). ICPSR version. Chicago, IL: National Opinion Research Center [producer]; Storrs, CT: Roper Center for Public Opinion Research, University of Connecticut/Ann Arbor, MI: Inter-university Consortium for Political and Social Research.

Denison, Edward F. 1962. *Sources of Economic Growth in the U.S.* New York: Committee for Economic Development.

Denison, Edward F. 1985. *Trends in American Economic Growth*, *1929–1982*. Washington, DC: Brookings Institution Press.

Dillon, Sam. 2003. "Cuts Put Schools and Law to the Test." *New York Times*, August 31, p. 1.

Downes, Thomas, and David Figlio. 2001. "Tax Revolts and Student Performance." In David H. Monk, Herbert J. Walberg, and Margaret C. Wang, eds., *Improving Educational Productivity* (pp. 7–26). Greenwich, CT: Information Age Publishing.

Duncombe, William D., and John M. Yinger. 1997. "Why Is It So Hard to Help Central City Schools?" *Journal of Policy Analysis and Management* 16(1): 85–113.

———. 1999. "Performance Standards and Educational Cost Indexes: You Can't Have One Without the Other." In Helen F. Ladd, Rosemary Chalk, and Janet S. Hansen, eds., *Equity and Adequacy in Education Finance: Issues and Perspectives* (pp. 260–97). Washington, DC: National Academy Press.

———. 2000. "Financing Higher Student Performance Standards: The Case of New York State." *Economics of Education Review* 19: 363–86.

Easterly, William. 2001. *The Elusive Quest for Growth*. Cambridge, MA: MIT Press.

Evans, William N., Shelia E. Murray, and Robert M. Schwab. 1999. "The Impact of Court-Mandated School Finance Reform." In Helen F. Ladd, Rosemary Chalk, and Janet S. Hansen, eds., *Equity and Adequacy in Education Finance: Issues and Perspectives* (pp. 72–98). Washington, DC: National Academy Press.

Finegold, Kenneth, Stephanie Schardin, and Rebecca Steinbach. 2003. "How Are States Responding to Fiscal Stress?" The Urban Institute Program on the New Federalism, Series A, No. A-58. Washington, DC. March.

Figlio, David N., and Maurice E. Lucas. 2000. "What's in a Grade? School Report Cards and House Prices." National Bureau of Economic Research Working Paper #8019, New York.

Fisher, Ronald C. 1996. *State and Local Public Finance*. 2d ed. Chicago, IL: Irwin.

———. 1997. "The Effects of State and Local Public Services on Economic Development." *New England Economic Review* March/April: 53–82.

Foster, Andrew D., and Mark R. Rosenzweig. 1996. "Technical Change and Human-Capital Returns and Investments: Evidence from the Green Revolution." *American Economic Review* 86(4): 931–53.

Goodnough, Abby. 2003. "This Year's Math Regents Exam Is Too Difficult, Educators Say." *New York Times*, June 20.

Grogger, Jeff. 1996. "School Expenditures and Post-Schooling Earnings: Evidence from High School and Beyond." *Review of Economics and Statistics* 78(4): 628–37.

Hanushek, Eric A. 1986. "The Economics of Schooling: Production and Efficiency in Public Schools." *Journal of Economic Literature* 24(3): 1141–77.

———. 1996. "School Resources and Student Performance." In Gary Burtless, ed., *Does Money Matter?* (pp. 43–73).Washington, DC: Brookings Institution Press.

Hanushek, Eric A., and Dennis D. Kimko. 2000. "Schooling, Labor-force Quality, and the Growth of Nations." *American Economic Review* 90(5): 1184–1208.

Hanushek, Eric A., Steven G. Rivkin, and Lori L. Taylor.

1996. "Aggregation and the Estimated Effects of School Resources." *Review of Economics and Statistics* 78(4): 661–727.

Harden, J. William, and William H. Hoyt. 2003. "Do States Choose Their Mix of Taxes to Minimize Employment Losses?" *National Tax Journal* 71(7): 7–26.

Harknett, Kristen, Irwin Garfinkel, Jay Bainbridge, Timothy Smeeding, Nancy Folbre, and Sara McLanahan. 2003. "Do Public Expenditures Improve Child Outcomes in the U.S.? A Comparison Across Fifty States." Center for Research on Child Well-being Working Paper #03-02.

Haveman, Robert H., and Barbara L. Wolfe. 1984. "Schooling and Economic Well-Being: The Role of Nonmarket Effects." *Journal of Human Resources* 19(3): 477–507.

Hayes, Kathy J., and Lori L. Taylor. 1996. "Neighborhood School Characteristics: What Signals Quality to Homebuyers." *Economic Review of the Federal Reserve Bank of Dallas*, Fourth Quarter 1996: 2–9.

Heckman, James, Anne Layne-Farrar, and Petra Todd. 1996a. "Does Measured School Quality Really Matter? An Examination of the Earnings-Quality Relationship." In Gary Burtless ed., *Does Money Matter?* (pp. 192–289). Washington, DC: Brookings Institution Press.

Heckman, James, Anne Layne-Farrar, and Petra Todd. 1996b. "Human Capital Pricing Equations with an Application to Estimating the Effect of Schooling Quality on Earnings." *Review of Economics and Statistics* 78(4): 562–610.

Hedges, Larry V., Richard D. Laine, and Rob Greenwald. 1994. "Does Money Matter? A Meta-Analysis of Studies of the Effects of Differential School Inputs on Student Outcomes." *Educational Researcher* 23: 5–14.

Hedges, Larry V., and Rob Greenwald. 1996. "Have Times Changed? The Relation between School Resources and Student Performance." In Gary Burtless, ed. *Does Money Matter?* (pp. 74–92). Washington, DC: Brookings Institution Press.

Helms, L. Jay. 1985. "The Effect of State and Local Taxes on Economic Growth: A Time-Series–Cross-Section Approach." *Review of Economics and Statistic*s 87: 574–82.

Hoxby, Caroline M. 2000. "The Effects of Class Size on Student Achievement: New Evidence from Population Variation." *Quarterly Journal of Economics* 115(4): 1239–85.

Hungerford, Thomas, and Gary Solon. 1987. "Sheepskin

Effects in the Returns to Education." *Review of Economics and Statistics* 69(1): 175–77.

Johnson, George E., and Frank P. Stafford. 1973. "Social Returns to Quantity and Quality of Schooling." *Journal of Human Resources* 8(2): 139–55.

Jones, Del. 1996. "Location, Location, Location: Better Schools Mean Higher Property Values, Home Buyers Go Shopping for Schools." *USA Today*, May 15.

Jud, G. Donald. 1985. "A Further Note on Schools and Housing Values." *AREUEA Journal* 13(4): 452–62.

Jud, G. Donald, and James M. Watts. 1981. "Schools and Housing Values." *Land Economics* 57(3): 459–70.

Kriss, Erik. 2003. "Teachers, Parents Protest Education Cuts." *The* [Syracuse, NY] *Post-Standard*, May 4, p. A11.

Krueger, Alan B. 1999. "Experimental Estimates of Education Production Functions." *Quarterly Journal of Economics* 114(2): 497–532.

Krueger, Alan B., and Diane M. Whitmore. 2001. "The Effect of Attending a Small Class in the Early Grades on College Test Taking and Middle School Test Results: Evidence from Project STAR." *Economic Journal* 111: 1–28.

Krugman, Paul. 2003. "State of Decline." *New York Times*, August 1.

Ladd, Helen F., and Janet S. Hansen, eds. 1999. *Making Money Matter: Financing America's Schools.* National Research Council Commission on Behavioral and Social Sciences. Washington, DC: National Academy Press.

Lewin, Tamar, and Jennifer Medina. 2003. "To Cut Failure Rate, Schools Shed Students." *New York Times*, July 31, p. 1.

Luce, Thomas. 1994. "Local Taxes, Public Services, and the Intrametropolitan Location of Firms and Households." *Public Finance Quarterly* 22(2): 139–68.

McNichol, Liz. 2003. "The State Fiscal Crisis: Extent, Causes, and Responses." Center on Budget and Policy Priorities. Retrieved April 24, 2003, from www.cbpp.org/4-24-03sfp.pdf.

NASBO (National Association of State Budget Officers). 2002. *State Expenditure Report 2001*. Summer. Washington, DC: Author.

New York State Division of the Budget. 2003. 2003–2004 Enacted Budget Report. May 28. Albany, NY: Author.

Mincer, Jacob. 1974. *Schooling, Experience and Earnings.* New York: National Bureau of Economic Research.

Mofidi, Alaeddin, and Joe A. Stone. 1990. "Do State and Local Taxes Affect Economic Growth?" *Review of Economics and Statistics* 72(4): 686–91.

National Center for Education Statistics. 2002. Digest of Education Statistics 2002. Washington, DC: U.S. Dept. of Education, Institute of Education Sciences, National Center for Education Statistics. Retrieved January 23, 2004, from http://nces.ed.gov/programs/digest/d02/

National Center for Education Statistics. 2003. National Assessment of Educational Progress: The Nation's Report Card. Washington, DC: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. Retrieved January 22, 2004, from http://nces.ed.gov/nationsreportcard/

National Governors Association and National Association of State Budget Officers. 2003. The Fiscal Survey of States. Washington, DC: National Governors Association and National Association of State Budget Officers. June. Retrieved March 2, 2004, from http://www.nasbo.org/Publications/fiscalsurvey/fs-spring2003.pdf

Poterba, James M. 1996. "Government Intervention in the Markets for Education and Health Care: How and Why?" In Victor R. Fuchs, ed., *Individual and Social Responsibility: Child Care, Education, Medical Care, and Long-term Care in America* (pp. 277–304). Chicago: University of Chicago Press.

"Quality Counts 2003." 2003: "Quality Counts 2003: If I Can't Learn From You..." *Education Week* 22(17), January 9. Retrieved March 2, 2004, from http://www.edweek.org/sreports/qc03/

Reschovsky, Andrew. 2003. "State Government Fiscal Crises And the Effect on Local Governments and Schools." La Follette Policy Report 14 (1 [Spring]): 5–6, 11–13. Retrieved March 2, 2004, from http://www.lafollette.wisc.edu/publications/policyreports/policyReport14_1.pdf.

Sander, William. 1993. "Expenditures and Student Achievement in Illinois: New Evidence." *Journal of Public Economics* 52: 403–16.

Sanders, Jim. 2003. "Vote Set With No Time for Review." *Sacramento Bee*, July 26, pp. A1, A24.

Schemo, Diana Jean. 2003a. "4th Grade Readers Improve, but 12th Grade Scores Decline." *New York Times*, June 19.

———. 2003b. "Questions on Data Cloud Luster of Houston Schools." *New York Times*, July 11, p. 1.

Schultz, Theodore W. 1960. "Capital Formation by Education." *Journal of Political Economy* 68(6): 545–57.

———. 1961. "Investment in Human Capital." *American Economic Review* 51(1): 1–17.

Smith, Adam. 1776. *An Inquiry into the Nature and Causes of the Wealth of Nations.* London, Printed for W. Strahan and T. Cadell, 1776. [Reprint: New York, A. M. Kelley, 1966.]

Sobel, Joel. 2002. "Can We Trust Social Capital?" *Journal of Economic Literature* 40(1): 139–54.

Stock, James H., and Mark W. Watson. 2003. *Introduction to Econometrics.* Boston, MA: Addison Wesley.

Strayer, Wayne. 2002. "The Returns to School Quality: College Choice and Earnings." *Journal of Labor Economics* 20(3): 475–503.

Wetzel, James N. 1983. "Schools and Housing Values: Comment." *Land Economics* 59(1): 131–33.

Winter, Greg. 2003. "New York State Failing City Schools, Court Says. " *New York Times*, June 26.

Wolfe, Barbara L., and Robert H. Haveman. 2002. "Social and Nonmarket Benefits from Education in an Advanced Economy." In Yolanda K. Kodrzycki, ed., *Education in the 21st Century: Meeting the Challenges of a Changing World.* Proceedings, Federal Reserve Bank of Boston 47th Economic Conference. Boston, MA: Federal Reserve Bank of Boston.