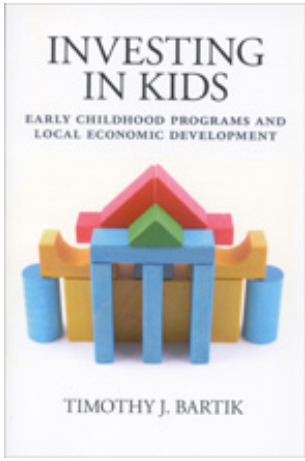
W.E. UPJOHN INSTITUTE
FOR EMPLOYMENT RESEARCH

Upjohn Institute Press

Bringing the Future into the Present:
How Policymakers Should Deal with the Delayed Benefits of Early Childhood Programs



Timothy J. Bartik
W. E. Upjohn Institute

Chapter 7 (pp. 175-217) in:
Investing in Kids: Early Childhood Programs and Local Economic Development
Timothy J. Bartik
Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2011

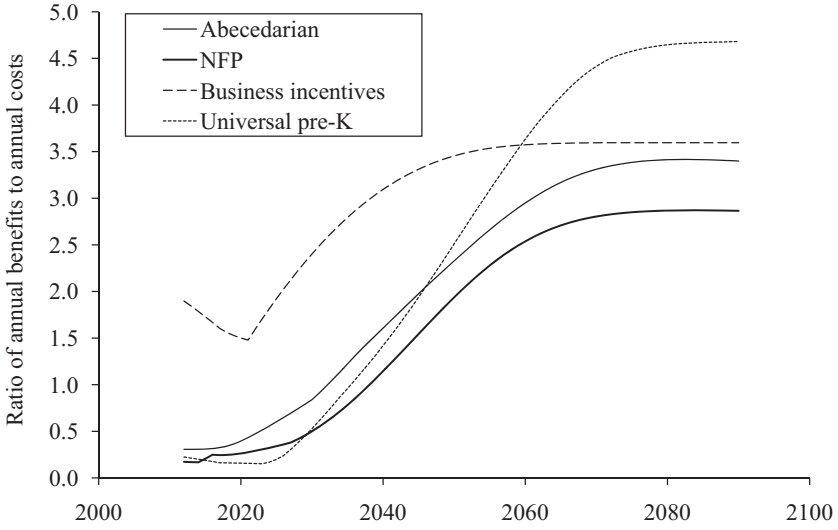
7
Bringing the Future into the Present

How Policymakers Should Deal with the Delayed Benefits of Early Childhood Programs

As discussed in Chapter 4, early childhood programs and business incentives differ in their benefits' timing. Business incentives deliver sizable economic development benefits almost immediately. Jobs are attracted, and this immediately increases employment rates and upgrades many state residents to better jobs. In contrast, most benefits of early childhood programs are long delayed. Early childhood programs have some economic development benefits in the short term. Free child care and other services to parents increase parental labor supply. Spending more money stimulates the state economy. But these short-term economic development benefits are modest. During the years right after these programs are begun, earnings of state residents go up by only 20 to 30 percent of program costs. Annual earnings effects of these programs do not exceed annual costs until at least 20 years later. (Figure 7.1, which reproduces Figure 4.2, shows the time pattern of effects.) These delays in benefits occur because so many of the benefits are due to the improved adult labor supply of former child participants. Better child development's benefits are only achieved in the long run.

The delayed nature of benefits from early childhood programs raises two issues. First, how should policymakers weight future benefits versus current costs? I will argue that policymakers should not discount future benefits too much. At any reasonable discount rate, benefits exceed costs for high-quality early childhood programs. However, policymakers often do drastically discount or disregard social benefits that are in the future. This leads to the second issue. Given that policymakers discount the future too much, what can be done to encourage policymakers to adopt early childhood programs? How can we get policymakers to adopt programs that are socially beneficial but politically unattractive because their benefits are delayed? Various approaches will be discussed to making such programs more attractive. We can work on

Figure 7.1 Ratio of Annual Economic Development Benefits for State Residents to Program Costs, Each Year after Permanent Program Is Begun, for Three Early Childhood Programs and a Business Incentive Program



NOTE: As defined in this book, annual economic development benefits for state residents are just effects on state residents' earnings per capita. This figure assumes that one of three early childhood programs is begun in 2011 and continues permanently. The figure reports effects on state residents' earnings due to increases in the earnings of the state's original residents who remain in the state. For comparison, the figure also shows effects for a permanent program of business incentives whose scale remains at the same percentage of the state economy over time. This figure is identical to Figure 4.2.

costs. Short-run costs can be postponed or reduced. Alternatively, we can work on benefits. Long-run benefits can be shifted toward the present. Short-run benefits can be increased.

Improving the short-run benefits versus costs of early childhood programs would put these programs on a more level playing field with business incentive programs. As will be discussed below, business incentive programs use various techniques to increase short-run benefits relative to costs. The magnitude of short-run benefits versus costs is not an immutable attribute of a program, but can be affected by policy.

DISCOUNTING

What social discount rate should be used for evaluating public policies? This question has been extensively debated in the economics literature. Recently, the debate over discount rates has been reignited in discussing environmental issues. Environmental issues such as global warming often involve trade-offs between short-run costs and long-run environmental benefits. The discount rate used to compare future benefits with current costs makes a big difference in whether specific policies pass a benefit-cost test. Low social discount rates support stringent environmental policies. High social discount rates support lax environmental policies.

For this book, I assume we are determining a discount rate for comparing consumption over time. What is the value of a dollar of consumption a year from now, or 10 or 30 years from now, compared to a dollar of consumption today?[1]

The relative value of future consumption versus current consumption should depend on several factors. First, the value of future versus current consumption should depend on how fast one assumes the social value of extra consumption declines with higher per capita consumption. Most economic models assume some growth of per capita consumption over time. If one assumes that the value of an extra dollar of consumption dramatically declines as per capita consumption declines, then future changes in consumption should be down-weighted more heavily. Second, the value of future versus current consumption should depend on how fast one expects per capita consumption to increase. If per capita consumption will increase more rapidly over time, then people in the future will have higher per capita consumption. Other things being equal, this reduces the social value of an extra dollar of consumption in the future versus a dollar today. Third, it is possible that there is some inherent bias toward current consumption over future consumption. Even if per capita consumption did not increase over time, it is possible that many people would value a dollar of consumption today more than a dollar of consumption in the future.[2]

The discount rates used in this book should be compatible with the growth rate of per capita consumption that I assume. For this book, I assumed a rate of growth of real wages (and hence per capita consump-

tion) of 1.2 percent per year. We could assume different rates of per capita consumption growth. But then we would need to adjust future earnings flows as well. For this discussion, I hold real wage growth and per capita consumption growth constant at 1.2 percent per year.

However, there are many possible assumptions about how rapidly the social value of consumption declines as per capita consumption increases. There are also different assumptions about how much the present should be inherently preferred to the future, even if per capita consumption were the same.

The debate over global warming has involved different assumptions about these determinants of discount rates. Sir Nicholas Stern, the lead author of the well-known *Stern Review on the Economics of Climate Change*, which was prepared for the British government, adopted assumptions that led to a relatively low discount rate (Stern 2007). Some of the American critics of the *Stern Review*, such as economists William Nordhaus and Martin Weitzman, adopted assumptions that led to somewhat higher discount rates.

In addition, the leading American academic journal on public policy, the *Journal of Policy Analysis and Management*, recently published an article that made other assumptions about discount rates. The article was titled "Just Give Me a Number! Practical Values for the Social Discount Rate" (Moore et al. 2004). The article tries to provide assumptions that would lead to some consensus on the social discount rate.

For the current book, I explored how it makes a difference to follow all these varying assumptions about discount rates. However, I adjusted all these discount rates to this book's assumption of a 1.2 percent annual growth rate in real wages. Under that wage growth scenario, the *Stern Review*'s assumptions imply a social discount rate of less than 2 percent. Nordhaus's and Weitzman's assumptions imply social discount rates of 3.9 percent and 4.4 percent, respectively (Nordhaus 2007; Weitzman 2007). The Moore et al. assumptions imply a social discount rate of 2.2 percent. Finally, this book's baseline estimates assume a social discount rate of 3 percent.

How do these discount rates affect the benefits and costs of business incentives and early childhood programs? Table 7.1 shows ratios of economic development benefits for state residents to costs for these programs under various discount rates. Notice two points about these results: First, as one would expect, the higher discount rates of Nordhaus or Weitzman make the early childhood programs look somewhat

Table 7.1 Effects of Alternative Discount Rate Assumptions on Ratio of Present Value of State Economic Development Benefits to Program Costs, for Business Incentives and for Three Early Childhood Programs

	Discount rate assumption of:				
	Stern	Moore et al.	This book	Nordhaus	Weitzman
Implied discount rate on aggregate future earnings (%)	1.6	2.2	3.0	3.9	4.4
Ratio of present value of earnings effects to costs for:					
Business incentives	3.56	3.36	3.14	2.92	2.82
Universal pre-K	4.46	3.62	2.78	2.10	1.82
Abecedarian	1.59	2.54	2.25	1.88	1.71
Nurse-Family Partnership	1.88	2.23	1.85	1.49	1.33

NOTE: State economic development benefits are defined in this book as increased earnings per capita of state residents. See Appendix 7A for methodology and references.

worse relative to business incentives. Higher discount rates mean that the future adult earnings of former child participants are not weighted as highly. Second, under all these discount rates, the present value of increased earnings for state residents exceeds the cost of the program. Therefore, even under assumptions that yield relatively high discount rates, these early childhood programs still make sense from a state economic development perspective. Benefits for former child participants are so large that even high discount rates do not make these benefits unimportant.

Another possible way to analyze these different policies is in terms of their rate of return. The "rate of return" of a proposed public policy is the maximum discount rate at which the project is still worth pursuing. This maximum rate of return helps reveal whether the project would be worth doing under more extreme assumptions about appropriate discount rates. As is well known in benefit-cost analysis, this rate of return should not be used to rank projects. The present value, calculated using the correct discount rate, should be used to rank projects. The discount rate's purpose is to allow a comparison of the relative value of consumption at different points of time.

Table 7.2 shows these rate-of-return calculations. Business incentives yield benefits exceeding costs immediately. Therefore, business incentives will have a positive return at any discount rate. Early childhood programs are all worth doing unless real social discount rates exceed 5.7 percent. Such high discount rates are implausible.

This discussion focuses on what policymakers should do. Research on the social discount rate suggests that policymakers should discount the future, but not too much. Therefore, policymakers should be willing to implement early childhood programs, even though many of their benefits are far in the future.

Unfortunately, this is probably not the way many state, local, and federal policymakers actually view the world. These early childhood programs do not have benefits exceeding costs for the remaining political career of most policymakers. In the short run, while the policymakers considering these programs are in office, these early childhood programs have benefits that fall short of costs.

Many policymakers may have implicit discount rates that exceed 10 percent. Research suggests that corporate executives evaluate investment projects at discount rates that average 12 percent (Poterba and

Table 7.2 Annual Rate of Return to Business Incentives and Three Early Childhood Programs, from a State Economic Development Perspective

Program	Annual rate of return, state perspective
Business incentives	Infinite or undefined
Universal pre-K	6.7
Abecedarian	7.7
Nurse-Family Partnership	5.7

NOTE: This table shows the highest real interest rate at which the present value of effects of the program on state residents' per capita earnings exceeds the present value of program costs. Business incentives' benefits exceed costs regardless of how high the real interest rate is, as estimated program benefits in the first year exceed costs. Therefore, the "rate of return" to business incentives can be seen as infinite or undefined. Note that all these "rates of return" only include "economic development benefits" for the state. Thus, these rates of return do not count, for example, the benefits of reduced crime, or spillover effects on earnings of residents of other states.

Summers 1995). Government policymakers might be at least as shortsighted. If policymakers' discount rates are 10 percent or greater, the value of the earnings benefits from early childhood programs will fall short of these programs' costs.

Can anything be done to change the net benefits of early childhood programs, as perceived by policymakers? We could simply argue for adopting a long-term perspective. However, changing such underlying attitudes is difficult. Political pressures encourage policymakers to worry about reelection.

A more politically feasible alternative is to adjust the benefits and costs of early childhood programs to increase their short-term payoff. Short-term costs can be postponed or otherwise reduced. Long-term benefits can be shifted toward the short term, or short-term benefits can be otherwise increased. The rest of this chapter considers the options for increasing the short-term economic development payoff of early childhood programs.

REDUCING SHORT-RUN COSTS: POSTPONING COSTS THROUGH BORROWING

One way to reduce short-run costs of early childhood programs is to finance the programs through borrowing. Borrowing delays program costs, allowing the timing of costs to better match the timing of economic development benefits.

Borrowing is generally accepted as a way for the government to pay for "physical capital"—roads, public buildings, prisons. The rationale for this borrowing is that it allows the costs of building or rehabilitating physical capital to be better matched to the stream of benefits from such capital. For example, building a new highway has large up-front costs. Yet its benefits will be received for many years to come.

Allowing borrowing for early childhood programs would put these programs on a more level playing field with business incentives. Business incentive programs can postpone many of their costs by promising future incentives to business. Because these programs can postpone costs, they become more attractive to policymakers.

However, most state constitutions severely restrict public borrowing, except for the building or redevelopment of tangible physical capital. In most states, it would be illegal for the government to sell a 30-year bond to pay for early childhood programs.

State and local governments have come up with creative ways of borrowing to get around these constitutional restrictions. States have sometimes securitized streams of revenues they will receive from dedicated sources. For example, states have sold off future revenues that they will receive from the settlement with tobacco companies, and have used the proceeds to finance public programs (Scheppach 2003; Sindelar and Falba 2004). Some states have sold off the rights to collect tolls on a public highway (Burwell and Puentes 2009).

In economic development policy, one common program is tax increment financing (TIF) (Dye and Merriman 2006). In a TIF program, the increase in property tax revenue in a particular geographic area is dedicated to a special TIF fund. For example, this geographic area might be a downtown area. This dedicated revenue can only be used for purposes determined by the authority overseeing the TIF district. It is common to use TIF revenues as backing for bonds that are sold to finance various

public improvements in the TIF district. For example, in a downtown area, the TIF revenues might be used to finance parking ramps, or for marketing the downtown.

TIFs are being used in more creative ways. Of particular relevance here is that TIFs are starting to be used for educational programs. Michigan recently passed a "Promise Zone" law, which was inspired by the Kalamazoo Promise. Under the Kalamazoo Promise, private donors guaranteed that they would pay up to four years of tuition at Michigan public universities and community colleges for all graduates of Kalamazoo Public Schools. The Michigan Promise Zone law allows for TIF zones to help finance similar programs in other areas of Michigan. A school district or some other local government can develop a plan to provide free college tuition to all students within the district or government jurisdiction. If this plan is approved by the state of Michigan, the plan can in part be funded by TIFs. The plan would receive the state education property tax revenue from the increase in property values in the designated area.[3]

Similar TIFs could be created to finance early childhood programs. Some portion of the increment in a tax's revenue could be dedicated to a fund to support early childhood programs. The incremental tax revenue would not have to necessarily be property tax revenue. Early childhood TIFs could be financed with incremental revenue from the sales tax or income tax. The dedicated revenue in that fund could be used to support bond issues to pay the up-front costs of early childhood programs.

What objections might be raised to borrowing for early childhood programs? One is that borrowing only makes sense if the early childhood program does produce sizable future benefits. If the early childhood program does not produce sizable long-run benefits, then it would be a mistake to borrow to pay its costs.

A second objection is that allowing borrowing for the operating costs of public programs, even highly desirable programs, might lead to abuses. There are good historical reasons why state constitutions often restrict public borrowing. In the early nineteenth century, American states were extraordinarily active in borrowing. This borrowing was often used to support corporations that promoted state economic development, such as investments in canals, railroads, and banks. However, this large-scale borrowing led to eight states defaulting on their debts during the economic downturn of the 1840s. Subsequent state constitu-

tional amendments put significant limitations on state debt issuance and investment in corporations (Wallis 2000).

A third objection is that the current period does not seem the most favorable time to expand debt. The recession that began in December 2007 is widely attributed to excessive promotion of overly risky debt by many different financial institutions and government agencies. The financial system might not be ready for new forms of government financing. The political winds might not support such government borrowing.

It is somewhat disconcerting that a few years ago, Citigroup was promoting the financing of early childhood education with debt financing. In October 2006, the managing director of the Student Loan Group of Citigroup made a presentation to a group of early childhood advocates on this topic (Sheldon 2006). According to the meeting summary, the Citigroup director pointed out that "because early care education [ECE] spending is a capital formation expenditure . . . , an optimal way for society to pay for ECE costs would be to match the repaying of cash to the time when benefits are received . . . He proposed this might be accomplished via a financing mechanism similar to the federal government's student loan program . . . Under such an arrangement, the same entities (parents, federal and state governments) that currently pay for early education would be responsible to pay under [this new financing] proposal" (Invest in Kids/PAES 2006). These are all cogent points. However, now does not seem the best time for new creative financing schemes.

REDUCING SHORT-RUN COSTS: POSSIBLE OFFSETS FROM REDUCED SPECIAL EDUCATION COSTS

One significant short-run cost offset to early childhood programs is reduced special education costs. High-quality early childhood programs have been shown to significantly reduce the percentage of students in K–12 special education. For example, the Perry Preschool project reduced special education assignments for mental impairment from 35 percent in the control group to 15 percent in the treatment group (Schweinhart et al. 2005). Reductions of about half as much in special

education assignments were found in the Chicago Child-Parent Center program: from 25 percent down to 14 percent (Reynolds et al. 2002). The more intensive and more expensive Abecedarian program had somewhat larger effects on special education assignments: it reduced them from 48 percent to 25 percent (Masse and Barnett 2002).[4]

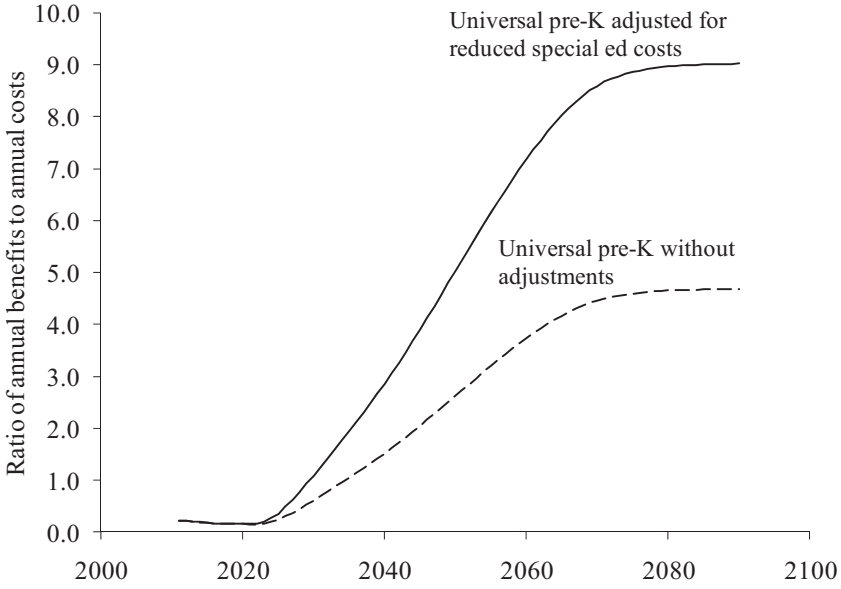
Reducing special education assignments even modestly can yield significant cost savings. Special education is expensive. It is estimated that special education assignment costs an average of more than $10,000 a year per special education student. This is an extra $10,000 cost above regular education costs (Parrish et al. 2004, Part II; updated to 2007 dollars using the CPI). These special education costs can extend over many years, from kindergarten through high school (and even beyond in some cases). Because special education costs such a great amount per year and extends for many years, the cost savings from reducing special education assignments can be large.

Early childhood programs might also cause other savings for the education system, the social welfare system, and the criminal justice system. However, in the present context, we are focusing on cost savings that are short-term. Reducing grade retention saves costs only in the long run. The costs that are saved from reduced criminal activity also take many years to be realized. Savings in child welfare costs from reduced abuse and neglect cases may be more immediate. However, the evidence suggests that such savings for the child welfare system are small relative to special-education cost savings. For example, for the Chicago Child-Parent Center program, cost savings for the child welfare system are only 11 percent of estimated cost savings from reduced special education costs (Reynolds et al. 2002). Estimates for the Nurse-Family Partnership also suggest modest fiscal savings from reduced child-welfare system costs (Aos et al. 2004, Technical Appendix, p. 96).

I added reduced special education costs into my simulation model of universal pre-K and a full-scale Abecedarian program. I used this revised simulation model to recalculate the flows of benefits versus costs of these programs over time. This revised simulation model calculates "net costs" of these early childhood programs for each time period. These net costs subtract out the reduced special education costs.[5]

Figures 7.2 and 7.3 show the results.[6] As the figures show, the ratio of economic development benefits to net costs increases significantly.

Figure 7.2 Ratio of Annual State Economic Development Benefits to Net Program Costs, Before and After Adjusting for Reduced Special Education Costs, for Universal Pre-K Education

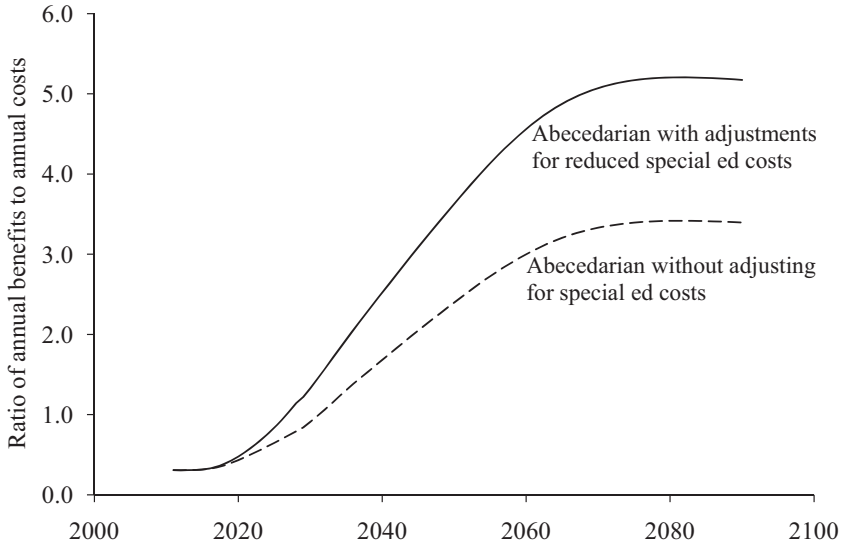


NOTE: Program is assumed to start full scale in 2011 and continue indefinitely. Ratio shown is earnings benefits for state residents in each year, divided by program costs in that year. Assumptions used are described in text and text endnotes. Appendix 7B shows the numbers behind this figure.

Calculations suggest that the ratio of benefits to net fiscal costs increases from 2.78 to 4.90 for universal pre-K education. For the Abecedarian program, this ratio increases from 2.25 to 3.21.

However, the short-term perspective on these programs only modestly improves. For example, under these revised calculations, which consider reduced special education costs, it takes 19 years after universal pre-K is implemented for annual economic development benefits to exceed annual net costs. (In terms of the figure, this happens when the ratio of annual economic development benefits to net costs exceeds 1.) This is an improvement over the baseline calculations. In the baseline calculations, it took 24 years for economic development benefits to

Figure 7.3 Ratio of Annual State Economic Development Benefits to Net Program Costs, Before and After Adjusting for Reduced Special Education Costs, for Abecedarian Program



NOTE: Program is assumed to start full scale in 2011 and continue indefinitely. Ratio reported is ratio of earnings benefits for state residents for that year, divided by net program costs for that year. Assumptions used are described in text and text endnotes. Appendix 7B shows the numbers behind this figure.

exceed costs. However, 20 years is still a long time to wait for economic development benefits to dominate costs.

In addition, during the first 10 years or so, the ratio of benefits to net costs only modestly improves if one considers special education cost savings. For example, 10 years after the universal pre-K program is begun, annual benefits are 17 percent of net costs, up from 16 percent in the original simulation.

For the Abecedarian program, under these revised calculations, it takes 16 years for annual economic development benefits to exceed annual net costs. In the baseline calculations, it took 21 years. Sixteen years is a long time to wait for annual economic development benefits to exceed costs.

In addition, 10 years after a full-scale Abecedarian program is begun, annual economic development benefits are 54 percent of net costs. This is only up modestly from the 47 percent figure calculated before, which did not consider special education cost savings.

In sum, even when special education cost savings are considered, early childhood programs are only attractive to policymakers who possess the patience needed to take a long-term perspective.

REDUCING SHORT-RUN GOVERNMENT COSTS: FINANCING PRE-K OUT OF THE K–12 SCHOOL BUDGET

Universal pre-K education or other early childhood programs could be financed without increasing taxes or borrowing. Some other spending category could be reduced. This budget reallocation would promote state economic development if this other spending category has lower economic development benefits than the early childhood program.

Politically, the most likely spending cut to finance universal pre-K would be to cut K–12 spending. Local school districts are likely sponsors of pre-K education. If they choose to finance universal pre-K education, and voters are not inclined to increase taxes, then universal pre-K's costs are implicitly being financed by reduced K–12 spending. At the state level, state governments frequently have special funds for support of public education spending. In addition, public education spending proposals are often considered together as part of a particular appropriations bill. Moreover, public education spending proposals often are considered together by the same committee. In this political process, achieving increased funding for high-quality pre-K education may involve some reduction in K–12 spending. This reduction may be explicit or it may be implicit. Because of expanded pre-K spending, K–12 spending may not increase as fast as it otherwise would. However, it would be politically naïve to deny the possibility of a political trade-off between pre-K funding and K–12 funding.

This political trade-off does not reflect any necessary logical consequence of increased pre-K spending. Increased pre-K education spending can logically be financed by cutting any spending category, not just K–12 spending. We can increase pre-K spending without increasing

taxes or government borrowing by cutting such budget categories as prisons, Medicaid, state employee benefits, and others. However, these logical possibilities are less politically likely than financing universal pre-K through reduced K–12 spending.

Suppose we did finance 100 percent of the costs of universal pre-K through reduced K–12 spending. Then this budget reallocation would have no net government spending cost. The short-term tax costs of increasing pre-K spending are eliminated. State policymakers need not worry about proposing tax increases to pay for universal pre-K.

But what would be the consequences of this budget reallocation for state economic development? Universal pre-K education increases state economic development largely by increasing the earnings of former child participants. K–12 education has similar types of effects on state economic development. The quality of K–12 education affects the earnings of former students. The quantity and quality of the labor supply of former K–12 students who stay in the state will affect the state's economic development. A cut in K–12 spending may damage the quality of K–12 education, which will adversely affect state economic development. If universal pre-K is funded, but K–12 spending is cut, which of these policy changes will dominate the state's future economic development? Will state residents' earnings increase or decrease?

To address these questions, I used this book's simulation model to estimate the economic development benefits derived from reallocating K–12 spending to universal pre-K education. To do so, I needed an estimate of how reductions in K–12 spending will affect the earnings of former students.

For this simulation, I used a maximum plausible estimate of how large the effects of cutting K–12 spending could be. I used estimates derived from economist Alan Krueger's estimates of how spending on reduced class size in grades K–2 affected future earnings (Krueger 2003).

Krueger's estimates are derived from the Tennessee Class Size Study. This study was a random assignment study in which students were randomly assigned to either "normal" K–2 classes that averaged 22 students or "experimental" lower class sizes that averaged 15 students. The study estimated effects of this lower class size on early elementary test scores. Krueger used these test score effects to estimate effects on future earnings. For his benefit-cost analysis, he also

estimated what percentage increase in K–2 spending was needed to achieve these results. Under reasonable assumptions, lower K–2 class sizes clearly passed a benefit-cost test. For example, under discount rate and wage growth assumptions similar to this book's assumptions, the present value of future earnings benefits is about three times the extra K–12 spending costs.[7]

Suppose we use Krueger's estimates to estimate the earnings effects of all changes in K–12 spending. Krueger's estimates imply that a 1 percent decrease (increase) in K–12 spending that occurs for one year of a student's K–12 career will decrease (increase) that student's future earnings by 0.03 percent. This is derived by assuming that the earnings effects of any change in K–12 spending will be the same as the earnings effects of changes in spending on smaller class sizes in grades K–2.[8]

I regard this as a maximum plausible estimate of the effects of lower K–12 spending for several reasons. First, not everyone accepts Krueger's estimates. For example, there is an ongoing dispute between Krueger and other education researchers such as Eric Hanushek about whether K–12 class size and spending have effects as large as those estimated by Krueger (Hanushek 2002; Krueger 2002). Second, even if we accept Krueger's estimates, it is unlikely that most changes in K–12 spending have as large an effect on student learning and future earnings as K–2 class size. Therefore, there are less damaging ways to cut the K–12 budget than increasing K–2 class size. As a result, we would expect the future earnings effects of an optimal cut in the K–12 budget to be less than the effects estimated by Krueger for K–2 class size.

Financing universal pre-K education is estimated to cost 2.8 percent of the K–12 budget.[9] Therefore, the simulations consider the economic development effects of implementing universal pre-K by cutting the K–12 budget by 2.8 percent.

Many effects of reduced K–12 spending are long delayed. In the first year, the spending cut only reduces the quality of education of students leaving K–12 for one year. Based on the Krueger estimates, a cut of 2.8 percent in K–12 spending experienced for only one year will reduce future earnings by only 0.08 percent (= 2.8 × 0.0296). After two years, this impact doubles. It keeps going up for each successive cohort of students for the next 13 years. After 13 years, we have students who have experienced 2.8 percent lower school funding from kindergarten through twelfth grade. Using the Krueger estimates, the 13 years

of lower school funding is estimated to reduce earnings by 1.08 percent. After 13 years, each successive cohort of students leaving public schools is estimated to have its members' lifetime earnings reduced by 1.08 percent.[10]

These effects on students' earnings are entered into this book's simulation model. As was done with early childhood programs, I make assumptions, based on reasonable estimates, on how many former K–12 students will survive to various ages and how many will stay in their home state. I also make similar assumptions that one-third of this change in the state's labor supply is offset by displacement effects. Due to the funding cuts, students leaving the K–12 system have lower labor force participation and job skills. This increases job opportunities for other state residents. These increased job opportunities offset one-third of the direct negative effects on state earnings due to students who remain in the state.[11]

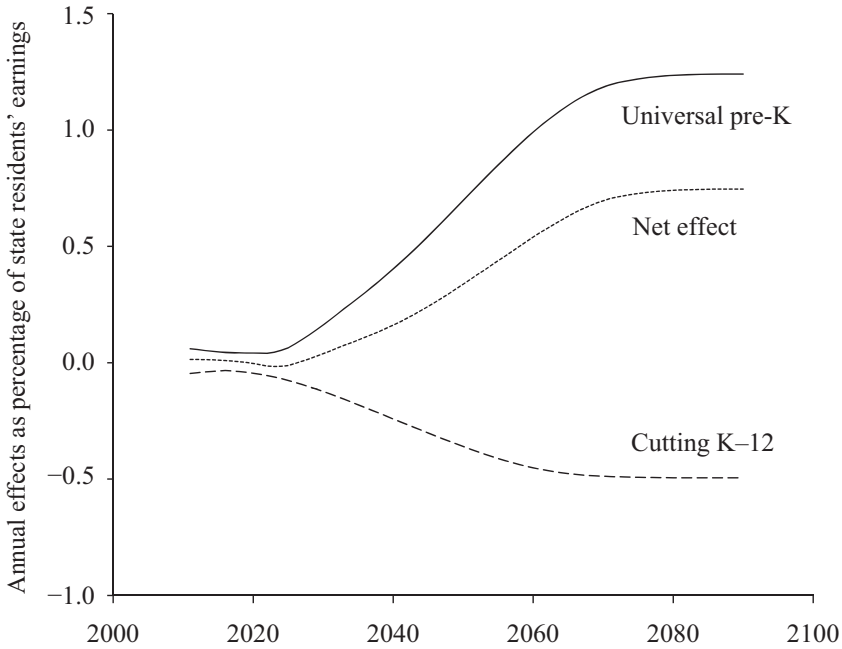
The reduced K–12 education spending also has some immediate economic development effects. Reduced education spending reduces demand for labor in the K–12 sector and also reduces the need for taxes to finance the expanded preschool. The reduced K–12 spending offsets 1-for-1 the balanced budget multiplier effects of the extra universal pre-K spending.

Figure 7.4 shows the estimated economic development effects of financing universal pre-K through reduced K–12 spending. The chart shows the annual effects of pre-K education by itself on the earnings of state residents, as a percentage of total state earnings. The chart also shows the negative effects on state residents' earnings of reducing K–12 spending. Finally, the chart shows the net effects of both changes combined.

As the figure shows, at first this budget reallocation has little or no net effect on state residents' earnings. However, after about 16 years, this budget reallocation begins to have positive effects on state economic development. These positive effects steadily increase until they max out, as a percentage of the state economy, at about a 0.75 percent boost to the economy, after about 60 years.

The negative effects of reduced K–12 spending are estimated to offset about two-fifths of the positive effects of universal pre-K education.[12] Why are there gains from this budget reallocation? These gains occur because the estimated effects of universal pre-K on child develop-

Figure 7.4 Effects on State Economic Development of Financing Universal Pre-K Education by Reducing K–12 Spending



NOTE: Effects for universal pre-K are as previously described in Chapter 4, and in Bartik (2006). Effects of cutting K–12 are modeled as described in chapter text, and follow estimates of Krueger (2003). The net effect is simply the difference between the two. Appendix 7C provides the detailed numbers behind this figure.

ment and adult success are significantly greater than the effects of later intervention. One can explain this as being due to the inherent advantages of earlier intervention. One could also hypothesize that increasing the time that children spend in school may be somewhat more productive per dollar than increasing the quality of that time.

None of this means that this budget reallocation is the best alternative. All the estimates say is that if we assume that the total K–12 plus pre-K budget is fixed, reallocating funds from K–12 to pre-K seems to have net positive effects on state economic development. But increasing total spending on pre-K and K–12 may also pay off. Recall that Krueger's estimates show a positive benefit-cost ratio for increasing

K–12 spending. In the present scenario, earnings benefits are scaled back, as I only count earnings effects due to former students who stay in the state, and I assume that extra quality of labor supply has some displacement effects. But I still conclude that reducing K–12 spending has negative economic development effects that are 22 percent greater than the resulting budget savings.[13] In this simulation, cutting K–12 spending is a bad idea from a state economic development perspective.

Therefore, the best alternative would be to increase spending for universal pre-K, and finance this in some way other than cutting K–12 spending. Cutting K–12 spending is definitely a "second-best" way of financing universal pre-K education.

What are this simulation's limitations? One obvious limitation is that the simulation does not allow for any interaction between universal pre-K education and reduced K–12 spending. The simulation assumes the effects of universal pre-K education and reduced K–12 spending are additive. But what if the effects of universal pre-K depend on the level of K–12 spending? Then the effect of the budget reallocation will differ from simply adding the two effects.

It has sometimes been argued that early childhood interventions will have stronger long-term effects if these interventions are coupled with a quality K–12 school system. For example, some believe that the effects of the Abecedarian program were enhanced by the relatively high quality of the Chapel Hill school system. According to Galinsky, the public school system in Chapel Hill at the time of the experiment was considered one of the two best public school systems in the state. The Chapel Hill public schools had a relatively small percentage of disadvantaged children, and a large number of different support services for children who were behind. Perhaps this excellent school system helped the Abecedarian treatment group more than the control group.

Therefore, it is possible that the estimated impacts of universal pre-K will be reduced if the quality of subsequent K–12 education is reduced, beyond the prediction from adding up the separate effects of these two interventions. In that case, Figure 7.4 may overstate the net benefits of this budget reallocation.

On the other hand, perhaps universal pre-K has greater impacts on children when K–12 school quality is lower. In that case, the combined impact of the budget reallocation will be more positive than shown in Figure 7.4.

Another issue is whether reducing K–12 spending will have the earnings effects estimated by Krueger. As mentioned above, it seems plausible that there are better ways to cut the K–12 school budget than by increasing K–2 class size. For example, in 2006, Mark Tucker and his colleagues at the National Center on Education and the Economy advocated that we consider getting rid of at least the senior year in high school for most students, as the senior year often seems unproductive. This is just one of many possible K–12 changes that could cut spending at lower costs to student achievement and earnings than by raising early elementary class sizes.

Finally, although funding universal pre-K through cutting K–12 spending avoids short-run tax increases, it does not produce short-run economic development benefits. As the figure shows, under this scenario, there are few economic development benefits for 25 years. This budget reallocation is only attractive to a policymaker with great patience.

INCREASING SHORT-RUN BENEFITS THROUGH CAPITALIZATION

Benefits of early childhood programs would be realized earlier if some of these benefits were "capitalized" into higher property values. A state or local government that implements at full-scale a high-quality early childhood program is providing a service that is valuable to families. The increased future earnings of former child participants should be valued by parents. Parents should be willing to pay more to obtain access for these future benefits. This willingness to pay could be reflected in a willingness to pay more to buy a house or rent an apartment in the state or local area that offers these services. This willingness to pay more for housing should increase property values. This increase in property values may occur as soon as buyers and sellers of property fully understand the future benefits provided by early childhood programs. These increased property values do not have to wait for these future benefits to occur if sufficient numbers of buyers and sellers of property believe that these benefits will occur. Therefore, capitalization of future earnings benefits into property values could increase the up-front benefits of early childhood programs.[14]

The value of property should also reflect the property's taxes. However, the economic development argument for early childhood programs is that these future earnings benefits significantly exceed the costs of financing these programs. Furthermore, as other authors have pointed out, early childhood programs provide many medium-run and long-run fiscal benefits. These fiscal benefits include the lower special education costs mentioned above. They also include other reductions in spending, such as lower criminal justice system costs and lower costs for welfare and Medicaid. Fiscal benefits also include increases in taxes due to the increased earnings in the state economy. Some simulations suggest that fiscal benefits greatly outweigh the costs of these programs (Bartik 2006; Dickens and Baschnagel 2008; Lynch 2007). The medium-run and long-run fiscal benefits are great enough that at modest discount rates such as 3 percent, the adoption of these programs has a positive net present fiscal value, not a cost.

How buyers and sellers of property value these short-run fiscal costs versus long-run fiscal benefits is uncertain. This may depend in part on how short-run fiscal costs are paid for. If all short-run fiscal costs are reflected in higher property taxes, costs may loom larger in property owners' minds. If short-run fiscal costs are financed in ways that are less visible, less tied to property purchases, or less a burden on the general taxpayer, then these short-run costs may have less influence on how typical buyers and sellers value property. For example, if these short-run costs are financed through higher sales taxes, they may be less visible to many households and therefore not affect property bids much. If short-run costs are financed through an increase in the top rate on a graduated state income tax, then these costs may not affect property bids that much.[15]

Will buyers and sellers of property perceive the benefits of early childhood programs as benefits that should increase their valuation of property? This seems much more likely for programs such as universal pre-K education that provide widespread benefits to many households. On the other hand, it seems less likely that property values will go up if early childhood programs only provide benefits to relatively few households. Some early childhood programs help relatively few households because they are targeted at disadvantaged households. This includes programs such as the Abecedarian program. It also includes many home-visiting programs, such as the Nurse-Family Partnership.

Whether universal pre-K education will affect property valuation depends in part on whether it provides benefits that are visible to prospective property owners in the state or local area. Some benefits of universal pre-K education do manifest themselves in the short run in a way that we know is visible enough to affect property valuation. Specifically, high-quality universal pre-K will affect elementary school test scores. We know from previous research that elementary school test scores are visible enough and tied enough to property ownership to affect property values.

Studies suggest that universal pre-K will increase average test scores in third, fourth, and fifth grades by about 0.08 in "effect size" units. This "effect size" jargon of educational researchers means that average test scores will increase by eight-hundredths of the typical standard deviation across students in test scores.[16] Based on previous studies of the housing market, an increase in average test scores in third, fourth, and fifth grades of one standard deviation probably increases property values by 5 to 10 percent.[17] Therefore, because of its effects on average elementary school test scores, universal pre-K should increase a state or local area's residential property values by 0.4 to 0.8 percent. This calculation assumes that property buyers and sellers value the increase in test scores but ignore the possible fiscal consequences of universal pre-K. As outlined above, fiscal consequences might be ignored because these fiscal consequences are on net positive in the long run, or because the short-run fiscal costs are not salient to homeowners' property valuation decision.

Based on typical U.S. property values, if universal pre-K raises residential property values by 0.4 to 0.8 percent, the capital gain from universal pre-K will be 6.4 to 12.7 times the annual gross budgetary costs of universal preschool.[18] If property valuations are unaffected until test scores actually improve, then this property value gain will begin to occur when the original participants in pre-K reach third grade, four years after the universal pre-K program is adopted. At average U.S. property tax rates, such an increased valuation of property would raise property tax revenues of 8 to 17 percent of the annual gross costs of the universal pre-K program.[19]

Universal pre-K would have much larger effects on property values if buyers and sellers of property fully valued its effects on future earnings. This book's simulations allow a calculation of universal pre-K's effects

on state residents' earnings. I can also calculate the effects on the earnings of former preschoolers who leave the state. These effects should also be relevant to parents' property valuation decisions. Combining these calculations, we can calculate the net present value of the increase in earnings that can be accessed by buying property in this state.[20]

This net present value obviously depends upon the discount rate typically used by buyers and sellers of property. What discount rate might actually be used by prospective buyers and sellers of property to value earnings effects that occur for their children? The honest answer is, we don't know. However, we can come up with some plausible alternatives. I consider four alternatives. First, prospective home buyers might use the same discount rate as the ideal policymaker. For this alternative, I use a discount rate of 3 percent, which this book has consistently assumed is optimal for the ideal policymaker. A second alternative is to rely on evidence of how parents behave in making investments in children. A study of parental investments in children's health estimated a parental discount rate of 4.70 percent (Agee and Crocker 1996). A third alternative is to estimate what discount rate is compatible with the finding that a one standard deviation increase in test scores raises property values by 5 to 10 percent. I calculated what discount rate would make this property value effect reasonable. I estimated discount rates of 7.48 percent (5 percent property value effect) and 6.06 percent (10 percent property value effect). Finally, as argued by Barrow and Rouse (2004), we might use the average 30-year real interest rate on mortgages. They calculate this to be 7.33 percent. This mortgage rate is quite close to the estimated discount rate associated with a 5 percent property value effect. I combine these two possible discount rates in the analysis.

Table 7.3 uses these plausible discount rates to calculate effects of universal pre-K on property values and property taxes. I consider two scenarios. Under one scenario, I only consider the property value effects of the gross economic development benefits provided by universal pre-K. This scenario ignores the fiscal effects of universal pre-K education. It implicitly assumes that the short-run taxes to support universal pre-K aren't relevant to property buyers and sellers. Perhaps the taxes are not paid by the decisive property buyer or seller. Or perhaps these short-run taxes are perceived as being outweighed by the long-run fiscal benefits of pre-K education in lowering special education costs, criminal justice system costs, and welfare system costs. Under the second scenario, I

Table 7.3 Possible Capitalization Effects of Universal Pre-K Education

Discount rate used	3.00%	4.70%	6.06%	7.33%	Elementary test score effect for comparison
Source of discount rate or estimates	Optimal social discount rate.	Parental discount rate for investment in children, inferred from investment choices regarding children's health.	Discount rate compatible with estimate that a one-standard-deviation increase in test scores increases property values by 10%.	Average 30-year real mortgage rate from Barrow and Rouse. (Also compatible with a one-standard-deviation test score effect of about 5%.)	Due to effects of elementary test scores on property values, and effects of universal pre-K on elementary test scores.
Gross capitalization of economic development benefits					
% effect on property values	18.3	5.1	2.5	1.4	0.4 to 0.8
Ratio of property value effect to annual costs of universal pre-K	292.1	81.2	39.4	22.7	6.4 to 12.7
Property taxes raised as proportion of annual costs of universal pre-K	3.88	1.08	0.52	0.30	0.08 to 0.17
Net capitalization of economic development benefits					
% effect on property values	14.0	3.0	1.0	0.3	
Ratio of property value effect to annual costs of universal pre-K	178.4	38.7	12.9	3.4	
Property taxes raised as proportion of annual costs of universal pre-K	2.37	0.51	0.17	0.05	

NOTE: The figures in the last column come from the previous section of the text, which analyzed capitalization effects expected because of universal pre-K's effects on elementary test scores. The remaining columns calculate capitalization under various assumptions about discount rates and whether all of the program costs are deemed relevant to property valuation. The first three rows of numbers simply consider capitalization under the assumption that only gross economic development benefits of universal pre-K are capitalized. Fiscal effects are ignored under the assumption that these are not relevant, either because of the many fiscal benefits (e.g., reduced special ed costs, criminal justice system costs, welfare costs, and child welfare costs) as well as costs of universal pre-K, or because the marginal home buyer may not pay many of those costs (e.g., fiscal costs may not be deemed relevant to property bids if financed by the sales tax, or a progressive income tax, or a business tax). The final three rows of numbers consider the opposite extreme example: all of the program costs of universal pre-K are capitalized, ignoring any fiscal benefits of universal pre-K. Capitalization effects on property values calculate the discounted present value of economic development benefits (or economic development benefits minus program costs) under various discount rates and get the percentage effect by dividing by the estimated total residential property values, which are estimated based on Federal Reserve Board Flow of Funds data (Federal Reserve Board 2009). Property tax collections assume a real property tax rate of 1.33%, based on average national data from Yilmaz et al. (2006) of the Tax Policy Center. The discount rate assumptions are based on different plausible discount rates. 3% is the optimal social discount rate used in this book. 4.7% is an estimate of the average discount rate used by parents for making decisions about investments in their children's health. 6.06% is an estimate of the discount rate that would be needed to explain how elementary test scores affect housing prices, assuming that a one-standard-deviation increase in test scores increases housing prices by 10%. 7.33% is an estimate from Barrow and Rouse of the average real 30-year mortgage rate. 7.33% is also close to the discount rate needed to explain how elementary test scores affect housing prices, under the assumption that a one-standard-deviation increase in test scores increases housing prices by 5%. (The actual discount rate for a 5% effect is 7.48%.)

consider the property value effects of universal pre-K after subtracting out 100 percent of the program costs for universal pre-K. No fiscal benefits from universal pre-K are considered. In the real world, it seems likely that the truth is between these two scenarios.

These property value effects vary widely. However, these results do support several conclusions. First, property value effects of universal pre-K are potentially about three times as great as predicted by effects on elementary test scores. This estimate is derived by comparing the elementary test score effects with the effects of gross economic development benefits using the comparable discount rate. This reflects that universal pre-K has considerably greater effects on the future earnings of former child participants than would be predicted from its effects on elementary test scores.

Second, effects of universal pre-K on property values are often large under plausible discount rates. Effects are many multiples of annual program costs.[21] The property taxes raised from these higher property values are often significant fractions of annual program costs. Under some plausible scenarios, these property tax increases are sufficient to fund universal pre-K.

Third, whether such capitalization effects will actually occur obviously depends greatly on how property buyers and sellers value universal pre-K. This depends in part on whether property buyers and sellers have accurate information about the quality of universal pre-K. It also depends on whether property buyers and sellers understand fully the potential long-run benefits of high-quality universal pre-K. Finally, this valuation depends on how heavily these buyers and sellers discount these benefits to children.

At present, I doubt whether most property buyers and sellers directly include pre-K quality in their property valuation decisions. I doubt this because information on pre-K quality is often weak. Furthermore, many property buyers and sellers may not sufficiently understand the effects of pre-K quality on future earnings of former child participants. Therefore, to the extent that universal pre-K currently has a property value effect, it is probably mostly indirect, through effects on elementary test scores. Elementary test scores are more widely known by prospective home buyers. Parents do believe that such test scores are related to future life prospects for their children.

However, these valuations of universal pre-K by property buyers and sellers may potentially be affected by pre-K advocates. Pre-K advocates might consider disseminating better information for prospective homeowners on the quality, availability, and cost of pre-K in different states and metropolitan areas. Some beginning attempts to provide such information include the *State of Preschool Yearbook* by the National Institute for Early Education Research.

Pre-K advocates might also consider further measures to inform the public about the future earnings effects of universal pre-K education. A fuller understanding of these effects might boost household valuations of these earnings effects.

Finally, public relations efforts that stress how children are affected by early childhood programs might alter parental discounting of these effects. Stressing the effects on children in public discourse may reduce parental discounting of such effects.

The rationale for increasing parental valuations of pre-K's effects is in part to improve parental choice options by providing better information. But public relations efforts to increase parental valuations will also change the incentives facing state policymakers. If pre-K quality, availability, and cost become more salient to prospective home buyers, the effects of these factors on property values and property tax revenues will increase. This will increase the attractiveness of high-quality universal pre-K to state and local policymakers who wish to boost their state or local area in the short run. Short-run boosts in property values and property tax revenues may be more of an incentive to policymakers than long-run boosts to earnings. As I will discuss in Chapter 13, property value effects have been used as an argument by past grassroots American movements to expand education.

One trade-off with increased capitalization is that it transfers some of the benefits of universal pre-K education to property owners. This will be further discussed in the chapter on distributional effects (Chapter 8).

Capitalization effects are relevant when universal pre-K is analyzed from a state perspective. These capitalization effects reflect the relative attractiveness of a given state, versus other states, due to the state's offering high-quality universal pre-K. At the national level, we would not expect universal pre-K to lead to capitalization effects. Chapter 10 further considers the national perspective.

INCREASING SHORT-TERM BENEFITS: INCORPORATING PARENTAL EMPLOYMENT PROGRAMS INTO EARLY CHILDHOOD PROGRAMS

The short-run benefits of early childhood programs may also be increased by program modifications. What program components might be added to significantly increase short-run benefits?

It seems reasonable to focus on program add-ons that might have some synergy with the early childhood programs. Otherwise, short-run benefits could be increased by adding any arbitrary program X that has a high ratio of short-run benefits to costs. But if program X's social returns do not depend on the existence of the early childhood programs, and vice versa, then it is unclear why we would consider the early childhood programs plus program X as a package. For example, perhaps some antipollution regulation would have large short-run benefits relative to costs. But it would seem strange to claim that we have "solved" the problem of delayed benefits to early childhood programs by adding an antipollution regulation to the policy package.

One program add-on that might have some synergy with early childhood programs is an employment and training program for the parents of the child participants. It seems possible that early childhood programs that provide some free child care, such as universal pre-K and the Abecedarian program, might make employment and training services for the parents more effective.

Employment and training services for parents may provide more short-run economic development benefits than are provided by early childhood programs. Increases in parental employment and wages will occur immediately, while improvements for former child participants have to wait until the children grow up.

What are plausible returns to high-quality employment and training programs for the parents of the child participants in universal pre-K or the Abecedarian program? How might adding on parental employment and training programs affect the short-run benefits from an early childhood program package?

We don't know the answer. There has not been much experimentation to explore the social returns to adding parental employment programs to early childhood programs.

I wanted to gauge the potential for adding on parental programs. To do so, I considered what would happen if the add-on parental employment program had a rate of return that matched the highest rates of return that have been reliably estimated for employment and training programs. I consider two scenarios. First, I consider an add-on parental job-training program that matched the highest rates of return that have been estimated for federally run job training programs. Second, I consider an add-on program that matched the highest rates of return that have been estimated for state or locally run job training programs.

For the first scenario, I assumed the parental employment and training program had returns as high as the estimated effects of Job Training Partnership Act (JTPA) programs on disadvantaged adults. JTPA was the main federally funded job training program from 1982 to 1998. It was evaluated by a random assignment experiment in the late 1980s and early 1990s.

The random assignment experiment indicated that JTPA had extremely high rates of return for adults. The experiment indicated modest effects per trainee on average earnings. Annual earnings for trainees increased by over $1,200 (Friedlander, Greenberg, and Robins [1997], updated to 2007 dollars). The evidence suggests that these earnings increases persisted without much change for at least five years after training (GAO 1996).[22] These increased earnings were achieved at a cost per adult trainee of about $2,000 for women and $1,400 for men. The real rate of return to society from JTPA training for adults exceeds 70 percent per year under any reasonable assumptions (Friedlander, Greenberg, and Robins 1997).

Although these rates of return to JTPA are high, the annual earnings effects are modest, at only $1,200. Why not consider a training program that had more dramatic effects on annual earnings than $1,200? For federally funded job training programs, research does not find any training programs that have persistent annual earnings effects for broad groups that exceed the $1,000 to $2,000 range (Bartik 2001, Chap. 4). Furthermore, until recently, most of the job training research literature has not found job training programs with annual earnings effects that exceed the $1,000 to $2,000 range. This research literature finds that the annual earnings effects for training programs, once they exceed some minimum threshold for services per trainee, do not significantly

increase with program spending per trainee (Greenberg, Michalopoulos, and Robins 2003).

Recently, however, there have been some estimates suggesting that job training programs may have annual earnings effects that are greater, at least for some job training programs that are state or locally directed, and are somewhat higher-cost. Hollenbeck and Huang (2006, 2008) have estimated annual earnings effects of some state and locally directed job training programs that exceed $4,000 annually. These large annual earnings effects are sometimes persistent.

These recent estimates are less rigorously estimated in that they are not derived from random assignment experiments. Instead, the estimates are derived by estimating the postprogram earnings experiences of participants in job training programs with nonparticipants who are matched on their preprogram characteristics and earnings. Although this matching eliminates observed preprogram characteristics and earnings as an explanation of the postprogram earnings differences, there could also be unobserved preprogram differences between program participants and nonparticipants that might explain the differences. However, it is noteworthy that Hollenbeck and Huang's estimates for federally funded job training programs are similar to previous estimates for federally funded job training programs that use experimental methods. Hollenbeck's estimates for annual earnings effects for programs under the Workforce Investment Act (WIA), the successor program to JTPA, seem roughly consistent with the experimental estimates for JTPA. This similarity adds some credibility that such nonexperimental methods may be reliable in this context.

One possible explanation for these higher earnings effects in Hollenbeck and Huang's research is that training programs may be better directed by state and local governments than by the federal government. Prior research suggests that job training programs may be more effective if they work closely with local employers (Bartik 2001, Chap. 4). Local employers can help identify higher-wage jobs that have strong local growth and a shortage of available workers with suitable skills. Local employers can also help identify what job skills are best addressed by training. Perhaps greater state and local discretion will allow for sufficient flexibility to facilitate better partnerships with local employers. Federally funded job training programs, such as JTPA and WIA, allow for state and local administration. However, federal rules

may inhibit the flexibility that is needed to work with local employers to meet local needs.

For the second scenario, I assumed that the add-on parental job training program had annual earnings effects similar to those estimated by Hollenbeck and Huang for community college job prep programs in the state of Washington. These community college programs provide training for individuals that leads directly to jobs, rather than to transfer to a four-year college or university. Hollenbeck and Huang estimate annual earnings effects of $4,758 as of three quarters after exiting training, and $3,962 as of three years after exiting training.[23]

These large annual earnings effects come at considerable program cost. The estimated additional community college tuition costs, plus state subsidized costs that are not part of tuition, amount to $11,231 per trainee (Hollenbeck and Huang [2006, p. 179], updated to 2007 dollars). The costs of this type of training are over $9,000 greater than the average costs per trainee of most federally funded job training, such as the JTPA program. However, this $9,000 in extra costs pays off, because it increases annual earnings effects by over $2,500 (e.g., $3,962 − $1,200 for JPTA = $2,762). These extra earnings effects appear to be persistent, so these estimates suggest that the more expensive training investment is worth it.

Costs of this community college training program are so much greater because the program is more intense. The program modeled is assumed to last 1.9 years on average. During those 1.9 years, the program requires full-time attendance at the community college. In contrast, average costs for JTPA, WIA, and other federally run job "training programs" reflect that for many "trainees," the training provided is mostly job placement assistance and very short-term training.

I resimulated the economic development benefits and costs of universal pre-K and the Abecedarian program with these two types of add-on training programs for parents. In one simulation, I assumed that the program had costs per trainee and earnings effects per trainee that were similar to the JTPA program's effects for adult women.[24] In the second scenario, I assumed that the add-on program had costs and earnings effects per trainee that were similar to the state of Washington's community college job prep programs.[25] I assumed that 75 percent of the families involved with the Abecedarian program would enroll in training, as the Abecedarian program targets disadvantaged families. I

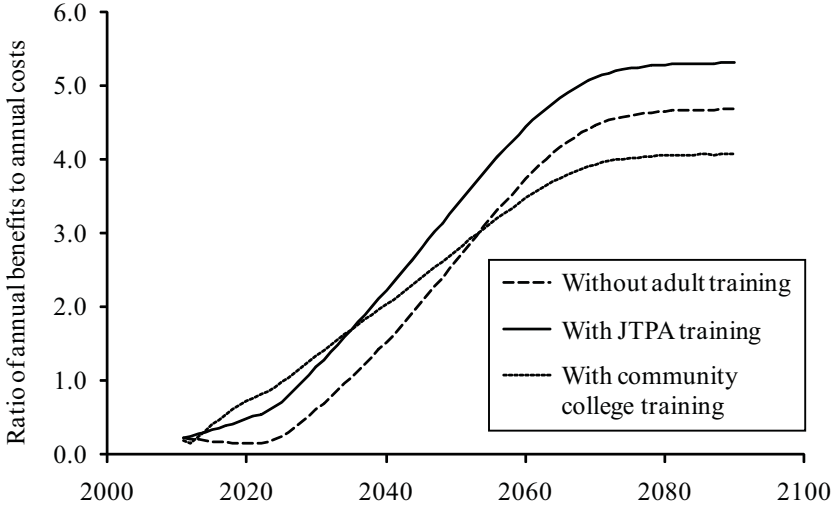
assumed that 75 percent of the "high-risk" families enrolled in universal pre-K would enroll in training, along with 25 percent of "medium-risk" families. This assumption means that 26.3 percent of all families in universal pre-K would enroll in training. In calculating increased earnings of state residents, I make my usual adjustments to include only survivors who stay in the state, and to adjust for labor market displacement.

Figures 7.5 and 7.6 show the annual ratio of economic development benefits to costs for universal pre-K education and the Abecedarian program with these two types of adult training add-ons. For comparison, the figures also show the annual ratios without the adult training add-ons.[26]

As shown in Figure 7.5, adding training to universal pre-K has the potential for significantly improving the short-term and medium-term economic development benefits of pre-K. The original program has annual economic development benefits that hover at about 15–23 percent of costs for the first 13 years or so after the program is initiated. With the add-on adult training, economic development benefits steadily increase during those first 13 years. This package of pre-K and adult job training yields much bigger benefits sooner. For example, five years after the original program is initiated (the year 2016), annual economic development benefits are only 16 percent of annual costs. With the add-on of JTPA-style training, by five years after program initiation, annual economic development benefits are 35 percent of annual costs, or twice as great. With the add-on community college job preparation training, by five years after program initiation, annual economic development benefits are 47 percent of annual costs. Annual economic development benefits of the original program did not exceed annual costs until 24 years after the program's start. With the JTPA-style training add-on, annual economic development benefits exceed costs after 18 years—six years earlier. With the community college job preparation training, annual economic development benefits exceed costs after 15 years.[27]

The potential for greater short-term ratios of benefits to costs is limited in a universal program because of the assumption that training benefits will be restricted to disadvantaged families. A more targeted pre-K program would have its short-term benefits-to-cost ratio boosted more by adult training add-ons. Alternatively, a training program that had high returns to more advantaged workers could increase the short-term benefits-to-cost ratio.

Figure 7.5 Ratio of Annual State Economic Development Benefits to Program Costs, Universal Pre-K Education, with Two Types of Adult Training Components, Compared to Similar Ratio without a Training Component

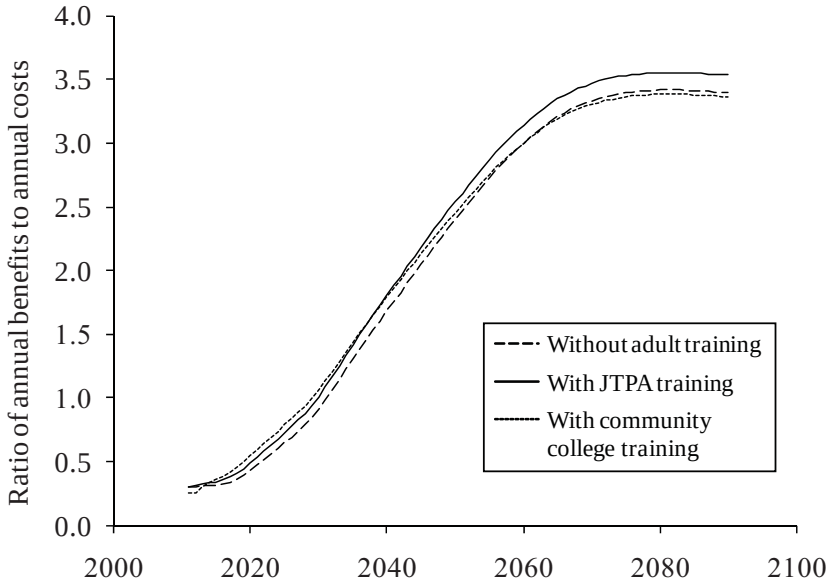


NOTE: Methodology is explained in chapter text and Appendix 7D. Economic development benefits are increases in earnings of state residents. The figure shows how the ratio of these annual economic development benefits to costs, for universal pre-K education, changes when either of two types of adult job training is added to the pre-K program. All these calculations are for a permanent universal pre-K program, with any adult job training add-ons also being permanent, that starts in 2011. As is discussed in the text, what is particularly important is how these add-on training programs affect short-run ratios of benefits to costs.

As Figure 7.6 shows, adding adult training to the Abecedarian program does not much affect the time pattern of the ratio of benefits to costs.[28] The lack of effect reflects the large costs of the Abecedarian program. The modest earnings benefits provided by adult training do not loom large compared to the large costs per child participant in the Abecedarian program.[29] In addition, the Abecedarian program already has considerable short-term benefits for parents, even without adult training add-ons.

These potential effects of short-term training are hypothetical. It would seem important to do some demonstration projects and experi-

Figure 7.6 Ratio of Annual State Economic Development Benefits to Program Costs, Abecedarian Program, with Two Alternative Adult Training Components, Compared to Similar Ratio without a Training Component



NOTE: Methodology is explained in chapter text and Appendix 7D. Economic development benefits are increases in earnings of state residents. The figure shows how the ratio of these annual economic development benefits to costs, for the Abecedarian program, changes when either of two types of adult job training is added to the program. All these calculations are for a permanent Abecedarian program, with any adult job training add-ons also being permanent, that starts in 2011. As is discussed in the text, what is particularly important is how these add-on training programs affect short-run ratios of benefits to costs.

mentation with adding training and employment services for adults to early childhood programs.

It is particularly important to do such experimentation because there may be synergies between early childhood programs and adult training and employment programs. High-quality early childhood services may increase the return to adult training and employment programs by providing free child care and peace of mind to parents. Improved parental employment and earnings may increase the rate of return to early childhood programs. Higher family income may reduce stresses of poverty

that harm child development and adult outcomes for those children. For example, research by Duncan, Kalil, and Ziol-Guest (2008) suggests that among families with less than $25,000 in annual income, increasing a family's income by $1,000 per year increases the future earnings of children in that family by 6 percent.[30] The calculations so far do not reflect these potential synergies, which may be important.

To gauge the potential importance of such synergies, I reestimated the economic development benefits from the adult training add-ons to the Abecedarian program, but this time including possible effects of adult training programs on the earnings of their children. I used Duncan, Kalil, and Ziol-Guest's estimates to do this reestimation. Including effects on the children of trainees increased the net present value of benefits of the JTPA-style training program by 22 percent. Including children's effects increased the benefits of the community college training program by 30 percent.[31] The benefit-cost analysis of adult job training programs is significantly altered by considering effects on children.[32]

It should be an important research priority to investigate the potential for programs that integrate services to children with services to their parents.

CONCLUSION

The economic development benefits from high-quality early childhood programs are mostly long-term. This is a problem for policymakers with short time horizons. What can be done about this problem?

Based on this chapter, a variety of solutions seem possible:

- Do calculations that demonstrate the likely savings in special education costs from early childhood programs.
- Establish systems of regularly rating the scope, quality, and costs of state and local pre-K education programs in a comparable way. Promote these quality rating systems to potential property owners. Also, promote the importance of pre-K education to potential property owners. Such rating systems and promotion efforts would improve family awareness of the importance and quality of preschool. As a result, high-quality universal pre-K programs would be more likely to increase property values in the short run.

- Do demonstration projects and experiments that add adult employment and training programs to early childhood programs. See what works and what doesn't work, and what potential synergies there are in combining such efforts.
- If policymakers are reluctant to raise taxes to improve early childhood programs, urge policymakers to finance such programs with reductions in other government spending that has lower rates of return.
- Once the current U.S. financial crisis has passed, explore options such as tax increment financing to fund expansion of high-quality early childhood programs.

Of all these options, I believe there are two options that offer the most promise: 1) promoting capitalization benefits and 2) experimenting with combining early childhood programs with programs for parents. We can increase capitalization by increasing information on pre-K education programs. This option directly addresses the central problem: policymakers undervalue the most important benefits of universal pre-K, the future benefits for former child participants. If parents have sufficient information that these benefits for children are reflected in property valuations, then these future benefits become visible to policymakers in the short run. Furthermore, greater parent knowledge and valuation of pre-K education is also likely to affect how parents vote. Such a change in voting behavior would certainly affect state policymakers. Finally, a sustained effort to promote better information on pre-K across states is relatively cheap compared to its potential benefits.

Comprehensive programs that include assistance to parents directly increase short-term benefits. We may find that such comprehensive programs offer higher returns. Early childhood programs may increase the rate of return of adult job training programs, and adult job training programs may increase the rate of return of early childhood programs. Experimentation should explore such possibilities. But even if these synergies are modest, a comprehensive program will have greater short-term benefits relative to costs.

This chapter has focused on the distribution of the benefits of early childhood programs over time. The next chapter focuses on the distribution of the benefits of early childhood programs and business incentive programs across different income groups.

Notes

1. Savings and investment issues may complicate the discussion. Suppose the policy affects savings and investment flows. Suppose further that the social value of a dollar of savings or investment exceeds the social value of a dollar of consumption. Under these assumptions, we need to determine some shadow prices of savings and investment to adjust the different dollar flows to consumption equivalents.

   The financing of the policy's costs may affect savings and investment in several ways. The financing may affect incomes, which will affect savings. Borrowing may affect interest rates. Extra taxes may affect the returns on savings and investment.

   But the benefits of the project may also affect savings and investment in several ways. Project benefits may also affect incomes. The project may also create a fiscal surplus. This may reduce borrowing's burden on interest rates, or affect the need for taxes that distort the returns on savings and investment.

   The shadow price of savings and investment may exceed 1 because of tax wedges between the private before-tax return on investment and the private after-tax return on savings. In addition, the shadow price of savings and investment may exceed 1 because of the social return on investment's exceeding the private before-tax return on investment. For example, if there are agglomeration economies, then investment may have external benefits for the economy.

   As mentioned in Chapter 4, I avoid in this book taking account of these long-run dynamic effects of changes in savings and investment. I avoid these dynamic investment effects because I think there is no consensus among economists on the magnitude of such effects. Dynamic investment effects can lead to unbounded effects of policies under certain assumptions, but not under other also plausible assumptions. Dickens and his coauthors have models of early childhood programs that incorporate dynamic investment effects (Dickens and Baschnagel 2008; Dickens, Sawhill, and Tebbs 2006).
2. Appendix 7A provides a more technical discussion. This includes an equation for the discount rate. It also includes discussing plausible values in that equation. Like all the appendices, Appendix 7A is available from the Upjohn Institute Web site.
3. Under Michigan's school finance law, this diversion would not significantly reduce revenue for the local schools or other governmental units in the area that approved the Promise Zone. The state education property tax is paid into the state School Aid Fund. Other state revenues are also paid into the state School Aid Fund. These School Aid Fund revenues are used to provide sufficient aid to each school district to make up the difference between capped local property taxes for schools and a largely state-determined foundation grant per student. This foundation grant per student constitutes essentially all local school district general operating revenue. A Promise Zone would reduce overall revenue going into the state School Aid Fund. This would tend to reduce overall foundation grants per student, unless state policy offsets this loss of revenue. However, the consequence of one Promise Zone for the foundation grant per student would be quite small. Therefore, each

Promise Zone has very little impact on the operating revenue per student of its own school district. But if many Promise Zones are designated, the program as a whole might significantly reduce K–12 school funding in Michigan.

4. This ratio compares the Abecedarian control group to the entire Abecedarian treatment group. Ramey et al. (2000) point out that the Abecedarian group that only received services prior to kindergarten, without extra K–12 support services, only had a special education services receipt rate of 12 percent. They argue that the extra K–12 services may have increased the recognition of special education service needs. However, the group that received only services prior to kindergarten has a sample size of 23. Therefore, to be conservative, I decided to use the comparison between the overall Abecedarian treatment group and the control group to calculate the special education cost savings for the Abecedarian program.
5. The simulation was done in the following way: I assumed that the reduced special education percentage due to universal pre-K education would be 2.3 percent of all participants. This is 23 percent of the approximately 10 percent effect found in the Chicago Child-Parent Center (CPC) program. This same 23 percent factor was used to scale back the CPC effects for all earnings effects of the program, and reflects the assumption that a universal program will have somewhat smaller effects on more-middle-class children and on children who would have attended pre-K even without the universal program.

   For the Abecedarian program, I assumed that special education assignments would be reduced by 23 percent of all participants. This 23 percent has nothing to do with the CPC scale-back factor. The Abecedarian 23 percent is based on experimental evaluations of the Abecedarian program that show a reduction in special education assignments from 48 percent in the control group to 25 percent in the treatment group.

   Increased special education costs were initially assumed to be $10,054 in 2007 dollars. This is based on Parrish et al. (2004, Part II) figures on special education costs for 1999–2000 of $8,080 (p. 22). These special ed costs are updated to 2007 dollars using the CPI-U. I assume that only 10 percent of special education costs are paid by the federal government and 90 percent by state and local governments. This seems consistent with the figures in Parrish et al. I only count as cost savings the state and local cost savings, as in this book I am focusing on the state perspective.

   It is assumed that the cost savings from reduced special education assignments accrue for all 13 years from kindergarten through twelfth grade. This implies that special education cost savings for a given cohort of early childhood participants begin accruing one year after the universal pre-K program begins, and five years after the Abecedarian program begins. For each cohort, it is assumed that special education costs after 2011 increase in real terms by 1.2 percent a year, which is this simulation model's assumption about average real-wage increases. As in the regular simulation models, each subsequent cohort is assumed to be 0.3 percent bigger, as this is the population growth assumption of these models. In addition, each subsequent cohort is assumed to have 1.2 percent higher special education costs per student, to reflect wage growth. These assumptions about increasing real

special education cost trends are modest, given that data from Parrish et al. suggest that special education costs have increased in real terms by an average of 1.6 percent a year from 1977–1978 to 1999–2000.

The simulations also allowed for reduced balanced-budget multiplier effects from the reduced special education spending. This reduces economic development benefits. However, this reduction in benefits is less than the reduction in net costs. Reduced balanced-budget multiplier effects were calculated the same way balanced-budget multiplier effects were calculated for the original simulations.

6. Appendix 7B presents the numbers behind these figures.
7. This comes from the scenario in Krueger where the social discount rate is 3 percent and the annual productivity growth rate is 1 percent. I use the same social discount rate and a wage growth rate of 1.2 percent. Under Krueger's assumptions, the present value cost of this intervention per student is $7,660 in 1998 dollars, and the present value of future earnings benefits is $21,667 (Krueger 2003, Table 5, p. F56). The resulting ratio of the present value of benefits to the present value of costs is 2.83.
8. Krueger estimates that earnings will go up by 3.2 percent because of smaller class sizes. These smaller class sizes require a 47 percent increase (e.g., 22 over 15 = 1.47) in funding. This estimate assumes that when class sizes are lower, all elements of per-pupil spending must increase proportionately, not just the ratio of teachers to students. The average experimental student in the Tennessee Class Size Study experienced these smaller class sizes for 2.3 years. If we divide 3.2 percent by the product of 47 percent and 2.3 years, we get an earnings effect of 0.0296 percent for a 1 percent change in spending for one year of a student's K–12 experience.
9. This is based on the estimates given in Chapter 4 for the costs of implementing universal pre-K. In 2007 dollars, this is estimated to have a net cost nationally of $14.3 billion. This figure is assumed to apply to the 2009–2010 school year. According to the Digest of Education Statistics, total public K–12 operating spending in the 2004–2005 school year was $424.6 billion. Updating to year 2007 prices yields a cost of $459.2 billion. According to projections from the Institute of Education Statistics, real education spending for public elementary and secondary schools is expected to increase by 32 percent from 2004–2005 to 2017–2018, which is an increase of 2.16 percent per year. Applying this annual rate of increase, we get projected K–12 spending for the 2009–2010 school year of $510.9 billion. Pre-K spending of $14.3 billion divided by $510.9 billion is 2.8 percent.
10. The actual simulation calculation is slightly more complicated. Because I am focusing on state residents and state earnings, I adjust these impacts down slightly to account for in- or out-migration during the K–12 school years. Therefore, of students leaving the K–12 school system at age 18, not everyone will have experienced their entire K–12 education in the state that is reducing its K–12 spending by 2.8 percent. This consideration lowers the average effect on earnings after 13 years from 1.08 percent to 0.96 percent.
11. I also have to make assumptions about how many public school students will annually exit the public school system through graduating or dropping out. For

graduates, I start with the figures on public school graduates for 2005–2006 from the Digest of Education Statistics. For dropouts, I use Heckman's figure that the true four-year graduation rate is 77 percent (Heckman and LaFontaine 2007). (Reported high school dropout rates are probably too low.) I calculate from this figure an annual dropout rate. I apply this dropout rate to total public high school enrollment in the fall of 2005 to get the number of dropouts exiting the high schools at that time. These 2005–2006 figures for annual numbers of both graduates and dropouts are adjusted to 2009 by using projections that public school graduates will grow at 0.59 percent per year (*Projections of Education Statistics to 2017* report by Hussar and Bailey [2008]). These 2009 figures are compatible with the 2009 starting date for the original pre-K projections. For 2011 starting numbers, I assume that all effects are the same percentage of total earnings.

12. The long-run positive effects of universal pre-K are a 1.241 percent boost to earnings. The long-run negative effects of reduced K–12 spending in this scenario are −0.495 percent. The ratio of this negative effect to the positive effect is 0.40.
13. This is my calculation using this simulation. I assumed a cutback in K–12 spending of 2.8 percent, and calculated the present value of state earnings losses versus the savings in K–12 program costs. The resulting ratio of the present value of state earnings losses to the present value of savings in K–12 program costs is −1.218.
14. In the model of this developed by Roback (1982) and used by many subsequent researchers, increased household amenities at the interstate or intermetropolitan level could also in theory be reflected in lower wages. However, as was pointed out in Bartik and Smith (1987), for an increase in an amenity that is just valued by households and not businesses, the percentage increase in property values should be much greater than the percentage reduction in wages. Labor is a much larger share of business costs than land, and therefore only very small reductions in wages are compatible with keeping profits the same after an increase in land prices. Furthermore, it could be argued that business will also place some direct value on the "amenity" of better early childhood programs. Any direct benefit to businesses from this amenity will further drive up both property values and wages.
15. These remarks are somewhat speculative. We really don't know the true incidence of many tax and spending programs at the state and local level. Economists seem to believe that higher property taxes will be capitalized into lower property values. There is less agreement about what will happen because of other changes in state and local taxes and spending. The text passage suggests that the incidence may depend in part on how many households mentally classify a particular tax or service as being tied to property ownership. Property taxes are clearly tied to property ownership. By longstanding tradition, the quality of public education is also tied to where a household lives, and so is mentally considered to be part of the property purchase. The question is whether households think of early childhood programs as being tied to property ownership. The issue that this section of the chapter explores is whether such a connection either naturally is made (through effects of early childhood programs on school test scores) or can be made through the right marketing of pre-K's benefits.
16. This is based upon estimates from the Chicago Child-Parent Center program that

the program increased participant average test scores in third, fourth, and fifth grades by an average effect size of 0.22 (Reynolds 1995). I assume, as was done in the simulation, that the effects of a universal pre-K program will be only 23 percent of the effects of a program (such as CPC) that is targeted. On the other hand, peer effects will multiply effects by 1.54 times the raw effects. Therefore, the effects on average test scores are $0.08 = 0.22 \times 0.23 \times 1.54$.

17. This statement principally relies on studies by Black (1999); Bayer, Ferreira, and McMillan (2007); and Kane, Riegg, and Staiger (2006). Black found that an increase of one standard deviation in across-school average test scores increased property values by 2.2 percent. Based on studies of test score variation by Bloom (2006) and Kane, Riegg, and Staiger, a one-standard-deviation difference in cross-student test scores is probably between two and five times the standard deviation in cross-school test scores. So Black's numbers imply that a change in average test scores of one standard deviation will increase property values by 4 to 11 percent. Bayer, Ferreira, and McMillan find that an increase in average school test scores of one standard deviation increased property values by 1.8 percent. Multiplying by two to five yields an effect of an increase in average test scores of one standard deviation of 4 to 9 percent. However, Bayer, Ferreira, and McMillan also find effects that are perhaps twice as great if one allows for test scores changing demographic composition of school neighborhoods. It could be argued that the long-run effect of school test-score changes should include such adjustments, which would raise the test score effects on property values to 8 to 18 percent. Finally, Kane, Riegg, and Staiger concluded that an increase in average school test scores of one standard deviation across students increased property values by about 10 percent. Therefore, an effect with a range of 5 to 10 percent seems reasonable.
18. This is based on figures from the Federal Reserve Board's (2009) Flow of Funds report indicating that residential property values in the United States as of the fourth quarter of 2008 totaled 23.1 trillion dollars. (This sums the residential real estate values of the household sector and the noncorporate sector.) Multiplying this by the percentage effects on property values, converting to 2007 dollars, and comparing this figure to the estimated national cost of universal pre-K in 2007 dollars of $14.3 billion, I get the ratio cited in the text.
19. This uses a figure from the Tax Policy Center that typical property tax rates in the United States are 1.33 percent of property value (Yilmaz et al. 2006).
20. I take the total flow of earnings in the state due to universal pre-K, including effects on parents, children, and spending effects. These effects are calculated including displacement effects. I then add in the flow of earnings for former child participants who leave the state. For these leavers, I do not adjust for displacement. The assumption is that prospective property buyers in the state will consider the net effect on their earnings if they stay in the state, which will include displacement effects, and also consider the net effect on their earnings if they leave the state, which will not include displacement effects because the state is assumed to be small relative to the nation.
21. Why are property value effects so much higher relative to annual program costs than the ratio of the present value of benefits to costs? This largely occurs because

property value effects take into account the entire present value of future benefits, and annual program costs represent just one year's costs. As a result, property value effects can plausibly be tens or hundreds of times the annual program costs of universal pre-K.

22. This is not how GAO spun the results. GAO emphasized that results became statistically insignificant some years after training. However, the results also indicated that results did not statistically significantly change over time. In any job training experiment, one would expect training effect estimates to become more imprecise with time. With more time since training, there are more random shocks to earnings that increase imprecision.
23. These figures take the difference-in-difference, regression-adjusted estimates from Hollenbeck and Huang (2006, Table 6.5, p. 68), adjust these quarterly figures to annual figures, and then use the CPI to adjust these earnings effects to 2007 dollars rather than first quarter 2005 dollars.
24. This add-on JTPA-style program, by itself, had a ratio of the present value of benefits to the present value of costs of 8.78. These benefits are mostly earnings benefits but also include some balanced budget multiplier effects (0.04 out of the 8.78). These benefits only count state economic development benefits, so they adjust downward for out-migration and displacement. These adjustments are similar to those made in Chapter 4 for early childhood programs.
25. This community college program by itself had a ratio of the present value of benefits to costs of 2.63. These benefits are mostly earnings benefits but also include some balanced budget multiplier effects (0.04 out of the 2.63). These benefits only count state economic development benefits, so they adjust downward for out-migration and displacement. These adjustments are similar to those made in Chapter 4 for early childhood programs.
26. The numbers behind the figures are in Appendix 7C.
27. The ratio of the present value of benefits to costs improves from 2.78 to 3.35 with the add-on of a JTPA-style training program. The ratio of the present value of benefits to costs decreases somewhat from 2.78 to 2.72 with the add-on of a community college job preparation program. The annual costs of the add-on JTPA training program are initially about $1.5 billion. The annual costs of the add-on community college job prep training program are initially about $8.6 billion.
28. The ratio of the present value of economic development benefits to the present value of program costs increases from 2.25 to 2.37 with the add-on of a JTPA-style adult training program, and increases from 2.25 to 2.28 with the add-on of a community college job preparation program. The annual costs of the add-on programs are somewhat lower than for universal pre-K because the number of assumed Abecedarian participants is lower than for universal pre-K, owing to the more targeted nature of the Abecedarian program. The annual costs of the add-on JTPA program are initially about $0.7 billion. The annual costs of the add-on community college job prep training program are initially about $4.1 billion.
29. The present value of costs for the add-on JTPA program are about 2 percent of Abecedarian's high costs, but are about 10 percent of costs for the cheaper universal pre-K program. The much more expensive add-on community college job prep

program has costs that are about 10 percent of Abecedarian's costs but 59 percent of costs of the universal pre-K program. Therefore, these add-on programs can sway the short-term and long-term rates of return of universal pre-K much more readily than they can sway the returns to the Abecedarian program.

30. This calculation uses the regression coefficients from Appendix Table 3 in Duncan, Kalil, and Ziol-Guest (2008). I use the coefficient of 0.584 in predicting ln(earnings) using income measured in $10,000 units, and then translate this effect on ln(earnings) into an actual percentage effect.
31. To do these calculations, I relied on Duncan, Kalil, and Ziol-Guest's analysis that a $4,326 increase in average family earnings for low-income families, while children are ages 0–5, will increase adult earnings at ages 25–37 by an annual average of $4,919. I adjusted this effect so that it applied to age 31, and I assumed that the dollar effect varied by age from ages 20 to 79 in the same way as did control-group female earnings in the database used to estimate the adult earnings effects of the Abecedarian program. As discussed in appendices to Chapter 4, these data are ultimately derived from CPS data on black females. Adult earning effects were only calculated from ages 20 to 79. I calculated effects on average earnings when the child is ages 0–5 by using figures for the JTPA and community college program's effects from the time the training starts until five years later. These figures are adjusted downward because of out-migration and displacement. Effects on children when they grow up are also adjusted downward for migration out of the state, death rates, and displacement. Thus, these calculations reflect state economic development benefits, not national economic benefits. Total earnings effects for the child, adjusted for displacement, from ages 20 to 79, are then discounted using a 3 percent discount rate back to age equals zero, when the training is supposed to start. The resulting discounted present value of earnings effects on the children of adult trainees, for the JTPA-style training program, is 2.60 times the program's costs. The discounted present value of earnings effects on the children of adult trainees, for the community college training program, is 1.14 times the program's costs. Thus, either of these programs passes a benefit-cost test based solely on its indirect effects on the earnings of the children of trainees.
32. The overall benefit-cost picture for the Abecedarian program is improved, but not by much, because of the high costs of the program. The ratio of benefits to costs for the Abecedarian program was originally 2.25. With the benefits of add-on adult training for both adults and their children, the ratio of benefits to costs with a JTPA-style add-on increases to 2.41. With a community college job prep add-on, the ratio of benefits to costs increases to 2.39.

    I should also point out that although the Abecedarian program also directly increases the earnings of the parents of the child participants, the effects of this parental earnings increase on the Abecedarian child participants, when they enter the labor market, are already captured by the baseline estimates.

    Similar calculations do not make as much sense for universal pre-K. An intervention with parents when their children are age four will not substantially affect average earnings from birth to age five. In the Duncan, Kalil, and Ziol-Guest estimates, family earnings when the child is age six and over do not have much effect upon the child's future adult earnings.