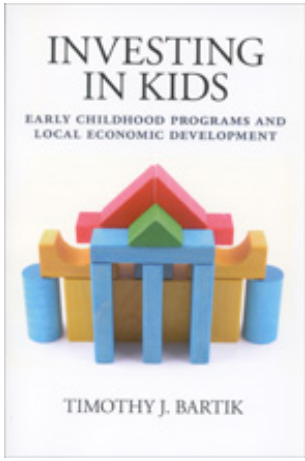
Who Benefits?
Distributional Effects of Early Childhood Programs and Business Incentives, and Their Implications for Policy



Timothy J. Bartik
W. E. Upjohn Institute

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Who Benefits?

Distributional Effects of Early Childhood Programs and Business Incentives, and Their Implications for Policy

How do early childhood programs affect the poor, the middle class, and the rich? The answer to this question is important for several reasons.

First, effects on different income groups may change these programs' social benefits. In this discussion, I assume that programs that tilt benefits toward the poor are more socially desirable. Policymakers, policy analysts, and voters may favor such a tilt because of special concern for the poor. Alternatively, policymakers, policy analysts, and voters may be concerned with making the income distribution more equal. A more equal income distribution may increase the number of people who can meet social standards for being a respectable member of society. Concern over the income distribution may be greater at present because over the last 30 years the U.S. income distribution has become more unequal. To address concerns about the poor, we need information on whether early childhood programs significantly affect the incomes of the poor. To address concerns about the income distribution, we need information about how the effects on the poor compare with effects on other income groups.[1]

Second, how early childhood programs affect various income groups may influence who will provide these programs with political support. An income group's support for a program may depend on what the program implies in taxes and benefits for that group. Assessing patterns of political support requires comparing the program's benefits with taxes for different income groups. Adopting and sustaining a program requires political support that is sufficiently powerful.

Third, how a program affects different income groups may influence program design. For early childhood programs, one important design issue is whether these programs should be targeted at children in lower

income groups, or whether services should be universally available to all children. This is most prominently an issue for pre-K education programs. The targeting versus universal service debate is advanced by looking at specific numbers for how programs benefit different income groups under different designs.

To frame this chapter's discussion, I begin with arguments for targeting pre-K education at the poor versus universalizing pre-K education. I then consider the effects on different income groups of business incentives. The effects of business incentives provide a baseline for considering the income distribution effects of early childhood programs. I then go on to provide estimates of the income distribution effects of pre-K programs under various assumptions about program design and program effects. Finally, I consider the income distribution effects of other early childhood programs.

In this chapter, I show that under a variety of distributional assumptions, early childhood programs have net overall benefits that are progressively distributed. Business incentives are more likely to benefit all income groups, but they provide much less net benefit for the poor. Among early childhood programs, universal pre-K, which combines large benefits for the poor with broad benefits for all income groups, has economic and political advantages.

TARGETED PRE-K VERSUS UNIVERSAL PRE-K

Advocates for targeting pre-K education argue that policymakers should invest where returns are greatest. Targeting advocates perceive returns as being greatest for children from lower income families. Nobel Prize–winning economist James Heckman (2005) makes the following argument: "I think the evidence is very strong that family background is a major predictor of future behavior of children. So a disproportionate number of problem kids come from disadvantaged families. The simple economics of intervention therefore suggests that society should focus its investment where it's likely to have very high returns. Right now, that is the disadvantaged population . . . Functioning middle-class homes are producing healthy, productive kids . . . It is foolish to try to substitute for what the middle-class and upper-class parents are already doing" (p. 24).

Advocates for universal services make two arguments. The first is that even if pre-K's benefits are greater for the poor, pre-K may still have benefits for middle-class children that exceed its costs. Steven Barnett, codirector of the National Institute for Early Education Research (NIEER), argues that "if the development of children in higher-income families is taken as an indicator of what is optimal, then it is clear that not only children in poverty, but children at the median income are entering school far less prepared to succeed than they should be. Children at the median income are as far behind their peers from families in the top income quintile as children in poverty are behind their peers from middle-income families" (Barnett 2006).

Barnett (2006) admits that "the weight of the evidence seems to indicate that effects [of pre-K education] are somewhat smaller for children who are not economically disadvantaged. However, these effects are not trivial and are proportionately large enough that long-term economic benefits [of pre-K] for middle-income children could easily exceed costs."

The second argument is that universal programs are more politically feasible and sustainable than programs targeted at the poor. This argument has been made with great force by Harvard sociologist Theda Skocpol (1991):

> Rarely . . . do advocates of targeted benefits or specially tailored public support services face up to the problem of finding sustained political support for them . . . When U.S. antipoverty efforts have featured policies targeted on the poor alone, they have not been politically sustainable, and they have stigmatized and demeaned the poor . . . It seems highly unlikely that further redistributive benefits or intensive services targeted on the poor alone can succeed politically. We still live amidst the backlash against the War on Poverty and the Great Society . . . Instead of policies for the disadvantaged alone, targeting within universalism is the prescription for effective and politically sustainable policies to fight poverty in the United States. (pp. 414, 420, 434)

By "targeting within universalism," Skocpol means policies that provide disadvantaged groups with extra services within a program that has universal accessibility.

Targeted programs may lack the political support needed to be enacted or sustained. Even if the programs can be sustained, lack of political support may mean there is inadequate funding or political attention to maintain program quality. Steven Barnett restates the often-used phrase, "The truth is that programs for the poor are too often poor programs." Barnett (2006) argues that pre-K programs targeted at the poor too often do not follow the best program designs:

> The targeted programs provided to low-income children have never been closely modeled on those that produced the largest benefits. Preschool teachers in many targeted programs are required to have only a high school diploma. Even Head Start requires only half of its teachers to have a two-year college degree. Many state-funded preschool programs do not require college degrees. Looking at subsidized child care policy at both federal and state levels, there is little evidence of a commitment to anything more than warehousing young children. Preschool teachers are paid about half what public school teachers earn, and child care staff are even more poorly paid.

The counterargument is that universal programs are much more expensive. Providing expensive services to the affluent may be politically controversial. Heckman (2005) outlines the following argument which might be made against universal pre-K education:

> Unfortunately, in discussions of early childhood interventions, people often bundle political issues with economic issues. Part of the appeal of universal early childhood intervention is that it provides universal day care, so some groups favor universal early childhood education because it effectively subsidizes women's working. But bundling in this way also creates an opposition group saying, "Why should we subsidize affluent working women?" (p. 24)

Robert Greenstein, executive director of the Center on Budget and Policy Priorities, argues that the right kind of targeted programs for the poor can get political support. In contrast, universal programs may run into problems because of large costs. According to Greenstein (1991),

> the evidence . . . indicates that factors other than whether a program is universal or targeted have a significant bearing on the political prospects of social programs. Targeted programs, for example, are more likely to be strong politically when they serve low-income and moderate-income working families as well as the

> very poor. They are also more likely to succeed when they are regarded as providing an earned benefit or are otherwise linked to work, when they are entitlement programs with federally prescribed and funded benefits, when they seem effective, and when they are not provided in the form of cash welfare assistance for young, able-bodied people who do not work.
>
> Skocpol's principal conclusion, that those seeking to develop new anti-poverty policies should rely almost exclusively on universal approaches, seems weak on another account as well: it conflicts with current fiscal constraints. Advocates of new universal programs need to acknowledge the political difficulties posed by the large costs of such programs, just as advocates of targeted programs need to acknowledge the political problems inherent in spending tax dollars on a narrow segment of the population. (p. 438)

Whether targeted or universal programs are the better way to deal with poverty is a fascinating philosophical debate. However, numbers can provide greater content to the argument. I now provide some actual numbers for the income distribution effects of different programs. I begin with business incentives before going on to various designs of universal pre-K and other early childhood programs.

BUSINESS INCENTIVES: WHO BENEFITS

I begin by analyzing the income distribution effects of business incentives. This analysis serves as a baseline for analyzing the income distribution effects of early childhood programs. The analysis also introduces the concepts that will be used to analyze income distribution effects.

Unlike the early childhood programs, business incentive programs as I have defined them have no natural scale. My models assume that business incentive programs have similar ratios of earnings effects to costs at different scales. In the following simulations, I scale this permanent business incentive so that its cost, in present value terms, is the same as that of the modeled universal pre-K program. As it happens, such a scale is a lower-bound estimate of what state and local governments typically spend on discretionary tax incentives for businesses

(as opposed to specialized business services).[2] Therefore, the effects reported can be interpreted as a lower-bound estimate of the likely effects of a typical state's tax incentives for business. An upper-bound estimate might be one-and-a-half times the effects I report here.

To analyze distributional effects, I consider the effects on different quintiles of the household income distribution (Table 8.1). Quintiles are defined by ranking all households in the United States by household income, then dividing the ranking into five parts.

The quintiles differ widely in their share of overall household income (row 1 of Table 8.1).[3] If each household in the United States had the same income, then each quintile would have 20 percent of total U.S. income. Instead, the lowest income quintile has only 3.4 percent of total household income, which implies that the average household income of this quintile is about one-sixth of the average household income for all U.S. households. In contrast, the highest income quintile has 49.7 percent of total household income. This implies that the average household income of this quintile is about two-and-a-half times the average household income for all U.S. households.

The simulations in this chapter report the effects of a particular program on the present value of household earnings or the present value of taxes. These figures are sometimes calculated as a percentage of the total present value of income for each household income quintile. This analysis thereby includes both immediate and long-term effects of each program on household income. All effects are included by discounting all future earnings, tax, and income flows at a 3 percent real discount rate.[4]

For each quintile, I calculated the estimated dollar effects of business incentives on the present value of household earnings, relative to the average dollar effects for the lowest income quintile. These figures are derived from estimates of how metropolitan income distributions are affected by increases in employment growth (Bartik 1994b).[5]

The dollar effect of business incentives on earnings tends to be lower for lower income quintiles, and higher for higher income quintiles (row 2 of Table 8.1). For example, the dollar effects of business incentives on the present value of earnings for the middle income quintile are a little more than twice the dollar effect on the lowest income quintile. The dollar effect on the highest income quintile is about three times the dollar effect on the lowest income quintile. Why is this the case? Busi-

Table 8.1 Distributional Effects of Business Incentives

Row		Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1	Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100
Business incentive effects on:							
2	Relative dollar effects on earnings, disadvantaged group = 1	1.00	1.39	2.25	3.64	3.10	2.38
3	Earnings benefits as % of income	1.532	0.835	0.791	0.811	0.325	0.620
4	Tax costs as % of income	0.249	0.227	0.216	0.206	0.179	0.197
5	Net benefits as % of income	1.283	0.607	0.575	0.606	0.146	0.422
6	Ratio of earnings benefits to tax costs	6.15	3.67	3.66	3.95	1.82	3.14

NOTE: Dollar benefits per participant for each quintile are indexed to lowest income quintile equals 1. All figures for percentages of income report the present value of that item as percentages of the present value of income for the relevant group. Ratios report ratios of the present value of earnings benefits or net income benefit to the present value of tax costs for the relevant group. All present value calculations use 3 percent real discount rate. Overall earnings effects and tax costs come from the simulation model for business incentives of this book. Earnings are translated into income percentages using the labor share figures of Gordon (2009). Earnings effects are allocated across quintiles based on how income effects of labor demand increases are allocated across quintiles in Bartik (1994b). Tax costs are allocated across quintiles based on average quintile incidence of state and local taxes reported in McIntyre et al. (2003). More details are in text and endnotes to text.

ness incentives increase earnings by increasing demand for labor. How much a given income group can respond to this labor demand increase is influenced by its involvement with the labor market and its skill level. Lower income groups have a lower percentage of their income in earnings. Furthermore, they earn lower hourly wages, so a given increase in hours of work has smaller dollar effects. Therefore, an increase in labor demand increases earnings by less, in dollar terms, for lower income groups.

However, as a percentage of income, the effect of business incentives on earnings is much greater for lower income quintiles (row 3 of Table 8.1). For example, the percentage effect of incentives on earnings for the lowest income quintile is about twice the effect for the middle income quintile. The percentage effect on earnings for the lowest income quintile is almost five times the effect on earnings for the highest income quintile. Dollar effects of business incentives decline in lower income quintiles, but not as fast as income, so percentage effects increase in lower income quintiles. Because lower income quintiles have more hours per year of unemployment and nonparticipation in the labor force, there is more room for greater percentage effects on their incomes.

The earnings effects of this business incentive program must be compared to the program's effects the on taxes of each income group. From the previous analysis in Chapter 3, we have estimates of the costs of a business incentive program relative to its effects on earnings. We need to determine how to allocate these costs across different income quintiles. I use estimates from the Institute on Taxation and Economic Policy on the relative percentage burden of state and local taxes across income quintiles (McIntyre et al. 2003; Table 8.1, row 4).[6]

These estimates are consistent with the consensus among public finance economists that state and local tax burdens are distributed in a modestly regressive fashion. That is, state and local tax burdens tend to be a somewhat higher percentage of income for lower income quintiles.

From these estimates of percentage earnings benefits by quintile and percentage tax costs by quintile, I construct two statistics for each quintile to describe income distribution effects. These same two statistics will be constructed for early childhood programs as well. First, for each quintile I calculate the simple difference of earnings benefits minus tax costs (each as a percentage of income). This is the net per-

centage effect on the present value of income of each income quintile due to the program. Second, for each quintile I calculate the ratio of the present value of earnings effects of the program to the present value of its tax costs. This is the ratio for each quintile of what it pays for the program to what it gets—a type of benefit-cost ratio.

Both these statistics might play a role in whether a given income quintile would support a program. The first statistic gives a "bottom line" for each program in terms of net effects on income. The second statistic reveals whether the program returns much in effects compared to what each income quintile invests in the program.

Both of these statistics are only calculated for effects on state residents' earnings and income. The focus of this book is on economic effects for states. Therefore, these statistics are calculated to reflect the effects of business incentives (and later, of early childhood programs) on the income distribution of a state.

For business incentives, the net percentage effects on each income quintile are positive (Table 8.1, row 5). Furthermore, the ratio of net earnings benefits to net costs is considerably greater than 1 for each quintile (Table 8.1, row 6). Overall, each income quintile has good economic reasons to favor a high-quality business incentive program.

Why do business incentives benefit all income quintiles? First, as discussed in detail in Chapters 3 and 5, this high-quality business incentive program has overall benefits that substantially exceed costs, by a factor of more than three to one. Second, as outlined above, the benefits of stronger local economic growth tend to be spread quite broadly. Higher income quintiles actually gain more in dollar terms from local economic growth, even though they gain less in percentage terms. At the same time, the regressivity of the tax burden from these programs is insufficient to offset the progressive effect that local economic growth has in increasing the incomes of lower income quintiles by a greater percentage.

The income distribution effects of business incentive programs are modestly progressive.[7] Net percentage effects of the program on the lowest income quintile are slightly more than double those on the middle income quintile. Net percentage effects on the middle income quintile are about four times those on the highest income quintile. In terms of ratios, the ratio of earnings effects to costs is about 70 percent greater for the lowest income quintile than for the middle income quintile. The

ratio of earnings benefits to costs is about twice as great for the middle income quintile compared to the highest income quintile.

However, the bottom line is that the net percentage effects of business incentives on the lowest income quintile are quite modest. The estimates suggest that a typical state's financial business incentives only raise the income of the lowest income quintile by about 1.3 percent. These programs are not going to dramatically raise the well-being of the poor.

Effects on the poor are modest because the lowest income groups have many labor market problems. Expanding overall labor demand only addresses one of the problems that low income groups have in the labor markets. Given the more limited involvement of lower income groups in the labor market, and given their lower wages, there are limits to how much expanded overall labor demand can do to help the poor.

More progressive distributional effects might be achieved by business incentives that target more labor demand at lower income groups. For example, business incentive programs might encourage assisted businesses to hire more of the local unemployed. As discussed in Chapter 5, greater hiring of the local unemployed can be encouraged through First Source programs coupled with customized job training. Business incentives may also be provided for hiring the local unemployed, such as in Minnesota's MEED (Minnesota Employment and Economic Development) program.

Business incentives could be made more progressive. However, the progressivity of boosts to labor demand is limited by how much such programs can change the job skills of the disadvantaged. Customized job training programs can increase job skills. Getting more job experience through greater labor demand can increase job skills. However, larger changes in skills may require human capital programs that directly focus on skills development. Adding on human capital components to business incentives may have more limited effects on job skills.

Greater help for the labor market problems of the poor requires greater changes in their skills. This is probably most appropriately addressed through human capital programs. Early childhood programs are human capital programs that try to intervene early, when skills are thought to be the most malleable.

PREKINDERGARTEN (PRE-K) EDUCATION: SPECULATION ABOUT POSSIBLE DISTRIBUTIONAL BENEFITS

The challenge in assessing the distributional effects of pre-K education is that there is no direct evidence. The best studies, such as those of Perry Preschool and the Chicago Child-Parent Centers, focus on the long-run effects on children from disadvantaged families. No studies rigorously examine the long-run effects of high-quality pre-K on children from middle-class and upper-class families. For example, although Heckman believes the returns from pre-K are lower for middle-class families than for the poor, he admits that this belief is not proven by empirical evidence: "Now you say, Do I have really hard evidence on this? The answer is no" (Heckman 2005, p. 24).

We can speculate about possible patterns of pre-K effects across different income groups. On the one hand, children in more disadvantaged groups are further from "optimal patterns" of child development. This might make it easier to improve the development path for these children. On the other hand, as Barnett argues, middle-class children also lag behind children from upper-class families. He maintains that there might be considerable benefits for middle-class children.

With respect to later outcomes, children from disadvantaged families will have greater baseline high school dropout rates. Therefore, it might be easier to improve high school graduation rates for disadvantaged groups. On the other hand, children from more advantaged groups might be closer to attaining a college degree. It might be easier for pre-K to positively affect college graduation rates for advantaged groups.

In this context, it is relevant that the dollar return from attaining a college degree is greater than the dollar return from attaining a high school degree. The annual earnings boost from attaining a four-year college degree, versus having only a high school degree, is $19,400 (2005 dollars), increasing average annual earnings from $31,500 to $50,900. The annual earnings boost from attaining a high school degree but no higher degree, versus being a high school dropout, is $8,100, increasing earnings from $23,400 to $31,500 (Baum and Ma 2007). Thus, fewer additional college graduates are needed to raise the population's total earnings by x dollars than would be required using additional high school graduates.

Another way to describe the contending influences is as follows. Disadvantaged groups have lower baseline wages and employment rates than more advantaged groups. On the one hand, this provides more potential for increasing earnings through boosting wages and employment rates. On the other hand, a given boost in employment rates or wage rates will increase earnings by more in dollar terms for groups with higher baseline rates.

The best direct evidence on the distributional effects of universal pre-K education is from studies of Oklahoma's universal pre-K program (Gormley et al. 2005).[8] This evidence is only for short-run effects, as of the beginning of kindergarten. The Gormley et al. study uses an evaluation methodology, "regression discontinuity" analysis, which is regarded as giving rigorous results.[9] Gormley and his colleagues find evidence that pre-K has short-run positive effects on test scores for children from all income groups. As is common in educational research, the only information on income status of children is whether they are eligible for a free lunch under federal rules (family income of less than 130 percent of the poverty line) or a reduced-price lunch (family income between 130 percent and 185 percent of the poverty line), or whether they must pay full price for lunch (family income above 185 percent of the poverty line). Test score effects for the highest income group are quite similar to test score effects for the lowest income group. Test score effects for the middle income group are somewhat higher than test score effects for either the higher income or lower income groups.[10]

Gormley et al.'s results weaken the case that pre-K education will have smaller effects on more advantaged children. Pre-K is about as effective in increasing the test scores of higher income groups as it is for lower income groups.[11]

BASELINE RESULTS FOR DISTRIBUTIONAL EFFECTS OF UNIVERSAL PRE-K

For the baseline results, I use distributional assumptions from Karoly and Bigelow (2005). Their results assume that lower income children are more likely to enroll in universal pre-K than upper income children. In addition, lower income children are assumed to be less

likely than upper income children to be enrolled in high-quality pre-K in the absence of a high-quality universal program. Finally, for any particular change in pre-K enrollment brought about by universal pre-K, the dollar benefits are assumed to be more for lower income children than upper income children. For example, consider children who without universal pre-K would not have been in any pre-K program. Karoly and Bigelow assume that in this group of children, benefits for upper income children are one-fourth the benefits for lower income children.[12]

I simulate the distributional effects of universal pre-K under these assumptions (Table 8.2). One part of the simulation calculates the dollar effect of pre-K on the average participant in each income quintile relative to the lowest income quintile (row 2, Table 8.2). These dollar effects are based on Karoly and Bigelow's assumptions. These distributional effects across quintiles assume a quite rapid fall-off in dollar effects from the lowest income quintiles to middle and higher income quintiles. For example, the dollar effects on the middle income quintile are less than a third of the dollar effects on the lowest income quintile. Dollar effects on the two highest income quintiles are less than one-tenth of the dollar effects on the lowest income quintile.[13]

This fall-off of dollar effects with family income is qualitatively consistent with the opinions of other pre-K experts. For example, NIEER codirector Steve Barnett assumed that effects for children in the middle three quintiles would be one-half those of children in the lowest income quintile, while effects for the top quintile would be zero (Barnett 2004). He regards these as "realistic assumptions about program participation and extrapolated benefits" (p. 10). Heckman has not made specific assumptions about how pre-K's returns decline for higher-income children. However, his remarks imply that returns are smaller for middle- and upper-income children, not nonexistent.

Under these distributional assumptions, universal pre-K's benefits are distributed highly progressively. The return per dollar of tax cost is about 25 to 1 for the lowest income quintile (row 6, Table 8.2). This is almost nine times the return per dollar of tax cost for the middle income quintile. Furthermore, the return per dollar of tax cost is about nine times as great for the middle income quintile as it is for the highest income quintile.[14]

Pre-K provides large benefits for the lowest income quintile. The net present value of earnings benefits, even allowing for the regressive

Table 8.2 Distributional Effects of Universal Pre-K Education, Baseline Distributional Assumptions (with comparisons to business incentives)

Row		Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1	Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100
Pre-K effects on:							
2	Relative dollar effects on earnings, disadvantaged group = 1	1.00	0.81	0.31	0.08	0.08	0.38
3	Earnings benefits as % of income	6.252	2.133	0.630	0.122	0.057	0.549
4	Tax costs as % of income	0.249	0.227	0.216	0.206	0.179	0.197
5	Net benefits as % of income	6.003	1.906	0.414	−0.083	−0.122	0.351
6	Ratio of earnings benefits to tax costs	25.08	9.38	2.91	0.59	0.32	2.78
Comparison with business incentive effects on:							
7	Net benefits as % of income	1.283	0.607	0.575	0.606	0.146	0.422
8	Ratio of earnings benefits to tax costs	6.15	3.67	3.66	3.95	1.82	3.14

NOTE: Rows 2 through 6 of table show effects of universal pre-K under the baseline distributional assumptions. Rows 7 and 8 show distributional effects of business incentives and are taken from Table 8.1. Dollar benefits per participant for each quintile are indexed to lowest income quintile equals 1.00. All figures for percentages of income report the present value of that item as percentages of the present value of income for the relevant group. Ratios report ratios of the present value of earnings benefits or net income benefits to the present value of tax costs for the relevant group. All present value calculations use a 3 percent real discount rate. Overall earnings effects and tax costs come from the simulation model for universal pre-K used in this book and described in Chapter 4. Earnings are translated into income percentages using the labor share figures of Gordon (2009). Earnings effects for former child participants and parents are allocated across quintiles based on the Karoly and Bigelow (2005) distributional assumptions, which are applied to quintiles as explained in Appendix 8A. Balanced-budget multiplier spending effects on earnings are allocated across quintiles based on how labor demand increases are allocated across quintiles in Bartik (1994b). Tax costs are allocated across quintiles based on average quintile incidence of state and local taxes reported in McIntyre et al. (2003). More details are in text and endnotes to text.

nature of state and local taxes, is more than 6 percent of income for the lowest income quintile.[15] This large effect is not surprising. The estimates for the lowest income quintile are based on studies of the Chicago Child-Parent Center program. This program gained fame because it was so effective.[16]

On the other hand, under these distributional assumptions, pre-K's benefits are distributed quite broadly. There are net positive benefits for the bottom three income quintiles, and thus net positive benefits for over half the population. The net benefits for the middle income quintile are a little more than 0.4 percent of income. Even the two upper income quintiles get some nonnegligible benefits. The highest income quintile gets 32 cents in benefits for every dollar that this quintile pays in taxes to support pre-K. The next-highest income quintile gets 59 cents in benefits for every dollar of taxes paid for pre-K. These benefits occur partly due to the broad labor demand benefits of simply spending more money. But they also occur because pre-K's benefits are so large for the disadvantaged that even benefits for upper income quintiles that are drastically scaled back have some importance.

But universal pre-K's benefits are more progressive, and hence less broad, compared to business incentives. For example, consider a universal pre-K program and a business incentive program of the same cost. For the lowest income quintile, the net benefits of the pre-K program are almost five times the net benefits of the business incentive program (Table 8.2, row 5 versus row 7). Yet the business incentive program overall has higher net benefits and returns. The upper three quintiles clearly gain much more from business incentives than from universal pre-K.

Universal pre-K's benefits are more progressive than those of business incentives because of how dollar benefits vary across income quintiles. As discussed above, the research literature suggests that increases in labor demand yield considerably higher dollar benefits for higher income quintiles. On the other hand, everyone seems to agree that dollar benefits of universal pre-K are highest in the lowest income quintile.

ADDING IN POSSIBLE CAPITALIZATION EFFECTS

As was discussed in Chapter 7, universal pre-K programs may lead to some property value increases. Property buyers and sellers may recognize the benefits of universal pre-K in increasing the earnings of former child participants and their parents. If they do so, property value increases will "capitalize" some of the benefits of universal pre-K. Benefits will be transferred from workers to property owners. This capitalization is likely to make the returns to pre-K more regressive.

The extent of capitalization depends upon whether property buyers and sellers recognize the future earnings benefits of pre-K. Capitalization also depends upon what discount rates are used by property buyers and sellers to value these future earnings benefits. I will assume here the maximum possible capitalization that has some empirical support, as discussed in Chapter 7. Specifically, I will assume that property buyers and sellers take full account of future earnings effects. I assume the taxes associated with these programs are ignored by property buyers and sellers. I assume property buyers and sellers use a real discount rate of 4.7 percent in considering how the earnings benefits from universal pre-K should affect property valuations. These assumptions yield a relatively large amount of capitalization. Other plausible assumptions about how property buyers and sellers behave would yield lower degrees of capitalization. Based on these assumptions, I calculate that universal pre-K will increase property values by 5.1 percent. How this particular property value increase is derived is discussed in Chapter 7.

I simulate the distributional effects of universal pre-K education under this capitalization assumption (Table 8.3). A considerable percentage of the total earnings benefits of pre-K are capitalized into higher values. I estimate that pre-K leads to property value increases that are about two-fifths of the present value of earnings benefits.[17]

Furthermore, the costs and benefits of this capitalization are distributed in a manner that makes distributional effects less progressive. For example, the lowest income quintile has a much higher percentage loss (about four times as great) from higher consumer housing prices than is true for the highest income quintile (0.681 percent versus 0.177 percent; row 3 of Table 8.3). But the highest income quintile has a somewhat higher percentage gain from higher property values than the

lowest income quintile (0.261 percent versus 0.216 percent, more than one-fifth greater; row 4 of Table 8.3).

Higher consumer housing prices have larger costs for lower income quintiles because housing expenditures are a greater percentage of income for lower income quintiles. Higher property values provide greater benefits for the highest income quintile because the highest income quintile owns more property relative to its income.

Therefore, on net, capitalization makes the distribution of the benefits from universal pre-K less progressive. The lower income quintiles gain less, and the highest income quintile gains more.

However, the earnings benefits from universal pre-K are so great for the lower income quintiles that their net benefits from universal pre-K are still quite high. For example, for the lowest income quintile, capitalization only lowers the ratio of net after-tax benefits to costs from about 25 to about 23. (Compare rows 8 and 10 in Table 8.3.) This is still a very progressive program.

Capitalization does significantly increase the payoff from universal pre-K to the highest income quintile. The highest income quintile now receives 79 cents in benefits for every tax dollar invested. This is more than double the 32 cents that accrues without capitalization (rows 8 and 10, Table 8.3).[18]

ALTERNATIVE DISTRIBUTIONAL ASSUMPTIONS

The baseline distributional assumptions for universal pre-K seem reasonable. As Karoly and Bigelow say, these distributional assumptions "can arguably be viewed as quite conservative." Given current evidence, the most reasonable assumption is that pre-K benefits significantly decline as we go from disadvantaged families to middle income families, but not to zero.

However, because of the lack of evidence on long-term distributional effects of universal pre-K, it seems prudent to consider alternative distributional assumptions. I consider two sets of alternative assumptions. One set is that the dollar benefits for the children of all income groups are the same as the dollar benefits for the children of the disadvantaged. This set of assumptions broadens benefits. Given

Table 8.3 Distributional Effects with Capitalization Effects of Universal Pre-K Education

Row		Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1	Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100
Pre-K effects with capitalization							
2	Earnings benefits as % of income	6.252	2.133	0.630	0.122	0.057	0.549
3	Costs of increased housing prices to consumers	0.681	0.360	0.267	0.223	0.177	0.234
4	Benefits of increased housing prices to property owners	0.216	0.210	0.207	0.210	0.261	0.234
5	Net benefits before taxes and after capitalization (row 2 − row 3 + row 4)	5.787	1.983	0.570	0.109	0.141	0.549
6	Tax costs as % of income	0.249	0.227	0.216	0.206	0.179	0.197
7	Net benefits as % of income	5.538	1.755	0.353	−0.097	−0.038	0.351
8	Ratio of before-tax benefits to tax costs	23.21	8.72	2.63	0.53	0.79	2.78
Comparison to pre-K effects without capitalization							
9	Net benefits as % of income	6.003	1.906	0.414	−0.083	−0.122	0.351
10	Ratio of before-tax benefits to tax costs	25.08	9.38	2.91	0.59	0.32	2.78

NOTE: Rows 2 through 8 of table show effects of universal pre-K when housing prices increase. Rows 9 and 10 show effects without such capitalization effects and are taken from Table 8.2. Earnings effects and tax costs for capitalization cases are also taken from Table 8.2. Overall capitalization effects are based on the assumption that property buyers and sellers have full knowledge of the overall earnings effects of universal pre-K, and on using a 4.7 percent discount rate to value such effects. This leads to a 5.1 percent increase in property values, as explained in Chapter 7 (Table 7.3 and surrounding text). This property value increase is recalculated as a percentage of the present value of overall income, using figures on earnings and a labor share of income of 73.5 percent (Gordon 2009). The effects of this housing price increase are allocated across consumers based on each income quintile's share of total shelter expenditures in the

Consumer Expenditure Survey for 2007 (see the Bureau of Labor Statistics' Web page http://www.bls.gov/cex/2007/Standard/quintile.pdf). The effects of this housing price increase are allocated across property owners based on figures used in Bartik (1994b) on how home ownership, ownership of rental property, and ownership of business real estate are divided across income quintiles. How these calculations are done is detailed in Bartik (1994b), but the allocation is largely based on CPS information on each income quintile's share of rental and dividend income, and of self-employment income, and on each income quintile's home ownership, combined with American Housing Survey data on home values by income quintile.

that everyone seems to agree that dollar benefits actually decline with increasing family income, this set of assumptions captures one bound that contains the possible assumptions. The other set of assumptions assumes that benefits are zero for the children of nondisadvantaged income groups. Given that there should be some benefits of pre-K for middle-class children, this second set of assumptions captures another bound that contains the possible assumptions.

I did simulations that compared the distributional effects of universal pre-K under three sets of assumptions: the baseline assumptions and these two sets of extreme-bound assumptions (Table 8.4). I focused on comparing three types of effects for each income quintile: 1) the dollar benefits of pre-K relative to the lowest income group, 2) the present value of the net after-tax benefits of universal pre-K as a percentage of income, and 3) the ratio of the present value of earnings benefits to the present value of tax costs.

Despite the extremity of the assumptions, the results have some elements in common. First, under all these assumptions, overall net benefits are positive. Second, under all these assumptions, the distribution of the benefits of universal pre-K is highly progressive.

Overall net benefits are positive in all three cases because the benefits of universal pre-K for the disadvantaged group alone are greater than the overall costs of universal pre-K. Extra benefits for nondisadvantaged groups are icing on the cake. Furthermore, benefits are always distributed progressively because the most regressive assumption is that different income groups have the same dollar benefit from pre-K. Even with this extreme assumption of equal dollar benefits, the percentage benefits from pre-K will be much greater for lower income quintiles.

Of course, there also are some large differences in results. As one would expect, universal pre-K's overall benefits are much greater when we assume that pre-K's large dollar benefits for the disadvantaged broadly extend to all income groups. Overall net benefits more than triple. (Overall net benefits increase from 0.351 percent of income under the baseline assumptions to 1.216 percent under the equal dollar benefits for all group assumptions. See rows 3 and 6, Table 8.4.) This broadening of benefits means that all income groups have net benefits from universal pre-K education, not just the first three quintiles (rows 3 and 6). In contrast, universal pre-K's benefits are much lower when benefits are restricted to the disadvantaged. Overall net benefits

Table 8.4 Distributional Effects of Universal Pre-K Education under Alternative Distributional Assumptions

Row		Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1	Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100
Pre-K effects under:							
	Baseline distributional assumptions						
2	Relative dollar effect on earnings, disadvantaged group = 1	1.00	0.81	0.31	0.08	0.08	0.38
3	Net benefits as % of income	6.003	1.906	0.414	−0.083	−0.122	0.351
4	Ratio of earnings benefits to tax costs	25.08	9.38	2.91	0.59	0.32	2.78
	"Equal dollar" distributional assumptions						
5	Relative dollar effect on earnings, disadvantaged group = 1	1.00	1.00	1.00	1.00	1.00	1.00
6	Net benefits as % of income	6.003	2.408	1.738	1.253	0.507	1.216
7	Ratio of earnings benefits to tax costs	25.08	11.59	9.03	7.09	3.83	7.16
	"Only disadvantaged benefit" distributional assumptions						
8	Relative dollar effect on earnings, disadvantaged group = 1	1.00	0.67	0.00	0.00	0.00	0.26
9	Net benefits as % of income	6.003	1.557	−0.194	−0.192	−0.173	0.180
10	Ratio of earnings benefits to tax costs	25.08	7.85	0.10	0.06	0.03	1.91

NOTE: Top rows of table show effects of universal pre-K under the baseline distributional assumptions. These figures are taken from Table 8.2. The next two sets of results resimulate these effects under alternative distributional assumptions. These alternative distributional assumptions assume the same dollar effects per participant for children in the lowest income quintile. What changes is what these dollar effects per participant are for other income quintiles. The "equal dollar" assumptions assume that the dollar effect per participant is the same for all quintiles. The "only disadvantaged benefit" distributional assumption assumes that the dollar effects per participant only occur for the disadvantaged group in Karoly and Bigelow (2005), which is in the bottom 35 percent of the household income distribution. Tax costs are not reported in this table, but are the same as in Table 8.2. All percentage effects are for the present value of the relevant variable as a percentage of the present value of income.

of universal pre-K are cut in half when only the disadvantaged benefit. (Overall net benefits decrease from 0.351 percent under the baseline assumptions to 0.180 percent. See rows 3 and 9, Table 8.4.) The program redistributes income from the upper three quintiles to the bottom two quintiles. If only the disadvantaged get earnings benefits from the program, the upper three quintiles all lose about 0.2 percent in income from the increased taxes they have to pay for the universal pre-K program (row 9, Table 8.4).

TARGETED VERSUS UNIVERSAL PRE-K

Given the distributional possibilities, should pre-K be targeted at the disadvantaged rather than be universally accessible?

I consider the implications of targeting pre-K on Karoly and Bigelow's disadvantaged group (Table 8.5). That group is the lower 35 percent of the household income distribution. Targeting considerably lowers pre-K costs. Because of lower enrollment, the total costs of this targeted pre-K program are only 26 percent of the costs of a universal pre-K program. Karoly and Bigelow's assumptions imply that only 26 percent of enrollment in a universal pre-K program will be in this disadvantaged group.[19]

These lower program costs reduce the tax cost of pre-K for all income groups. To calculate these costs, I scale back the costs of universal pre-K for each income group by 74 percent.

Targeting also means that benefits will be the same under all three sets of distributional assumptions. As discussed above, the different sets of distributional assumptions differ in the dollar benefits for nondisadvantaged groups relative to disadvantaged groups. If services are only targeted at children from the disadvantaged group, then these distributional assumptions are irrelevant in determining gross or net benefits.

I calculated net benefits, and the ratio of benefits to tax costs, for each income group from a targeted pre-K program. This targeted program has a very high overall ratio of benefits to costs—more than seven (row 5 of Table 8.5). Targeting services to a disadvantaged group that is estimated, based on several good studies, to have high returns to pre-K obviously will result in a program that has high overall returns.

The returns to the bottom two quintiles are particularly high. These two quintiles receive much the same benefits from services as under a universal program. Benefits go down a little bit because of lower economic development benefits from pre-K spending. But this lowering of benefits is slight. However, the targeting lowers tax costs by 74 percent. The ratio of earnings benefits to tax costs for the two bottom quintiles more than triples (Table 8.5, row 5 versus row 7). However, this corresponds to only increasing the net benefit to the lowest income quintile by 0.1 percent of income (row 4 versus row 6, Table 8.5). Net benefits to the second lowest income quintile actually go down, because some households in this quintile are excluded from pre-K services with targeting.

On the other hand, the targeting means there is no possibility of substantial economic development benefits for the upper three quintiles. (There are no child benefits at all in these groups; there are some assumed benefits from the spending.) However, the targeting does hold down the tax burden from pre-K. Under a pre-K program that is strictly limited to households in the lower third of the household income distribution, the top three quintiles all suffer net losses from paying taxes to support the targeted program.

It should again be noted that this analysis focuses on economic development benefits. An analysis that also considers the benefits of reduced crime would probably come up with larger benefits overall, and some additional benefits for the upper three quintiles.

Given these data, then, which is better, targeted or universal pre-K? I will consider two perspectives. The first is that of some objective policymaker or policy analyst. This policy wonk is trying to choose the policy that maximizes some weighted sum of overall efficiency benefits plus benefits from making the income distribution more progressive. The other perspective is that of a political operative. Which program will be easier to get enacted, and to sustain and grow over time at a high-quality level?

From the first perspective, the targeted versus universal pre-K issue depends upon which world we live in. Do we live in a world in which pre-K only benefits the disadvantaged? Or do we live in a world in which pre-K has at least some significant benefits for the nondisadvantaged?

Table 8.5 Distributional Effects of Targeted Pre-K Program vs. Universal Pre-K Program, under Alternative Distributional Assumptions

Row	Targeted or universal program?	Distributional assumptions	Variable calculated to right for each quintile	Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1			Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100.0
2	Targeted	Consistent with all 3 sets	Tax costs of targeted as % of income	0.064	0.058	0.056	0.053	0.046	0.051
3	Universal		Tax costs of universal as % of income	0.249	0.227	0.216	0.206	0.179	0.197
4	Targeted	Consistent with all 3 sets	Net benefits as % of income	6.099	1.691	−0.053	−0.050	−0.045	0.313
5			Ratio of earnings benefits to tax costs	96.15	29.91	0.05	0.05	0.03	7.16
6	Universal	Baseline	Net benefits as % of income	6.003	1.906	0.414	−0.083	−0.122	0.351
7			Ratio of earnings benefits to tax costs	25.08	9.38	2.91	0.59	0.32	2.78
8	Universal with capitalization	Baseline	Net benefits as % of income	5.538	1.755	0.353	−0.097	−0.038	0.351
9			Ratio of earnings and housing price effects to tax costs	23.21	8.72	2.63	0.53	0.79	2.78
10	Universal	"Equal dollar"	Net benefits as % of income	6.003	2.408	1.738	1.253	0.507	1.216
11			Ratio of earnings benefits to tax costs	25.08	11.59	9.03	7.09	3.83	7.16
12	Universal	"Only disadvantaged benefit"	Net benefits as % of income	6.003	1.557	−0.194	−0.192	−0.173	0.180
13			Ratio of earnings benefits to tax costs	25.08	7.85	0.10	0.06	0.03	1.91

NOTE: After the top row showing quintile income shares, each of the next pairs of rows considers results from the simulation of one scenario, with one row showing net benefits as a percentage of income, and the other row showing the ratio of benefits to tax costs. The columns "Targeted or universal program?" and "Distributional assumptions" show the assumptions made under that scenario for that

pair of rows. (For example, rows 6 and 7 both show results when program is universal and the distributional assumptions are the baseline assumptions.) The top 2 rows of results consider tax costs of a targeted versus a universal program. The next pair of rows considers the effects of a targeted program on net income and the ratio of earnings effects to tax costs. For comparison, the following rows compare these effects to effects of a universal pre-K program under various distributional assumptions. The baseline distributional assumption results for universal pre-K are taken from Table 8.2. The results with capitalization are taken from Table 8.3. The results for the "equal dollar" and "only disadvantaged benefit" distributional assumptions are taken from Table 8.4. The targeted program only includes pre-K for the disadvantaged group, which is in the bottom 35 percent of the household income distribution and makes up 26 percent of the enrollment in a universal program. Therefore, the tax costs in the top row are simply 26 percent of the universal program's costs. The net benefits and benefit-to-cost ratios for the targeted program are simulated by assuming the same effects for disadvantaged children and parents as under the universal program, but setting such effects for all other groups to zero because they will not be enrolled. The balanced budget multiplier effects of spending are also reduced to 26 percent of the original spending effects for all groups. As in all the tables in this chapter, effects as a percentage of income are the present value of relevant variable effects as a percentage of the present value of income. Ratios are ratios of present values of relevant variables. Present value calculations use a 3 percent discount rate.

If we live in a world in which pre-K only benefits the disadvantaged, then a targeted pre-K program is the better policy. In that world, the net overall benefits from a targeted program are more than 70 percent greater than those of a universal program (0.313 percent versus 0.180 percent, from row 4 versus row 12, Table 8.5). All income groups will be better off with a targeted pre-K program than with a universal program (row 4 versus row 12).

At the other extreme, if we live in a world in which pre-K's dollar benefits do not decline with family income, then a universal program is the better policy. In that world, the universal program's overall net benefits are almost four times as great as those of the targeted program (row 10 versus row 4, Table 8.5). Both the targeted and the universal program have the exact same "bang for the buck," delivering more than $7 in benefits for every dollar of costs (row 5 versus row 11). But the universal program operates at an almost a four times greater scale. Four out of the five income groups gain more from the universal program than from the targeted program, and the benefits for the lowest income group are the same in either program (row 10 versus row 4).

But these are the extreme cases. More interesting is the set of baseline distributional assumptions. What if we live in a world, as we probably do, in which pre-K's benefits do decline significantly with income, but there are still considerable benefits for middle-income families? In that case, I think the objective policymaker would probably favor universal pre-K over targeted pre-K. Targeted pre-K does have a higher bang for the buck than universal pre-K: targeted pre-K has overall benefits of more than $7 for every dollar of cost. These benefits are more than twice as great per dollar of cost as those of universal pre-K, which has benefits of less than $3 per dollar of cost (row 5 versus row 7). However, net overall benefits of universal pre-K are about 12 percent greater (0.351 percent of overall income versus 0.313 percent, from the last column of row 6 versus row 4). And under universal pre-K, the second-lowest and the middle income quintiles do better than under targeted pre-K. The lowest income quintile's net benefits are almost unchanged. And the two highest income quintiles do somewhat worse under universal pre-K (row 6 versus row 4). Therefore, universal pre-K would seem to be preferable on efficiency grounds to targeted pre-K, as net benefits are higher. And universal pre-K would also seem preferable to targeted pre-K on distributional grounds, as it redistributes more

income from the highest income quintiles to the low and middle income quintiles.

From a policy wonk's perspective, there are net efficiency and distributional benefits to choosing universal pre-K over targeted pre-K. Returns to pre-K are lower as we extend services to higher income families. However, these returns are high enough that the gains for lower-middle and middle income quintiles outweigh the losses to the highest income quintiles. Cutting off pre-K service to middle-class families doesn't make sense. The benefits of such services to middle-class families outweigh the costs. The benefit-cost ratio is not as high as it is for lower income families, but it still exceeds 1.

But the practical political perspective is just as important. What conditions will make a program easier to enact and sustain? From a political perspective, what is important is what people perceive to be the benefits of universal pre-K. Perceived benefits may differ from actual benefits.

From a political perspective, expanded pre-K is more feasible and sustainable if it is perceived as having broader benefits for the middle class and if the proposal is for a broad program. In that case, the universal program will probably benefit a majority of the population. A targeted program, in contrast, relies for its support on some altruism from a majority of the population.

This political case for universal pre-K over targeted pre-K is strengthened if the public and political actors believe universal pre-K may be capitalized into higher property values. Capitalization creates larger benefits of pre-K for the politically powerful upper income quintile. The ratio of benefits to tax costs for this quintile more than doubles (row 9 versus row 7). Targeted pre-K, with its narrower eligibility, seems less likely to lead to capitalization. With capitalization, the net losses for the upper income quintile from adoption of a pre-K program are slightly lower for a universal program than for a targeted program (row 8 versus row 4).

Three other factors may increase the policy-wonk and political case for universal pre-K over targeted pre-K: 1) administrative costs, 2) stigma costs of targeting, and 3) reduced peer effects due to targeting. My simulations of strict targeting assume that administrative costs are unchanged because of adding income-targeting to a pre-K program. I assume these costs are slight because all the program has to do is accept

or reject some participant. However, if these costs prove to be significant, they would lower net benefits of the targeted program, which would hurt the case for targeting. For example, administrative costs of targeting could be significant if there were political demands to recertify eligibility every month or every calendar quarter. Administrative costs of targeting could also be significant if there were political demands to push the error rate in targeting too close to zero, which would require extensive documentation of eligibility. In contrast, a more reasonable targeting system for a single year of pre-K would have more modest documentation demands and would certify eligibility once at the beginning of the pre-K year. "Good enough" targeting is considerably cheaper than "close to perfect" targeting.

Targeting may also impose stigma costs on participation. Targeting means that pre-K is now identified as a program that serves the disadvantaged. Some disadvantaged parents may choose not to participate in a targeted program but would participate in a universal program. If this occurs on a large scale, then the benefits of targeted pre-K may be significantly reduced.

Finally, targeted versus universal programs may affect peer effects. The work of Henry and Rickman (2007) provides evidence of significant peer effects in pre-K education. Targeting, compared to universal programs, means that the publicly funded pre-K will have less middle-class and upper-class participation. This may reduce positive peer effects on disadvantaged students. On the other hand, this greater income integration may have negative peer effects on middle- and upper-class students. It is often assumed in discussions of income integration in K–12 education that peer effects are asymmetric by income group (e.g., Kahlenberg 2001). It is assumed that the positive effects on the lower income students from the presence of middle-class and upper income students will exceed the negative effects on the middle and upper income students from the presence of lower income students. The rationale for this asymmetry is that the academic achievement of lower income students may be more sensitive to school culture. If this asymmetry is true, then reducing income integration will lower the overall effectiveness of early childhood experiences in preparing children for future success. Even if this asymmetry of peer effects is untrue, peer effects mean that the reduction of income integration in a targeted program will hurt the academic achievement of lower income students.

For all of these reasons, if universal pre-K has some significant actual and perceived benefits for middle-class students, then I think a universal program is preferable to targeting pre-K education at the disadvantaged. A program with broader middle-class benefits makes more economic and political sense. If such benefits are at all plausible in public debate, universal pre-K is the way to go.

But what if the vision of broad benefits for pre-K does not win out in the political marketplace of ideas? For example, what if the "research consensus" moves toward finding that these programs only benefit the disadvantaged? In that case, a targeted pre-K program is a reasonable fall-back position. Such a targeted program would deliver significant benefits to low income groups. (For example, the net benefits for the lowest income quintile are more than 6 percent of income.) And the tax costs for the middle and upper income quintiles are modest: the net losses for these three upper income quintiles are only about 0.05 percent of income (row 4). If the public does not believe that universal pre-K has broad benefits, this may be all the public is willing to pay for.

TARGETING WITHIN UNIVERSALISM: UNIVERSAL PRE-K WITH INCOME-GRADUATED FEES

What about a more moderate targeting effort that maintains universal accessibility? Specifically, I did simulations that considered the possible effects of running a universal program with some fees for children from upper income families.

To try to preserve middle-class benefits, these fees are only imposed on families in the upper 40 percent of the income distribution (greater than $62,000 in household income). In the baseline set of assumptions, this upper 40 percent of households was the group with the lowest benefits from pre-K. In contrast, the lower three quintiles all had significant benefits from pre-K. Therefore, restricting fees to the upper 40 percent seems more likely to increase efficiency than a broader fee structure. Imposing fees on the bottom three quintiles might discourage use from those quintiles, which after all have the highest benefits. Furthermore, it seems politically wise to only impose fees on a minority of the population. This is consistent with the political advice, given above, by Robert

Greenstein of the Center for Budget and Policy Priorities that "targeted programs . . . are more likely to be strong politically when they serve low-income and moderate-income working families as well as the very poor."

The fees I considered were half of pre-K costs for upper income families. This ends up being a fee of $4.70 per hour.[20] This seems roughly consistent with what upper income families might be willing to consider paying. Data suggest that families in such income brackets average paying $3.90 per hour for all types of paid child care.[21] Paying a little more for high-quality pre-K seems feasible.

Charging fees to upper income families should reduce their demand for the pre-K program. I used estimates from a previous study by Blau and Hagy (1998) of how overall demand for all types of child care responds to changes in hourly fees. However, we would assume that the change in usage of one type of child care, a public pre-K program, in response to a fee would be larger than the change in usage of all types of child care in response to fees. Other types of child care and private pre-K programs are substitutes for the public pre-K program. The availability of these substitutes will increase the demand response. Households can more readily reduce demand for any good or service if there are adequate substitutes for that good or service. Therefore, I assumed that the change in public pre-K demand due to the fee would be twice the overall child care demand response estimated by Blau and Hagy.

With this assumption about the demand response to fees, usage of pre-K among households with incomes greater than $62,000 (the top 40 percent) is reduced by 26 percent. This demand response seems plausible. Overall usage (and costs) of the pre-K program is reduced by 13 percent. Fee revenue makes up 20 percent of the overall costs of the program. Fees do have significant effects on the size and financing of the program.

A targeted program that charges fees should have some extra administrative costs. The program will have to determine household income and the appropriate fees, and collect those fees. I assumed that these extra administrative costs from fees amount to about 5 percent of program costs.[22] The exact magnitude of administrative costs depends upon being reasonable about how much documentation of income is required and how often such documentation is required.

What are the effects of charging income-based fees in a universal pre-K program? I do simulations using the baseline distributional assumptions (Table 8.6).[23] The simulations suggest that the addition of these fees has almost no effect on the overall net benefits of the program (row 7 versus row 11; a 0.352 percent net benefit versus 0.351 percent). The fees do promote economic efficiency to some extent by cutting back usage from upper income quintiles whose benefits from the program are low. On the other hand, charging fees does add administrative costs to the pre-K program. Furthermore, the new program does reduce economic development benefits somewhat. This occurs for some of the upper income families that now forgo pre-K. It also occurs for all income quintiles because of the reduced spending and size of the program. On net, all of these factors turn out to be a wash.

However, adding fees does have some important redistributive effects. First, charging fees redistributes some income from the two upper income quintiles to the three lower income quintiles. This redistribution is relatively modest. The net losses for the two top income quintiles, and the net gains for the three bottom income quintiles, are all less than 0.1 percent of income (row 7 versus row 11). This redistribution takes place for two reasons: The reduced demand for pre-K from upper income families 1) reduces benefits for pre-K for the upper two income quintiles and 2) reduces costs for pre-K services for the three lower income quintiles. The fees paid by the upper income families also reduce net benefits for the top two income quintiles and reduce the taxes that the three lower income quintiles pay to finance the program.

Second, charging fees redistributes how program cost is financed in the upper two income quintiles. Some program cost is shifted from upper income households that do not use this pre-K program to families that do. For upper income households that do not use pre-K, what is relevant is the change in their tax cost from the program. This tax cost is reduced by a little more than one-quarter for these upper two income quintiles (row 3 versus row 10). Although this is large as a percentage of the tax burden of the program, it is modest in relation to income—again less than 0.1 percent of income. For upper income households that use pre-K, they now are charged a fee for the program. However, they still presumably are better off having the program than having no program, or else they would not have chosen to enroll their children and pay the fee. In addition, I note that the estimates suggest that the earnings ben-

Table 8.6 Distributional Effects of Universal Pre-K with Income-Based Fees

Row	Fees or free?		Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1		Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100
Effects of universal pre-K with fees on:								
2	Fees	Earnings benefits as % of income	6.238	2.128	0.628	0.092	0.042	0.533
3		Tax costs as % of income	0.182	0.166	0.158	0.150	0.130	0.144
4		Net benefits after taxes as % of income	6.057	1.962	0.471	−0.058	−0.088	0.389
5		Ratio of earnings benefits to tax costs	34.37	12.85	3.99	0.61	0.33	3.71
6		Tax-plus-fee costs as % of income	0.182	0.166	0.158	0.229	0.167	0.181
7		Net benefits after taxes and fees as % of income	6.057	1.962	0.471	−0.137	−0.125	0.352
8		Ratio of earnings benefits to tax-plus-fee costs	34.37	12.85	3.99	0.40	0.25	2.95
Effects of universal pre-K that is free on:								
9	Free (baseline)	Earnings benefits as % of income	6.252	2.133	0.630	0.122	0.057	0.549
10		Tax costs as % of income	0.249	0.227	0.216	0.206	0.179	0.197
11		Net benefits after taxes as % of income	6.003	1.906	0.414	−0.083	−0.122	0.351
12		Ratio of earnings benefits to tax costs	25.08	9.38	2.91	0.59	0.32	2.78

NOTE: The first set of rows, 2 through 8, examines the effects of a universal pre-K program with income-based fees. These rows analyze net benefits, and ratio of benefits to costs, in two ways. One way simply looks at benefits versus tax costs. The other way includes fees as part of costs. The inclusion of fees is proper for an overall social benefits analysis. However, the analysis without fees is more relevant for households that do not use universal pre-K. The second set of rows, 9 through 12, considers the case of universal pre-K without any

fees. These estimates are taken from Table 8.2. The fees are set and analyzed as described in the text. The reduced usage induced by fees requires that both tax costs and balanced-budget multiplier effects be recalculated for all groups. In addition, the earnings benefits of pre-K must be recalculated for all groups. I assume that the usage of pre-K that is due to fees is distributed equally across the top two income quintiles. The effects as a percentage of income are the present value of the relevant variable as a percentage of the present value of income. The ratio is formed by the present value of benefits divided by the present value of costs. Present value calculations use a 3 percent discount rate.

efits for upper income families who use the program exceed the fees.[24]

Does charging income-based fees improve universal pre-K? From a policy wonk's perspective, the fee-based program might be slightly preferable. The fee-based program does not affect the overall net benefits of the program. However, the modest redistribution from the upper two quintiles to the bottom three quintiles would be desirable.

From a perspective of political practicality, it is unclear whether charging fees makes universal pre-K easier to enact and sustain. The political attractiveness of fees depends on the political influence of upper-class households who don't use pre-K versus those who do. The upper-class "nonusers" may be more supportive of a universal pre-K program that holds down costs by charging fees. They may be less supportive of a free universal program that can be framed as subsidizing "affluent working women" (Heckman 2005). On the other hand, the upper-class users of pre-K may resent paying these income-based fees while other families receive free services. This may reduce this group's support for universal pre-K. Whether fees make sense from a political perspective depends on how fees and their rationale are perceived by both pre-K users and nonusers in upper-class groups.

An interesting analogy is made by comparing need-based fees for universal pre-K to need-based college scholarships. There is general public support for providing college scholarships based on need. But despite this, it appears that college scholarship programs for the needy are underfunded. Based on the U.S. experience with need-based college scholarships, it is apparently politically feasible to base education assistance on needs, but doing so does not ensure a well-funded program.

THE ABECEDARIAN PROGRAM: DISTRIBUTIONAL EFFECTS OF A LARGE-SCALE TARGETED PROGRAM

As described in Chapter 4 and its references, the Abecedarian program is an intense and costly intervention targeted at children from disadvantaged families. The program provides full-time, full-year, and high-quality child care and pre-K from birth to age 5. The program potentially provides over 12,000 hours of service to each child. Because of the program's intensity, the Abecedarian program is very expensive

per child. The present value of gross costs for each child is close to $80,000. Of course, in return for those intense services, the program produces large economic development benefits. As outlined in Chapter 4, of the various early childhood programs considered here, the Abecedarian program yields the largest economic development benefits per child participant. This is partly due to the large effects on the future earnings of former child participants. But it also is due to the much larger effects on parents' labor supply of five years of free child care, compared to the more limited intervention of other early childhood programs, such as one year of part-time, school-year prekindergarten education.

To analyze the income distributional effects of the Abecedarian program, I assume that services would be restricted to the bottom quintile of the population. As outlined in Chapter 4, Ludwig and Sawhill (2007) estimate that a full-scale Abecedarian program could achieve similar results to those of the original model by targeting families below the poverty line. This would involve providing services to families in the lowest 15 percent of the family income distribution.

Why not an Abecedarian program that is universal? First, there is no research basis for estimating the effects of such a program. Second, as will be seen below, the costs of a full-scale Abecedarian program for 15 percent of the population are already extremely high. A universal Abecedarian program would be prohibitively expensive.

Targeting for the Abecedarian program faces some complications because the program lasts five years. If targeting were based strictly on each year's family income, families would cycle in and out of the program. This would reduce the program's effects. If targeting were based solely on family income just prior to admission to the program, when the child was an infant, then a significant number of family participants would greatly exceed income cutoffs sometime in the next five years.

A pragmatic approach to targeting for the Abecedarian program is to require that families at admission score high on some number of risk factors. These risk factors would be family characteristics that are known to be good predictors of a family having persistent poverty. For example, risk factors might include family income, single-parent family, teenage mother, welfare receipt, low education of the parents, etc. To be admitted to the program, families would have to score high on a certain number of these risk factors, as well as having family income

below some cutoff. Once admitted to the program, the child and his or her family would stay in the program for the full five years. With these procedures, the overwhelming majority of participating families would be in poverty or close to poverty for most of the five-year period. This risk-factor targeting approach is similar to how the original Abecedarian program participants were selected. It is also similar to how children are selected for some state pre-K programs. For example, Michigan's state-funded pre-K program requires that the child and his or her family have at least two risk factors from a list of 25 (Daniel-Echols and Schweinhart 2007).

The simulations of the distributional effects of the Abecedarian program used similar methods to those used for universal pre-K education. Therefore, the results can be compared (Table 8.7).

As previously shown in Chapter 4, a full-scale Abecedarian program has quite large net benefits. Overall net benefits are almost twice those of universal pre-K education, even though these benefits are confined to the lowest quintile (row 4 versus row 6).

Furthermore, a full-scale Abecedarian program results in extraordinary net benefits for the lowest income quintile. The program boosts net income for this group by over 35 percent. This is nearly six times the effects on the lowest income quintile of universal pre-K education (row 4 versus row 6).

Why are effects on the lowest-income quintile so high for the Abecedarian program compared to pre-K education? The greater effects for Abecedarian compared to pre-K probably occur because of the more intense services provided by the program to both children and their parents. Five years of full-time, high-quality child care and pre-K education is a far more extensive intervention in the lives of children than one year of part-time, school-year pre-K education. Five years of full-time, full-year free child care changes the working opportunities for parents far more than one year of part-time, school-year, free child care.

However, the Abecedarian program is so large and so redistributive that it imposes large net costs on the upper 80 percent of the income distribution. The upper 80 percent of the population gets very little direct economic development benefit from the Abecedarian program. (There are some economic development benefits for these upper income groups from the increased spending, but these benefits are small.) The upper 80 percent of the household income distribution suffers average net losses

Table 8.7 Distributional Effects of the Abecedarian Program

Row		Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1	Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100
Abecedarian program's effects on:							
2	Earnings as % of income	35.814	0.033	0.031	0.032	0.013	1.240
3	Tax costs as % of income	0.696	0.635	0.604	0.574	0.500	0.551
4	Net benefits as % of income	35.118	−0.602	−0.574	−0.542	−0.487	0.689
5	Ratio of earnings benefits to tax costs	51.45	0.05	0.05	0.06	0.03	2.25
Comparison to universal pre-K's effects on:							
6	Net benefits as % of income	6.003	1.906	0.414	−0.083	−0.122	0.351
7	Ratio of earnings benefits to tax costs	25.08	9.38	2.91	0.59	0.32	2.78

NOTE: Rows 2 through 5 show distributional effects for a full-scale Abecedarian program. Rows 6 and 7 show distributional effects for a universal pre-K program. These bottom rows are taken from Table 8.2. The overall size, effects, and costs of an Abecedarian program are derived in Chapter 4. The earnings effects due to effects on former child participants and their parents are derived by assuming all of these effects are allocated to the lowest income quintile; see text for the rationale for this assumption. Balanced-budget multiplier effects of spending are allocated across quintiles based on results in Bartik (1994b) for distributional effects of labor demand. Tax costs are allocated across quintiles based on results in McIntyre et al. (2003). These procedures are similar to what was done for universal pre-K in Table 8.2. All effects as a percentage of income are effects on the present value of the relevant variable as a percentage of the present value of income. Ratios are the present value of benefits divided by costs. Present value calculations use a 3 percent discount rate.

in income from a full-scale Abecedarian program of about 0.5 percent of income (row 4). This far exceeds the net losses for any income quintile from universal pre-K. And of course universal pre-K results in net gains for the middle income quintile and below.

The Abecedarian program is so expensive per participant that its tax burden for the population is almost three times as great as universal pre-K, even though universal pre-K is projected to have more than four times as many participants. (See Table 4.2, and compare the overall tax cost in Tables 8.2 and 8.7.) Because of its more limited number of participants, the Abecedarian program has many fewer direct beneficiaries, and these beneficiaries are concentrated in the lowest income quintile.

This analysis, as is true of all the analysis in this book, only looks at economic development benefits. Studies have not found evidence that the Abecedarian program reduces crime, so anticrime benefits for the overall population cannot be counted on. There may be some benefits for other income quintiles in reduced social service costs.

However, overall, a full-scale Abecedarian program appears to be economically promising but politically troubled. The program could deliver large antipoverty benefits. However, achieving such benefits puts great demands on the altruism of the majority of the population, which is ineligible for the program.

THE NURSE-FAMILY PARTNERSHIP: DISTRIBUTIONAL EFFECTS OF A SMALLER-SCALE ANTIPOVERTY PROGRAM

As detailed in Chapter 4, the Nurse-Family Partnership (NFP) provides disadvantaged first-time mothers with nurse home visits from the prenatal period to age two. These visits focus on delivering a curriculum that includes healthier prenatal care, more sensitive child care, and a better maternal life course. Direct hours of interaction during the visits with each mother total perhaps 45 hours over this two-and-a-half-year period. Estimates suggest that a full-scale NFP would perhaps include about 9 percent of all children.

The NFP is much less intense and costly in services per child than the Abecedarian program. The NFP has a present value of $10,000 per child. This compares to almost $80,000 for the Abecedarian program.

The NFP is also highly targeted on the disadvantaged population compared to universal pre-K: the NFP serves less than 10 percent of all children, whereas universal pre-K is estimated to serve about 70 percent of all children. As shown in Chapter 4, the NFP has an economic development benefits-to-cost ratio that exceeds 1, at 1.85. But the highly targeted nature of the NFP, and its relatively modest costs per child, shape the magnitude and distribution of its economic development benefits.

I simulated the distributional impact of a full-scale version of the NFP (Table 8.8). The methodology was identical to that used for universal pre-K and the Abecedarian program, to allow comparisons.

This full-scale NFP program is assumed to deliver all of its benefits to children and mothers in the lowest income quintile. This is because the full-scale program that is modeled is a targeted program. There is no research basis to project what impact the NFP would have if delivered universally. The NFP was designed to address the needs of disadvantaged families. Early experiments with the NFP suggested that its benefits were greater for more-disadvantaged women (Karoly et al. 1998; Olds et al. 1997).

As expected based on Chapter 4, the NFP has net benefits overall. And given how the NFP is targeted, these benefits are delivered in a highly progressive way (row 4).

However, the lesser intensity of the NFP has two consequences. First, the NFP only has moderate percentage effects on the income of the lowest income quintile, even though this quintile receives most of the NFP's benefits. The NFP increases the income of the lowest income quintile by 2.7 percent (row 4). This is less than one-half of the effects on the lowest income quintile of universal pre-K (row 6 versus row 4). These lesser effects occur even though the NFP is a far more targeted program than universal pre-K. But the hours of services per participant are far less for NFP than for universal pre-K. It is therefore not surprising that its benefits are smaller for lower income groups.

Second, the cost of the NFP for the remaining upper 80 percent of the income distribution is quite modest. The NFP costs about one-twentieth of 1 percent of income for these upper income groups (row 4). In contrast, the costs of the Abecedarian program for upper income quintiles are more than 10 times as great (row 8). Compared to the Abecedarian program, the NFP is quite cheap because of the lesser

Table 8.8 Distributional Effects for the Nurse-Family Partnership (NFP)

Row		Income quintile: Lowest 1	2	Middle 3	4	Highest 5	Overall
1	Quintile % share of total household income	3.4	8.7	14.8	23.4	49.7	100
NFP's effects on:							
2	Earnings as % of income	2.770	0.003	0.003	0.003	0.001	0.096
3	Tax costs as % of income	0.066	0.060	0.057	0.054	0.047	0.052
4	Net benefits as % of income	2.704	−0.057	−0.054	−0.051	−0.046	0.044
5	Ratio of earnings effects to tax costs	42.14	0.05	0.05	0.05	0.03	1.85
Comparison: Universal pre-K's effects on:							
6	Net benefits as % of income	6.003	1.906	0.414	−0.083	−0.122	0.351
7	Ratio of earnings effects to tax costs	25.08	9.38	2.91	0.59	0.32	2.78
Comparison: Abecedarian effects on:							
8	Net benefits as % of income	35.118	−0.602	−0.574	−0.542	−0.487	0.689
9	Ratio of earnings effects to tax costs	51.45	0.05	0.05	0.06	0.03	2.25

NOTE: Rows 2 through 5 show effects for full-scale implementation of the Nurse-Family Partnership (NFP). The next set of rows, 6 and 7, shows effects for universal pre-K. The final set of rows, 8 and 9, shows effects from the Abecedarian program. The universal pre-K effects and Abecedarian effects come from Table 8.2 and Table 8.7, respectively. The NFP effects on overall earnings and taxes are derived from the simulation models outlined in Chapter 4. These effects are expressed as percentages of income by using data from Gordon (2009) on the labor share. NFP effects on former child participants and parents are allocated across quintiles under the assumption that all such effects occur in the lowest income quintile. Balanced-budget multiplier effects of NFP are allocated across quintiles based on estimates in Bartik (1994b) for how labor demand affects the income of different quintiles. Tax costs are allocated across quintiles based on estimates by McIntyre et al. (2003). All effects for percentage of income are the present value of the relevant variable as a percentage of the present value of income. All ratios of earnings to tax costs are the present value of earnings effects to the present value of tax costs. All present value calculations use a 3 percent social discount rate.

costs per participant. Compared to universal pre-K, the NFP is cheap because it is far more targeted.

These findings suggest that politically, a full-scale NFP program may be an easier sell than a full-scale Abecedarian program. The net sacrifice required does not put as much strain on voters' altruism. On the other hand, the antipoverty effects of the NFP are more modest.

CONCLUSION

Previous chapters show that high-quality business incentives and early childhood programs can deliver economic development benefits that exceed costs for state residents overall. This chapter shows that all of these programs increase the progressivity of the income distribution and help the poor.

All of the early childhood programs are far more progressive than business incentives in their effects on the income distribution. This is partly because some of these early childhood programs are designed to target assistance to disadvantaged families. But it also reflects the idea that programs to develop human capital may by their very nature deliver more progressive benefits than programs that boost labor demand. The progressivity of boosts to labor demand is more limited by the current capacities of disadvantaged groups. Early childhood programs are not so limited. As a result, business incentives are unlikely to deliver large boosts to the economic well-being of state residents who are poor.

How politically feasible is it for early childhood programs to be targeted to the poor? For smaller-scale programs, such as the NFP, the program cost is low enough that such targeted efforts are probably politically feasible. However, the trade-off is that the antipoverty benefits are modest. Smaller-scale targeted programs such as the NFP have the potential to play an important role in addressing the problems of lower income groups. However, they clearly do not have sufficiently large effects to be the "solution" to poverty. This should not be interpreted as a criticism of these programs. I doubt whether advocates of the NFP think that this program can "solve" poverty on its own.

For large-scale early childhood programs, such as the Abecedarian program and universal pre-K education, their political feasibility may

be improved if the program can be plausibly designed to deliver broad benefits across many income groups. These larger-scale programs have a greater potential to deliver large benefits to lower income groups. Whether this potential is politically enacted and sustained depends on whether some combination of the general population's altruism and self-interest can be mobilized to support these efforts. Universal accessibility, if not necessarily universal free access, may be helpful in making credible the notion of broad benefits, including improvements in property values. But if political perceptions change so that broad benefits are not plausible, either because of changing research findings or changing perceptions of these findings, then a more targeted program may be the only politically sustainable fall-back position. However, targeted programs may be more limited than universal programs in terms of the costs that a majority of the public is willing to pay. This more limited willingness to pay may limit the quality and hence effectiveness of a targeted program. It may also limit how many disadvantaged children are able to access a targeted program. Universal early childhood programs may be more politically effective than targeted programs in delivering assistance to the poor.

Notes

1. For a useful and insightful recent discussion of the consequences of income inequality, and recent trends in income inequality in the United States and other industrial democracies, see Kenworthy (2008).
2. The estimated annual cost of universal pre-K if implemented nationwide is $14.3 billion. As stated in Chapter 2, annual costs of state and local business incentives are probably $20–$30 billion. Most of these business incentive dollars come in the form of tax incentives. Based on Michigan's figures, about two-thirds (more precisely, 68.2 percent, or $678 million in Michigan tax incentives out of $994 million total Michigan resources for business incentives) of annual state and local business incentives are tax incentives. Out of a $20–$30 billion total in state and local business incentives, this would imply $13.6–$20.5 billion in annual state and local business tax incentives. So, $14.3 billion is probably a conservative estimate of the magnitude of business tax incentives.
3. Figures on what percentage of each household is in each quintile are reported on-line by the U.S. Census Bureau from the 2008 Annual Social and Economic Supplement to the CPS. This reports data for calendar year 2007. The relevant figures are in Table 2 and Table A-3 of DeNava-Walt, Proctor, and Smith (2008). The cutoffs for each income quintile are as follows: quintile 1 (lowest income),

less than $20,300; quintile 2, from $20,300 to less than $39,100; quintile 3 (middle income), from $39,100 to less than $62,000; quintile 4, from $62,000 to less than $100,000; quintile 5 (highest income), $100,000 or more. These income cutoffs are provided on-line in Table HINC-05, available at the Census Bureau's Web site at http://www.census.gov/hhes/www/macro/032008/hhinc/new05_000.htm (accessed June 22, 2010). Mean income of each quintile, available in Table A-3 of Denava-Walt et al. (2008), is as follows: quintile 1, $11,551; quintile 2, $29,442; quintile 3, $49,968; quintile 4, $79,111; quintile 5, $167,971. The implied mean income of all households is $67,609, which is increased relative to the middle income quintile mean by the high incomes of the top quintiles.

4. All these calculations use figures for current income, and the present value of such, for the relevant group. I used current income rather than permanent income because it is more straightforward to measure, and because there are better data on the effects of policies and programs relative to current income. Permanent income is a concept that is never directly measured but only inferred. Trying to measure distributional effects relative to permanent income adds complications about how to measure permanent income. Is consumption a valid measure of permanent income? How can we incorporate borrowing constraints into a model of effective permanent income? The distributional calculations relative to current income probably exaggerate the progressivity of all programs relative to the permanent income distribution. However, the relative progressivity of the different programs would probably hold even if measured against permanent income.
5. Specifically, I first used this book's model to calculate the present value of earnings increases due to business incentives, as a percentage of the present value of earnings. This was then multiplied by 0.735. This factor of 0.735 reflects the estimated labor share of income (Gordon 2009). I use Gordon's figures for the average labor share from 1998 to 2008. Looking at Commerce Department figures on personal income and compensation, and allowing for proprietors' income to have a two-thirds labor share, yielded similar labor share figures. The overall percentage effect on income for all households was then allocated across income quintiles based on the results in Bartik (1994b). I used my estimates from this paper of how income percentages varied by quintile to calculate percentage effects in each income quintile. These percentage figures were then translated into dollar impact figures using each quintile's estimated share of total income.
6. These estimates use fairly standard incidence assumptions. However, as noted by Reschovsky (1998), they may yield more regressive impacts of state and local taxes than is consistent with many economists' views of tax incidence. Therefore, these estimates are somewhat tilted toward not finding progressive effects of these various economic development programs. As a result, the finding in this chapter of progressive impacts of all these programs is strengthened. I also considered incidence using Pechman's estimates (Pechman 1985, variant 3b, p. 61). I had used Pechman's estimates in Bartik (1994b). Pechman's estimates are somewhat more regressive at the lower end, and more progressive between the middle and high end. The Institute on Taxation and Economic Policy (ITEP) numbers imply the following relative tax rates by quintile, where the overall tax rate average is

indexed as 1.00: quintile 1 (lowest), 1.26; quintile 2, 1.15; quintile 3, 1.10; quintile 4, 1.04; quintile 5 (highest), 0.91. Pechman's numbers imply the following relative tax rates by quintile: quintile 1, 1.48; quintile 2, 1.11; quintile 3, 0.97; quintile 4, 0.91; quintile 5, 1.00. None of the qualitative and quantitative findings of this chapter are altered significantly by using the Pechman incidence assumptions rather than the ITEP incidence assumptions. The interested reader can use the numbers in this endnote to recalculate the numbers.

The allocation first calculates the present value of taxes paid overall for business incentives, divided by the present value of future earnings. This percentage is then multiplied by 0.735 to reflect the share of labor compensation in total income. The overall percentage share of taxes in income is then used to calculate the percentage share of taxes in income of each quintile using the relative percentage tax rates in McIntyre et al. (2003). The specific ITEP numbers I used were state and local taxes before considering the potential federal income tax offset. This is the row labeled "Total taxes" in the table for "Averages for All States." Therefore, there may be some additional net benefits from all these programs, both business incentives and early childhood programs, from federal tax deductibility, particularly for higher income quintiles.

The ITEP figures for tax burden by income quintile are for nonelderly couples and individuals. Therefore, the procedure I use implicitly assumes that tax burdens by household income quintile follow the pattern for tax burdens by income quintile for nonelderly couples and individuals.

7. These calculations focus on the economic development benefits. They do not include the effects on capital gains that were included in my 1994 paper. But including capital gains would not make much difference. The real earnings effects calculated here already adjust for changes in local prices, including changes in local housing prices. Therefore, capital gains due to increases in property values are a net addition to benefits, above and beyond what has been counted so far. These capital gains have an estimated present value of only about 0.05 percent of the present value of income. The ratios of gross earnings benefits plus capital gains to tax costs, by income quintile, are as follows: quintile 1 (lowest), 6.30; quintile 2, 3.83; quintile 3, 3.83; quintile 4, 4.13; quintile 5, 2.08; overall, 3.35. (The identical numbers for this ratio for quintiles 2 and 3 is not a typo; it is merely an odd coincidence.) These ratios are not much of an increase from what is reported in Table 8.1.
8. Although there are other studies of how pre-K effects differ with economic status, all these other studies are potentially subject to much more serious selection effects. Parents choose to send their children to pre-K. As a result of this choice, pre-K attendees differ from nonattendees in many ways, both observed and (most critically) unobserved. This selection will bias estimates of pre-K effects. There is no reason to think that this selection bias will be of similar magnitude or even sign across different income groups. Gormley et al. (2005) use a regression discontinuity approach, which, as outlined in the text and in Lee and Lemieux (2009), is potentially much less biased by selection effects.
9. The merits and issues with regression discontinuity studies are discussed in Lee and Lemieux (2009). Gormley et al.'s (2005) regression discontinuity analysis

exploits the fact that Oklahoma's pre-K program has an age cutoff. The same tests were administered at both the beginning of Oklahoma's pre-K program and the beginning of kindergarten for students who had participated in the pre-K program the previous year. These two groups, one of beginning kindergartners, the other of beginning pre-K students, will tend to be similar on most observed and unobserved characteristics, because both groups of families chose to participate in the state pre-K program. We can also add statistical controls for any observed differences across these two groups that happen to occur. The one observed characteristic that will significantly differ across the two groups is age, as the beginning kindergartners will be older than the beginning pre-K students. However, the sample of beginning kindergartners includes students who in the previous year barely made the pre-K program's age cutoff. Furthermore, the sample of beginning pre-K students includes students who in the previous year barely missed the pre-K program's age cutoff. We can estimate how test scores vary with age, controlling for other student characteristics. We would expect test scores to smoothly vary with age, except that there may be a sharp jump at the age cutoff. Those students above the age cutoff were able to participate in state-funded pre-K for one year. Those students below the age cutoff instead participated in other activities, including private pre-K programs. Gormley et al. find that although test score results improve with age, there is an abrupt jump in test score results at the age cutoff. This abrupt jump is most likely associated with having attended the state's pre-K program. The jump is inferred as being the effects of participating in the state's pre-K program, compared to alternative activities.

10. Gormley and his colleagues do not report the statistical significance of these differentials across different income groups. My own calculations suggest that in comparisons across any two groups for any of the tests, the results are not statistically significantly different across income groups. This can be computed by calculating the difference of estimates, then calculating the variance assuming the coefficient estimates are uncorrelated. They would appear to be uncorrelated in that each estimate comes from separate regression estimates using a different sample. With the three tests involved and three groups, there are nine possible comparisons of two groups for a given test. Six of these nine comparisons have *t*-statistics on the differences of less than 1 in absolute value. The largest in absolute value *t*-statistic is 1.47, which is statistically significant only at the 14 percent level.

    In some discussions of these results, Gormley's presentation may lead some readers to infer that pre-K's effects are larger for lower income groups. For example, the presentation of results in Gormley et al. (2004) or Gormley (2007b) show larger percentage effects on the test scores of lower income children. Percentage effects are larger for lower income groups because average test scores of lower income groups are lower. Absolute effects on test scores are similar across income groups. The implication of these greater percentage effects for later-life effects is unclear. Will the same absolute increase in test scores have greater effects on later-life success starting from a small base test score compared to starting from a large base test score? I know of no evidence that addresses this question.

11. One could argue that a given absolute increase in test scores will have greater effects on lower income groups. This could occur because of the lower test score base of lower income groups (see endnote 10). Or, it could occur because lower income groups are at greater risk of dropping out of high school, or of becoming involved in criminal activities or other negative activities that may reduce employment and earnings. On the other hand, as noted in the text, middle and upper income groups may be easier to induce to have large absolute earnings increases. These groups have higher employment rates and wage rates, so any given absolute increase in employment rates or wage rates will cause larger dollar effects on earnings. In addition, middle and upper income groups may be closer to the margin of being induced to attain a college degree, which affects annual earnings much more than high school graduation.
12. Appendix 8A summarizes their distributional assumptions and explains how I use them to generate some distributional results by quintile. Appendix 8A, like all of this book's appendices, is available from the Upjohn Institute.
13. Earnings effects per quintile do not fall off quite so fast per household in each quintile. The Karoly and Bigelow enrollment assumptions imply that although a higher percentage of four-year-olds who are low-income enroll in universal pre-K, this enrollment is a lower percentage of households in the lowest income quintile. This probably reflects that the lowest income quintile includes a considerable number of single-person households. The pattern of dollar benefits per household, relative to the lowest income quintile, is as follows: quintile 1, 1.00; quintile 2, 0.87; quintile 3, 0.43; quintile 4, 0.12; quintile 5, 0.12. See Appendix 8A for more details.
14. Because of the way in which these distributional effects are calculated, the model implicitly assumes that such phenomena as peer effects and displacement effects occur within each quintile. If peer effects or displacement effects occur across quintiles, this will broaden the benefits of pre-K somewhat. However, there is no way to reliably estimate the extent of such broadening. It seems unlikely that such broadening would significantly reduce the highly progressive nature of benefits for pre-K and other early childhood programs.
15. This 6 percent figure does not measure the annual percentage effect of pre-K on participants. The 6 percent is the present value of the effect on state residents as a percentage of the present value of the income of that quintile. This will be below the long-run annual effects on former child participants for several reasons. First, some former child participants move out of state. Second, the model allows for displacement effects. Third, because the effect on former child participants is long-delayed, this reduces the present value percentage effect relative to the long-run annual percentage effect. Calculations of annual percentage effects on participants suggest that they average 17.3 percent from ages 16 to 79. This is an unweighted average. The percentage effects do not vary greatly across years. Percentage effects on earnings for each year range from 13.6 to 23.5 percent.
16. Estimated effects for the lowest income quintile are somewhat reduced relative to CPC because the CPC estimates are only assumed to fully apply to lower income children who otherwise would have attended no pre-K program. Some members

of the lowest income quintile would otherwise have attended some other pre-K program. The estimated benefits for these children are assumed to be lower than the CPC program's estimated effects. Overall, the average benefits per participant for the lowest income quintile are about 61 percent of the estimated benefits per participant of the CPC program.

17. Pre-K's benefits lead to a 0.549 percent boost to the present value of overall earnings, as a percentage of the present value of income (Table 8.3, row 2). The property value increase is equivalent to 0.234 percent of the present value of income (row 3). Therefore, capitalization into higher property values captures about 42 percent of the earnings effects of pre-K (42% = 0.234 ÷ 0.549). Overall property value increases do not capture all of the overall earnings effects of pre-K because we assume different discount rates. From a social perspective, we use 3 percent to discount future earnings, but we assume that property buyers and sellers use a higher discount rate in determining property bids. Individuals may be more myopic in their market behavior than is socially optimal.
18. It is apparent from these calculations that even complete capitalization would not eliminate the overall progressivity of universal pre-K education. Even if the overall benefits of pre-K are fully capitalized into higher property values, this does not mean that these benefits are completely capitalized for each income group. We can think of blowing up capitalization benefits so that they are the same as the overall earnings benefits. Under this assumption, the lowest income quintile still gains so much from the higher earnings benefits that the capitalization effects cannot completely offset these effects. Because all income groups participate in the same housing market, capitalization effects cannot perfectly offset earnings benefits for each income group, even if they do so overall.

    Why doesn't capitalization differentiate by income groups to capture differential benefits? Differential capitalization is implausible given that land can be reallocated from one housing type to another. In terms of Table 8.3, if capitalization differentiates by income group, then capitalization implies that housing prices of the lowest income quintile would have to go up by much more in percentage terms than those of the average household, while housing prices of the highest income quintile would go up by much less in percentage terms than for the average household. Presumably these housing price changes are due to differential land price changes, as in the long run the price of structural capital should be related to replacement costs. In any event, it would be very difficult to sustain the large differences in land prices between income groups implied by non-uniform capitalization. Perhaps in theory some perfectly enforced zoning and new housing regulations could do so. In practice, the required land price differentials seem likely to overwhelm any such regulatory barriers.
19. This largely occurs because the lower income household groups seem to have fewer four-year-olds. This probably occurs because lower income households have a greater percentage of single individual households.
20. This fee is based on the pre-K program being three hours a day, 175 days a year, and having net costs in 2007 dollars of $4,933. This cost is what was assumed in my original report in 2006. These cost estimates were derived by Karoly and

Bigelow (2005). These are net cost figures that net out cost savings on existing pre-K programs. Therefore, the fee as a percentage of gross pre-K costs would be higher. However, the net cost figures assumed by Karoly and Bigelow end up being similar to some estimates of the gross costs of high-quality pre-K programs. Consider the estimates of the cost of high-quality pre-K education in Gault et al. (2008). There, a similar three-hour-a-day school-year program and a lead teacher paid public-school wages cost $4,071 per year per child at a class size of 20 to 2, $4,506 per year per child at a class size of 17 to 2, and $4,893 per year per child at a class size of 15 to 2. The calculation of pre-K costs also adds in extra administrative costs of 5 percent above this $4,933 per child to monitor family income and regularly collect the fees. (However, fees are set at half of the net costs before these extra administrative costs.)

21. This figure is taken from PPL Table 6B from the on-line version of Smith (2002). It can be found at http://www.census.gov/population/socdemo/child/ppl-964/tab06.pdf (accessed June 28, 2010).

    Specifically, I looked at the weekly child care expenditures divided by weekly child care hours for children less than five, and for families with annual incomes greater than $69,763 per year in 2007 dollars. (In the table, these are families with an average monthly income of greater than $4,500 in 1997 dollars.) I then updated this hourly figure to 2007 dollars using the CPI.

22. Karoly and Bigelow (2005) assume that charging fees will increase administrative costs by 10 percent. However, this appears to be based on a statement by Barnett (1993) that refers to the overall administrative costs of welfare programs, not the extra administrative costs that result simply from charging fees. Studies of administrative costs as a percentage of benefits in the United States suggest that non-means-tested programs such as Social Security have administrative costs of 2.5 percent of benefits, while welfare and unemployment insurance programs have administrative costs of 12.1 percent and 11.8 percent of benefits (Kesselman [1982], of which I was made aware by Besley and Kanbur [1990]). This might suggest that means testing adds 9–10 percent in administrative costs as a percentage of benefits. However, many of the administrative costs of welfare and unemployment insurance programs are due to complex work search rules, as well as administrative procedures that in part are meant to discourage usage. Therefore, I suspect that the extra administrative costs of charging fees to upper income families in a universal pre-K program would be considerably less than 9–10 percent. An extra 5 percent is a somewhat arbitrary but reasonable assumption.
23. A working-paper version of this chapter considers other distributional assumptions.
24. This can be derived by comparing row 2 to the fees paid, which is given by the difference between row 7 and row 3. For income quintile 4, the earnings benefits from pre-K with fees are 0.092 percent of income, whereas fees are 0.079 percent of income. For income quintile 5, the earnings benefits from pre-K are 0.042 percent of income, whereas fees are 0.037 percent of income.