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Economic Development Benefits of Preschool Expansion in Kalamazoo County

Upjohn Institute Staff Working Paper 09-147

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ABSTRACT

This paper examines the effects of preschool expansion in Kalamazoo County on the county's economic development. Effects on the county's economic development are defined as effects on the employment and earnings of county residents. The estimated effects are found to be large relative to the costs. In addition to their relevance to Kalamazoo County, these simulations illustrate how the analysis presented in two previous papers (Bartik 2006, 2008) can be done for an individual county or metropolitan area. Such simulations may be of interest to other counties or metropolitan areas that are considering expansions in early childhood programs.

This paper's purpose is to show possible effects of large-scale expansion of early childhood education programs in Kalamazoo County. The effects include benefits for the county's economic development. These benefits are compared to program operating costs.

The specific early childhood education program considered is high-quality preschool. However, similar types of benefits and costs also occur for other high-quality early childhood education programs. Similar estimates to this paper's estimates for preschool could be done for some other early childhood programs—those for which we have estimates of effects based on solid research evidence.

The paper also provides estimates for current usage in Kalamazoo County of different types of preschool by different income groups. These estimates suggest possible needs for preschool expansion.

This paper's benefit and cost calculations are based on a variety of sources of information:

- published American Community Survey estimates of the number of Kalamazoo children in different income classes, and these children's preschool enrollment;
- published data on slots in Kalamazoo County Head Start and in Kalamazoo County locations of the Michigan School Readiness Program;
- published estimates on national and state percentages of preschool enrollment in different income groups, and on enrollment patterns by income in the Head Start and Michigan School Readiness programs;
- published estimates of the effects of high-quality preschool programs, such as the Perry Preschool program and the Chicago Child-Parent Center program, on the educational attainment, employment and wages of former child participants in these programs;
- assumptions about what percentages of former child participants in Kalamazoo County preschool programs will remain in Kalamazoo County as adults;

- models of how free high-quality preschool will affect average child care prices, and how parental labor supply will respond to lower costs of child care;
- models of how local economies, such as the Kalamazoo County economy, will respond to higher spending on preschool, and to increased labor supply of former child participants in preschool and their parents.

Some of these estimates could be refined. Such refinement would require some time and money costs to work with a variety of micro data sets to get more precise estimates of some of the aforementioned numbers. However, I do not think that these refined estimates would significantly change the overall conclusions of this paper about patterns of preschool enrollment or the effects of expanding preschool enrollment.

The paper's main conclusion is that a wide variety of possible large-scale expansions of high-quality preschool programs in Kalamazoo County would have economic development benefits for the county that significantly exceed the increased costs due to these program expansions. These program expansions would increase jobs in Kalamazoo County by between 300 and 1,100 jobs, and annual earnings by between \$30 million and over \$110 million. Preschool expansions that are more narrowly targeted at lower-income four-year-olds, but are still large-scale expansions, would have the highest ratio of economic development benefits to costs. In one simulation, a program targeted at lower-income four-year-olds would increase the present value of earnings in Kalamazoo County by about three times the program costs. However, there still would be net benefits of going beyond such targeted expansions to offering more universal preschool to all four-year-olds, including four-year-olds from middle- and upper-income families. There also would be net benefits from going beyond four-year-olds to offering high-quality preschool slots for additional three-year-olds. Finally, although the economic development benefits for Kalamazoo County exceed the costs, the costs of these possible

program expansions are considerable, ranging from \$3 million to \$10 million annually. The cheaper program expansions are more targeted at lower-income four-year-olds.

THREE- AND FOUR-YEAR-OLDS IN KALAMAZOO COUNTY: NUMBERS, INCOME DISTRIBUTION, AND PRESCHOOL ENROLLMENT

Table 1 presents some data on three- and four-year-olds in Kalamazoo County. The County has about 3,000 children at each of these ages. About one-quarter are in families below the poverty line. Another one-quarter of these children are in families whose incomes are between 100 and 200 percent of the poverty line. The remaining one-half are in families whose incomes are above 200 percent of the poverty line.

As of 2008, the poverty line for a family of three is \$17,600 per year. The poverty line is adjusted across families based on family size, and over time based on inflation. The poverty line does not define for all purposes who needs assistance or who does not. For many purposes, government programs provide aid to persons whose incomes are above the poverty line. For example, the cutoff for receiving a free school lunch is set at 130 percent of the poverty line, and the cutoff for receiving a reduced-price lunch is set at 185 percent of the poverty line. Twice the poverty line for a family of three would be \$35,200 in annual income. Many Kalamazoo residents would no doubt agree that a family of three with less than \$35,200 in annual income will find resources to be very tight. Such a family might find it difficult to provide their children with all the resources that are needed for optimal child development.

I refer to families below the poverty line as being poor or having a poverty income. I refer to families between 100 percent and 200 percent of the poverty line as low income but not poor. I refer to families above 200 percent of the poverty line as being middle income and above.

Preschool programs generally focus on ages three and four, but particularly on age four. Preschool programs available in Kalamazoo County can be classified into three types: 1) Head Start, 2) the Michigan School Readiness Program (MSRP), and 3) private preschool programs. Head Start is funded by the federal government. In Kalamazoo County, Head Start is administered by the county government. Head Start is mostly restricted to children from poor families. Both three- and four-year-olds can enroll in Head Start. The Michigan School Readiness Program is largely funded by the state, although some support also comes from local school districts. In Kalamazoo County, this program is delivered through local school districts. Program eligibility is limited to four-year-olds. Ninety percent of the enrolled children must have at least 2 of 24 risk factors. At least 50 percent of enrolled children must have the risk factor of a family income of less than 250 percent of the poverty line. Families that apply to MSRP but whose children are eligible for Head Start based on income—that is, children who are from families below 100 percent of the poverty line—are supposed to be referred to Head Start. If a slot is not available there, their children can then be admitted into MSRP programs. Therefore, the MSRP program is to some extent targeted at children from families between 100 percent and 250 percent of the poverty line. Finally, private preschool programs obviously come in a wide range of designs. Because of fees, private preschool programs will tend to enroll children from middle-income and above families.

Table 2 presents information on enrollment in different preschool programs at ages three and four for different income groups in Kalamazoo County. These estimates are based on estimates for Kalamazoo County from the American Community Survey, administrative data from Kalamazoo County, and some national data.

As one would expect, Table 2 shows a much higher percentage of Kalamazoo County four-year-olds enrolled in preschool compared to three-year-olds. By income level, the pattern of enrollment is “U-shaped”: the percentage enrolled in preschool is higher for children from poor families and middle-income and above families than it is for children from low-income (but not poor) families. This pattern probably occurs because poor families are more able to enroll in Head Start, whereas middle-income and above families can pay fees for private preschool. Low-income but not poor families are left in the middle, which the MSRP program attempts to offset, but not completely successfully.

For four-year-olds from poor or low-income families, and for three-year-olds from poor families, Head Start and MSRP overwhelmingly dominate the preschool market. For middle-income and above families, and for three-year-olds of low-income families, private preschool dominates the market.

Table 3 compares data for preschool enrollment by income for Kalamazoo County to similar data for the United States. Kalamazoo has higher preschool enrollment among those below poverty income, and somewhat lower preschool enrollment among those above the poverty line.

Kalamazoo’s state preschool enrollment is far below the percentages achieved by leading states. Oklahoma is the state that has most fully implemented “universal” preschool for four-year-olds. In Oklahoma, 68 percent of all four-year-olds are in state-run preschools, compared to 22 percent in Kalamazoo (National Institute for Early Education Research [NIEER] 2007). In Oklahoma, overall enrollment of four-year-olds in preschool, including Head Start and private preschool, is estimated to be over 90 percent, compared to 57 percent in Kalamazoo.

For three-year-olds, the leading state for state-sponsored preschool is Illinois, which has 19 percent of its three-year-olds enrolled in such programs (NIEER 2007). No three-year-olds are enrolled in state-funded preschools in Kalamazoo, given the regulations for the MSRP program.

Kalamazoo preschool enrollment is also low compared to preschool enrollment in the United States for the highest education groups and the most upper-income families. Among college-educated mothers in the United States, 87 percent of their four-year-olds and 58 percent of their three-year-olds are enrolled in preschool. Among families in the United States with more than \$100,000 in annual income, four-year-old preschool enrollment is 89 percent, and three-year-old preschool enrollment is 71 percent (Barnett and Yarosz [2007]); these figures from the National Household Education Survey tend to report higher preschool enrollment numbers than similar figures from the American Community Survey, but it still seems likely that U.S. preschool enrollment of highly educated or higher-income families is a much larger percentage than overall preschool enrollment in Kalamazoo).

ANALYSIS OF ECONOMIC DEVELOPMENT EFFECTS OF PRESCHOOL PROGRAMS

In this section, I describe the assumptions behind this paper's estimates of the effects on the economic development of Kalamazoo County of various large-scale expansions of high-quality preschool in the county. These estimates require assumptions about

- program design and costs;
- types of possible economic development effects to be estimated;
- characteristics of the various preschool expansions in terms of number of children, and their ages and family income;

- how preschool effects on former participants vary with family income, and with the number of years of participation; and
- how many former preschool participants will move out of Kalamazoo.

Program Design

The preschool program modeled is similar to a number of high-quality preschool programs that have been studied. The specific design and costs are based on a high-quality preschool program that has been costed out by the Institute for Women's Policy Research (IWPR). This program operates for three hours per day during the school year. The class size to teacher ratio is 15 to 2. The lead teacher has a bachelor's degree and is assumed to be paid at typical wages for a kindergarten teacher. The assistant teacher has a Child Development Associate credential and is assumed to be paid the average wages for pre-K teachers with a high school diploma. Such a program is estimated to cost \$4,785 annually per student.

This program is assumed to have similar effects on child participants to those achieved by the Chicago Child Parent Center (CPC) program. The CPC program's effects have been examined exhaustively in many publications by Arthur Reynolds and his associates (e.g., Reynolds et al. 2002). Based on this research, the long-term effects of CPC-quality preschool programs have been modeled in detail by Bartik (2006). It is reasonable to assume similar effects to the CPC program as the programs have similar designs. The CPC program has class size to teacher ratios of 17 to 2. The CPC lead teacher has a bachelor's degree and is employed at Chicago Public Schools teacher wages. In addition, Kalamazoo County public schools have experience running the MSRP, which typically is designed similarly to the CPC program or the IWPR program. Michigan School Readiness Programs must have student to teacher ratios of no more than 8 to 1, and class sizes of no more than 18. Two-thirds of MSRP-funded preschools

operate half time during the school year. Several research studies indicate that MSRP has positive short-term and long-term effects on former child participants (Daniel-Echols and Schweinhart 2007; Lamy, Barnett, and Jung 2005).

Types of Economic Development Effects

In this paper, I model similar economic development effects to those considered in my two previous papers on state universal preschool programs and other state early childhood programs (Bartik 2006, 2008). The principal economic development effects of these programs occur through three avenues:

- 1) local spending,
- 2) free child care, and
- 3) effects on educational attainment, employability, and productivity of former child participants.

(A fourth avenue considered in the two previous papers, social spillover effects of more college graduates in the local population, is quantitatively of minor importance, is quite difficult to estimate accurately, and is not an agreed upon effect of college education by all researchers. See Bartik [2006] for more discussion.)

An expanded preschool program will stimulate the local economy due to the hiring of teachers and other preschool employees, and the purchase of local supplies for the preschool program. These preschool employees and the employees of local suppliers will further stimulate the local economy as they spend their earnings at local retailers.

This *increased local spending* will stimulate the local economy even if the increased local spending is entirely financed by local taxes or other local sources of revenue. Of course,

increased local taxes will reduce local household and business spending on local goods. However, the increased local spending has both an immediate direct effect in hiring local employees, as well as an indirect effect due to effects of the increased income on respending. Increased local taxes have only indirect effects on respending through reducing local after-tax incomes. Another way to put it is that local spending is in the first instance 100 percent spent on hiring local employees, whereas a portion of the increased taxes will reduce spending that would have gone to nonlocal goods.

For the expanded preschool program considered in this paper, I assume that the program is financed through donations. The issue is, would these donations have otherwise been spent locally? I assume that only half of the donations would have otherwise been spent locally. The other half would either not have been spent in Kalamazoo, or would have been saved. Compared to local tax financing, these assumptions expand somewhat the net stimulative effects per dollar from spending more money on preschool.

I use the estimates of Bartik and Erickcek (2003) of the stimulative effects of Michigan spending and tax increases to adjust the stimulative effects of preschool spending estimated by Bartik (2006). Specifically, using the Bartik and Erickcek figures, I calculate the ratio of spending increase effects when the spending increase is half financed by taxes, to the spending increase effects when the spending increase is totally financed by taxes. This ratio is multiplied by the preschool spending effects per dollar of spending estimated by Bartik (2006), and then by the spending involved with the various preschool expansions considered here.

The *free child care* provided to parents for a half day during the school year will stimulate the economy by increasing the labor supply of parents. I use the labor supply effects per child participant estimated in Bartik (2006) to estimate the effects of the expanded preschool

program. These parental labor supply effects end up being relatively small, because a half-day preschool program during the school year for only a child aged three or four does not lower the overall annual cost of child care that much for the typical parent.

The *greater employability and productivity* of former child participants in these programs will stimulate the economy by expanding the local quantity and quality of labor supply. From rigorous studies of high-quality preschool, most notably the studies of the CPC program and the Perry Preschool program, we know that high-quality preschool has a number of effects that enhance the labor supply of former child participants when they become adults. Their educational attainment increases, which will increase their adult labor force participation rates and wages. In addition, these studies suggest that high-quality preschool increases employment rates of former child participants for a given level of education. Increases in the quantity and quality of local labor supply have been shown to encourage the attraction and expansion of employers, which will increase local employment and wages.

I base the effects on the local economy of the expanded labor supply of former child participants on the estimates in Bartik (2006). As detailed below, there are some adjustments for various factors, most notably the greater likelihood that former child participants will move out of Kalamazoo County compared to former child participants moving out of a typical home state.

Characterizing Possible Preschool Expansions

I consider three hypothetical preschool expansions in Kalamazoo County:

- 1) “universal” preschool for four-year-olds,
- 2) a preschool expansion for four-year-olds that is more targeted at low-income families,
and
- 3) a preschool expansion for three-year-olds.

Table 4 provides a description of the total number of additional preschool slots assumed to be made available by these three hypothetical programs. Table 4 also describes how these slots are assumed to be distributed across income groups.

The “universal” preschool program for four-year-olds is assumed to be of sufficient size that the number of slots funded by the expanded program and MSRP together equal the same percentage of all four-year-olds that is achieved by Oklahoma (68 percent of all four-year-olds, which would require 1,385 additional four-year-old slots in Kalamazoo County).

These additional “universal” slots are allocated across income groups in the following manner. First, it is assumed that poor families and “low-income but not poor families” (between 100 percent and 200 percent of the poverty line) receive sufficient slots that total preschool enrollment in those income groups reaches 90 percent of all four-year-olds. Second, the remaining additional slots are allocated to families above 200 percent of the poverty line.

Because many poor four-year-olds are already in preschool, this means that over half of the additional slots in this universal preschool programs go to children from families above 200 percent of the poverty line.

The more targeted preschool expansion for four-year-olds is assumed to provide sufficient slots for both poor families and low-income families to bring them to 90 percent preschool enrollment. However, it seems unreasonable to assume that in practice any preschool program will be totally focused on poor and low-income families, given that other families have problems that put their children at risk, and programs need to fill slots. Therefore, I assume that this preschool expansion will also include some families above 200 percent of the poverty line. For this expanded program, the ratio of slots for those above 200 percent of the poverty line, to

slots for those below 200 percent of the poverty line, is assumed to be the same as the ratio of slots across these two income groups for the MSRP and Head Start program together.

The expanded program for three-year-olds is assumed to be the same percentage of all three-year-olds in Kalamazoo County as the percentage served by the state-funded preschool program for three-year-olds in Illinois (19 percent of all three-year-olds, or 568 slots in Kalamazoo County). These slots are assumed to be allocated across these three income groups (poor, low-income but not poor, middle-income and above) in the same way as total slots are for the MSRP and Head Start program taken together.

How Preschool Effects Vary

Because the Chicago Child Parent Center program targeted children from poor families, I assume that these expanded preschool programs in Kalamazoo will have effects similar to the CPC program for poor families. Studies of the Oklahoma program by William Gormley and his colleagues (Gormley et al. 2004) suggest that the Oklahoma preschool program has, if anything, stronger effects on kindergarten readiness for children eligible only for reduced-price lunch (130 percent to 185 percent of the poverty line) than for children eligible for a free lunch (less than 130 percent of the poverty line). Therefore, I assume that the expanded preschool program in Kalamazoo will have the same effects per participant for children from low-income but not poor families (100 percent to 200 percent of the poverty line) than for children from poor families. Gormley's studies do suggest somewhat lower effects on higher-income families. Based on his results, and similar to what was assumed in Lynch (2007), I assume that effects per participant for children from middle income and above families are 70 percent of the effects per participant for children from poor families.

Additional preschool slots may displace some existing private preschool slots. Based on the data collected here, there appear to be relatively few private preschool slots in Kalamazoo County for low-income and poor families. Therefore, I assume no displacement of private preschool slots in these income groups. For middle-income and above families, I assume that displacement is sufficient that even with a universal program for four-year-olds, displacement of private slots is sufficient that total preschool enrollment in these groups does not exceed 90 percent. A displacement rate of 49 percent achieves this result (e.g., for each 100 additional slots created for middle-income and above families, 49 private preschool slots disappear, and the net number of total preschool slots only increases by 51.) I apply this same displacement rate of 49 percent to all preschool expansions for middle-income and above families.

The displacement of a private preschool slot by an additional publicly funded preschool slot may reduce the net benefits from the publicly funded preschool slot. If the privately funded preschool slot is identical in quality to the publicly funded preschool slot, then displacement yields no net benefits. At the other extreme, if the privately funded preschool slot has no development benefits for the child above what the child would have received at home, then displacement is irrelevant to determining the net benefits of expanding publicly funded preschool.

Lynch (2007, pp. 101–105) reviews a variety of evidence suggesting that private preschools in the United States are on average of lower quality than publicly funded preschools. (This finding *on average* of course does not mean that there are not some excellent private preschools.) Private preschools tend to have higher student to teacher ratios and lower average teacher credentials and pay. I follow Lynch in adopting the assumption that private preschool has 40 percent of the benefits of publicly funded preschool. This means that the benefits of a public

preschool slot that displaces a private preschool slot are 60 percent of what the benefits would be from a public preschool slot that adds to net preschool enrollment.

The CPC results are for a program in which 55 percent of the children participated in preschool both as three- and four-year-olds, and 45 percent of the children only participated for one year, in almost all cases just as four-year-olds (Reynolds et al. 2002). Therefore, one issue is what are the relative effects of one-year vs. two-year participation in a preschool program similar to the CPC. The CPC program did not in most cases find statistically significant differences between preschool's effects for two-year participants vs. one-year participants. However, in most cases two-year participants received greater benefits from preschool than one-year participants (Reynolds 1995). The benefits of two-year participation were, in general, less than twice as great as those from one-year participation. This suggests that there are positive returns to extending preschool from one to two years, but these returns are diminishing. Therefore, for this analysis, I assume, somewhat arbitrarily, that the returns to attending preschool at age three (as well as age four) are two-thirds of the returns to only attending preschool at age four. This also implies that the returns to attending preschool at age four are less than the returns to the CPC program, given that more than half of CPC participants attended the program for two years. Specifically, the returns to attending this expanded preschool program at age four will be 73.2 percent of the returns estimated for the CPC program ($73.2 \text{ percent} = 1 / [(1 + (2/3) * 0.55)]$). I assume in making this calculation that all those attending the expanded preschool program at age four did not attend preschool at age three. It is further assumed that all children attending any expansion of three-year-old programs would also be attending at age four. Therefore, the returns to an average participant in a three-year-old program will be two-thirds of the return to attending at

age four, or 48.8 percent of the returns per participant from the CPC program (48.8 percent = $(2/3) \times 73.2$ percent).

Will Former Preschool Participants Stay in Kalamazoo?

One issue is whether the participants in these expanded preschool programs will stay in Kalamazoo. I assume that from a Kalamazoo County perspective, we only want to count the increased employment rates and earnings of former preschool participants while they are living in Kalamazoo.

My previous studies found that a surprising number of former preschool participants end up staying in the state they attended preschool for most of their working careers (Bartik 2006). For example, on average, 72 percent of four-year-olds who go to a typical universal preschool program will be in that same state at age 40.

However, because Kalamazoo is smaller and less varied than the typical state, it seems likely that the proportion of former preschool participants staying in Kalamazoo will be smaller. How much smaller is a subject I am looking at in a separate research study.

For this current study, I assumed that 60 percent of participants in Kalamazoo preschool programs will still be in Kalamazoo at age 16, and 25 percent will still be in Kalamazoo at age 40. From age 4 to 16, I assumed that the proportion staying in Kalamazoo changed smoothly from 100 percent down to 60 percent. From age 16 to age 80, I have already estimated the proportion of former preschool participants who will be located in the same state. I calculated ratios of the Kalamazoo probabilities at age 16 and age 40 to these probabilities of staying in the same state (85 percent at age 16, and 72 percent at age 40). From ages 16 to age 40, I assumed that this ratio of the Kalamazoo-staying probability to the state-staying probability changed

smoothly. Beyond age 40, I assumed that the ratio of the Kalamazoo-staying priority to the state-staying probability was a constant.

I believe that these assumptions are very conservative about what percentage of Kalamazoo preschool participants will live in the Kalamazoo metro area as adults. College graduates in the United States are more mobile, but most U.S. residents still do not graduate from a four-year college.

RESULTS FOR ECONOMIC DEVELOPMENT EFFECTS AND COSTS OF VARIOUS EXPANSIONS TO KALAMAZOO COUNTY PRESCHOOL PROGRAMS

Figure 1 shows the results for the present value of economic development benefits of four possible expansions of Kalamazoo County preschool. These four expansions include 1) “universal” preschool for four-year-olds, 2) more targeted preschool expansion for four-year-olds, 3) preschool expansion for three-year-olds, and 4) “universal” preschool for four-year-olds plus preschool expansion for three-year-olds.

As the figure shows, all these preschool expansions generate extra earnings for Kalamazoo County residents of more than twice their costs. As one would expect, the more targeted preschool expansion has greater earnings effects per dollar of cost than is true for “universal” preschool. This occurs because the “universal” preschool spends a greater proportion of its costs on middle income and above families for whom the earnings benefits of preschool are somewhat less. (However, other calculations show that the present value of earnings effects per dollar of costs is still 1.91 even for a program that exclusively serves four-year-old children from middle-income and above families.) The program for three-year-olds has a somewhat lower ratio of earnings effects per dollar of costs, but the program still pays back over twice its costs in economic development benefits.

Most of these earnings effects are due to effects on former child participants. For each of the programs, the extra spending on these programs produces \$0.10 in increased earnings per dollar of costs, and the earnings from extra parental labor force participation produce \$0.07 in earnings per dollar of costs. The remainder, which constitutes most of the effects, are due to long-run effects of these programs on the employability and productivity of former child participants.

Figure 2 shows the job creation effects over time of these four permanent expansions in preschool in Kalamazoo County. (Appendix Table 1 gives the numbers behind this figure for each year.) As the figure shows, these programs have modest effects on job creation for the first 15 years after being started in 2009. These modest short-run effects are due to effects of these programs through spending and through expanded labor supply of parents. However, after the early 2020s, the job creation effects of these programs take off. This expanded job creation occurs as the first cohort of former preschool participants hits the labor market. Job creation continues to expand until all cohorts of workers have been affected by the greater labor quality due to expanded preschool.

The bigger programs produce considerably higher effects. Universal programs have much higher job creation effects than more targeted programs, even though the effects per dollar spent are smaller.

Figure 3 shows similar effects on earnings creation over time. (Appendix Table 2 gives the numbers behind this figure for each year.) The patterns of effects in Figure 3 are similar to those in Figure 2. Earnings grow over time with the growth of real wages in the economy.

Table 5 summarizes the long-run effects, as of the year 2100, of adoption of these permanent preschool expansions. All the programs have job creation and earnings creation

effects that are certainly significant. Effects vary from 300 jobs created to over 1,100 jobs created, and from \$30 million in annual earnings created to over \$110 million. As the table shows, the larger programs have much greater long-run job creation and earnings creation effects.

Table 5 also shows the initial annual costs and the number of participants in the program. The annual participants will not change over time; the annual costs are assumed to increase by 1.2 percent in real costs each year to allow for increased real wages of program staff. Program scale and costs vary by a factor of 3 from about 600 participants and \$3 million per year in initial costs up to almost 2,000 participants and almost \$10 million per year in initial costs.

Table 5 also shows in another way the greater benefit-cost ratio of a more targeted program. The targeted expansion of the four-year-old program has almost half the job creation and earnings creation effects of the universal plus three-year-old program, at a cost of a little more than one-third as much. However, it still is the case that the larger program has a significantly larger effect on the Kalamazoo County economy.

POSSIBLE EXTENSIONS TO OTHER BENEFITS AND OTHER PROGRAMS

These calculations of economic development benefits do not include other possible effects of expansion of high-quality preschool that might be important benefits. These other benefits include

- savings in special ed costs due to former preschool participants being less likely to be in need of special education services;
- savings due to reduced crime rates of former preschool participants, which will reduce governmental costs of controlling crime, and produce financial and nonfinancial benefits for potential crime victims; and

- fiscal benefits for local governments due to reduced special education and crime control costs, as well as due to the increased tax base associated with an expanded economy.

Reasonable estimates of these other benefits could be produced if there is a need for such numbers.

Similar calculation of economic development benefits, or benefits from reduced special education costs or reduced crime, could be produced for some, but not all, early childhood education initiatives. Other programs for which such benefits could be calculated include

- comprehensive child care and preschool programs such as the Abecedarian program, which provided high-quality, full-time, full-year preschool from birth to age five;
- the Nurse Family Partnership program, which provides home visits by nurses to low-income first-time mothers from the prenatal period until the child is age two; and
- the Parent Child-Home Program, which provides home visits to low-income families from paraprofessionals when the child is ages two and three.

Calculations can be made for all these programs because the programs have been subject to some decent long-term evaluation studies, and it is possible to describe in some detail the costs and characteristics of implementing such programs in Kalamazoo County.

There are other possible interventions in early childhood education that may be desirable, but whose benefits are harder to quantify. For example, there may well be significant benefits from efforts to increase child care quality standards or provide more training to child care providers. However, to my knowledge, there are no studies that would allow us to exactly quantify the dollar benefits of these interventions. This inability to quantify a benefit should not be interpreted as meaning that a benefit does not exist.

CONCLUSION

This paper shows that feasible expansions in preschool in Kalamazoo County would generate significant benefits for the community. A given dollar investment generates earnings whose present value is two to three times as great. Long-run job creation is from 300 jobs to over 1,100 jobs, and long-run earnings creation effects range from \$30 million per year to over \$110 million per year. These benefits can be achieved by program expansions whose initial costs start out at \$3 million to \$10 million per year, although these costs grow over time.

I regard these preschool expansions as “feasible” because their costs are on the order of magnitude of the Kalamazoo Promise investment, and of other charitable contributions that have been made to this community’s well-being. The issue is whether the community and its charitable supporters believe that this particular type of social investment makes sense at this time. This report provides some evidence that such investments would have significant long-run payoffs.

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Table 1 Numbers and Percentages of Three- and Four-Year-Olds in Kalamazoo County in Various Income Groups

	Below poverty	Between 100 and 200% of poverty line	Above 200% of poverty line	Total
Number of 3- and 4-year-olds in Kalamazoo County	1,433	1,526	3,017	5,976
Percentage in group	24.0%	25.5%	50.5%	100.0%

NOTE: Data are estimates based upon figures from the American Community Survey, 2006. The total population numbers for three- and four-year-olds are based on multiplying the American Community Survey numbers for Kalamazoo County for children less than five by two-fifths; the official intercensal estimates of children by age are quite similar. The estimated number of three- and four-year-olds in poverty is based on the reported percentage of children less than five years old in poverty in Kalamazoo County. The estimated number of three- and four-year-olds between 100 and 200% of the poverty line in poverty is based on the ratio between the reported number of children less than 18 in Kalamazoo County between 100 and 200% of the poverty line, and the reported number of children less than 18 in Kalamazoo County below the poverty line. This ratio is multiplied by the estimated number of three- and four-year-olds in poverty in Kalamazoo County to get an estimate for three- and four-year-olds between 100% and 200% of the poverty line.

Table 2 Percentages of Different Aged Children and Different Income Groups in Various Types of Preschool in Kalamazoo County

Below poverty line:			
	In any preschool	In MSRP	In Head Start
4-year-olds	64.7%	9.0%	53.0%
3-year-olds	38.8%	0.0%	38.8%
Between 100% and 200% of poverty line:			
	In any preschool	In MSRP	In Head Start
4-year-olds	43.5%	40.7%	2.8%
3-year-olds	21.2%	0.0%	2.0%
Above 200% of poverty line:			
	In any preschool	In MSRP	In Head Start
4-year-olds	61.0%	18.0%	1.4%
3-year-olds	41.2%	0.0%	1.0%
Total for all income groups:			
	In any preschool	In MSRP	In Head Start
4-year-olds	57.4%	21.7%	14.1%
3-year-olds	35.5%	0.0%	10.3%

NOTES: Data on percentage of 3- and 4-year-olds in poverty who are enrolled in any preschool are derived from American Community Survey for 2006, from responses to whether 3- or 4-year-olds are enrolled in school for all children of those ages. These responses were allocated across the poor vs. non-poor based on a separate question asking about nursery school and preschool enrollment that had separate figures for the poor and non-poor. The percentages for 3- and 4-year-olds separately are derived from national data from the National Household Education Survey, as cited in Barnett and Yarosz (2007), on relative percentage enrollment for each year. I use these national figures to allocate Kalamazoo County's total preschool enrollment across the two ages. I also did separate calculations for those above the poverty line in the same way (not reported directly in this table). These calculations together give figures for total preschool enrollment. To derive preschool enrollment for those between 100 and 200% of the poverty line, I used national figures on preschool enrollment by age for those families with incomes between \$20,000 and \$40,000 per year (Barnett and Yarosz 2007). I used the ratio between percentage enrolled in preschool by age for this low income group to the percentage enrolled in preschool by age for all families above the poverty line to estimate the percentage enrolled in preschool by age for families between 100% and 200% of the poverty line in Kalamazoo. Specifically, this ratio was multiplied by the percentage enrolled in preschool by age for those above the poverty line. The percentage enrolled in preschool by age for those above 200% of the poverty line was then calculate as a residual, given figures on preschool enrollment for the overall population, and the other two income groups.

MSRP and Head Start total enrollment in Kalamazoo County comes from Kalamazoo County Head Start (2006). According to a paper by Daniel-Echols and Schweinhart (2007), as of 2005 in Michigan as a whole, 58% of MSRP children are listed as meeting the risk factor of low income, which means below 250% of the poverty line. I assume that in Kalamazoo 58% of MSRP enrollees are actually below 200% of the poverty line, as programs may not have bothered to qualify some enrollees under the low income factor if they had two other risk factors. I assume that 10% of MSRP enrollees are below the poverty line, given that MSRP is supposed to first refer such children for possible Head Start enrollment. For Head Start, national figures on Head Start enrollment (Head Start Bureau 2005, p. 183) show that 799,000 of the 1.065 million children enrolled in Head Start were eligible based on family income below 100% of the poverty line, and another 188,000 were enrolled based on receipt of public assistance, which in most cases means that these children were below the poverty line. Therefore, I assume that in Kalamazoo County, 90% of Head Start enrollees were below the poverty line, and that another 5% were between 100% and 200% of the poverty line.

Table 3 Preschool Enrollment by Income, Kalamazoo and U.S.

	Poor 3- and 4-year-olds	Non-Poor 3- and 4-year-olds
Kalamazoo County	51.8%	44.8%
United States	35.9%	48.9%

NOTES: Figures on preschool enrollment at ages 3 and 4 for poor and non-poor, for both Kalamazoo and U.S. are based on combining figures from two different questions in the American Community Survey. One question gives school enrollment for ages 3 and 4 but with no breakouts based on family income. A second question gives figures for nursery school and preschool enrollment for poor and non-poor, but does not give age of child. I allocated the school enrollment for ages 3 and 4 across the poor versus non-poor population using the figures for nursery school and preschool enrollment for the poor versus the non-poor. Kalamazoo figures for poor are adjusted upwards slightly based on estimated MSRP and Head Start enrollment among poor (e.g., I prevent combined MSRP and Head Start enrollment from exceeding total enrollment for any age.) This upward adjustment increases Kalamazoo County preschool enrollment among the poor by 1.3%.

Table 4 Assumptions about Additional Slots by Income Level Created by Three Expanded Preschool Programs

	“Universal” preschool for 4-year-olds	More targeted expansion of preschool for 4-year-olds	Preschool expansion for 3-year-olds
Poor	181	181	298
Low income but not poor (100% to 200% of poverty line)	355	355	143
Middle income and above (200% of poverty line and above)	848	155	127
Total slots in expanded preschool program	1,385	691	568

NOTES: Table shows the number of additional preschool slots assumed to be created by three different expanded preschool programs.

Table 5 Various Annual Effects of Four Preschool Expansions in Kalamazoo County

	Long-run jobs creation	Long-run annual earnings creation (millions of 2008 dollars)	Number of participants in expanded preschool per year	Initial annual costs, as of 2009 (in millions of 2008 dollars; increases by 1.2% per year)
“Universal” preschool for 4-year-olds	830	84	1,385	6.8
More targeted preschool for 4-year-olds	508	51	691	3.4
Expanded preschool for 3-year-olds	282	28	568	2.8
“Universal” for 4-year-olds + expanded preschool for 3 year olds	1,112	112	1,952	9.6

NOTES: Long-run effects are for year 2100. All dollar figures are in 2008 dollars; however, dollar figures are not discounted. Note that annual earnings creation numbers are in a ratio of about \$100,000 to jobs created. This does not imply that each job created pays \$100,000. Rather, earnings are created both through jobs being created, and some increase in wages of former preschool participants that are not reflected in jobs created.

Appendix Table A1 Job Creation Numbers for Four Preschool Expansions in Kalamazoo County, Each Year from 2009 to 2100

Year	“Universal” for 4s	Targeted for 4s	3s program	“Universal” plus 3s
2009	69	34	28	97
2010	64	32	26	91
2011	59	30	24	84
2012	54	27	22	76
2013	49	25	20	69
2014	44	22	18	62
2015	44	22	18	61
2016	43	22	18	61
2017	43	21	17	60
2018	42	21	17	59
2019	42	21	17	59
2020	41	20	17	58
2021	54	29	17	71
2022	74	41	21	95
2023	99	57	28	127
2024	134	78	36	170
2025	168	99	48	216
2026	201	119	59	260
2027	233	139	70	303
2028	263	158	81	344
2029	292	175	91	383
2030	316	191	101	417
2031	339	205	109	448
2032	359	217	117	476
2033	378	229	123	501
2034	396	240	130	526
2035	414	251	136	550
2036	431	262	142	573
2037	448	272	148	596
2038	464	282	153	617
2039	480	292	159	638
2040	495	301	164	658
2041	508	309	169	677
2042	522	318	173	695
2043	535	326	178	713
2044	548	334	182	730
2045	559	341	187	746
2046	572	349	190	762
2047	584	356	195	779
2048	596	364	199	795
2049	609	371	203	812
2050	621	379	207	828
2051	633	387	211	845
2052	646	394	215	861
2053	658	402	219	877
2054	669	409	223	893
2055	681	416	227	908
2056	692	423	231	924
2057	704	430	235	939
2058	715	437	239	954
2059	725	443	243	968

Table A1. (Continued)

Year	“Universal” for 4s	Targeted for 4s	3s program	“Universal” plus 3s
2060	735	449	246	981
2061	745	455	250	994
2062	754	461	253	1007
2063	763	467	256	1019
2064	772	472	259	1031
2065	779	477	262	1041
2066	786	481	264	1050
2067	792	485	267	1059
2068	798	488	269	1067
2069	803	491	271	1074
2070	807	494	273	1080
2071	811	496	274	1084
2072	814	498	275	1089
2073	817	500	276	1093
2074	819	501	277	1096
2075	821	502	278	1099
2076	823	503	279	1101
2077	824	504	279	1104
2078	826	505	280	1105
2079	827	506	280	1107
2080	827	506	280	1108
2081	828	507	281	1109
2082	829	507	281	1110
2083	830	508	281	1111
2084	830	508	281	1112
2085	830	508	282	1112
2086	830	508	282	1112
2087	830	508	282	1112
2088	830	508	282	1112
2089	830	508	282	1112
2090	830	508	282	1112
2091	830	508	282	1112
2092	830	508	282	1112
2093	830	508	282	1112
2094	830	508	282	1112
2095	830	508	282	1112
2096	830	508	282	1112
2097	830	508	282	1112
2098	830	508	282	1112
2099	830	508	282	1112
2100	830	508	282	1112

NOTES: This table presents the numbers behind figure 2. See notes to figure 2.

Appendix Table A2 Earnings Creation Numbers in Kalamazoo County for 4 Preschool Expansions, Each Year from 2009 to 2100, in Millions of 2008 Dollars

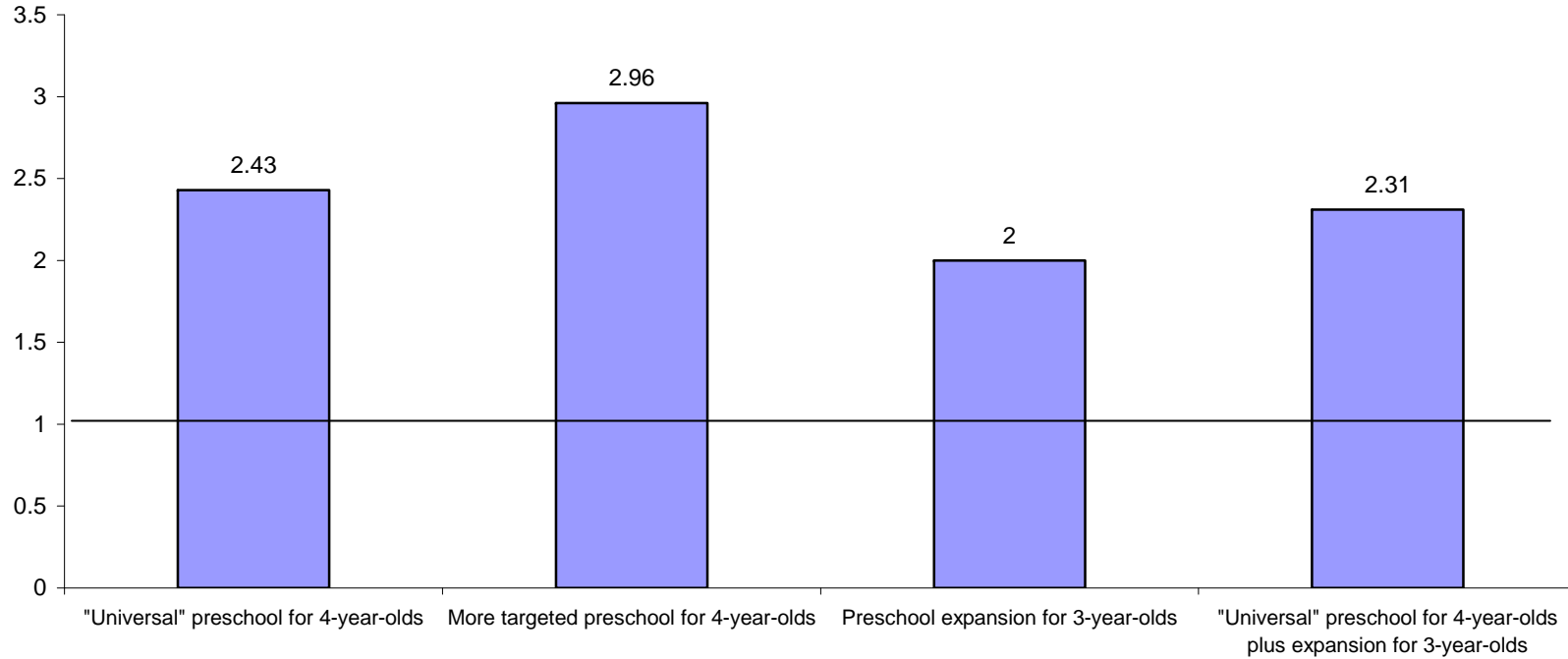
Year	“Universal” for 4s	Targeted for 4s	3s program	“Universal” plus 3s
2009	2.9	1.4	1.2	4.1
2010	2.7	1.4	1.1	3.9
2011	2.6	1.3	1.1	3.7
2012	2.4	1.2	1.0	3.5
2013	2.3	1.1	0.9	3.2
2014	2.1	1.1	0.9	3.0
2015	2.1	1.1	0.9	3.0
2016	2.1	1.1	0.9	3.0
2017	2.1	1.1	0.9	3.0
2018	2.1	1.1	0.9	3.0
2019	2.1	1.1	0.9	3.0
2020	2.1	1.1	0.9	3.0
2021	2.3	1.2	0.9	3.2
2022	2.7	1.4	0.9	3.6
2023	3.1	1.7	1.0	4.2
2024	3.9	2.1	1.2	5.1
2025	4.6	2.6	1.4	6.1
2026	5.5	3.1	1.7	7.2
2027	6.4	3.7	2.0	8.4
2028	7.3	4.3	2.3	9.6
2029	8.2	4.8	2.6	10.9
2030	9.2	5.5	2.9	12.2
2031	10.2	6.1	3.3	13.5
2032	11.2	6.6	3.6	14.8
2033	12.1	7.3	3.9	16.1
2034	13.1	7.9	4.3	17.4
2035	14.1	8.5	4.6	18.7
2036	15.1	9.1	4.9	20.0
2037	16.2	9.8	5.3	21.4
2038	17.2	10.4	5.6	22.8
2039	18.3	11.1	6.0	24.3
2040	19.4	11.7	6.3	25.7
2041	20.5	12.4	6.7	27.2
2042	21.6	13.1	7.1	28.6
2043	22.7	13.8	7.5	30.1
2044	23.8	14.5	7.8	31.7
2045	24.9	15.2	8.2	33.1
2046	26.1	15.9	8.6	34.7
2047	27.3	16.6	9.0	36.3
2048	28.5	17.4	9.4	37.9
2049	29.7	18.1	9.8	39.5
2050	31.0	18.9	10.2	41.2
2051	32.3	19.7	10.7	42.9
2052	33.6	20.5	11.1	44.7
2053	34.9	21.3	11.5	46.5
2054	36.3	22.2	12.0	48.3
2055	37.6	23.0	12.4	50.1
2056	39.0	23.9	12.9	52.0
2057	40.4	24.7	13.4	53.8
2058	41.8	25.6	13.9	55.7
2059	43.2	26.5	14.4	57.6

Table A2. (Continued)

Year	“Universal” for 4s	Targeted for 4s	3s program	“Universal” plus 3s
2060	44.6	27.3	14.8	59.4
2061	45.9	28.1	15.3	61.2
2062	47.3	28.9	15.8	63.0
2063	48.6	29.8	16.2	64.8
2064	49.9	30.6	16.7	66.6
2065	51.2	31.3	17.1	68.3
2066	52.4	32.1	17.6	69.9
2067	53.6	32.8	18.0	71.6
2068	54.7	33.5	18.4	73.1
2069	55.8	34.2	18.8	74.6
2070	56.8	34.8	19.1	75.9
2071	57.8	35.4	19.5	77.2
2072	58.7	36.0	19.8	78.5
2073	59.6	36.5	20.1	79.8
2074	60.5	37.1	20.4	81.0
2075	61.4	37.6	20.7	82.2
2076	62.3	38.2	21.1	83.4
2077	63.2	38.7	21.4	84.5
2078	64.0	39.2	21.7	85.7
2079	64.9	39.8	22.0	86.9
2080	65.7	40.3	22.2	88.0
2081	66.6	40.8	22.5	89.1
2082	67.5	41.3	22.8	90.3
2083	68.3	41.9	23.1	91.4
2084	69.2	42.4	23.4	92.6
2085	70.0	42.9	23.7	93.7
2086	70.9	43.4	24.0	94.9
2087	71.7	43.9	24.3	96.0
2088	72.6	44.5	24.6	97.1
2089	73.4	45.0	24.9	98.3
2090	74.3	45.5	25.2	99.5
2091	75.2	46.1	25.5	100.7
2092	76.1	46.6	25.8	101.9
2093	77.0	47.2	26.1	103.1
2094	78.0	47.8	26.4	104.4
2095	78.9	48.3	26.7	105.6
2096	79.8	48.9	27.0	106.9
2097	80.8	49.5	27.4	108.2
2098	81.8	50.1	27.7	109.5
2099	82.7	50.7	28.0	110.8
2100	83.7	51.3	28.4	112.1

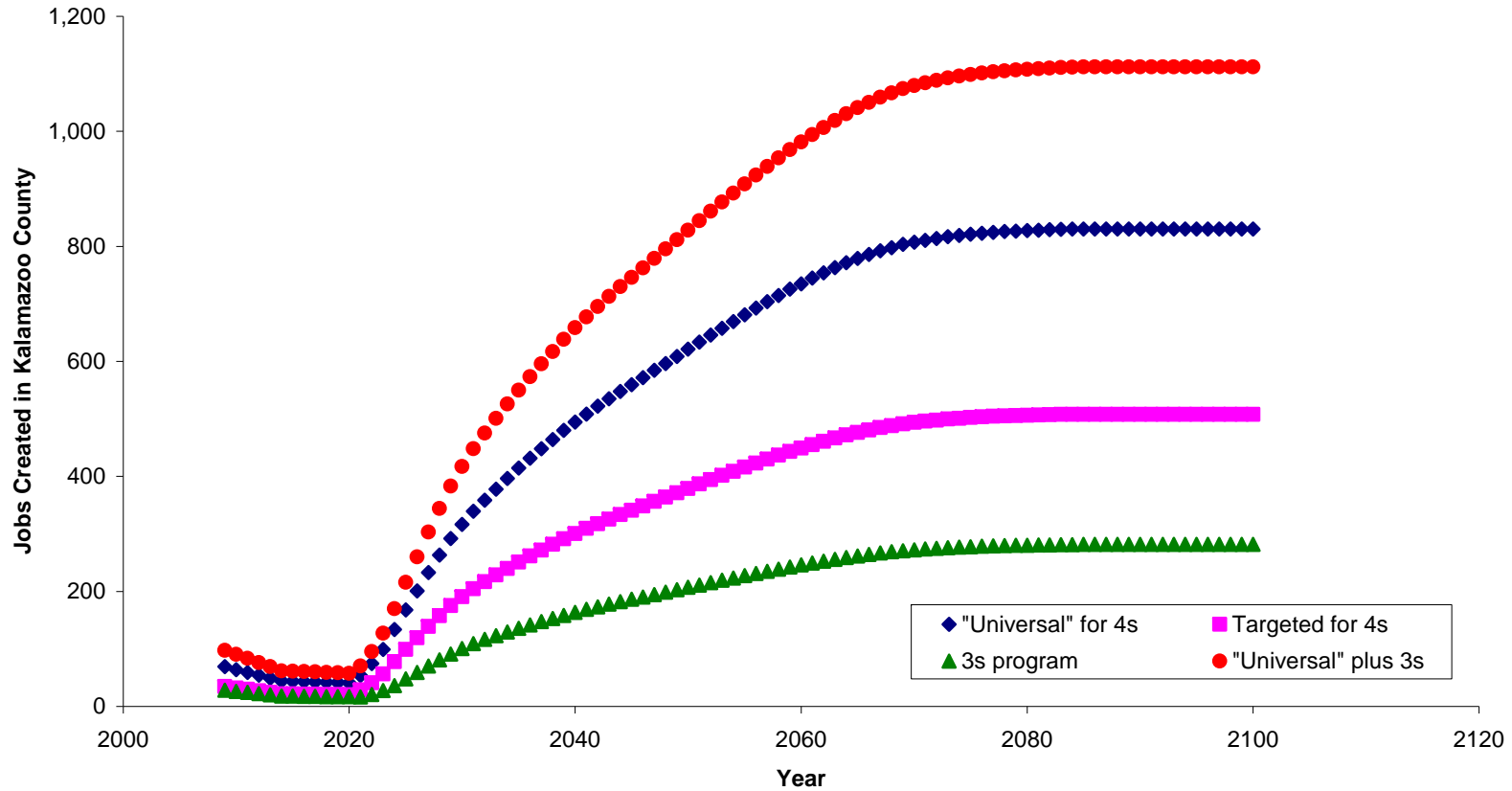
NOTES: This table presents the numbers behind figure 3. See notes to figure 3.

Figure 1
**Ratio of Present Value of Effects of Preschool Expansions on Kalamazoo County Residents' Earnings,
to Present Value of Program Costs, for Various Permanent Expansions of Kalamazoo County Preschool Programs**



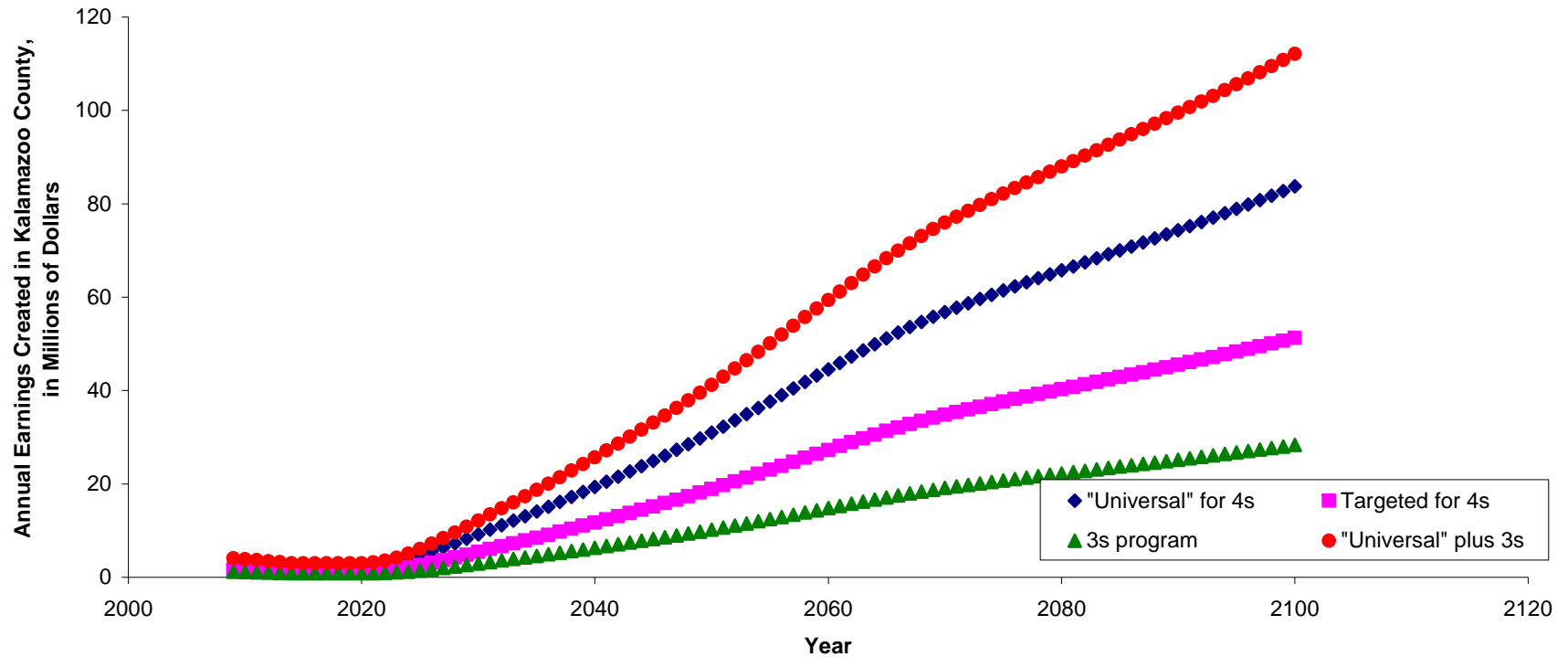
Notes: Figure considers effects of permanent expansions of preschool in Kalamazoo County. The expansions start out at the scales described in the text. The underlying Kalamazoo County economy is assumed to have zero population growth, and growth rate in real wages of 1.2%, which affects both the earnings effects and program costs. Earnings effects considered include effects due to extra spending, lower child care prices for parents of preschool participants, and greater employability and productivity of former preschool participants. Present value figures are calculated using real discount rate of 3%. Ratio of 1.0 indicates that present value of earning effects is just equal to present value of costs.

Figure 2
 Job Creation Effects Over Time of Various Permanent Expansions of Preschool in Kalamazoo County



Notes: These figures consider the four permanent programs described in the text: 1) universal preschool for four-year-olds; 2) more targeted preschool for four-year-olds; 3) expanded preschool for three-year-olds, and 4) universal preschool for four-year-olds plus expanded preschool for three-year-olds. The job creation figures are for number of jobs created in Kalamazoo County for Kalamazoo County residents by these programs. The last intervention (universal plus 3s) is simply the sum of the other two programs that make up this overall program. The underlying economy is assumed to have a static population of three- and four-year-olds.

Figure 3
Earnings Creation Effects Over Time of Various Permanent Expansions of Preschool in Kalamazoo County



Notes: These figures consider the four permanent programs described in the text: 1) universal preschool for 4-year-olds; 2) more targeted preschool for 4-year-olds; 3) expanded preschool for 3-year-olds; and 4) universal preschool for 4-year-olds plus expanded preschool for 3-year-olds. The earnings creation figures are for millions of dollars in annual earnings created in Kalamazoo County for Kalamazoo County residents by these programs. The last intervention (universal plus 3s) is simply the sum of the other two programs that make up this overall program. The underlying economy is assumed to have a static population of 3- and 4-year-olds, and real wages that increase by 1.2% per year. The underlying upward trend in real earnings causes the upward long-term trend in the earnings effects. The permanent program is assumed to start in 2009. All earnings figures are in 2008 dollars.