



THE ECONOMICS OF EARLY CARE AND EDUCATION IN ARIZONA

April 2004

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**P³ | PRODUCTIVITY AND
PROSPERITY PROJECT**

ASU W. P. CAREY
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Introduction and Organization of Report

Early care and education for young children is rapidly becoming a major public policy issue in the United States. With the welfare reforms of the late 1990s (e.g., the Personal Responsibility and Work Opportunity Reconciliation Act of 1996), Congress now recognizes that child care services are essential if the nation is to move ahead with its new work initiatives. Policy makers who are alarmed by the rise in U.S. wage inequality over the past twenty years are also interested in early education programs as a way to equalize economic opportunities later in life. High quality early childhood programs have proven effective in raising educational attainment and improving earnings and labor market performance. These results are all the more appealing in light of the general ineffectiveness of adult retraining programs. In the area of crime prevention, sociologists and criminologists have also turned their attention to early childhood intervention programs. In contrast to juvenile treatment programs, early interventions hold special promise in that they are preventative rather than crisis-oriented and take place before anti-social behavioral patterns become entrenched.

The purpose of this report is to provide a comprehensive look at the economic issues surrounding early care and education in Arizona. The first section of the report provides an overview of the child care industry itself. Information is presented on the importance of alternative providers of child care services and the prices charged for care in Arizona. We review some of the major government programs that provide child care support for needy families. We also identify the industries that rely most heavily on workers who receive child care assistance from the state of Arizona.

The second section of the report offers an assessment of the economic impact the child care industry has on the state. We first review alternative statistical sources to estimate the number of jobs connected with the provision of child care in Arizona. An economic impact analysis is then conducted to measure the indirect economic impacts that arise when child care providers purchase supplies and services from other Arizona businesses, when employees spend a portion of their incomes in the state, and when state and local governments spend tax revenues that are directly and indirectly generated by the industry. We also examine the role of the industry in supporting parent's labor force participation.

The third section of the report provides a review of the public policy analysis that has been done regarding early care and education programs. First, the theoretical case for public intervention in child care is reviewed. We then survey four well-known program interventions: Perry Preschool, Abecedarian, Head Start and Chicago Child-Parent Centers. Cost-benefit studies have been done for two of these programs. These studies are also reviewed.

The fourth section of the report provides estimates of the costs and benefits of a hypothetical early care and education program in Arizona. The program used for analysis is a large-scale public program with an education component that is similar in structure

and intensity to the Perry Preschool model, but one that offers full-time care for working parents. First, program costs are calculated. Then we estimate the benefits that are likely to accrue in the form of increased lifetime earnings for both participating children and their mothers, in lower crime costs, and in cost savings from reduced grade retention and special education services in public K-12 education.

In the final section of the report, we develop projections out to 2020 of the 0-5 population in Arizona. These are used to estimate growth in the general demand for child care. We also provide estimates of growth in the number of Arizona children under 6 who will be raised in single-adult poverty households. Without access to quality early care and education, this group of children will be at high risk of economic and social underachievement.

Summary of Major Findings

A majority of children across the nation regularly spend time under the care of someone other than their parents. Nearly 75% of children less than 5 years old with employed parents are in child care arrangements other than parental care. Anglo-American and African-American children are more likely to participate in center-based programs than are Hispanic children who are more likely to be cared for by their parents. Children from high-income households are more likely to attend center-based child care programs than are children from low-income households.

Child care costs account for a significant fraction of family income. According to information from the *Arizona Child Care Market Rate Survey 2000*, a family with a child 3-5 years old needing child care for at least 6 hours a day, twenty days a month, can expect to pay between \$300-\$400 a month for care provided by either a licensed center or an approved family home.

Although fees paid by parents in the United States cover about 70% of the operating costs of child care, the government has taken on an increasingly important role in financing child care expenses. Federal government support of child care has increased from a total of \$2.8 billion in 1980 to \$19.8 billion in 2000. Adjusted for inflation and growth in the population of young children, this represents almost a three-fold increase in real per capita support.

The Arizona Department of Economic Security has recently conducted an analysis of data for FY 2003 of individuals who received child care assistance in Arizona for reason of employment. A total of 30,923 subsidized employees were identified, representing 2.1% of total Arizona employment. Industries that rely most heavily on workers receiving child care assistance include laundry services, auto repair, professional services, real estate, wholesale trade, ambulatory health care and restaurants.

The most accurate and comprehensive estimates of the number of people who work in the child care sector come from surveys of registered and licensed operators by state agencies. According to the *Arizona Wage and Benefit Survey*, there were a total of 19,328 employees in Arizona center-based child care facilities in 2001. Using this employment figure as a measure of industry scale, and including multiplier effects, we estimate that industry operations in 2001 were responsible for \$1.7 billion in output (synonymous with gross receipts and total spending), \$828 million in value added (synonymous with income and gross state product), \$624 million in labor income and 29,379 jobs.

An industry the size of the child care industry generates a significant amount of revenue for state and local governments. Including direct taxes paid by the industry and its employees, as well as tax revenues generated through the multiplier process, the child care industry is estimated to generate \$75 million in state and local tax revenues. The economic impacts arising from the recycling of these revenues are \$129 million in output, \$109 million in value added, \$87 million in labor income and 2,470 jobs.

Market-provided child care has grown since WWII in large part as a response to the demand for child care services by parents with young children who wish or need to work. The industry has come to play a vital role in supporting the work efforts of millions of Americans. Using data from the 2000 Census, we estimate that there are 102,000 employed primary caregivers in Arizona with young children in paid child care arrangements. The net income generated by these Arizona residents is estimated to be \$1.9 billion. This is more than six times the size of the labor income paid directly to people employed in the child care industry. The economic role the industry plays in supporting the Arizona workforce is much more significant than its role as a job-creating industry.

In summary, three separate economic impacts are identified in this report: (1) the role of the industry as an employer and purchaser of goods and services from other Arizona businesses; (2) the state and local tax revenues generated by the industry and their impact when tax revenues are spent by local governments; and (3) the role of the industry in supporting labor force participation by family members with young children. When all three types of effects are added together, the child care industry in Arizona is estimated to generate \$5.9 billion in output, \$3.9 billion in value added, \$3.2 billion in labor income and 153,800 jobs. The value added generated is 2.5 percent of Arizona gross state product, and the jobs created are 5.4% of total Arizona employment.

A case for government support of early childhood education can be made on the grounds of equity. If a government wishes to reduce income inequality among adults, the most cost-effective approach is to focus on developing social and learning skills in people at a very early age, rather than trying to upgrade their job skills later in life. An argument for public support of early care and education can also be made for reasons of economic efficiency. Some parents may under-invest in their children if they are liquidity-constrained, lacking the financial resources to pay for high quality care. They are unable to borrow against the future earnings of their children and so may not be able to finance what could prove to be an investment with a very high return. Another type of efficiency argument for public support of high quality child care involves externalities that may be associated with negligent care of young children. Children who lack social skills and knowledge may impose costs on the rest of society, both in terms of classroom disruption and grade retention when they are young and an increased likelihood of antisocial or criminal behavior when they become adults.

Since the mid 1960s, there have been dozens of early childhood enrichment programs aimed at helping disadvantaged children improve their learning skills so that they can begin school on a more equal footing with other children. These programs have been evaluated on the basis of a number of different outcomes, including various measures of cognitive development, criminal and delinquent behavior, and adult educational and earnings attainment. Studies generally indicate that gains in intellectual development, such as IQ and achievement in math and reading, tend to fade out. However, the programs do have long-term effects on educational attainment and reduced likelihood of criminal behavior.

There have been two formal cost-benefit studies of early childhood education programs: a study of the Perry Preschool Program and a study of the Carolina Abecedarian Project. In the Perry study, the present value of all benefits realized was 8.7 times the size of program costs per child. Benefits accruing to potential crime victims represented the single greatest benefit of the program, with avoided victim costs being almost 5 times as large as program costs. Incremental earnings received by participants were 2.5 times the size of program costs.

In the Abecedarian cost-benefit study, the present value of all benefits was estimated to be 3.8 times the size of incremental costs. The most significant benefits identified were those relating to maternal earnings. The present value of higher maternal lifetime earnings alone was more than twice the size of program costs. Higher participant earnings themselves were slightly larger than the incremental costs of the program.

While lack of data do not allow a formal cost-benefit analysis, there is evidence of significant benefits in large-scale public early education programs. Studies of the Chicago Child-Parent Centers have found that participants had higher rates of high school completion and lower arrest rates. Data analysis of Head Start has been complicated by the nonexperimental nature of participant selection. However, recent studies that employ statistical techniques to control for family background and other environmental factors have found that Head Start also has had significant long-term effects on educational attainment and reduced criminal behavior.

This report provides estimates of the costs and benefits of a hypothetical early care and education program in Arizona. The hypothetical program used for analysis is a two-year, large-scale public program with an education component that is similar in structure and intensity to the Perry Preschool model, but one that offers full-time high quality care for working parents. It is assumed that the children selected for participation would be 3 year olds with a high statistical chance of economic underachievement and of being a future burden to society, either as a welfare recipient or as someone likely to engage in criminal behavior.

Gross costs for the full two years of the program are estimated to be \$19,084 per participant. Child care costs that would be avoided by parents are \$5,282. Thus the incremental cost of the program is \$13,802. The present value of all program benefits is

estimated to be \$88,019. The program would then provide a total of \$6.38 worth of benefits for every \$1 of incremental costs. Benefits received by participants and their families (participant earnings and maternal earnings) amount to \$70,159 for each child, or more than five times the costs of the program. Societal benefits from reduced crime and K-12 education costs are also significant, amounting to \$17,860 per child.

While the benefits of early care and education have been well documented, the expense associated with high quality programs often prevents families from taking full advantage of these opportunities. The children often in most need but least likely to participate in ECE programs are those living in single-parent poverty households. Based on Census information, in 2000 there were 107,000 Arizona children 0-5 living in households with incomes below the federal poverty threshold. Of this total, 54,000 were in households with a single parent (or other adult caregiver).

The Arizona population in general, and the number of young children in particular, is expected to grow rapidly over the next several decades. We use historical birth data to project the state's 0-5 population out to 2020. The projections suggest that the population of young children will increase 72% over the next two decades, from around 460,000 in 2000 to 790,000 by 2020. If the proportion of young children in early care activities were to remain constant, the number of children under 6 receiving non-parental care would increase from around 180,000 in 2000 to 307,000 by 2020.

Projections are also made of the future Arizona 0-5 population to be living in poverty and single-adult households. The projections are made by combining population forecasts with proportions found in the 2000 Census of children living in poverty. The projections indicate that the number of children 0-5 in poverty households will rise from 107,000 (or 23% of all children 0-5) in 2000 to 211,000 (or 27% of the total) in 2020. The number of young children in single-adult poverty households is projected to increase from 54,000 (12% of the total) in 2000 to 107,000 (14% of the total) in 2020.

Chapter 1: Industry Overview

What is Early Care and Education?

The industry related to Early Care and Education (ECE) includes a wide range of part- and full-day programs provided by commercial businesses and educational and social service organizations. Programs serve a variety of needs and vary in the relative emphasis placed on the care and education components of ECE. Programs focusing on child care, especially those serving children younger than 3 years of age, support and are essential for parents' labor force participation. Other programs focus on child development. Their goal is to help prepare children to be "school ready" by teaching valuable social and learning skills. Many programs focus on children from low-income families and children who may need special assistance. Some programs provide health and nutrition support and strive to involve the entire family in the child's development process.

ECE providers covered in our analysis include preschools, center-based child care providers and licensed family child care homes. Because of data limitations, parental care, relative care and care provided in the child's own home are generally not covered.

Brief History of the Industry

ECE programs first emerged in the United States during the 1830s. The first day program was established in Boston in 1838 to help care for the children of seamen's wives and widows. Early programs were custodial in nature and served to support women who had been forced to join the work force because of economic hardship. By the end of the century, a National Federation of Day Nurseries had been established. Enrollment swelled during war times—the Civil War, WWI and WWII—but then declined when the wars ended. Preschool programs also developed during the 1830s from early education programs in Massachusetts. Preschools and kindergartens grew slowly during the 19th century and did not experience rapid growth until the 1920s when middle-class families had the means to provide children with an enriched early childhood experience.

A confluence of factors led to a significant expansion of ECE programs during the mid 1960s and early 1970s. President Johnson's War on Poverty included a focus on deprived and disadvantaged children. Head Start was established in 1965 to support children of low-income families. Researchers in the area of child development began to identify early education programs as a way of not only preparing children for formal schooling but also as a means of ensuring proper health care and nutrition. Growing interest in labor force participation among middle-income women during this period also helped to increase the demand for quality out-of-home care. Finally, middle-income parents regardless of work status increasingly came to view preschool as a valuable experience for children.

National child care legislation was first enacted by Congress in 1971. The law was vetoed by President Nixon and subsequent efforts to reintroduce child care legislation were resisted throughout the 1970s by conservatives who regarded it as encouraging communal practices of child rearing. By the 1980s, however, all parties came to acknowledge the value of high quality child care. In the past two decades, a variety of programs have emerged to suit the needs of specific groups: children of low-income families, children with special needs, children of working parents and children of parents who simply value ECE as a way of fostering social and intellectual childhood development. The present industry is highly fragmented, but there has been some movement since the late 1980s toward integrating education and care.

Distribution of Children Across Providers

A majority of children across the nation regularly spend time under the care of someone other than their parents. According to the Urban Institute's 1999 National Survey of America's Families (NSAF), which concentrates on families with employed adults, nearly 75% of children less than 5 years old with employed parents are in child care arrangements other than parental care. Twenty-eight percent of children with employed parents receive center-based care (including preschools), 14% receive family-based care, 27% are cared for by relatives and 4% are cared for by nannies or babysitters (Sonenstein, et al., 2002).

At the age of 5, most American children begin kindergarten. However, some type of child care arrangement is needed when kindergarten is not in session. According to the NSAF survey, 80% of 5 year-olds with employed parents receive child care apart from kindergarten. Forty percent receive center-based care, 19% are cared for by relatives, 11% receive family-based care, 8% participate in before/after school programs and 3% are cared for by nannies or babysitters.

Detailed breakdowns of providers used by age, race/ethnic group and income class of the child is available from surveys conducted by the National Household Education Survey Program of the National Center for Education Statistics (see Exhibit 1.1). Predictably, nonparental care is more commonly used as a primary care arrangement for children between the ages 3-5 than it is for children aged 2 years or less. For all children, regardless of the employment status of their parents, the percent in a nonparental primary care arrangement rises with age from a low of 44% for children under 1 year of age to 84% for children 5 years of age. Use of center-based care (including Head Start), in particular, also rises with age. For children aged 0-2, 6-17% are in a center-based primary care arrangement while 35-64% of children aged 3-5 years are in center-based care.

Exhibit 1.1
Distribution of U.S. Children Aged 0-5 Yrs by Type of Primary Care Arrangement

Percent of children by type of care:						
Child and Family Characteristics	Head Start	Other center-based	Parental care only	Family child care	Sitter	Relative
Age						
Under 1 year	---	6	56	14	3	21
1 year old	---	10	51	15	3	20
2 years old	---	17	47	15	4	17
3 years old	4	31	33	13	3	17
4 years old	10	44	23	9	2	11
5 years old	12	52	16	9	2	8
Race/ethnicity						
White	2	26	39	15	4	14
Black	8	21	35	9	1	25
Hispanic	4	11	54	8	2	20
Other	4	20	43	9	2	21
Household income						
\$15,000 or less	7	15	50	8	1	20
\$15,001 - \$25,000	4	17	50	10	2	17
\$25,001 - \$35,000	3	20	42	14	2	19
\$35,001 - \$50,000	1	24	39	16	3	16
More than \$50,000	1	37	26	18	7	13

Source: U.S. Department of Education, National Center for Education Statistics. National Household Education Surveys Program, "Parent Interview Survey", various years.

When comparing racial/ethnic groups, children identified as Anglo- or African-American are more likely to participate in center-based programs than are Hispanic children who are more likely to be cared for by their parents. Anglo-American children are more likely to use family-based care than are any other racial/ethnic group. Similarly, children identified as African-American are more likely to be cared by relatives or to participate in Head Start than are any of the other groups. Children from high-income households are more likely to attend center-based child care programs than are children from low-income households, while children of low-income households are more likely to receive care from parents or relatives.

In Arizona, the Department of Economic Security (DES) Child Care Administration surveys child care providers as to average daily program attendance and other information (including prices charged). DES compiles its list of providers from: 1) the DES list of certified homes that provide child care service to eligible families; 2) the Department of Health Services list of licensed child day care centers (including preschools licensed as child day care centers and certified child day care group homes); 3) lists from non-profit sponsors who approve child care homes to participate in the Arizona Department of Education's Federal Child and Adult Care Food Program; and 4) lists of unregulated homes registered with the state-contracted Child Care Resource and Referral Program. DES classifies providers into four groups: licensed centers, approved family homes, certified group homes and identifiable unregulated homes. According to information obtained in the *Child Care Market Rate Survey 2000*, of a total average daily attendance of 119,393 children reported, 83% were in licensed centers, 13% were in approved homes, 2% were in certified group homes and 2% were in unregulated homes.

Cost of Child Care

According to information from the Arizona *Child Care Market Rate Survey 2000*, a family with a child 3-5 years old, and needing child care for at least 6 hours a day twenty days a month, can expect to pay between \$300-\$400 a month for care provided by either a licensed center or an approved family home (see Exhibit 1.2). Families with infants or toddlers can expect to pay even more.

Exhibit 1.2
Price of Child Care in Arizona

	<i>Median Daily Rate for Full-Time Care:</i>		
	Less than 1 Yr Old	1 and 2 Yr Olds	3-5 Yr Olds
Type of Provider:			
Licensed Centers	\$25.20	\$22.00	\$20.00
Approved Homes	16.00	16.00	15.00
Certified Group Homes	19.00	18.00	18.00
Unregulated Homes	20.00	18.00	17.00

Source: *Child Care Market Rate Survey 2000*, Arizona DES Child Care Administration

Working families with children find alternative ways of managing the high cost of nonparental child care. Families may receive assistance from employers, government organizations or relatives. A report from the National Survey of America's Families (NSAF) found that almost 30% of employed families with children aged 12 and under receive some type of child care aid (Giannarelli, et al., 2003). Among these families, most receive either free child care services from a relative or free or subsidized child care from a government agency or private organization. Low-income families are more likely to receive child care aid than are high-income families. Nearly 40% of employed, low-income families with children aged 12 years and younger obtain child care assistance, compared with 24% of higher-income families. Families below the poverty level and headed by a single parent are especially likely to qualify for assistance.

At current levels of assistance, just under one-half of working families with children aged 12 and under pay for child care at a cost of \$303 per month, amounting to 9% of average parental earnings. Higher income families who pay for child care spend an average of 7% of their income for child care; low-income families pay an average of 14%; and poor families spend an average of 18% of their earnings.

Based on findings from the NSAF report, child care assistance makes a major difference in the ability of some families to cope with the high costs of nonparental child care. With help from relatives or government organizations, an estimated 20% of families who use nonparental child care incur no child care expenses. However, even at current levels of child care assistance, the 42% of low-income families that do pay for child care spend an average of \$1 out of every \$7 of earnings to purchase that care (Giannarelli, et al., 2003).

Government Programs

Although fees paid by parents in the United States cover about 70% of the operating costs of child care, the government has taken on an increasingly important role in financing child care expenses. Federal government support of child care has increased from a total of \$2.8 billion in 1980 to \$19.8 billion in 2000 (see Exhibit 1.3). Adjusted for inflation and growth in the population of young children, this represent almost a three-fold increase in real per capita support since 1980.

Exhibit 1.3
Federal Funding for Early Care and Education
(in millions of dollars)

Program/source	1980	1986	1992	1998	2000
Child Care and Development Block Grant and Child Care and Development Fund (CCDF)			\$825	\$3,067	\$4,800
Head Start	\$766	\$1,040	2,200	4,355	5,103
Child and Dependent Care Tax Credit	956	3,410	4,000	2,485	3,000
Child and Adult Care Food Program	239	501	1,200	1,530	1,740
Other Programs	846	533	1,305	1,233	5,165
TOTAL	\$2,807	\$5,484	\$9,530	\$12,670	\$19,808

Source: Kamerman and Gatenio, Table 1.6, p. 20.

Notes:

(1) CCDF funding for 2000 includes \$1 billion for child care services from the Temporary Assistance for Needy Families program.

There have been major changes in the policies of federal programs, most connected with welfare reform legislation in the late 1990s. The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 requires that low-income women with young children find work within 2 years of claiming assistance and limits lifetime assistance to a maximum of 5 years. Clearly, single mothers are expected to work, even if they have young children. Congress now recognizes that child care services are essential if the nation is to move ahead with its new work initiatives.

PRWORA also resulted in major changes in the organizational structure of federal programs that support child care. It consolidated four separate funding programs into a single Child Care and Development Fund (CCDF). PRWORA also allowed states to transfer funds from the Temporary Assistance for Needy Families (TANF) block grant into child care.

States have always assumed major responsibility for funding and setting policy for educational programs. With the passage of PRWORA, states are taking on an even greater responsibility for meeting the child care needs of low-income families. States make decisions as to which families will be eligible for assistance; they determine rates of co-payment by parents; and they set health and safety standards.

Selected details on key government child care programs are provided below.

Child Care and Development Fund

Although there are many federal programs involved in funding ECE programs, four are especially significant (see Exhibit 1.3). The Child Care and Development Fund (CCDF) provides federal funds to states for child care subsidies for families with incomes less than or equal to 85% of the state's median family income. At the federal level, CCDF is administered by the Administration for Children and Families in the Department of

Health and Human Services. At the state level, the Arizona Department of Economic Security oversees administration of CCDF funds.

In 2000, state and federal spending associated with CCDF totaled \$7.2 billion (including TANF funds transferred into CCDF). According to the National Center for Children in Poverty, Arizona ranked second lowest at \$2,750 in annual federal and state spending per child among the ten western states in 2000 (see Exhibit 1.4). Only Colorado spent less per child at \$2,129. Washington ranked highest with \$5,257, followed closely by California at \$5,216. Arizona was also second lowest in spending per family at \$4,632.

Exhibit 1.4
Child Care and Development Fund (CCDF):
Recipient and Spending Data for FY 2000

State	Number of Recipients:		Total State and Federal Spending (3) (in millions)	Spending per Family (4)	Spending per Child (4)
	Families (1)	Children (2)			
Arizona	22,800	38,400	\$105.6	\$4,632	\$2,750
California	123,800	183,400	956.6	7,727	5,216
Colorado	13,900	24,900	53.0	3,813	2,129
Idaho	4,800	8,300	25.7	5,354	3,096
Nevada	3,400	5,700	22.1	6,500	3,877
New Mexico	10,400	17,600	52.8	5,077	3,000
Oregon	10,500	20,100	64.0	6,095	3,184
Texas	56,100	103,100	421.4	7,512	4,087
Utah	5,800	11,300	44.3	7,638	3,920
Washington	32,000	54,000	283.9	8,872	5,257
U.S.	1,038,600	1,744,900	\$7,221.0	\$6,953	\$4,138

Source: "Let's Invest in Families Today" initiative of the National Center for Children in Poverty,
www.lift.nccp.org

Notes:

- (1) Average monthly number served with CCDF funds, including TANF funds transferred into CCDF.
- (2) Estimated by Child Care Bureau using data provided by states on the ratio of children per family.
- (3) Total CCDF spending, including TANF funds transferred into CCDF. Many states provide additional child care subsidies outside of CCDF.
- (4) Figure estimates average spending for a recipient enrolled in the program for a full year. Actual periods of subsidy use are typically much shorter.

Exhibit 1.5
Characteristics of CCDF Programs in Western States

State	Annual Income Eligibility Level	Income Eligibility as Percent of State Median Income	Monthly Income Requiring Maximum Fee	Minimum Fee per Child
Arizona	\$18,000	48%	\$1,500	\$0.50/day
California	30,036	75%	2,149	\$2/day
Colorado	24,648	58%	2,000	\$176/mo
Idaho	19,476	66%	1,623	2% of cost
Nevada	31,536	75%	2,628	10% of cost
New Mexico	23,412	75%	2,278	\$0
Oregon	33,012	85%	2,087	\$25/mo
Texas	27,480	75%	3,000	\$27/mo
Utah	21,108	56%	1,759	\$10/mo
Washington	23,328	56%	1,944	\$10/mo

Source: Blau, D., "The Economics of Means-Tested Child Care Subsidies,"
 NBER Conference on Means-Tested Transfers, April 2000.

States have considerable independence in setting parameters for CCDF support including limits on income eligibility, co-payments by families, and reimbursement rates to providers. Among western states, Oregon has the most liberal income threshold for families to receive child care assistance, with income eligibility set at 85% of state median income. In contrast, Arizona is the only western state to set income eligibility at less than half of the state's median income (see Exhibit 1.5).

Head Start

Public investment in early care and education began on a large scale with the Head Start program in 1965. Head Start is a federally-funded program administered by the Head Start Bureau of the Administration on Children, Youth and Families within the Department of Health and Human Services. Head Start provides a variety of early childhood development, health, nutrition and social services targeted at low-income families. Head Start services are provided primarily to 4-year-old children. The program's overall goal is to increase the school readiness of young children from low-income families. Nationwide, the program serves more than 900,000 children at a total cost of \$6.3 billion. Appropriations have been insufficient, however, to allow all eligible children to participate. Only two-thirds of the children who would pass eligibility requirements are served.

Exhibit 1.6
Head Start Program: State Allocations and Enrollment, FY 2002

State	Funding (in millions)	Enrollment	Funding per Child
Arizona	\$96.9	13,297	\$7,288
California	801.4	98,687	8,120
Colorado	65.7	9,872	6,656
Idaho	21.7	3,347	6,472
Nevada	19.8	2,754	7,184
New Mexico	49.2	7,749	6,347
Oregon	57.1	9,199	6,207
Texas	454.3	67,644	6,715
Utah	36.3	5,527	6,562
Washington	97.2	11,167	8,708
U.S.	\$6,326.3	912,345	\$6,934

Source: U.S. Department of Health and Human Services, Administration for Children and Families,
www.acf.hhs.gov/programs/hsb/about/.

Head Start is administered at the local level subject to federal guidelines. Local and community organizations interested in establishing a Head Start program are awarded grants. In 2002, Arizona received \$96.9 million for 13,297 enrolled children, averaging \$7,288 per child (see Exhibit 1.6). Because of insufficient funding, a significant number of children eligible for Head Start do not receive services.

Child and Dependent Care Tax Credit

The Child and Dependent Care Tax Credit is a personal income tax credit for expenses related to the care of a dependent child younger than 13 years old or a spouse or dependent who is not able to care for him or herself due to a mental or physical impairment. The tax credit is administered by the U.S. Internal Revenue Service and is available to all families regardless of income. Child care expenses up to \$3,000 per year for one child and \$6,000 per year for two or more children are credited for allowing the parent/legal guardian to work or look for work.

Twenty-seven of the 50 states provide some form of state child and dependent care tax credit. Half of the 10 western states provide a dependent care tax credit: California, Colorado, Idaho, New Mexico and Oregon (National Center for Children in Poverty, 2003). There is no state dependent care tax credit in Arizona.

Child and Adult Care Food Program

The Child and Adult Care Food Program provides licensed child care centers, schools, and group and family child care homes federal subsidies for breakfasts, lunches

and dinners that meet federal nutrition requirements. The program is administered at the national level by the U.S. Department of Agriculture's Food and Nutrition Service. The Arizona Department of Education oversees the program at the state level.

Other Programs: Temporary Assistance for Needy Families

Temporary Assistance for Needy Families (TANF) provides monthly cash benefits to low-income families based on eligibility standards set by the states. Unlike Aid to Families with Dependent Children, the program replaced by TANF, needy families are not guaranteed benefits. A major goal of TANF is to provide temporary assistance while recipients gain employment. Recipient families must fulfill ongoing work requirements to continue receiving benefits, and there is a time limit on benefit receipt. The federal government sets basic rules for administering TANF cash assistance, but states have responsibility for developing their own programs. Income eligibility limits and benefit levels vary widely across the states. Among the western states, annual spending per family ranges from a high of \$7,307 in California to a low of \$2,017 per family in Texas. Arizona ranks third lowest in spending per family at \$3,513. Texas and Arizona also spend the least on a per person basis at \$756 and \$1,412 respectively.

Exhibit 1.7
Temporary Assistance for Needy Families (TANF):
Recipient and Spending Data for FY 2001

State	Number of Recipients:		Total State and Federal Spending (1) (in millions)	Spending per Family	Spending per Person
	Families	Individuals			
Arizona	33,194	82,595	\$116.6	\$3,513	\$1,412
California	473,615	1,228,605	3460.8	7,307	2,817
Colorado	10,639	27,132	55.2	5,188	2,034
Idaho	1,293	2,246	4.5	3,480	2,004
Nevada	7,466	19,461	29.7	3,978	1,526
New Mexico	19,322	56,105	108.0	5,589	1,925
Oregon	18,638	41,976	72.9	3,911	1,737
Texas	130,893	349,279	264.0	2,017	756
Utah	7,487	21,815	39.1	5,222	1,792
Washington	54,160	141,397	292.5	5,401	2,069
U.S.	2,093,544	5,381,770	\$10,891.9	\$5,203	\$2,024

Source: "Let's Invest in Families Today" initiative of the National Center for Children in Poverty, www.lift.nccp.org; U.S. Dept. of Health and Human Services, The Administration for Children and Families, U.S. Welfare Caseloads Information, www.acf.hhs.gov/news/stats/newstat2.html. Spending data from Zoe Neuberger, *TANF Spending in Federal Fiscal Year 2001*, Center on Budget and Policy Priorities, 2002.

Employers of Arizona Workers Receiving Child Care Assistance

The Arizona Department of Economic Security recently collected information useful in identifying industries that employ Arizona workers who receive child care assistance. The data refer to individuals who received child care assistance in FY 2003 for reason of employment. Because of confidentiality restrictions, the identities of specific employers could not be revealed. However, confidentiality could be maintained by aggregating employers into broad industry groups, as defined by the North American Industry Classification System (NAICS).

A total of 30,923 subsidized employees were identified and matched with a NAICS industry. This represents 2.1% of total Arizona employment, as measured by BLS covered employment. These figures refer to the number of workers actually receiving child care assistance, not the number who qualify for assistance. There are currently 9,000 children on the waitlist, and this number is projected to rise to 14,400 by June 30, 2004.

Exhibit 1.8 provides a breakdown by 2-digit NAICS code of the industry locations of subsidized workers. In terms of absolute number, the most important employers of subsidized workers are industries providing health care and social assistance, accommodation and food services, and retail trade. Of course, these are also among the industries with the largest overall employment. More useful as an indicator of the workforce support provided by child care subsidies are statistics on subsidized workers as a percent of total employment. There are six 2-digit industry groups in which subsidized workers account for more than 3 percent of total employment: other services (e.g., laundry and auto repair), professional and technical services (e.g., law, architecture, engineering and accounting), real estate, wholesale trade, health care (e.g., offices of doctors and dentists) and food services.

Exhibit 1.8
Industry Distribution of Arizona Workers Receiving
Child Care Assistance in FY 2003

NAICS Code	NAICS Title	Number of Subsidized Employees*	Total Employment**	Subsidized as a Percent of Total
11	Agriculture, forestry and fishing	250	11,930	2.10
21	Mining	21	4,784	0.44
22	Utilities	48	14,427	0.33
23	Construction	1,572	53,122	2.96
31 - 33	Manufacturing	1,651	109,654	1.51
42	Wholesale trade	1,196	32,666	3.66
44 - 45	Retail trade	3,794	204,787	1.85
48 - 49	Transportation and warehousing	606	39,775	1.52
51	Information	434	37,712	1.15
52	Finance and insurance	1,461	89,400	1.63
53	Real estate and rental and leasing	1,067	23,965	4.45
54	Professional and technical services	1,707	31,726	5.38
55	Management of companies	36	2,355	1.53
56	Administrative and waste services	2,838	147,660	1.92
61	Educational services	903	137,149	0.66
62	Health care and social assistance	6,093	176,291	3.46
71	Arts, entertainment, and recreation	432	23,849	1.81
72	Accommodation and food services	4,735	147,850	3.20
	Other services, except public			
81	administration	1,773	27,846	6.37
92	Public administration	306	131,472	0.23
	Total	30,923	1,448,420	2.13

* A subsidized employee working for more than one employer may be counted under more than one employer code.

** Preliminary 3rd month employment from 2nd quarter 2003 Covered Employment and Wages (ES-202) program.

Source: Prepared by the Arizona Department of Economic Security, Research Administration in cooperation with the U.S. Department of Labor, Bureau of Labor Statistics and the Arizona Department of Economic Security, Child Care Administration, October 2003.

Information was also released at the 3- and 4-digit level of industry detail. Some of that information is summarized in Exhibit 1.9. This exhibit provides a ranking of industries based on share of subsidized employees for all 3-digit industries with at least 100 subsidized employees and a share of subsidized workers of at least 3 percent.

Exhibit 1.9
Detailed Industries with Highest Shares of
Workers Receiving Child Care Assistance*

NAICS		Number of	Total	Subsidized
Code	NAICS Title	Subsidized Employees	Employment	as a Percent of Total
812	Personal and laundry services	876	9,844	8.90
425	Electronic markets and agents and brokers	121	1,403	8.62
323	Printing and related support activities	183	2,294	7.98
624	Social assistance	1,609	24,208	6.65
531	Real estate	817	12,584	6.49
811	Repair and maintenance	519	8,435	6.15
621	Ambulatory health care services	3,426	60,925	5.62
541	Professional and technical services	1,707	31,726	5.38
453	Miscellaneous store retailers	573	11,774	4.87
488	Support activities for transportation	149	3,405	4.38
442	Furniture and home furnishings stores	227	5,273	4.30
448	Clothing and clothing accessories stores	478	11,496	4.16
236	Construction of buildings	273	6,568	4.16
332	Fabricated metal product manufacturing	188	4,935	3.81
423	Merchant wholesalers, durable goods	682	18,300	3.73
722	Food services and drinking places	3,913	112,219	3.49
339	Miscellaneous manufacturing	182	5,337	3.41
238	Specialty trade contractors	1,100	34,433	3.19
424	Merchant wholesalers, nondurable goods	393	12,963	3.03
447	Gasoline stations	416	13,734	3.03
484	Truck transportation	180	5,971	3.01
813	Membership associations and organizations	284	9,421	3.01

* Industries shown are 3-digit industries with at least 100 subsidized workers and a share of at least 3 percent.

Source: From data prepared by the Arizona Department of Economic Security, Research Administration in cooperation with the U.S. Department of Labor, Bureau of Labor Statistics and the Arizona Department of Economic Security, Child Care Administration, October 2003.

Chapter 2: Economic Impact of the Child Care Industry

Employment Provided by the Industry

The ECE sector is complex. It consists of for-profit, non-profit and publicly funded establishments and includes child care centers, approved home-based providers, school-age child care, and part-time preschool programs such as Head Start, prekindergarten and nursery schools. There are also many self-employed home providers who are not registered or licensed and, consequently, are difficult to count. There are several official sources of information on employment in the ECE sector, but these data typically undercount the size of the sector. Licensing data provide a more accurate estimate of the number of providers and their employees.

In the government's official statistics, child care activities are dispersed across a number of industry categories and are not fully captured in any one of them. One category that is dedicated solely to child care activities is SIC 8351, or NAICS 624410 in the new North American Industry Classification Code. This category is referred to as "Child Day Care Services" and consists of "establishments primarily engaged in care of infants or children, or in providing prekindergarten education, where medical care or delinquency correction is not a major element. These establishments may or may not have substantial education programs and may care for older children when they are not in school. Establishments providing babysitting services are classified in Industry 7299. Head Start centers operating in conjunction with elementary schools are classified in Industry 8211." Statistics in this category cover all privately-operated child day care centers, nursery schools and preschool centers but do not include centers operated in conjunction with public schools. Family child care homes are not included as a category of service in any industry code.

Recent estimates of employment in the Arizona ECE sector are provided in Exhibit 2.1. One official source of information on employment is from the Bureau of Labor Statistics' *Covered Employment and Wage Data (ES-202)*. These data are derived from surveys of firms and workers covered by unemployment insurance legislation. Major exclusions are self-employed workers and small establishments. According to these data, there were 11,572 workers employed in Arizona ECE establishments in 2001.

The other major official source of information on employment is the U.S. Census Bureau's *County Business Patterns*. According to this information, there were 10,326 employees in the ECE sector in 2001. Not included in these figures are self-employed individuals and most government employees.

As part of its IMPLAN input-output software, the privately-operated Minnesota Implan Group, Inc. (MIG) maintains a comprehensive regional database. MIG uses data from the Bureau of Economic Analysis' *Regional Economic Information System (REIS)* to supplement and provide control totals (at the 2-digit level) for state ES-202 data. The REIS data are the most inclusive available and contain information on self employment.

Based on information in the IMPLAN database, the Arizona ECE sector had employment of 11,964 in 2000.

The most accurate and comprehensive estimates of employment in the child care sector come from occasional surveys of registered and licensed operators by state agencies. Exhibit 2.1 shows results from the *2001 Arizona Wage and Benefit Survey of Child Care / Early Education Center Based Personnel* conducted for the Governor's Division for Children by the Maricopa County Office of Research and Reporting. The survey covered center-based personnel in state-funded preschool, Head Start, non-profit and for-profit child care programs. Included were all centers licensed by the Arizona Department of Health Services Office of Child Care Licensure. It included programs at public schools. Employees counted are teachers, assistant teachers, teacher directors and administrative directors. Excluded were office workers and non-teaching staff such as custodians, cooks, receptionists, etc. According to the survey results, there were a total of 19,328 employees in Arizona center-based child care facilities in 2001. Of these, 12,561 (or 65%) were full-time employees. When broken down by type of center, 30% of the total number of employees were in independent centers, 18% worked in chain-based centers, 9% were in Head Start facilities, 17% were in public schools and 26% worked in other non-profit centers.

Exhibit 2.1
Measures of the Size of the Arizona Child Care Workforce
Circa 2001

	Number of Employees
1. BLS Covered Employment and Wage Data (ES-202) (Data for 2001: NAICS 624410)	
Private	11,062
Local government	446
Federal government	64
Total	11,572
2. County Business Patterns, U.S. Census Bureau (Data for 2001: NAICS 624410)	10,326
3. IMPLAN Data Base (Data for 2000: Sector 499)	11,964
4. Arizona Wage and Benefit Survey (Data for 2001)	
Independent	5,800
Chain	3,556
Head Start	1,721
Public Schools	3,302
Other Non-Profit	4,949
Total	19,328

Sources: Bureau of Labor Statistics; U.S. Census Bureau; Minnesota Implan Group, Inc.; "Arizona Wage and Benefit Survey of Child Care / Early Education Center Based Personnel," Conducted for the Governor's Division for Children by the Maricopa County Office of Research and Reporting, October 2001.

Wages Earned by Industry Employees

Exhibit 2.2 shows estimates of the average annual earnings of employees in the Arizona child care industry. Data from BLS ES-202 surveys indicate that average earnings per employee in 2001 were \$14,128. Information on industry payrolls obtained by the Census Bureau in its surveys of *County Business Patterns* show average annual payroll expenses per employee to be \$12,198. Information on employee compensation (including benefits) from the IMPLAN database indicate that earnings per employee were \$15,277 in 2000.

Exhibit 2.2
Average Wages in the Arizona Child Care Sector
(dollars per employee)

	Annual Earnings
1. BLS Covered Employment and Wage Data (ES-202) (Data for 2001: NAICS 624410)	\$14,128
2. County Business Patterns, U.S. Census Bureau (Data for 2001: NAICS 624410)	12,198
3. IMPLAN Data Base (Data for 2000: Sector 499)	15,277
4. Arizona Wage and Benefit Survey (Data for 2001)	16,271

Sources: Bureau of Labor Statistics; U.S. Census Bureau; Minnesota Implan Group, Inc.; "Arizona Wage and Benefit Survey of Child Care / Early Education Center Based Personnel," Conducted for the Governor's Division for Children by the Maricopa County Office of Research and Reporting, October 2001.

Average annual earnings of child care workers were also estimated using information on hourly wages collected in the 2001 *Arizona Wage and Benefit Survey*. To annualize the figures, we assumed that employees classified either as Administrative Directors, Teacher Directors or Teachers work full time (40 hours a week, 50 weeks per year). We also assumed that these employees receive benefits equal to 15 percent of their wages. Based on the average hourly wages reported in the survey, average compensation was estimated to be \$31,832 for Administrative Directors, \$23,437 for Teacher Directors and \$18,400 for Teachers. Employees classified as Assistant Teachers were assumed to be part-time, working 25 hours per week and 50 weeks per year. Assistant Teachers were assumed to receive no benefits. Average annual wage income for this group was estimated to be \$9,025. Finally, using information from the survey on number of employees by job classification, average compensation in the Arizona child care sector was estimated to be \$16,271 per employee.

Economic Impact Analysis

The purpose of economic impact analysis is to trace the full impact, direct and indirect, of an industry on jobs and incomes in a local economy. An industry contributes directly to the economy by hiring workers and purchasing goods and services from other local businesses. Less obvious but no less significant are the indirect or so-called

multiplier effects that arise when a business' immediate suppliers place upstream demands on other producers and when workers either directly or indirectly associated with the industry spend a portion of their incomes in the local economy. Spending out of the income generated during the various stages of this process continues to circulate through the economy until it is dissipated through "leakages" in the form of savings or payments for goods and services from outside the local economy. In the end, the cumulative changes in incomes and employment are a multiple of the initial direct effects.

Estimates of economic impacts were made using an Arizona-specific version of IMPLAN, an input-output model used widely by researchers throughout the United States. The study area for the analysis was the state of Arizona. Impacts refer to jobs and incomes generated somewhere in the state. Impacts are reported in terms of four economic variables: output, value added, labor income and employment. Output is synonymous with spending or gross receipts. Value added is a broad measure of income consisting of employee compensation (wages, salaries and benefits), proprietor income, property income and indirect business taxes. Value added is synonymous with gross state product. Labor income is the sum of employee compensation and proprietor income. Employment is a count of both full- and part-time jobs.

In the analysis reported in this section, multiplier effects were calculated using so-called "Type II" multipliers. In this kind of analysis, indirect impacts are limited to those arising from interindustry linkages (i.e., when one business buys goods or services from another business) and household spending out of the earnings generated either directly from the child care industry or through the multiplier process. In the next section, we will consider the impacts arising from the effect the child care industry has on state and local government tax revenues.

The Type II economic impact multipliers used in this study are shown in Exhibit 2.3. For purposes of comparison, we also report the multipliers used in a recent study of the California child care industry. Economic impact multipliers represent the ratio of the total impact to the direct impact. For example, once multiplier effects are included, employment of 1,000 workers in the child care industry can be associated with a total of 1,520 workers being employed somewhere in the state. Economic impact multipliers are larger the larger and more diverse is a state's economy. This is because there are fewer leakages in the form of imports. In a small state, many goods and services are not available from local businesses and so must be purchased from out-of-state suppliers. Money spent on imports generates no local income or jobs and is not recycled through the local economy. Predictably, multipliers for California are uniformly larger than they are for Arizona.

Exhibit 2.3
Economic Impact Multipliers: Arizona vs California

Economic Variable	Arizona	California
Output	1.96	2.51
Value Added	2.45	3.06
Labor Income	2.06	2.43
Employment	1.52	1.68

Sources: Multipliers for Arizona are the Type II multipliers provided in IMPLAN.
 Multipliers for California are the Type II multipliers reported by M Cubed in
 "The Economic Impact of the Child Care Industry in California," prepared
 for the National Economic Development and Law Center, June 2001.

When comparing industries, multipliers tend to be large in industries with important interindustry linkages and, in the case of employment multipliers, in industries that pay high wages. Relative to other industries in Arizona, the child care industry relies heavily on other businesses and suppliers for goods and services necessary for daily operations. As a percent of payroll expenses, expenditures on inputs from other businesses (including rent, social services and educational materials) are 175% in the child care industry but only 122% in the general Arizona economy. However, the child care industry pays relatively low wages, and this limits the size of the multiplier effects arising from its operations. Average earnings in the child care industry are only 43% of the statewide average. In general, multipliers tend to be smaller in service industries than in manufacturing or mining. For example, with average compensation of almost \$100,000 per worker, the semiconductor industry has an employment multiplier of 3.26, compared with an employment multiplier of 1.52 for the child care industry.

Our estimates of the economic impacts of the Arizona child care industry are shown in Exhibit 2.4. The impacts were calculated assuming that a total of 19,328 workers are employed in the industry, as per the estimate from the *Arizona Wage and Benefit Survey*. Column (1) shows the direct impacts of the industry per employee, as reported in the Arizona database files of IMPLAN (expressed in 2001 dollars). Output or gross receipts per employee are \$44,923. Of this amount, \$17,492 represents value added accruing to employees, as property income or money paid out in indirect business taxes. The difference between gross receipts and value added is expenditures on inputs from other suppliers. Labor income per employee is estimated to be \$15,666.

Exhibit 2.4
Economic Impact of Arizona Child Care Industry
 (Estimates for 2001)

Economic Impact Measure	Direct Impact per Employee (in \$) Col. (1)	Direct Impact (in mill \$) Col. (2)	Indirect Impact (in mill \$) Col. (3)	Total Impact (in mill \$) Col. (4)
Output	\$44,923	\$868	\$834	\$1,702
Value-Added	\$17,492	\$338	\$490	\$828
Labor Income	\$15,666	\$303	\$321	\$624
Employment (number of jobs)	1	19,328	10,051	29,379

Source: Center for Business Research using IMPLAN

The second column of Exhibit 2.4 shows the direct impacts of the industry calculated by multiplying the impacts per employee by the total number of employees. Thus the Arizona child care industry in 2001 is estimated to have generated gross receipts of \$868 million and labor income for employees of \$303 million, all of this before multiplier effects are considered. Column (3) shows our estimates of the multiplier effects of the industry, effects associated with linkages to other industries and the spending of labor income by households. These numbers are derived by combining the information on multipliers shown in Exhibit 2.3 with the direct estimates in Column (2). The total economic impacts are shown in Column (4). When multiplier effects are included, the Arizona child care industry in 2001 was responsible for \$1,702 million in output or gross receipts, \$828 million in value added or gross state product, \$624 million in labor income and 29,379 jobs.

Fiscal Impacts

An industry the size of the child care industry generates a significant amount of revenue for state and local governments. Exhibit 2.5 presents our estimates of the impact the industry has on Arizona state and local tax revenues. The estimates include the direct taxes paid by the industry and its employees as well as tax revenues generated through the multiplier process. The estimates are made by starting with the ratios in FY 2000 of Arizona state and local tax revenues to total Arizona value added or labor income. For taxes whose initial burden falls on households (individual income tax, property taxes on owner-occupied housing, sales taxes on household purchases), the rates are expressed by dividing household taxes by Arizona labor income. For taxes whose initial burden falls on businesses (corporate income taxes, business property taxes, sales taxes from business purchases, etc.), the rates are calculated by dividing business tax collections by Arizona

value added. Separate rates are available for each of three types of taxes: income, property and sales. This information was collected from unpublished sources for Arizona by the Utah State Tax Commission. Once the rates are calculated, estimates of total taxes generated are made by multiplying each rate by the appropriate total economic impact measure: \$624 million in labor income for the household taxes or \$828 million in value added for the business taxes.

Exhibit 2.5
Impact of Child Care Industry on Arizona State and Local Taxes
 (Estimates for 2001, in millions of dollars)

Initial Burden Falling on:	Income	Property	Sales	Total
Businesses	\$2.7	\$9.2	\$10.2	\$22.1
Households	14.9	11.5	26.8	\$53.2
Total	\$17.6	\$20.7	\$37.0	\$75.3

Source: Center for Business Research using estimates of Arizona tax burdens compiled from state sources by the Utah State Tax Commission, Economic and Statistical Unit, "Western States' Tax Burden: FY 2000"

Our estimates indicate that the child care industry is responsible for a total of \$75 million in state and local tax revenue. Of this total, 23% accrues in the form of income taxes, 27% in property taxes and 49% in sales taxes.

New taxes generated in this way will be spent, of course, by state and local governments on public schools, roads, police and fire protection, etc. Thus another round of spending will occur generating economic impacts that were left out of the calculations shown in Exhibit 2.4. Using IMPLAN multipliers for state and local government spending, we estimate that the economic impacts arising simply from the recycling of new state and local tax revenues are \$129 million in output, \$109 million in value added, \$87 million in labor income and 2,470 jobs.

Support for Labor Force Participation

Market-provided child care has grown since WWII in large part as a response to the demand for child care services by parents with young children who wish or need to work. The industry has come to play a vital role in supporting the work efforts of millions of Americans. In this section we estimate the number of employed primary caregivers in Arizona who have children of preschool age and use some kind of paid child care arrangement. We then estimate the net income they are able to earn by calculating their

gross earnings from employment and then subtracting an estimate of their paid child care costs. This provides an alternative economic impact measure of the child care industry, one that highlights the role played by the industry in supporting the Arizona workforce.

Exhibit 2.6
Number of Employed Primary Caregivers with Children under 6 Years,
by Family Type and Work Status
 (Estimates for 2000)

Family Type / Work Status	Number
Married-couple, part-time	71,095
Married couple, full-time	54,515
Single father, part-time	4,671
Single father, full-time	13,433
Single mother, part-time	10,958
Single mother, full-time	15,834
Total	170,505
Number using paid care (60% of total)	102,303

Source: U.S. Census Bureau, Census 2000

Notes:

1. Total number of employed primary caregivers in married-couple families and families with female householder, no husband present equals number of employed females with children under 6 years. Allocation between two family types made using number of families by type with children under 6 years (no condition of employment).
2. Number of employed single fathers with children under 6 years computed as number of single fathers with children under 6 years (no employment condition) times percent of children under 6 years living with one parent/father who is in the workforce times ratio of employed to members of workforce among male householders with no wife present.
3. Breakdown of employment into part-time and full-time status made using number of families by work status (no condition on presence of young children). These are very similar to national figures cited by M. Cubed, The National Economic Impacts of the Child Care Sector.

Exhibit 2.6 shows estimates from the 2000 Census of the number of primary caregivers in Arizona who are employed and have children ages 0-5. The estimates are broken down by family type and work status. For married-couple families with both spouses working, the primary caregiver is assumed to be the female. There were a total of 170,505 employed primary caregivers with young children in 2000. Of these, 125,610 (or 74%) were in married-couple families. There were 44,895 working single parents with children under 6 years of age. Slightly less than half (49%) of all employed primary

caregivers worked full time. Following Census definitions, full-time workers are those working 35+ hours per week and at least 50 weeks per year.

National survey data suggest that approximately 60% of working families with young children use some kind of paid child care arrangement (Giannarelli and Barsimantov 2000, p.4). Assuming this proportion is representative of the situation in Arizona, we estimate that there are 102,303 employed primary caregivers in Arizona using paid child care to help with their preschool children.

Exhibit 2.7
Gross Earnings of Employed Primary Caregivers with Children under 6 Years

Family Type / Work Status	Number of Workers	Earnings per Worker (in thous \$)	Total Earnings (in mill \$)
Married-couple, part-time	71,095	\$14.2	\$1,010
Married couple, full-time	54,515	31.9	1,739
Single father, part-time	4,671	21.2	99
Single father, full-time	13,433	46.0	618
Single mother, part-time	10,958	14.2	156
Single mother, full-time	15,834	31.9	505
Total	170,505		4,126
Those using paid care (60% of total)	102,303		\$2,476

Source: U.S. Census Bureau, Census 2000

Notes:

1. Earnings per worker by work status computed for all workers (no condition on presence of young children).
2. Primary caregiver assumed to be female for all married-couple family.

Exhibit 2.7 provides estimates of the gross earnings of Arizona workers who are primary caregivers with young children. The estimates are made using national figures on mean earnings of men and women by work status. The estimates indicate that by using some kind of child care arrangement for their children, formal or informal, the more than 170 thousand employed primary caregivers in Arizona are able to earn a total of \$4.1 billion in income. Assuming that 60% of these families use paid child care, the numbers indicate that the formal ECE industry allows 102,303 primary caregivers to be employed and to earn \$2.5 billion in income.

To calculate the net income generated by working parents with young children, we need to deduct from gross income an estimate of paid child care costs. To calculate total paid care costs, we first estimate the number of children aged 0-5 by work status of the primary caregiver and then multiply by average child care costs for full- or part-time care. Child care rates are based on the *Arizona Child Care Market Rate Survey 2000*.

Estimates of child care expenses are shown in Exhibit 2.8. The total cost for all employed primary caregivers using paid care arrangements is estimated at \$557 million.

Exhibit 2.8
Paid Care Costs for Children under 6 Years

Family Type / Work Status	Number of Children	Annual Cost of Child Care (\$ per child)	Total Cost (in mill \$)
Married-couple, part-time	75,068	\$3,458	\$156
Married couple, full-time	57,561	5,060	\$175
Single father, part-time	7,780	3,458	\$16
Single father, full-time	22,375	5,060	\$68
Single mother, part-time	22,042	3,458	\$46
Single mother, full-time	31,851	5,060	\$97
Total	216,677		\$557

Notes:

1. Calculations assume that 60% of the young children in working families are in paid child care arrangements.
2. Number of children under 6 years with primary caregivers in labor force directly Available. Adjustment for employment status of parents made using data on number of families by type and employment status (no condition on presence of young children). Adjustments for full- vs part-time work status made as in Exhibit 2.7.
3. Annual costs of paid care estimated from information in *Child Care Market Rate Survey 2000*. Average daily market rates were \$20.24 for full-time care and \$13.83 for part-time care. These averages were calculated assuming 10% of children were under one year of age, that 30% were 1 or 2 years old, and that 70% were either 3, 4 or 5 years of age.

The net income generated for Arizona residents when paid care arrangements are used to enable primary caregivers to work either part- or full-time is estimated to be \$1.9 billion. This is more than six times the size of the labor income paid directly to people employed in the child care industry. The economic role the child care industry plays in supporting the Arizona workforce is then much more significant than its role as a job-creating industry.

Just as multiplier effects arise when child care industry employees recycle income back through the local economy, so do employed primary caregivers create multiplier effects by spending a portion of their incremental net income in the local economy. Assuming that 80% of the \$1.9 billion in net income is spent on consumer goods and services (the nationwide ratio of personal consumption expenditures to personal income), there will be additional rounds of economic activity that generate indirect impacts of \$2.2 billion in output, \$1.1 billion in value added, \$.6 billion in labor income and 19,648 jobs.

The total impacts associated with the workforce effects of the paid child care industry are shown in Exhibit 2.9. Including both multiplier effects and the estimated 102,303 jobs held by primary caregivers along with their net income of \$1.9 billion, the total impacts amount to \$4.1 billion in output, \$2.9 billion in value added, \$2.5 billion in labor income and 121,951 jobs.

Exhibit 2.9
Net Earnings and Economic Impact of Employed Primary
Caregivers Who Use Paid Child Care
 (Estimates for 2001, in millions of dollars)

Net Earnings Calculations:

Gross earnings of primary caregivers using paid care	\$2,476
Costs of paid child care	\$557
Net earnings	\$1,919

Economic Impacts:

Output	\$4,080
Value-Added	\$2,927
Labor Income	\$2,513
Employment (number of jobs)	121,951

Notes:

1. Economic impacts represent the sum of direct impacts of employed primary caregivers plus multiplier effects arising from consumer spending out of direct net earnings. Direct impacts on output, value added and Labor income are all equal to the net earnings figure of \$1.9 billion.

Total Economic Impact of the Child Care Industry

All of the economic impacts identified in this chapter are summarized and added up in Exhibit 2.10. Three separate impacts have been identified: (1) the industry itself as an employer and purchaser of goods and services from other Arizona businesses; (2) the state and local tax revenues generated by the industry and their impact when tax revenues are spent by local governments; and (3) the role of the industry in supporting labor force participation by family members with young children. When all three types of effects are added together, the child care industry in Arizona is estimated to generate \$5.9 billion in output, \$3.9 billion in value added, \$3.2 billion in labor income and 153,800 jobs. The total value added generated is 2.5% of the Arizona gross state product, and the total jobs created are 5.4% of total Arizona employment.

Exhibit 2.10
Total Economic Impact of Paid Child Care Sector
 (Circa 2001)

Economic Impact Measure	Effects from Industry Operations	Effects from State & Local Taxes	Workforce Effects	Grand Totals
Output (in \$ mill)	\$1,702	\$129	\$4,080	\$5,911
Value-Added (in \$ mill)	\$828	\$109	\$2,927	\$3,864
Labor Income (in \$ mill)	\$624	\$87	\$2,513	\$3,224
Employment (number of jobs)	29,379	2,470	121,951	153,800

Source: Center for Business Research

Chapter 3: Public Policy and Early Care and Education

The Case for Public Support of ECE

A case for government support of early childhood education can be made on the grounds of *equity*. There is increasing evidence that if a government wishes to reduce income inequality among adults, the most cost-effective approach is to focus on developing social and learning skills in people at a very early age, before they enter the public school system, rather than trying to upgrade their job skills later in life. Recent studies of early childhood investments indicate that early interventions for children from a poor socioeconomic background can have significant and lasting effects on learning skills, social skills and motivation. Children who participate in enriched early childhood programs are more successful in school and earn more income throughout their working lives. In contrast, efforts to train and upgrade job skills in adult males and youths have generally been ineffective. Training programs for adult women have had only moderate success in raising earnings.

An argument for public support of early care and education can also be made for reasons of economic *efficiency*. Some parents may under-invest in their children if they are liquidity-constrained, lacking the financial resources to pay for high quality care. They are unable to borrow against the future incremental earnings of their children and so may not be able to finance what could prove to be an investment with a very high return. The presence of liquidity constraints would only justify financial assistance to certain parents, not public delivery or regulation of child care services. However, there is mounting evidence that parents find it difficult to evaluate the quality of care at many child care centers; and even for those that are informed, high quality care is hard to find. In this case, the government may be able to improve upon the outcome by developing, supporting and enforcing higher standards for all care.

Another type of efficiency argument for public support of ECE involves externalities that may be associated with negligent care of young children. Children who do not understand how to get along in school and society impose costs on others, both in terms of classroom disruption and grade retention when they are young and an increased likelihood of antisocial or criminal behavior when they become adults. Externalities may represent one of the most effective arguments for public support of child care, since the rest of society stands to benefit (quite apart from the child) from public investments in early care through reduced crime and lower tax burdens.

In his assessment of what we know about how to best promote human capital development through public policy, Nobel prize winning labor economist James Heckman draws this principal conclusion: At current levels of spending on human resources in America and in many European countries, "the returns to investment in the young are quite high" and "efficiency would be enhanced if human capital investment were reallocated to the young" (Heckman 2000a, p.8).

Selected Review of Early Intervention Programs

Since the mid 1960s, there have been dozens of early childhood enrichment programs aimed at helping children who are at risk improve their learning skills so that they can begin school on a more equal footing with other children. Some of the programs have been small-scale model programs, while others (such as Head Start) have been large-scale public programs. The programs differ in the delivery setting (center, school, home), in the primary target (child, parent), in intensity and duration, and in curriculum content, staff training and staff-child ratios. These programs may include developing parenting skills, but that is not their primary focus.

Child enrichment programs are evaluated on the basis of a number of different outcomes, including various measures of cognitive development, frequency of school remedial services, criminal and delinquent behavior, and adult educational and earnings attainment. Studies generally indicate that any gains in intellectual development, such as IQ and achievement in math and reading, tend to fade out. For example, a report by the Consortium for Longitudinal Studies concludes that early IQ gains erode within 3 years of school entry and academic gains erode within 5-6 years (Lazar et al., 1982). However, the programs do have lasting effects on educational attainment and decreasing the likelihood of criminal behavior.

Most of the evidence on the long-term benefits of early intervention is drawn from four programs: the Perry Preschool Project, the Carolina Abecedarian Project, the Chicago Child-Parent Centers and Head Start. The first two programs were carried out on a very small scale. They are highly regarded programs, however, because of their experimental design, low attrition and long-term follow-up of subjects. Our review of early intervention programs will focus on these four. For a broader review of studies of early intervention programs, see Karoly, et al. (1998) and Currie (2001).

Perry Preschool

The Perry Preschool program was conducted in Ypsilanti, Michigan over the period 1962-67. The program enrolled a total of 123 African-American children aged 3-4 years. Subjects selected had scored low on socioeconomic status and had an IQ of less than 85. The program was of high quality. The in-class teacher-student ratio was 1:6, and all teachers were certified public school teachers trained in child development. The program provided center- and home-based services and involved both the child and the mother. Children attended half-day sessions, 5 days a week for 2 academic years. There were also weekly 1.5 hour home visits to involve both the mother and child in educational activities. The cost of the program has been estimated at \$7,261 per child per year, in 1992 dollars (Barnett 1996, p.20). Using the GDP deflator, this would be equivalent to \$8,736 in 2002 dollars.

The Perry Preschool program had an experimental design, with children randomly assigned to “treatment” or control groups. This ensures that differences in measured outcomes observed later in life can be ascribed to the program itself. Subjects have been

followed throughout their lives, with the most recent observations on subjects at age 27. The principal findings from studies of subject data are summarized below. For more information, see Schweinhart et al. (1993).

Cognitive development: By the end of the program, participating children had IQ scores that exceeded those from the control by an average of 11 points. However, these differences disappeared by the second grade. Achievement test scores for program participants remained significantly higher than the control group through age 14. Source: Schweinhart, et al. (1993), pp. 66-70.

Special school services: Members of the program group spent significantly fewer school years in programs for educable mental impairment (1.1 vs. 2.8 years). For all types of special services (educable mental impairment, emotional impairment, learning disability, speech and language impairment, disciplinary, etc.), the program group spent 1.3 fewer years than did the non-program group (3.9 vs. 5.2 years). Source: Schweinhart, et al. (1993), p. 62.

Educational attainment: The program group completed almost a year more of schooling than did the non-program group (11.9 vs. 11.0 years). Treated subjects also had a higher rate of high school graduation or the equivalent (71% vs. 54%). Results were much stronger for females than for males. Program-group females had a significantly higher level of schooling (12.2 vs. 10.5 years) and significantly higher rate of high school graduation or the equivalent (84% vs. 35%). Program-group males, however, did not differ noticeably in either high school graduation or highest level of schooling. Source: Schweinhart, et al. (1993), pp. 58, 64.

Employment and earnings: When interviewed at age 27, subjects did not differ noticeably in their rate of employment over the previous 5 years or in months of unemployment during the previous 2 years. Employed members of the program group did, however, have significantly higher monthly earnings than employed no-program members (\$1,556 vs. \$1,251 in 1990 dollars, or using the GDP deflator, \$1,987 vs. \$1,598 in 2002 dollars). When broken out by gender, the earnings differential of employed program males was larger (at 39%) and more statistically significant than the earnings differential of employed program females (only 15%). These results run counter to the findings for educational attainment. Source: Schweinhart, et al. (1993), pp.99-105.

Crime and delinquency: Group differences in social responsibility, as measured by arrests and crimes, were very strong and represented one of the most important findings of the Perry study. According to police records collected when participants were 27-32 years old, the program group averaged significantly fewer lifetime (juvenile and adult) criminal arrests (2.3 vs. 4.6 arrests). Also, significantly fewer program-group members were frequent offenders, i.e., arrested 5 or more times in their lifetimes (7% vs. 35%). Group differences were especially strong for males. As compared with no-program males, treated males had significantly fewer lifetime arrests (3.8 vs. 6.1 arrests) and were less likely to be frequent offenders (12% vs. 49%). Source: Schweinhart, et al. (1993), p.83.

Carolina Abecedarian

The Carolina Abecedarian project involved a sample of 4 cohorts of 28 African-American children chosen from a small North Carolina town over the period 1972-77. Subjects were selected using a high-risk index based on parental education, income and IQ. The program schedule was unusually long and comprehensive. Children received center-based care and education services 8-9 hours a day, 5 days a week, and 50 weeks a year from infancy until 5 years of age. The ratio of infants to caregivers was 3:1. This ratio was gradually raised to 6:1 by preschool. When expressed in 2002 dollars, the annual costs per child were \$13,445 (Masse and Barnett (2003), p.9).

The Abecedarian project also had a random experimental design. The most recent follow-up of subjects has been through age 21. Some of the principal findings to date are summarized below.

Cognitive development: Unlike most other interventions, the Abecedarian program produced highly persistent gains in IQ and academic achievement. By the end of preschool intervention, the treated group had significantly higher IQ scores (a 7 point difference). This IQ differential remained significant through age 12 but did lose significance by age 15 (Karoly, et al. (1998), p. 53). At age 15, the program group had significantly higher scores in reading and mathematics. Achievement in reading remained slightly higher at age 21. In mathematics, the advantage of the preschool group showed no tendency to diminish. Source: Campbell, et al. (2002), pp. 47-50.

Special education and grade retention: By age 12, treated children had lower incidence of special education (13% vs. 48%) and grade retention (38% vs. 57%). Source: Campbell and Ramey (1994), p. 693.

Educational attainment: By age 21, there was only a small difference in the percent of participants who had graduated from high school (70% vs. 67%). However, individuals treated in preschool completed significantly more years of schooling (12.2 vs. 11.6 years). And a significantly higher percentage of program members were enrolled in a four-year college or university (36% vs. 14%). Like the Perry Preschool program, results were much more significant for women than for men. For men, there was no significant difference in years of schooling completed. Source: Campbell, et al. (2002), pp. 48, 51.

Crime: Studies have evaluated the incidence of crime among participants from age 16 to 21. Surprisingly, no statistically significant differences have been found in either the amount or types of arrests. The proportion of subjects receiving any charge at age 21 was 44.9% for the preschool group and 41.2% for the no-preschool group. Mean numbers of charges were 2.8 vs. 2.7. Mean number of arrests were 1.8 vs. 1.5. Source: Clarke and Cambell (1998), p.326.

Other programs that report more success in reducing crime and delinquency included services for parents, such as counseling on ways to manage children's behavior. This type of counseling was not given to parents in the Abecedarian project. One conclusion to be drawn is that improvement in children's cognitive test scores and school achievement is no guarantee of reductions in criminal behavior later in life. It has also been noted that the school system into which the Abecedarian children graduated was a university community, with children who were well above national averages in IQ and academic achievement. Thus any advantage a treated child may have had over the control group may have been insignificant in the context of their broader peer group, and this may have been a source of frustration.

Maternal productivity and earnings: Experimental group mothers had higher educational attainment and held better paying jobs when their children were age 5. Mothers were more likely to have a skilled job when the child was 21. Indeed, group mothers had an earnings advantage at almost all times since program entry, with an average annual differential of \$3,750. No such effect on maternal earnings was found in the Perry Preschool data. This may have been due to the fact that Perry did not offer full-day year-round care. Source: Masse and Barnett (2003), p. 29.

Chicago Child-Parent Centers

The Chicago Child-Parent Center (CPC) program is a large-scale, federally funded preventative intervention program that was started in 1967. Long-term effects of the program have been evaluated by Reynolds, et al. (2001) using longitudinal data from a same-age cohort of 1,539 low-income (93% African-American) children born in 1980 who attended alternative early childhood programs in 25 sites in Chicago from 1985-1986. Of this group, 989 children received comprehensive education and family-support services through the Child-Parent Centers. Program participants attended an enriched half-day preschool program for two years starting at age 3 and then half- or full-day kindergarten. Some subjects went on to receive supplemental school-age services through the third grade. The comparison group consisted of 550 children who attended full-day kindergarten but did not participate in CPC preschool. Adult-to-child ratios in the CPC program averaged 1:8 for the preschool program. The cost of the program for one year of preschool was \$4,350 per child (in 1996 dollars).

Subjects were chosen in a nonrandom fashion. Researchers have used econometric techniques to try to control for the nonrandom participation of children. The following results are reported by Reynolds, et al. (2001).

Cognitive development: By age 9, those who participated in the preschool program had significantly higher reading and math achievement scores. The differences did diminish over time. By age 14, differences in scores remained statistically significant for math but not for reading. Results indicate that improvements in achievement scores are greatest when the child participates in both the preschool and primary grade components of the program.

School remedial services: Preschool participation was associated with significantly lower rates of grade retention (23.0% vs. 38.4%) and special education placement (14.4% vs. 24.6%).

Educational attainment: Preschool participants had a significantly higher rate of high school completion by age 20 (49.7% vs. 38.5%).

Crime: Based on official juvenile arrests through age 18, rates of arrest were 16.9% for the preschool group and 25.1% for the comparison group. Preschool participants also had lower rates of multiple arrests (9.5% vs. 12.8%) and violent arrests (9.0% vs. 15.3%).

Head Start

Head Start is a public preschool program primarily serving at-risk 4-year olds. Begun in 1965, Head Start now serves over 900,000 children nationwide. The program is run at the local level, subject to Federal guidelines. Head Start is not an entitlement but is funded by appropriation, so a significant number of eligible children are not served. It is estimated that the program currently serves about two-thirds of all eligible children. The program provides part-day services, 34 weeks a year.

Data analysis is complicated by the nonexperimental nature of participant selection. Favorable outcomes may be the result of self-selection bias, where a disproportionate number of unusually motivated children and parents participate. Analysis is also complicated by the fact that the nature of the program and its curriculum content has changed over time and varies across locations. Many studies of the short-term effects of Head Start have found only slight evidence of program effectiveness. The weakness of results is often attributed to the short period of intervention (usually only 8 months) and a staff that is less qualified than ones used in small-scale model programs like Perry Preschool.

Cognitive development: Reviews of studies (hundreds of reports and dozens of studies) of the effectiveness of Head Start in improving test scores later in school generally conclude that Head Start confers short-term benefits but that these fade out in elementary school within two to three years (Garces, et al., 2002).

As proven in longitudinal studies of other programs, it is possible for early education programs to have important long-term effects on educational attainment and social behavior even without lasting effects on IQ or achievement tests. Recent attempts to study long-term effects have used statistical techniques and special samples to control for other factors.

Garces, Thomas and Currie (2002) used data from the Panel Survey of Income Dynamics where in 1995 a supplement was added inquiring about participation in Head Start and other preschools. These data provide measures of economic and social success of Head Start participants when they have reached adulthood. Because the data stretch

back over 25 years, the authors are able to control for family background and other environmental factors. Incremental contributions of Head Start are identified by using both these observed background characteristics (parents' education, family income, family size, etc) and observations on siblings to control for unobserved family characteristics.

Educational attainment: Whites who attend Head Start are 20 percentage points more likely to complete high school than are nonparticipant siblings. They are 28 percentage points more likely to attend college than siblings who attend no preschool. And they are 20 percentage points more likely to attend college than siblings who attend another kind of preschool.

Crime: African-American children who attend Head Start are 12 percentage points less likely to have been booked or charged with a crime than siblings who did not.

Review of Cost-Benefit Studies

There have been two formal cost-benefit studies of early childhood education programs: a study by Barnett (1996) of the Perry Preschool Program and a study by Masse and Barnett (2003) of the Carolina Abecedarian Project. The methodologies and findings of these studies are summarized below.

Barnett/Perry Preschool

Benefits measured in this study include both those that accrue to participants in the form of higher lifetime earnings and those that accrue to taxpayers and other societal members. Societal benefits that were measured are those that derive from reduced crime (e.g., lower victim costs and lower criminal justice system expenses), from avoidance of special education and grade retention, and from reduced welfare assistance. Earnings impacts through age 27 were evaluated using self-reported earnings data. Earnings effects beyond age 27 were projected on the basis of educational attainment using national data on the relationship between earnings and education. To evaluate the effect of the program on crime, individual crime histories were constructed for each participant using criminal justice system records. Projections beyond the years covered by official records were based on national data on arrests by age. Two kinds of benefits were measured that relate to crime reduction: lower victim costs (including direct losses, pain and suffering and risk of death) and reduced operating costs in the criminal justice system, which include police, prosecution, court costs and corrections.

The principal results of the Perry cost-benefit study are summarized in Exhibit 3.1. When expressed in 1992 dollars, the present value of all benefits was \$108,002 per participant. This is 8.7 times the size of average participant program costs, which were \$12,356. Alternatively viewed, the real internal rate of return on the Perry project was more than 11%. This compares favorably with real returns on stocks, which averaged 6.8% over the period 1963-1993. For taxpayers alone, the benefits were \$88,432 if crime victims are included, or \$30,847 without crime victims, only justice system cost savings.

Exhibit 3.1
Cost-Benefit Analysis of Perry Preschool
 Source: Barnett (1996)

- When expressed in 1992 dollars, the present value (discounted at 3%) of all societal benefits is \$108,002 per participant. This compares with a program cost of \$12,356. The ratio of total societal benefits to costs is 8.7 to 1.
- For taxpayers alone, the benefits per participant are \$88,432, and the ratio of benefits to costs is 7.1 to 1.
- The most important categories of benefits, with benefits as expressed as a percent of program costs, are as follows:

Crime victims	466%
Job compensation	245%
Justice system	104%
K-12 education costs	56%

Benefits accruing to potential crime victims represent the single greatest benefit of the program, with avoided victim costs being almost 5 times as large as program costs. Incremental earnings received by participants were 2.5 times the size of program costs. Other significant benefits include avoided criminal justice system costs and reduced costs of special education and grade retention.

Masse and Barnett/Abecedarian

Most of the benefits measured in this study accrue to program participants and their mothers. These benefits include higher participant earnings, higher maternal earnings and increased life expectancy associated with a lower probability that the child will smoke. Societal benefits that were measured include reduced K-12 education costs and reduced welfare assistance. Crime costs were not considered since data analysis has failed to identify a significant effect of the program on criminal and delinquent behavior.

One of the most important benefits found in the Abecedarian project is the favorable impact program participation had on a mother's lifetime earnings. Experimental group mothers had higher educational attainment and higher earnings when their children were 5 years old. Data on self-reported earnings indicate that program group mothers also had higher incomes when they were 23, 35 and 41 years of age. Masse and Barnett conjecture that these impacts were made possible because of the full-time quality care provided in the Abecedarian project. With stable and high quality care available for their children, mothers were better able to focus on their employment. When such care is not provided, as in the Perry program, maternal earnings effects are not as significant.

Participant earnings were projected solely on the basis of educational attainment at age 21. Future education levels were predicted using national studies of the likelihood that a person will achieve a certain education level given his most recently observed education status.

The major results of the Abecedarian cost-benefit study are shown in Exhibit 3.2. All values are expressed in 2002 dollars. Gross program costs per participant were \$67,225. The authors estimate that the child care costs that were avoided by parents were \$31,361. Thus the incremental costs of the program were \$35,864. It is this figure against which benefits should be compared. The present value of all benefits were estimated to be \$135,546 per participant. Benefits are then 3.8 times the size of incremental costs. Because crime costs were not considered, taxpayer benefits alone fall short of costs.

Exhibit 3.2
Cost-Benefit Analysis of Carolina Abecedarian
 Source: Masse and Barnett (2003)

- When expressed in 2002 dollars, the present value of all measured benefits (discounted at 3%) is \$135,546 per participant. This compares with an incremental program cost (gross program costs minus avoided child care costs) of \$35,864. The ratio of benefits to costs is 3.8 to 1.
- Benefits from reduced crime were not considered, since researchers have failed to identify a statistically significant program effect. Without crime benefits, taxpayer benefits alone fall short of program costs.
- The most important categories of measured benefits, with benefits expressed as a percent of incremental costs, are as follows:

Maternal earnings	205%
Participant's earnings	105%
Smoking/health	50%
K-12 education costs	25%

The most significant benefits identified are those relating to maternal earnings. The present value of higher maternal lifetime earnings alone is more than twice as large as program costs. Higher participant earnings themselves slightly outweigh the incremental costs of the program. When considering both higher earnings and improved life expectancy, the benefits accruing to the participant are 1.5 times the size of program costs.

Chapter 4: Cost-Benefit Analysis of a Hypothetical ECE Program in Arizona

Defining the Program

The purpose of this section is to present a cost-benefit analysis of a hypothetical early care and education program in Arizona. Many of the response parameters will be set using research findings from the model programs surveyed earlier. But we use benchmark data specific to Arizona whenever possible. The program we consider for study is a large-scale public program with an education component that is similar in structure and intensity to the Perry Preschool model, but one that offers full-time care for working parents. Quality is essential to the effectiveness of any preschool program. Perry meets what are widely considered to be the basic requirements of an effective program (Schweinhart, et al. 1993, p. 17). If implemented today, a Perry-style program would be expensive. However, it would be much more affordable than the Abecedarian program. And in contrast to Head Start, with its large class sizes and brief period of intervention, a Perry-style program would be of sufficient quality and intensity that we could be confident that the intervention would make a significant difference in the economic and social lives of participants.

Unlike the original Perry experiment, the hypothetical program we consider for Arizona would offer full-time, year-round care for children. Researchers who have followed the Perry program admit that the lack of child care provided was a shortcoming of the original program (Barnett 1996, p. 27). Given the realities of today's economy, especially with the public's expectation that single parents and parents in poor families will work, an early childhood program that does not offer long hours of operation is not practicable. Although this feature of the program will add to costs, it is also likely to allow working parents to progress further in their careers and to generate higher lifetime earnings for them.

Target population: Children selected to participate in the program would be those with a high statistical chance of economic underachievement and of being a future burden to society, either as a welfare recipient or as someone likely to engage in criminal behavior. As in other intervention programs, children could be selected on the basis of low socioeconomic status using measures such as low family income and low educational attainment of parents.

Program intensity: As with Perry, the education component of the program would consist of half-day classroom sessions five days a week for a period of eight to nine months coinciding with the regular school calendar. Participants would enroll at age 3 and would participate for two years. This would provide roughly twice the usual period of intervention in Head Start but would be substantially briefer than the five-year period in the Abecedarian experiment.

Studies of early childhood programs generally find that for a program to be successful, parents must be involved at some level. Teachers learn from parents about a child's particular needs and, in turn, inform parents about the curriculum and the child's development. The Perry program involved weekly 1½-hour home visits between a teacher, the child and the parent. While improved parenting skills would not be a primary focus of the Arizona program, it is recognized that some consultations may be necessary for the program to be effective and that these will involve some time and money. Early intervention programs that have been successful in reducing delinquency and crime provided not only classroom development of cognitive skills but also involved parental consultations to teach basic child care skills and techniques for effective discipline.

Curriculum: The curriculum in the Perry program was based on the principles of active learning and emphasized the development of both cognitive and social skills in young children. One of the primary lessons from long-term studies of early childhood intervention programs is that economic success later in life is very often more a matter of motivation and socialization than intellectual achievement. Much of the Perry curriculum focused on social relations, including the expression of feelings, working in groups and dealing with social conflict. It is assumed that the Arizona program would be similarly balanced between cognitive and social development.

Instructional staff: Studies of effective early childhood education programs conclude that class sizes should be kept small and that the teaching staff should be trained in early childhood development and stable in their job positions (Schweinhart, et al. 1993, p. 17). The instructional staff in the Perry program consisted of four experienced public school teachers who were paid 10% above the district's standard pay scale. On average, there were 6 children for every teacher. Researchers associated with the Perry program feel that program quality can be maintained even if the number of children per teacher is raised to 10 (Schweinhart, et al. 1993, p. 33).

Child care: For the program to appeal to working parents, high quality care may have to be provided during times when the education part of the program is not in session. This would amount to half-day care for nine months out of the year and full-time care for the remaining three months.

Cost of the Program

In our estimation procedure, there are three components to the cost of operating a public early childhood education program in Arizona: (a) the cost of the instructional staff for the education part of the program, (b) other non-instructional costs associated with education, and (c) the child care component of the program. Estimates of the various costs are summarized in Exhibit 4.1.

Exhibit 4.1
Costs of Arizona Early Childhood Education Program
(costs per child, in 2002 dollars)

Instructional Staff

Assuming 1 teacher for every 10 children	\$4,242
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Other Education Costs

Administrative & support staff, school overhead, capital costs, supplies, etc.	\$1,754
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Child Care

Half-day for nine months @ \$13.00 per day and full-day for three months @ \$20.00 per day	\$3,688
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Total Costs for One Year	\$9,683
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**Present Value of Costs for
Two-Year Program**

Discounted to age 3 using 3% discount rate	\$19,084 per child
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Notes and Sources:

1. Teachers salaries from BLS State Occupational Wage Estimates; Compensation includes fringe benefits assumed to equal 20% of salary
2. Other education costs from Perry Preschool program as reported by Barnett (1996, p.20); figures adjusted for inflation using GDP price index for state and local government purchases
3. Rates for child care from Child Care Market Rate Survey 2000

To ensure program effectiveness, the teaching staff should be trained in early childhood education and should be familiar with the particular developmental problems of children in at-risk environments. To estimate the costs of obtaining a qualified instructional staff, we use figures from the Bureau of Labor Statistics on the mean salaries of Arizona workers trained to teach special education at the level of preschool, kindergarten and elementary school (SOC Code 2041). On average, these teachers had an annual salary of \$35,350 in 2001. An additional 20% was added for fringe benefits and other employer costs. Following the advice of Schweinhart, et al. we assume that effective instruction is possible if there are as many as 10 children per teacher. Using this ratio, the costs of the instructional staff are \$4,242 per child.

Other costs related to the education part of the program are estimated using the detailed figures reported by Barnett (1996) in his cost-benefit analysis of the Perry Preschool program. Non-instructional costs such as administration, support staff, school

overhead and capital costs were estimated to be approximately \$280 per child during the mid 1960s. Using the GDP price index for state and local government purchases, this would be equivalent to \$1,754 today.

The education part of the Arizona program is assumed to consist of half-day sessions offered every weekday for nine months of the year. To help support full-time working parents, the program will also offer child care services to cover the remaining hours of an eight-hour day. This amounts to half-day care for nine months and full-day care for three months of the year. We assume that families take two weeks of vacation sometime during the year and that child care services are not required then. Using data from the Arizona *Child Care Market Rate Survey 2000*, this implies an annual child care cost of \$3,688.

The total of all program costs is \$9,683 per child. Our hypothetical Arizona program is a two-year program offered to selected children aged 3-4 years. Using a 3% discount rate, the present value at age 3 of the costs of a two-year program is \$19,084 per child.

Governments are cost conscious and will look for ways to reduce the cost of operating a large-scale ECE program. Costs can be lowered significantly by providing only 1 rather than 2 years of preschool education, eliminating home visits, increasing class size or using lower-paid teaching assistants rather than certified preschool teachers whenever possible. Proponents of these kinds of program alterations should admit there might be a significant loss in program efficiency if these measures are implemented. They should be aware that the empirical literature on early childhood programs cannot say with any precision whether the programs will remain effective or to what extent their effectiveness may be reduced.

Avoided Child Care Costs

The benefits of an early childhood program are incremental in nature. They are measured relative to what would have happened had the child had an alternative child care arrangement, presumably one not as enriched as the considered program. Program costs should also be measured incrementally. The costs that should be compared with benefits are the additional costs of the program over and above whatever costs would have been incurred in the most likely alternative.

For the children targeted by our hypothetical Arizona program, the most likely alternative is care provided by either the mother herself or a relative of the child. As shown in Exhibit 1.1, the percentage of preschool children cared for by mothers or relatives is 67% for households with income less than \$25,000 and 74% for all Hispanic households. Much of this kind of care is provided without charge. To impute a value for the time and resources that are no longer required when center-based care is made available, we use the figure of \$1.34 per hour cited by Masse and Barnett (2003, p.12). This rate was based on child care payments reported in the 1990 National Child Care Survey for care provided by relatives. This figure is well below market, of course, since

relatives are willing to provide care at a subsidized rate out of a sense of family responsibility or because they derive satisfaction from caring for a child they are related to. Use of this figure to value the child care costs avoided is conservative and serves to overstate the incremental costs of the proposed Arizona program.

Using an hourly rate of \$1.34, and assuming that care would have been provided 40 hours a week for 50 weeks out of the year, we arrive at a discounted cost of avoided care equal to \$5,282 for the two-year period of the program.

Lifetime Earnings of Participating Children

The incremental impact of the Arizona ECE program on the lifetime earnings of participating children is estimated by assuming that the Arizona program will have the same effect on a child's educational attainment as did the Perry program and then calculating the resulting impact on earnings using information from the 2000 Census on the relationship between earnings and educational attainment in the Arizona population. Lifetime earnings refer to the present value of future earnings discounted to age 3 using a discount rate of 3% and expressed in 2002 dollars. Children who, because of the program, proceed farther in school generate costs, both to taxpayers and their families. These additional education costs are netted from the gains in earnings.

Educational attainment in the Arizona program is projected using Perry outcomes (see Exhibit 4.2). The Perry results are, of course, a natural reference point because the program we analyze for Arizona is fashioned after Perry. Also, the Perry results are highly credible because of the strong experimental design of the program and because the estimated impacts on educational attainment are consistent with other intervention experiments. There is, however, one shortcoming associated with Perry which serves to understate or bias downward our estimates of the effect on lifetime earnings of a similar program implemented in Arizona. All of the Perry subjects were African-American children. An early childhood program in Arizona, on the other hand, would serve a large number of Hispanic children. There is evidence that early interventions may be especially beneficial to Hispanic children (Currie and Thomas 1999), especially those who live in immigrant, Spanish-speaking families and communities. Preschool increases exposure to English and enhances cultural assimilation.

Exhibit 4.2
Percentage Distribution of Perry Children at Age 27
by Category of Educational Attainment
(males and females together, equally weighted)

Educational Attainment	Program Group (percent)	Control Group (percent)
Less than high school	27.7	49.3
High school graduate (including GED)	38.2	23.1
Some college (no degree)	30.1	27.6
BA degree	2.0	0.0
MA degree	2.0	0.0

Source: Schweinhart, et al. 1993 (fn.14, p.57)

Studies of Perry children have found that the program had a more significant effect on the educational attainment of females than it did for males. This is not a finding that is well understood or repeatedly found in other interventions, however. For example, studies of the Chicago Child-Parent Centers have found that boys may have benefited more than girls in terms of subsequent educational success (Reynolds et al., 2001, p. 2343). We follow Masse and Barnett (2003) in their cost-benefit analysis of Abecedarian and average the estimated program effects on educational attainment across both sexes.

To go from projected effects on educational attainment to effects on lifetime earnings, we use data for Arizona from the 2000 Census (PUMS 5% sample) to estimate age-earnings relationships for each of five categories of educational attainment. The categories are: some high school but no degree, a high school degree or its equivalent, some college but no degree, a bachelor's degree, and some post-graduate education. Our estimates of lifetime earnings for each category are shown in section A of Exhibit 4.3. Earnings data for the entire population were used, not just for people working full time. This accounts for any systematic effects on labor force participation of sex, age or level of schooling. Young adults are assumed to work summers if they are in school. Everyone is assumed to retire at age 65. Salary data from the Census are escalated by 20% to estimate the value of fringe benefits. Earnings are discounted to age 3 using a discount rate of 3%.

Exhibit 4.3
Effect of Arizona Early Childhood Program on
Net Lifetime Earnings of Participating Children
(in 2002 dollars, discounted to age 3 at 3%)

A. Earnings	Lifetime Earnings (Males)	Lifetime Earnings (Females)	Program Weight	Control Weight	Program	Control
Less than HS	333,565	146,334	0.277	0.493	66,466	118,295
HS graduate	470,243	259,522	0.382	0.231	139,385	84,288
Some college	576,766	332,221	0.301	0.276	136,803	125,440
BA degree	860,353	465,840	0.020	0.000	13,262	0
post-graduate degree	977,038	547,575	0.020	0.000	15,246	0
Difference in lifetime earnings (program total minus control total)	\$43,139			Totals	371,162	328,023

B. Education Costs	Costs of Education Beyond Grade 10 (both sexes)	Program Weight	Control Weight	Program	Control
Less than HS	0	0.277	0.493	0	0
HS graduate	9,686	0.382	0.231	3,700	2,237
Some college	22,814	0.301	0.276	6,867	6,297
BA degree	35,189	0.020	0.000	704	0
post-graduate degree	52,432	0.020	0.000	1,049	0
Difference in education costs (program total minus control total)	\$3,785		Totals	12,319	8,534

C. Net Lifetime Earnings

Difference in net lifetime earnings \$39,353

Lifetime earnings rise consistently with educational attainment. Since program children complete more years of schooling (e.g., are more likely to complete high school), they are projected to have higher lifetime earnings. Our estimates indicate that if a Perry-style program were implemented in Arizona, participating children would receive approximately \$43,000 more in lifetime earnings than would a child who did not participate in an enriched preschool program.

By looking only at participant earnings, we overstate somewhat the net economic benefit associated with higher educational attainment. Education consumes resources that someone must pay for—taxpayers in the case of high school education, and both taxpayers and families in the case of college-level education. There will be additional education costs associated with the education success of program children, and these should be netted out from the gross gains in earnings. The cost of a public high school education in Arizona is estimated to be \$7,200 per pupil per year. We arrive at this figure by using national estimates cited by Masse and Barnett (2003, p.20) and then adjusting for the lower salaries of Arizona public school teachers. For college and post-graduate education, we use a figure of \$10,444 per student per year, which is an average of tuition, fees and state appropriations for students at Arizona State University. The end result of these considerations is that program children generate an additional \$3,800 in education costs, discounted to the time when the child is 3 years old (see section B of Exhibit 4.3).

An Arizona preschool program would serve to increase the present value of a child's lifetime earnings, net of education costs, by approximately \$39,000. This benefit alone is twice the size of the costs of implementing the program.

Crime and Delinquency

Involvement in crime tends to peak in the late teens. Interventions with juvenile delinquents have been largely ineffective, however, in preventing recidivism. As a result, sociologists and criminologists have turned their attention to early intervention programs. In contrast to juvenile treatment programs, early interventions are preventative rather than crisis-oriented and take place before anti-social behavioral patterns become entrenched.

There is considerable evidence of preschool intervention programs reducing criminal behavior among participants later in life. In the Perry Preschool program, the number of lifetime arrests by age 27 was 50% lower in the program group than in the control group (Schweinhart, et al. 1993, p. 83). Evidence of reductions in crime and juvenile arrests has even been found in large-scale public programs such as Head Start (Garces, et al. 2002) and the Chicago Child-Parent Centers (Reynolds, et al. 2001). In their review of early intervention programs and their effect on youth crime, Clarke and Campbell (1998) conclude that preschool programs can significantly reduce delinquent behavior regardless of whether they are oriented more to the parents or to the child's cognitive development and even if they do not succeed in improving school performance. What does seem critical, however, is that the program provide services for parents. All of the programs that were successful in reducing crime and delinquent behavior helped to counsel parents on ways to interact with their children and manage their children's behavior.

The program we analyze for Arizona is modeled after the Perry program and would involve parents as well as children. Thus it is reasonable to expect that the program would provide significant social benefits in the form of crime reduction. In his cost-benefit analysis of Perry, Barnett (1996) found reduced crime costs to be far and away the most significant economic benefit associated with the program. To quantify

these potential benefits, we make the conservative assumption that the Arizona program, which would be offered on a much larger scale than Perry, would succeed in reducing crime by one half of the amount realized in the Perry program. Specifically, the Arizona program will reduce by 25% the lifetime offenses of participants. Whether this represents a significant benefit for society depends critically on the way in which participants are targeted for inclusion in the program. Naturally, a program that selects randomly from the population of 3-year olds will produce smaller crime benefits than one that targets children with a high statistical likelihood of becoming serious criminal offenders.

The first step in our analysis is to estimate the number of criminal offenses in the Arizona population by type of offense and age of offender. This was done by first using national data from FBI Uniform Crime Reports on arrests by age to calculate the probabilities of individuals of different ages being arrested in connection with a given crime. These probabilities were then used to estimate the age distribution of offenses over the lifetime of an individual. The results confirm the well-known fact that criminal behavior peaks in the teenage years.

Given the age profile of an individual's criminal offenses, it is possible to use data on the size of the Arizona population by age group along with Bureau of Justice Statistics estimates of total offenses in the state to infer the number of offenses by age group and type of offense. The results are shown in Exhibit 4.4, expressed per thousand people in each age group. For example, we estimate that a total of 53 burglaries are committed annually in Arizona for each group of 1,000 residents aged 17-18.

Exhibit 4.4
Number of Criminal Offenses in the Arizona Population
by Type of Offense and Age of Offender, circa 2000
(per thousand people in each age group)

	13-14	15-16	17-18	19-20	21-22	23-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
Murder	0.03	0.11	0.29	0.35	0.33	0.28	0.17	0.10	0.07	0.06	0.04	0.03	0.02
Rape	0.47	0.67	0.94	0.96	0.89	0.77	0.57	0.49	0.43	0.32	0.19	0.12	0.09
Robbery	2.39	5.96	8.43	7.46	5.68	3.99	2.59	2.04	1.57	1.01	0.54	0.24	0.10
Assault	4.20	6.82	8.50	9.52	10.47	9.56	7.32	6.36	5.44	4.32	2.78	1.65	1.00
Burglary	28.92	46.32	52.52	41.07	29.32	21.77	14.71	13.02	10.90	7.95	4.24	1.96	0.94
Larceny-theft	99.55	151.84	158.55	116.35	86.57	65.48	48.67	46.47	41.30	33.90	22.80	13.39	7.69
Auto theft	21.86	50.88	47.32	34.97	26.30	19.33	13.12	10.76	7.60	5.11	2.58	1.29	0.58

Source: Estimated by the Center for Business Research using (1) nationwide statistics from the FBI Uniform Crime Reports on arrests by age and type of crime in 2001, (2) Bureau of Justice Statistics data for Arizona on the number of offenses by type of crime from 1999-2001, and (3) data from the 2000 Census on the age distribution of the U.S. and Arizona populations.

Following Barnett (1996), we assume that the benefits of crime reduction derive from three sources: (1) lower costs to victims, (2) lower criminal justice system costs and (3) lower costs of incarceration. Our estimates of victim costs per offense are the same as those used by Barnett (1996, Table 20, p. 52), updated to 2002 dollars using the GDP deflator. Barnett's numbers, in turn, are based on the work of Cohen (1988). Cohen's estimates of victim costs account for direct losses (including property losses, costs of medical services and value of time lost from work), pain and suffering (as estimated by jury awards) and risk of death (valued using wage differentials for occupations of varying degrees of hazard). Total victim costs are calculated by multiplying victim costs per offense by the total number of offenses.

The figures we use for criminal justice system costs (excluding costs of incarceration) also come from Barnett (1996, Table 22, p. 54). These represent police, prosecutorial and court costs and are assumed to be incurred whenever there is an arrest. Total criminal justice system costs for Arizona are calculated by combining Barnett's figures with estimates of total arrests in Arizona. Total arrests are calculated by multiplying total offenses in the state by arrest rates derived from Bureau of Justice Statistics data for Arizona.

Total corrections costs are taken from Donohue and Siegelman (1998) who estimate that the present value (using a 3% discount rate) of the future incarceration costs of the 1993 U.S. cohort of 3.8 million 3-year olds is \$16.0 billion. Based on this figure, we calculate the present value in 2002 dollars of the incarceration costs of a cohort of 1,000 Arizona 3-year olds to be \$4.97 million.

Exhibit 4.5 shows our estimates of the present value of all future crime costs associated with a representative cohort of 1,000 Arizona 3-year olds. The figures are expressed in 2002 dollars and are discounted to the year in which the children were 3 years old. The lifetime crime costs imposed on Arizona victims and taxpayers amounts to a little over \$15 million for each group of 1,000 3-year olds. Forty-four percent of these are victim costs; 23 percent are associated with resources used in the criminal justice system; and 33 percent involve costs of corrections.

Exhibit 4.5
Present Value of Lifetime Crime Costs
Imposed by One Thousand 3-year Olds in Arizona
(in 2002 dollars, discounted to age 3 at 3%)

Victim costs	\$6.71 million
Criminal justice system costs	3.53
Costs of corrections	4.97
Grand Total	\$15.21 million

We are now in a position to estimate the potential benefits of an early childhood program that accrue through reduced crime costs. There are several important assumptions that must be made. First, how effective will the program be in reducing the criminal behavior of participants? As noted earlier, it seems reasonable to assume that the program will reduce lifetime offenses among participants by at least 25%. A second important assumption involves the potential out migration of enrolled children. In our cost-benefit calculations, we only count benefits to be received by Arizona residents. Benefits associated with reduced crime among out migrants accrue to the nation as a whole but are lost to Arizona. (These children would not be committing crimes in Arizona even if they had they not been enrolled in the preschool program). Based on Census data for Arizona, it is reasonable to assume that 25% of Arizona 3-year olds will end up leaving the state before they reach peak criminal age. To account for this, we allow Arizona to receive only 75% of the crime benefits calculated for the entire group of treated children.

A final and extremely important assumption involves the nature of the selection process used to enroll children in the preschool program. Is it a random process, or is it designed to have a maximum effect on crime reduction? To illustrate the importance of this assumption, we calculate reduced crime costs for three different cases (see Exhibit 4.6). First, assume the enrollment process is random in the population of all 3-year olds. Each group of 1,000 children enrolled would be responsible for crime costs of \$15.21 million. So the benefits of crime reduction would amount to $(.25)(.75)(15.21)$, or \$2.85 million. This represents only 15% of the costs of implementing an enriched preschool program. Obviously, it would be impossible to justify such a program on the basis of crime benefits alone.

Exhibit 4.6
Reduction in Crime Costs Achieved by Enrolling
One Thousand 3-year Olds in an Arizona
Early Childhood Education Program
(in 2002 dollars)

	Reduction in Crime Costs (per 1,000 participants)
A. Random selection of participants (likelihood of criminal behavior the same as the general population of 3-year olds)	\$2.85 mill
B. Targeting with maximum effect on crime reduction (all participants drawn from the population of serious future male offenders)	\$39.55 mill
C. Proposed program (equal participation of the sexes, one half of participants assumed to be serious future offenders)	\$13.09 mill

At the other extreme, assume that the program only enrolls children with a high statistical chance of becoming serious offenders. In an often cited study of a cohort of African-American males born in Philadelphia in 1945, 6% of this cohort was responsible for 52% of the juvenile crime committed by all males from that birth cohort (Donohue and Siegelman, 1998, n.79, p. 30). Suppose we apply these numbers to Arizona. Then 30 males (6% of 500) are responsible for 52% of all the crimes committed by the males in a random sample of 1,000 Arizonans. Data on U.S. arrests indicate that men are responsible for approximately 80% of all crimes. So, taken together, the 30 males who are serious offenders would account for $(.52)(.80)15.21$ or \$6.33 million worth of crime costs. If these people could be perfectly targeted as children, then the benefits in terms of reduced crime from enrolling 1,000 of them in the program would amount to $(.25)(.75)(1000/30)6.33$ or \$39.6 million. This is more than twice the cost of implementing the program.

The last case we consider seems most likely to replicate the outcomes in an actual Arizona program, one that enrolls both sexes at equal rates but is focused on children of low socio-economic status and therefore on children with a relatively high statistical chance of becoming serious criminal offenders. We assume that one half of the participants would be serious criminal offenders and the other half represent no more serious a threat than the rest of the population. This means that out of every 60 male participants, 30 would have been responsible for 52% of the crime committed by 500 males in the general population. Similarly, we assume that out of every 60 female participants, 30 would have been responsible for 52% of the crime committed by a random sample of 500 females. Under these assumptions, a sample of 120 enrolled children would have imposed lifetime crime costs in the amount of $\{(.52)+(.48)(30/470)\}15.21$ or \$8.375 million. So with 1,000 such children, we could expect crime reduction benefits in the amount of $(.25)(.75)(1000/120)8.375$ or \$13.1 million. This benefit alone would not be enough to cover program costs. But it does represent 69% of those costs.

Mother's Earnings

The Perry Preschool program measured outcomes on maternal education and employment but found no significant effects. However, the Perry program was operated on a part-time, part-year basis. It did not have a major child care component and, consequently, did not substantially reduce the amount of time mothers had to spend caring for their children. There is ample evidence from programs offering care and education on a full-time basis that mothers of participating children are more likely to be employed and to go further in their education and careers than are mothers who use lower quality care (see the survey by Benasich et al., 1992). In the Abecedarian project, program group mothers had higher levels of educational attainment and held higher paying jobs when their children were age 5 (Campbell and Ramey 1994). Masse and Barnett (2003) report that program group mothers also had higher earnings at participant ages 12, 15 and 21. The average annual earnings advantage of experimental group mothers was estimated to be \$3,750 in 2002 dollars.

Unlike Perry, the hypothetical program we are analyzing for Arizona would provide full-time, year-round care. Participating mothers feeling that their children are safe and well cared for are more likely to focus on matters related to work and employment. Since the duration of the proposed Arizona program is only two years rather than five years as in Abecedarian, the benefits mothers derive may not be as large. We assume that the earnings advantage Arizona program mothers receive will be only 40% as large as extra earnings received by Abecedarian participants, or \$1,500 per year. Assuming that these additional earnings are received for a period of 40 years beginning 5 years after the child is enrolled, their present value at the time the child begins the program equals \$30,806.

Avoided K-12 Education Costs

One of the primary goals of any preschool program is to help children become "school ready." Virtually all studies of enriched preschool programs report that the programs were to some degree effective in promoting educational success in children. One measure of educational success is total years of schooling completed. Another measure – one not yet accounted for – is success in the form of reduced incidence of grade retention or special education.

In his cost-benefit analysis of the Perry program, Barnett (1996) provides a very careful accounting of K-12 school costs based upon the school records of individual children and detailed figures on the costs of different tracks of regular and special education. He finds (Table 13, p. 35) the average cost-saving effect of the program to be \$6,872 when expressed in 1992 dollars and discounted at 3%. Using the GDP deflator for state and local government spending, this would translate to a cost saving of \$8,866 in 2002 dollars. This figure is almost identical to the cost savings effect estimated by Masse and Barnett (2003, Table 8.2, p. 45) for the Abecedarian project. For further perspective, Currie (2001, Table 3, p. 232) estimates that the potential K-12 education cost savings derived from the Head Start program would amount to \$2,029 if expressed in 1999 dollars and discounted at 5%. Reworking these numbers using a 3% discount rate and converting to 2002 dollars, her analysis implies cost savings of \$2,489 per child.

Our hypothetical Arizona program would be of higher quality and greater duration than Head Start, but it would be operated on a much larger scale than Perry. A conservative approach is to assume that the savings from avoided K-12 education costs will lie between the estimates for Perry and for Head Start. Using a simple average, the savings would be \$5,678 per child.

Adding Up Benefits and Costs

Exhibit 4.7 summarizes the estimated costs and benefits of operating a hypothetical early education program in Arizona. Future realizations of costs and benefits are discounted to the year in which the child is enrolled (age 3). All values are expressed on a per child basis, in 2002 dollars.

Exhibit 4.7
Present Value of Costs and Benefits of Enrolling
a Child in an Arizona ECE Program
(in 2002 dollars, discounted to age 3 at 3%)

Costs:

Gross program costs	\$19,084
Avoided child care costs	-5,282
Incremental costs	\$13,802

Benefits:

Participant's earnings	\$39,353
Crime reduction	13,090
Mother's earnings	30,806
Avoided K-12 education costs	4,770
Total benefits	\$88,019

Benefit-Cost Ratio \$6.38 of benefits for \$1 of costs

Gross program costs per participant are \$19,084. Child care costs that would be avoided by parents are \$5,282. Thus the incremental cost of the program is \$13,802. It is this figure against which benefits should be compared.

The present value of all program benefits is estimated to be \$88,019. Higher lifetime earnings of participant children account for 45% of these benefits. Impacts on mother's earnings are also significant, accounting for 35% of total benefits. The remaining benefits consist of reduced crime costs (15%) and lower education costs associated with grade retention and special education (5%).

The program provides a total of \$6.38 worth of benefits for every \$1 of incremental costs. Benefits received by participants and their families (participant earnings and maternal earnings) amount to \$70,159 for each child, or more than five times the costs of the program. Societal benefits from reduced crime and K-12 education costs are also significant, amounting to \$17,860 per child. Assuming that participant families pay none of the gross program costs, then the benefits received by the public will offset 94% of costs. An early care program in Arizona would almost pay for itself on the basis of crime and tax benefits alone.

CHAPTER 5: ARIZONA DEMOGRAPHICS AND THE DEMAND FOR CHILD CARE

Situation in 2000

The 2000 Census counted 459,000 children less than 6 years of age in Arizona. This figure constituted approximately 9% of the total state population of 5.1 million. Unfortunately, the Census did not include questions regarding participation in early education and child care activities; nor are comprehensive statistics for the number of children participating in ECE programs in Arizona available from other sources.

However, combining data from (1) the 2000 Census relating to the employment status of parents and (2) survey information from the 1999 National Survey of American Families (NSAF) relating to non-parental care of children of working parents can provide some indication of the numbers of children under 6 who were (1) in center-based early care and education programs and (2) were regularly being cared for by someone other than their parents in 2000. The 2000 Census enumerated more than 240,000 Arizona children less than 6 whose primary care giver was in the labor force. Results of the 1999 NSAF relating to child care arrangements indicated that 73% of children 0-4 with employed primary care givers were regularly cared for by someone other than their parents and that 28% were in center-based care arrangements. For 5 year-old children, the proportions were even higher, 80% in some form of non-parental care and 40% in center-based care (Sonenstein et. al. 2002). Based on the assumption that these proportions from the national study were reasonably representative of the situation in Arizona, the number of children 0-5 with working parents regularly cared for by someone other than their parents would have been approximately 180,000, with approximately 70,000 of those in center-based care (Exhibit 5.1). Of course, while most of the kids under 6 in child care had working parents, the total population would have been somewhat larger since these estimates are based only on children with working parents.

While the benefits of early childhood care and education have been well documented, the expense associated with high quality programs limits access to children from lower income households. The children often in most need but least likely to participate in early childhood care and education activities are those living in poverty households and most particularly children living in single parent poverty households. Based on Census information, there were 107,000 children 0-5 in Arizona living in households with incomes below the federal poverty threshold in 2000 (Exhibit 5.2). And of this total, about one half (or 54,000) were living in households with a single parent (or other adult caregiver).

Exhibit 5.1
Arizona Children Aged 0-5 Years in ECE Programs, 2000

		Percent of Children 0-5
Total Number of Children 0-5	459,141	100.0
Number with Primary Caregiver in Workforce	240,252	52.3
Estimated Number Receiving Regular Non-Parental Care	178,200	38.8
Estimated Number Receiving Center-Based Care	72,100	15.7

Source: Calculated by the Center for Business Research from U. S. Census, 2000 Census of Population and Housing and 1999 National Survey of American Families data.

Exhibit 5.2
**Arizona Children Aged 0-5 Years in Poverty Households
and in Single-Adult Poverty Households, 2000**

		Percent of Children 0-5
Total Number of Children 0-5	459,141	100.0
Number in Poverty Households	106,512	23.2
Number in Single-Adult Poverty Households	54,013	11.8

Source: Calculated by the Center for Business Research from U. S. Census, 2000 Census of Population and Housing data.

It should be noted that the 1999 National Survey of American Families used a household income of less than two times the federal poverty level as its definition of a low-income household. Based on that criterion, 232,000 (or more than 50%) of children 0–5 were in low-income households in Arizona in 2000.

Projected Growth of the 0-5 Population

Current and expected future demographic trends imply rapid growth in the number of children less than 6 during the first two decades of the 21st century. Overall the state's population will continue to grow swiftly fueled by both interstate and international migration. Arizona's Hispanic and other racial/ethnic minority populations will grow much more than the Anglo-American population. This will in turn lead to rapid growth in the number of children, since the state's Hispanic and Native American populations tend to have higher birth rates than Anglo-Americans.

Unfortunately, there are no up-to-date population projections for the state that provide disaggregated projections by age and race/ethnicity. The most recent set produced by the U. S. Census Bureau in 1996 have proved to be much too conservative. The 2000 population of Arizona was projected to be 4.8 million – 6 percent less than the actual 2000 Census count; and the projections for the Hispanic population proved even less accurate – the 2000 estimate was nearly 20% below the 2000 Census population. Similarly, the latest available age-specific projections produced by the Arizona Department of Economic Security (ADES) are not consistent with the 2000 Census and furthermore do not provide racial/ethnic detail.

Because of the shortcomings with official population projections, the Center prepared its own set of projections for the state's 0-5 population for this study. The methodology was based directly on birth data. This approach was chosen for the following reasons:

1. The size of the 0-5 population is closely related to the number of births.
2. Annual data series for live births for each of the major race/ethnic groups were available from the Arizona Department of Health Services for the 1970-2002 period.
3. The computational process was much simpler than other methods that would have been necessary to produce a complete set of age-specific population projections.

The following procedures were used to produce population projections for the 0-5 population of Arizona for the 2000-2020 period:

1. Forecast equations were estimated for each of three separate annual series for live births (non-Hispanic white, Hispanic, and Other races/ethnicities) based on trend analysis of the 1970-2002 period. In projecting the number of children at risk of underachievement because of low socioeconomic status, it is useful to project the 0-5 population by racial/ethnic group since the incidence of poverty historically has been much higher for Hispanics than for Anglo-Americans.
2. For each of the three race/ethnic groups, projections of the annual number of live births for the 2003-2020 period were calculated using the forecast equations.
3. Since population estimates and projections are normally presented in terms of mid-year values, the annual birth projections were converted into provisional estimates for the 0-5 population of children using the following formula:

$$\begin{aligned}
 \text{0-5 population in year "t"} = & \frac{1}{2} \text{ of estimated births in year "t"} \\
 & + \text{the sum of the estimated births in the five} \\
 & \text{years "t-1" through year "t-5"} \\
 & + \frac{1}{2} \text{ of estimated births in year "t-6"}
 \end{aligned}$$

4. In order to account for the effects of migration and mortality, these provisional figures were adjusted by the ratio of the estimated 0-5 population in 2000 calculated using the formula in step #3 to the 0-5 population count from the 2000 Census. Separate ratios were computed for each race/ethnic group, and these ratios were used to adjust the provisional figures produced by step #3.
5. The three sets of adjusted figures were summed to produce the final product – projections of the number of children under 6 in Arizona for the 2000–2020 period. The census count for 2000, and projections for 2005, 2010, 2015 and 2020 are presented in Exhibit 5.3.

Exhibit 5.3 Projections of the Arizona Population 0-5 Years, 2000-2020

Population 0-5	
2000 (2000 Census)	459,141
2005	531,100
2010	605,800
2015	693,000
2020	790,200
Percent Increase	
2000 – 2010	31.9
2010 – 2020	30.4
2000 – 2020	72.1

Source: Center for Business Research, L. William Seidman Institute, W. P. Carey School of Business, Arizona State University.

These projections imply that the state's 0-5 population will increase by 72% to nearly 800,000 by 2020. The projections indicate a much bigger increase in the numbers of children under 6 than do the outdated ADES projections or the even older U.S. Census Bureau series.

Future Demand For Early Care and Education

Rapid growth for Arizona's 0-5 populations implies increasing demand for ECE programs. If the proportion of children in early childhood activities in 2000 were to remain constant, the number of children under 6 receiving non-parental care would increase to 235,000 in 2010 and to 307,000 by 2020. Similar projections based on the proportion in 2000 would imply that the number of children under 6 for whom parents would be seeking center-based ECE programs would grow to 95,000 in 2010 and 124,000 by 2020.

Exhibit 5.4 Projections of Demand for ECE Programs for Arizona Children 0-5, 2000-2020

	Total Non-Parental Care	Center-Based Care
2000 Census	178,200	72,100
2005	206,100	83,400
2010	235,100	95,100
2015	268,900	108,800
2020	306,700	124,000

Source: Center for Business Research, L. William Seidman Institute, W. P. Carey School of Business, Arizona State University.

In all likelihood, these projections represent conservative forecasts of the potential demand. They are based on the assumption of no further changes in family structure or labor force participation even though U. S. society has been experiencing significant change. Demographers and economists believe that the trends that have increased demand for early childhood education and care – rising divorce rates and increasing labor force participation of women with young children – will continue in the future (Hernandez 1995).

Future Trends In The At-Risk Population

To assess the future growth in the numbers of children in most need of ECE programs, we focus on children under 6 living in poverty households and, more specifically, in single-adult poverty households. Exhibit 5.5 presents projections of these two subpopulations for the 2005-2020 period for Arizona. These figures are based upon the population projections developed by the Center for this analysis (Exhibit 5.3) and the

proportions of children of each racial/ethnic group found in the two subpopulations in the 2000 Census.

Exhibit 5.5
Projections of Arizona Children Aged 0-5
In Poverty Households and Single-Adult Poverty
Households, 2000-2020

Households	Poverty Households	Single-Adult Households
2000 (2000 Census)	106,512	54,013
2005	129,800	67,200
2010	153,500	78,900
2015	180,800	92,200
2020	211,400	107,000

Source: Center for Business Research, L. William Seidman Institute, W. P. Carey School of Business, Arizona State University.

The projections indicate that these two measures of the “at-risk” population will nearly double between 2000 and 2020, with the number of children under 6 in poverty households increasing to 211,000 and the number in single-adult poverty households rising to 107,000. The figures further imply that these “at-risk” populations will become a bigger share of the total 0-5 population – those in poverty households rising from 23% in 2000 to 27% by 2020 and children in single-adult poverty households up to 14% in 2020 from 12% in 2000.

These projections should be regarded as conservative estimates, since they were computed holding the 2000 ratios constant. To the extent that the gap between rich and disadvantaged populations and/or the proportion of single-parent households continues to increase, as is forecast based on current trends, the numbers of “at-risk” children will grow even faster than implied by the projections in Exhibit 5.5.

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The Productivity and Prosperity Project: An Analysis of Economic Competitiveness (P3) is an ongoing initiative begun in 2005, sponsored by Arizona State University President Michael M. Crow. P3 analyses incorporate literature reviews, existing empirical evidence, and economic and econometric analyses.

Enhancing productivity is the primary means of attaining economic prosperity. Productive individuals and businesses are the most competitive and prosperous. Competitive regions attract and retain these productive workers and businesses, resulting in strong economic growth and high standards of living. An overarching objective of P3's work is to examine competitiveness from the perspective of an individual, a business, a region, and a country.

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The Center for Competitiveness and Prosperity Research is a research unit of the L. William Seidman Research Institute in the W. P. Carey School of Business, specializing in applied economic and demographic research with a geographic emphasis on Arizona and the metropolitan Phoenix area. The Center conducts research projects under sponsorship of private businesses, nonprofit organizations, government entities and other ASU units. In particular, the Center administers both the Productivity and Prosperity Project, and the Office of the University Economist.

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