A COST-BENEFIT ANALYSIS OF UNIVERSALLY-ACCESSIBLE PRE-KINDERGARTEN EDUCATION IN TEXAS

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CHAPTER 1: INTRODUCTION

This study provides an analysis of the relative costs and benefits of a high-quality, universally-accessible pre-kindergarten program in Texas. The RAND Corporation's report, "The Economics of Investing in Universal Preschool Education in California," will serve as the model for a Texas-specific analysis. However, while Texas and California have similar populations, key differences exist between the two states that prohibit us from assuming the same costs and benefits. Aspects of the Texas population, workforce, economy, and its existing educational system differ.

The Need for a Highly Educated Labor Force

High-quality pre-kindergarten is an important policy issue in both California and Texas because both states face economic changes that make upgrading labor force skills a major priority. During the 1980s, for instance, Texas experienced the collapse of its oil, agriculture, and other extractive industries. Following a recession and a subsequent recovery, Texas emerged with an economy based on knowledge and technology. These changes offer great opportunities for people with high levels of education, technical skills, and intelligence. Unfortunately, a large percentage of the Texas population is not highly skilled nor is it highly educated. Such members of the population are forced to fill low-wage service jobs that offer few chances to escape poverty. Murdock and Klineberg (2005) have identified high-quality education as one solution to the shortage of the human capital that the Texas market now demands, and pre-kindergarten is one of the most cost-effective educational investments.

In the absence of efforts to reform the quality and educational attainment of the labor force in Texas, the situation will likely only worsen in the state. According to an economic analysis conducted by the Federal Reserve Bank of Dallas, the average American citizen became better educated between 1990 and 2000 (Taylor 2003). However, Texans show much less improvement than the residents of other states. In Texas, for example, the share of the population with a college degree equaled the national average in 1990, but it was a full percentage point below the national average in 2000. Texas was also one of only eight states where the number of high school drop outs rose during the 1990s (Taylor 2003).

The demographic profile of Texas suggests that the need for change is urgent. The future workforce those under 18 in 2000 is over 57 percent non-Anglo (Murdock and Klineberg 2005). This increased diversity could have serious economic effects within Texas because minority groups in Texas are historically less educated and less likely to complete high school. For a variety of reasons, members of minority populations are far more likely to have an income below the poverty level, and are much less likely to have attended college (Murdock and Klineberg 2005). The growth in these poorly educated populations in Texas make the state susceptible to becoming "poorer and less competitive in the future" if nothing is done to correct such problems (Murdock and Klineberg 2005, 9). In fact, if Texas continues on its current path, by 2040 the

proportion of households living in poverty will increase by 4 percent, and the average annual household income will decrease by $6,500 per year in Texas (Murdock and Klineberg 2005). Moreover, these consequences will be accompanied by losses in general tax revenues and increases in the demand for health, criminal, and social services.

One proposed solution is the implementation of a universally-accessible high-quality pre-kindergarten program. Research has shown that high-quality pre-kindergarten can increase educational attainment, improve test performance, reduce the share of the student population in special education classes and lower the incidence of juvenile delinquency.

The Texas Plan

Our analysis of a high-quality, universally-accessible pre-kindergarten program is our interpretation of some of *The Texas Plan*'s policy recommendations. The Texas Early Childhood Education Coalition (TECEC) and the Texas Program for Society and Health (TPSH) developed *The Texas Plan: Statewide Early Education and Development System (SEEDS)* to address the need for high-quality, universally-accessible pre-kindergarten. The developers of SEEDS created the proposed system to "ensure that ALL children have the tools to succeed in school and life[,]" and they propose that all three- and four-year-olds enter an early education program with expansion planned to include all children under five (Tarlov et al. 2005, 2). TECEC believes that the creation of a widely available early education program open to children of all different income levels will increase the overall quality of the Texas workforce (Tarlov et al. 2004, 15).

The Texas Plan contains 50 policy recommendations covering three core educational areas—effective infrastructure, quality standards, and families and communities—that should be implemented over a ten year period. Our analysis focuses on the costs and benefits of specific infrastructure and quality standards.

Infrastructure

The proposed system will be built upon the existing early education infrastructure currently in Texas. The overarching theme is that the proposed program must operate within a public-private partnership, and funding will be garnered from individual families, local, state, and federal funds, and private donations (Tarlov et al. 2005, 17). *The Texas Plan* recommends that the educational system have "seamless public-private integration[,]" universal quality and accountability standards, broad stakeholder input, and include all forms of existing early education providers within the state. It is believed that by including all existing providers, such as Head Start, public pre-kindergarten, and home-based early child care programs, a seamless public/private partnership will be created, and it will allow parents many early education choices (Tarlov et al. 2004, 16).

Quality Standards

The Texas Plan will include a unified set of quality standards to ensure a high-quality early education system. This plan will include statewide teacher standards for certification and

training. Moreover, *The Texas Plan* advocates increasing teacher compensation in order to "recruit and retain" better teachers (Tarlov et al. 2004, 35). In addition to increasing teacher qualifications, the Plan will also include program standards to ensure that children's educational, behavioral, and school readiness needs are being met (Tarlov et al. 2004, 36). The standards will also include unified assessments and accountability mechanisms.

The Analysis of Costs and Benefits

The RAND Corporation's "The Economics of Investing in Universal Preschool Education in California" provides a useful model for a cost-benefit analysis of high-quality universally-accessible pre-k in Texas. However, there are significant differences which preclude a transfer of the costs and benefits to Texas.

California and Texas face similar labor force and population issues. Both states face troubling futures if gaps in education and income are not closed amongst growing minority populations and children of different socioeconomic backgrounds. However, California and Texas differ significantly in many other areas, and such differences prohibit us from directly applying costs and benefits estimated in one state on the other state. Such differences imply that a Texas-specific study must be completed to weigh, more appropriately, the benefits and costs of a high-quality, universally-accessible pre-kindergarten program in Texas.

Differences in wages and costs of living between California and Texas necessitate a Texas-specific study, as well. The wage level is much higher in California, which impacts both the costs and benefits of any educational proposal. In California, the prevailing wage for a college graduate is 9 percent higher than the national average, while in Texas the same college graduate makes nearly 2 percent above the national average (Taylor and Fowler 2006). It will cost California much more to hire teachers and fund a pre-kindergarten program. On the other hand, the primary benefit of education is higher earnings, so the estimated benefits of universally-accessible, pre-kindergarten programs in high-wage states will also be larger.

California and Texas also have vastly different current participation rates in state funded and pre-kindergarten programs. Texas currently enrolls 46 percent of eligible four-year-olds in state funded pre-kindergarten and about 58 percent of all four-year-olds are enrolled in some sort of publicly funded school program (Barnett et al. 2005).

To estimate the benefits in California, the RAND study measured gains from the differential between California's current state funded pre-kindergarten enrollment of 9 percent of all four-year-olds and an expected participation rate of 70 percent (based on the realized participation of a similar program implemented in Oklahoma). Benefits to California, therefore, are based on a vast increase in participation, and Texas will not be able to realize such benefits due to its currently high participation rate within the existing pre-kindergarten system. On the other hand, a survey of privately-owned child care facilities and pre-kindergarten programs reveals that the quality of existing pre-kindergarten programs in Texas varies greatly. A universally-accessible, high-quality pre-kindergarten program in Texas would likely increase the quality of education across the state and result in significant increased benefits over the existing system. Indeed, the current state funded system in Texas is lacking in many of the quality

indicators that are necessary to realize the benefits to society of high-quality pre-kindergarten, such as those quality indicators within the Chicago Child-Parent Center (CPC) program. Texas could improve its pre-kindergarten system in many areas. Surely, both California and Texas benefit from a high-quality, universally-accessible pre-kindergarten program; however, they do so through different means. California is able to assume great increases in participation, while Texas must capitalize on improvements in educational quality.

Another key difference between California and Texas exists in the structure of their tax codes. Because California has an income tax, the RAND study could directly measure benefits from increases in income through higher income tax revenues to the state. Texas, on the other hand, relies heavily on various sales taxes. While increases in income should imply increases in revenue for Texas, such differences disallow us from directly applying the California study to the state of Texas.

Comparison of Texas and California Universal Pre-Kindergarten Proposals

Although the RAND report proposes a viable early education system in California, the environmental characteristics of Texas are unique and require a separate cost-benefit analysis. While the program we evaluate, which was modeled after *The Texas Plan,* is similar to the California program, the programs diverge in several areas.

The pre-kindergarten program evaluated by RAND and the pre-kindergarten program proposed for Texas have two important similarities that require acknowledgement. First, both programs allow voluntary participation. That is—like kindergarten in Texas—a high-quality, universally-accessible public pre-kindergarten program would be offered, but participation in the public program would not be mandatory. Second, neither the Texas nor the California program would require a minimum level of parental involvement for a child to enroll. As such, both proposals have the potential to generate substantial labor force benefits for the parents of participating children.

Three main differences exist between the pre-kindergarten program proposed by the RAND Corporation for California and the proposed Texas program.

The primary difference between the programs is the inclusion of privately-owned child care providers and pre-kindergarten programs. The Texas program would allow private sector providers to participate, as long as the quality standards outlined within the Chicago Child-Parent Center (CPC) program and *The Texas Plan* are met; the RAND proposal does not allow for such an inclusion. Allowing private sector providers to enter the proposed program ensures the viability of the private child care and pre-kindergarten industry, allows for parental choice, and reduces the implementation costs to the state.

An integrated public/private partnership will minimize the impact to the private child care and pre-kindergarten industry. RAND presumed that enrollment of four-year-olds in private pre-kindergarten and child care facilities would fall from 55 percent to 10 percent, but they did not evaluate the costs such a change would impose on the private child care and pre-kindergarten industry and, thus, on the parents of children younger than four. If Texas removed the same

amount of children from private providers, then the impact would be large; a 2003 Texas Workforce Commission report estimates the annual economic impact of the child care industry in Texas to be $2.3 billion in wages alone (TWC 2003, 2).

The creation of an accreditation system will also allow parents to choose between public and privately-owned pre-kindergarten programs. In our analysis, we assume that parents with children currently enrolled in a privately-owned pre-kindergarten program will stay with the same program, given that the program meets the same quality standards as public pre-kindergarten.

Creating a public/private partnership will also reduce the overall program costs to the state. Currently, the existing infrastructure is not sufficient to absorb the expected pre-kindergarten enrollees, and allowing private programs to enter the proposed system is one viable solution to this problem. Therefore, allowing privately-owned pre-kindergarten programs will not debilitate the private child care and pre-kindergarten industry; rather, the allowance will reduce the costs to the state of creating new infrastructure.

CHAPTER 2: THE CPC MODEL

As did RAND, we base our analysis of the benefits of pre-kindergarten education on the Chicago Child-Parent Center (CPC) program. The Chicago Child-Parent Center (CPC) program was established by the Chicago Public School System using funds from the Elementary and Secondary Education Act of 1965. The CPC program provides educational and family support services to socio-economically disadvantaged children from pre-kindergarten through the early elementary years. CPC provides a half-day pre-kindergarten program for children ages three and four. CPC was established for children living in poverty stricken neighborhoods, which have no access to federal Head Start program facilities. In keeping with the family support aspect of the program, parents must agree to devote a portion of their time to working at the program prior to their children being enrolled in CPC. Also, each CPC facility is managed by a head teacher and includes a staffed parent resource room, school-community outreach activities, and health services.

The Chicago Longitudinal Study (CLS) evaluated a total of 1,539 children. In that group, 989 children were in the CPC program during the 1980s; a control group consisted of 550 children. The children in the control group did not attend a CPC program, although approximately 20 percent were enrolled in Head Start. However, these children did attend full-day kindergarten either within the CPC program or at one of five randomly selected schools in the area which were not incorporated within the CPC program. Within the group that attended the CPC program, 93 percent were African-American, 7 percent were Hispanic, and 70 percent came from a single-parent household.[1] Additional characteristics of CPC participants are listed in Table 2.1.

Table 2.1

Selected Risk Indicators for Chicago Child-Parent Center Participants

Characteristic	Percentage
Living in single parent family	76
Parent/guardian has less than high school diploma	41
Eligible for free lunch subsidy	84
In school area where more than 60% of students are low income	77
Parent/guardian not employed full time or part time	56
Minority status	100

SOURCE: Reynolds (2000), Table 14.
NOTE: Sample size is 889 in the CPC program group.

Approximately 80 percent of children eligible to participate in the CPC program enrolled because there were not many alternative pre-kindergarten options in the areas served. Researchers anticipated that the children in the study would graduate from high school between 1998 and 1999. Researchers matched the CPC and control groups for family income,

race/ethnicity, and gender. At the age of 20, 83 percent of the original sample still participated in the study.

High-Quality Program Components

Generally, the quality of an early childhood program can be determined based on combinations of the following aspects: 1) class size with low student-teacher ratios; 2) teacher qualifications; 3) concentrated and long-lasting intervention; 4) child-focused communication between school and home; and 5) curriculum content and classroom processes similar to those found in traditional schooling (Frede 1995). These program features correspond to program quality factors discussed by Janet Currie in a paper commissioned by the Brookings Institute relating to early childhood intervention programs. According to Currie (2000), program quality may be assessed based on two components. These two evaluative categories are "classroom structure" and "classroom process." Structural components include student-teacher ratios, teacher credentials and experience, and class size. Process components include the layout of cognitive classroom materials and the type of interactions between the teacher and students (Currie 2000). These quality program features begin to explain why certain programs produce both long- and short-term benefits while other programs do not. According to Reynolds (2000), the key contributing factors to the CPC's success were early intervention, parent involvement, program continuity and duration, small class sizes, teacher training and experience, and a focus on language and math. The occurrence of these factors in the CPC program is important because higher quality programs are associated with better cognitive and social development during the initial years of schooling (Barnett 1995).

Full-day Attendance

The first key program component for high-quality pre-kindergarten is having a full-day (7 hours per day for the length of the Texas public school year) program for four-year-olds. This component is roughly analogous to the CPC program, which provided a half-day program for both three- and four-year-olds. A two-year, half-day program provides an equal amount of classroom time as a full-day, one-year program. Implementing a full-day program allows parents to enter the labor force full-time, if so desired. However, the CPC program does not capture the labor force benefits of a full-day program. Also, research shows that full-day instruction is connected to positive outcomes when compared to half-day programs. These positive outcomes include academic achievement, grade retention, special education referrals, and social and behavioral development (Plucker 2004).

Focus on Language Arts and Math

The CPC pre-kindergarten program emphasizes basic skills in language arts/reading and mathematics through numerous academic enrichment activities that include whole class exercises, small groups, and individualized learning activities (Reynolds 2000). These activities aid the development of essential cognitive functions, which are important for school readiness at an early age. According to Dr. Laura French (1997), a professor at the Warner Graduate School of Education and Human Development at Rochester University, essential cognitive foundations include: 1) a strong knowledge base sufficient to support comprehension, drawing inferences,

and making predictions, 2) problem solving skills, and 3) an ability to translate between language and mental representations. High-quality program curriculums are consistently reading and mathematics intensive.

In an article reviewing studies designed to define high-quality programs, Dr. Ellen Frede observes that all high-quality programs have a strong focus on language. She (1995, 124) states, "Teachers provided a model of standard English, and the programs encouraged children to talk and be understood, to understand the speech of others, and to use language to express ideas and symbolic concepts." Classroom activities and materials concentrate on knowledge of typical topics such as colors, shapes, and numbers. This focus may offer continuity during the transition from home to pre-kindergarten, which aids the children's development by providing a more comforting learning environment.

Teacher Credentials

High-quality early childhood education programs require teachers with substantial teaching experience, preferably in early education, and a high level of educational attainment. Research shows that more experienced and educated professionals display greater ability to assess children's needs, plan for individual children's learning, and plan and implement activities that stimulate interpersonal communication (Frede 1995). CPC program teachers are all required to possess a Bachelors degree and a certification in early childhood education to obtain employment with the program.

Classroom Characteristics

Small class sizes and the presence of adult aides enable a relatively intensive child-centered approach to early childhood development. Topical research indicates a relationship between the numbers of children in a classroom, the amount of positive interaction a child has with his/her teacher, and a child's development outcomes (Frede 1995). A primary reason that small class size and low student-teacher ratios are associated with positive outcomes relate to the increased amount of time these characteristics allow a teacher to spend with individual children. Increased individual interaction time allows the teacher to have more knowledge about the learning abilities of each child. Also, lower ratios may create a more comfortable learning atmosphere for children who do not excel in group situations (Frede 1995). The CPC program requirements set a student-teacher ratio of 17:2 (Reynolds 2000).

Parent Involvement

Parent involvement has been a key component in most studies attempting to define high-quality early childhood education programs. According to Frede (1995, 123), most of the studies combine "center-based experiences for children with efforts to involve parents by offering any combinations of home visits, parent group meetings, and/or parent involvement in the classroom." The primary goal of this program component is to establish a collaborative relationship between parents and teachers so that parents have a greater understanding of the child's school life and the teachers gain greater insight into the child's home life.

Prior to a child's acceptance into the program, parents must commit a certain portion of their time each week to the program. Involvement in the program can occur in numerous ways. In CPC programs, parents can volunteer to aid the primary teacher in the classroom or read to groups of children in the parent-resource room. The greatest amount of parent participation occurred in the resource room, during organized school activities, and within home support activities. Program evaluators ranked parent participation in the classroom as moderate, and parent enrollment in formal adult education courses as low (Reynolds 2000). Therefore, parent involvement, while helpful in improving program quality, does not appear essential for the children to capture the positive outcomes associated with the CPC program.

Findings

The CPC program displayed positive academic outcomes in the CLS. In relation to the matched comparison group, which included the 20 percent of children who were enrolled in the federal Head Start program, children enrolled in the CPC program showed academic achievement gains in three areas: school achievement, usage of school remedial services, and educational attainment by age 20. The CPC program also had positive estimated effects in two social areas: the amount of child maltreatment from ages 4 to17 and the amount of juvenile crime and delinquency at age 18. Table 2.2 summarizes the estimated effects previously mentioned.

Table 2.2

Estimated Effects for Chicago Child-Parent Centers Program

Outcome	N	Treatment	Control	Difference	p-value	Effect Size
School achievement						
Cognitive development at age 5 (ITBS)	1102	49.6	43.3	6.3	<0.001	0.21
Reading achievement at age 9 (ITBS)	1286	98.2	93.5	4.7	<0.001	0.19
Reading achievement at age 14 (ITBS)	1158	147.1	141.6	5.5	<0.01	0.16
School remedial services						
Grade retention by age 15 (%)	1281	23.0	38.4	–15.4	<0.001	–0.34
Special education use by age 18 (%)	1281	14.4	24.6	–10.2	<0.001	–0.26
Years in special education from ages 6 to 18	1281	0.73	1.43	–0.70	0.06	–0.11
Child maltreatment from ages 4 to 17						
Indicated report of abuse/neglect (%)	1408	5.0	10.3	–5.3	<0.001	–0.20
Juvenile crime and delinquency by age 18						
Petition to juvenile court (%)	1404	16.9	25.1	–8.2	0.003	–0.20
Petition to juvenile court for violent offense (%)	1404	9.0	15.3	–6.3	0.002	–0.19
Number of petitions to juvenile court	1404	0.45	0.78	–0.33	0.02	0.13
Educational attainment by age 20						
High school completion (%)	1233	49.7	38.5	11.2	0.01	0.23
Highest grade completed	1226	10.55	10.23	0.33	0.01	0.15

Source: The Economics of Investing in Universal Pre-kindergarten in California, RAND Corporation

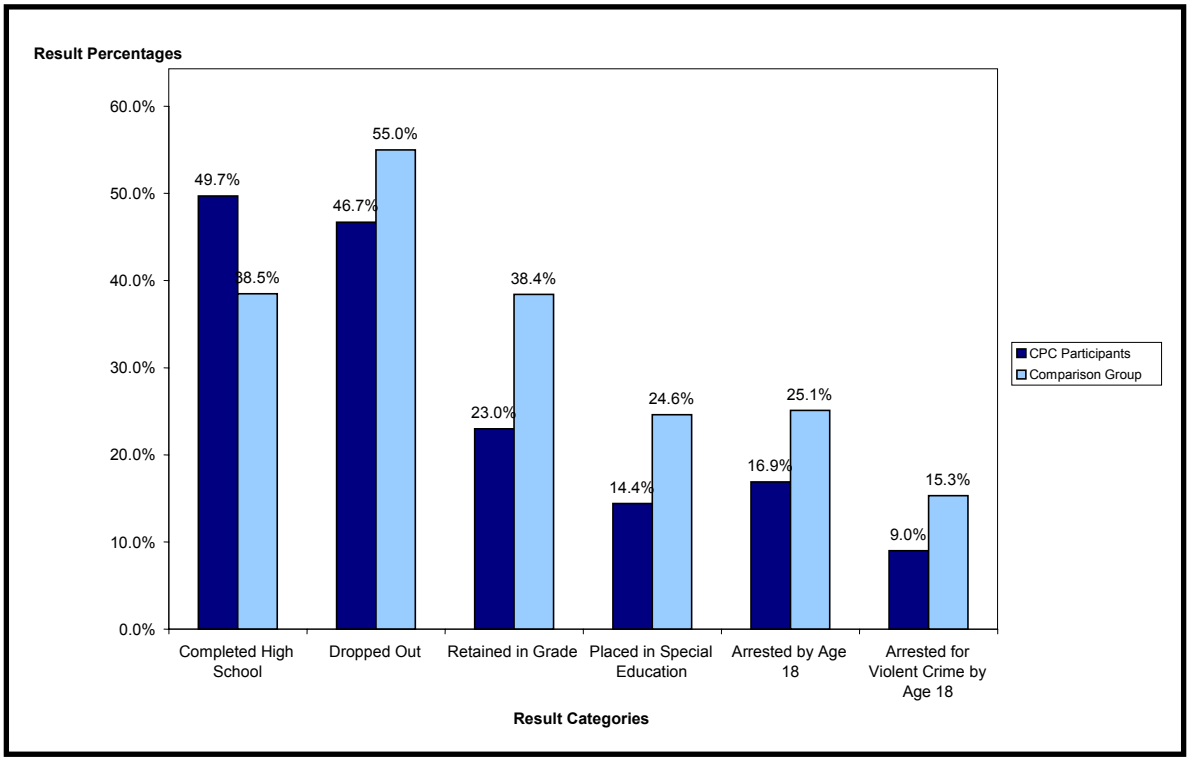
These findings indicate that the CPC program had statistically meaningful and valid impacts for many long-term outcomes. The largest effects were in the areas of grade retention by age 15, the percentage of students that used special education programs by age 18, and high school completion percentages.

Focusing on the use of remedial educational services, CPC program participants were 40 percent less likely to have been retained in a grade through the eighth grade and 41 percent less

likely to require special education by age 18. The percentage point differences between CPC participants and the comparison group for the two categories were 15.4 and 10.2, respectively. CPC's participants also showed sizable gains in the area of educational attainment by age 20. Particularly, participants were 29 percent (11.2 percentage points) more likely to have completed high school by this age. Reynolds attributed these large gains to CPC's commitment to a math and language arts intensive curriculum (Reynolds 2000). Conversely, these gains may be partly attributable to problems in the study, such as selection bias, which will be discussed in further detail later in this paper.

Similar to Table 2.2, Figure 2.1 shows the impact the CPC pre-kindergarten program had on participants compared with the control group by age 20. The contribution of this figure is the statistical account of the difference in dropout rates between CPC participants and children in the comparison group. The dropout rate for the comparison group was approximately 55 percent. This figure represents a 15 percent reduction in the dropout rate. According to RAND (2005, 31), the outcomes for CPC participants and the comparison group were gathered through school records, interviews with participants, teachers and parents, and court records.

Figure 2.1



Source: Proving the Value of Early Childhood Education in the Real World; CPC Website

In relation to gender effects, the CPC program had a greater impact on males. Males in the CPC program experienced a 47 percent higher rate of high school completion than males in the comparison group. This percentage difference was significantly greater than the difference between females in the experimental and control groups.

Interestingly, data from this study suggests that a high-quality pre-kindergarten program has diminishing marginal returns. Children who participated in the CPC pre-kindergarten program for two years displayed an initial advantage based on academic readiness testing. However, this advantage did not continue, according to RAND, in educationally meaningful ways (2005, 35). Basically, the CLS shows that while a second year of pre-kindergarten is beneficial to a child, the marginal effect of a second year is significantly less than the initial year of pre-kindergarten.

Importantly, both the participants and the control group in the CPC study differ markedly from the typical Texas student. In assuming that California could gain the same benefits realized by participants in the CPC program, RAND simply applied the percentage point differences realized by CPC participants to California's potential participants. However, we feel that using percent change, instead of percentage point change, is more accurate. For example, among low-income students, the reported dropout rate in Texas for 2004-2005 was 5.9 percent. If we were to simply apply the 8.3 percentage point decrease observed in the CPC study, the dropout rate would be negative (TEA 2005, 8). This result is not a realistic outcome. Instead, wherever credible, we applied the percentage change realized by the CPC program to all of our result categories in order to analyze benefits received.

Other Targeted Early Childhood Programs

The high-quality program features and a long-term evaluation make the CPC program well suited to act as a model for a universal pre-kindergarten program in Texas (RAND 2000). However, the CPC program is not the only targeted program that demonstrated positive effects on participants. The Perry Preschool Project and the Carolina Abecedarian Project are two other high-quality programs that have been evaluated and had positive cognitive effects on participating children.

The Perry Preschool Project was conducted from 1962 until 1967 and consisted of 123 African-American children from Michigan. Eligible participants had IQ scores under 85 upon entry into the program (RAND 2000). This program consisted of a half-day pre-kindergarten program Monday through Friday and an occasional 90 minute home visit. The student-teacher ratio in the classroom was 6:1, and teachers were required to have a master's degree and to have specialized training in children's development (Schweinhart et al. 1993). Analysis of the Perry Preschool Project found that participants displayed more positive effects in the areas of achievement tests, grades, high school graduation rates, and earnings by the age of 27 than children in the program's control group. Program participants also committed fewer crimes and relied less on welfare programs (RAND 2000).

The Carolina Abecedarian Project enrolled 111 children who were randomly placed into two groups. The treatment group participated in a pre-kindergarten program for 8 hours per day, 5 days per week, and 50 weeks per year from birth until age 5. The control group did not receive any of the services provided to the treatment group. The treatment group had student-teacher ratios ranging from 3:1 to 6:1, depending on the children's age. Follow-up assessments were conducted on 104 of the original 111 students. The children that received the pre-kindergarten treatment had received higher average test scores, and they were twice as likely to have stayed in

public school and attended a university as those children that were placed in the control group (Currie 2001). Also, Campbell and Ramey (1995) reported that pre-kindergarten participants experienced lower levels of grade retention and placements in special education classes.

Although these programs produced achievement gains for participants, they do present deficiencies not found within the CPC program. First, both the Perry Preschool program and the Carolina Abecedarian Project claim results based on relatively small sample cohorts. The Perry Preschool Project observed 123 children, and the Carolina Abecedarian Project observed 111 children. In contrast, the CPC sample cohort consisted of 989 children in the treatment group and 550 children in the control group. Therefore, the CPC findings convey a higher level of face validity.

Second, while all of the Perry Preschool Program participants were African-American, Carolina Abecedarian Project participants were mostly of African-American decent (Masse and Barnett 2002). This lack of diversity within the program could have an unobservable effect on the results due to the small size of the sample cohort. Although the CPC program was also targeted at a minority population (93 percent African-American and 7 percent Hispanic), the program consisted of a higher percentage of Hispanic children than other studies.

A final reason for modeling a universal pre-kindergarten program in Texas after the CPC program includes the student-teacher ratio of the programs and the cost-benefit estimates found in the RAND report. The CPC program had a ratio of 8.5 students for every teacher. The other two programs used much lower ratios. Given that current Texas law requires a ratio of 22:1 for public schools, the CPC model ratio would be more easily implemented in Texas pre-kindergartens. These reasons represent the key factors in choosing to model the Texas Universally-accessible Pre-kindergarten program after the CPC program.

Cost-Benefit Analysis of CPC

While the CLS concluded that CPC participants show gains in academic and social areas, a key question still remains: Do the benefits received from the program exceed the costs of implementing and operating it? A cost-benefit analysis of the program was presented in 2001 when the original cohort of children turned 21 years old. The study includes 1,286 of the original 1,539 children in the CLS sample. Researchers estimated the present value of CPC program costs in 1998 dollars for five specific categories of benefits. The benefit categories were: "1) reductions in expenditures for the school remedial services of grade retention and special education, 2) reductions in criminal justice system expenditures for both juvenile and adult arrest and treatment, 3) reductions in child welfare system expenditures associated with child abuse and neglect, 4) averted tangible costs to crime victims, and 5) increases in adult earnings and tax revenues projected for increases in educational attainment" (Reynolds et al. 2001). Researchers calculated the present value of program benefits using an annual discount rate of 3 percent, evaluated at the beginning of pre-kindergarten participation.

The cost-benefit analysis revealed that the CPC pre-kindergarten program generated economic benefits that exceeded program costs. The average cost per child for the pre-kindergarten component of the CPC was approximately $6,730 in 1998 dollars. The analysis

concluded that the pre-kindergarten program provided a total return to society of $47,759 for each CPC program participant. That equates to a $7.16 benefit to society for each dollar invested in the program (Reynolds et al. 2001; Galinsky 2006).

Evaluated separately, the largest benefit is realized in "program participants' increased earnings capacity projected from higher educational attainment" (Reynolds et al. 2001). The economic benefit to the general public from the pre-kindergarten program was calculated to be $25,771 per participant, excluding increased earning capacity. The public benefits most from increased tax revenues caused by higher expected earning capacity, criminal justice system savings due to a decrease in arrests, savings on tangible costs to victims, and savings on school remedial services. Even excluding the direct benefits to participants, the general public realized a benefit of $3.83 for every dollar invested (Reynolds 2001, 2).

The results of this cost-benefit analysis indicate that participation in a pre-kindergarten program equal to the standards of the CPC program are associated with economic benefits to participants, the general public, and government that exceed the costs of implementing and operating such a program. The high benefit to cost ratio is achieved by "increasing economic well being and decreasing educational and social expenditures for remediation and treatment" (Reynolds et al 2001). Researchers make the generalized conclusion that with the proper quality standards, a pre-kindergarten program such as the CPC can produce long-term benefits to society.

Critique of CPC

The CPC program utilized in Reynolds' (2001) longitudinal study is the standard for high-quality early childhood education programs. This program was used as the quality model by the RAND Corporation in a 2005 report evaluating the economics of universal pre-kindergarten education in California. However, the findings of this study may be limited by the impact of unobservable factors, non-random study attrition, and non-replicable study conditions.

The impact of unobservable factors presents a problem for generalizing the study's findings. Unobservable factors might include a certain child's development favoring one type of teaching method over another. That is, children with particular characteristics and backgrounds may benefit more from one type of program that emphasizes a certain teaching style, regardless of program factors such as class size or curriculum. Another example of this phenomenon occurs if participants in a program do better than individuals in a control group because parents of participants are more motivated to help their children (Currie 2000). Moreover, non-random attrition of children might skew the study's results and produce results that are too robust or sparse due to a large portion of children with certain qualities resigning from the study. Finally, the conditions present during the study may not be replicable. According to Barnett (1995, 44), this could preclude the desired benefits from being realized because "the large-scale programs cannot replicate the small class sizes, provide poorer student supervision, have higher student-teacher ratios, and have a less qualified staff." The preceding issues might complicate the usefulness of generalizing study findings.

Analysis of Head Start in Comparison to CPC

The federal Head Start program became operational in the 1960's. Analysis of Head Start literature, conducted by McKey et al. (1985), concluded that the program produces immediate cognitive benefits, but those benefits were not evident as children became older. More current analysis, conducted by Currie and Thomas (1995; 1999), used national survey data and statistical controls to account for selection bias with Head Start, and this analysis indicated that Head Start may have long-term effects on academic performance. However, Currie and Thomas (1995; 1999) noted that stronger gains were realized by whites and Hispanics. The difference in impact between the CPC program and Head Start may be explained by quality differences between the two programs.

The disparity between minimum teacher qualifications within Head Start and the CPC program is one important quality difference between the two programs. Head Start teachers are not required to have a Bachelors degree, whereas CPC teachers must have a Bachelors degree and be certified in early childhood education. As of the 2001-2002 school year, only 29 percent of all Head Start teachers had earned a Bachelors degree. Table 2.3 shows the level of teacher education in the Head Start program.

Table 2.3

National Head Start Teacher Qualifications in 2001-02	
Bachelor of Arts Degree of Higher	29%
Associates Degree	23%
CDA or State Credential	35%
No Degree or CDA	13%

Source: Head Start Program Information Report, 2001-02 Program Year

Additionally, the CPC program places a much stronger emphasis on literacy than the federal Head Start program, according to Stanfield (2005). Historically, Head Start has focused more intensely on the general health and nutrition of participants than on math and language skills. However, Head Start advocates, including President Bush, insist that the program will continue striving to make pre-literacy a central focus. Another difference, relating to CPC teachers with more experience, is that CPC teachers earn, on average, higher annual salaries when compared with Head Start teachers (Stanfield 2005). All of the aforementioned factors contribute to the quality differential between the CPC program and the federal Head Start program.

CHAPTER 3: EVALUATION OF CURRENT PRE-KINDERGARTEN PROGRAMS IN TEXAS

Texas currently offers pre-kindergarten for children that are economically disadvantaged or do not speak English as their primary language. This section examines the quality of the current pre-kindergarten program in Texas compared to the quality of the CPC program. It then recommends the necessary changes in order to raise the existing program to the quality of the CPC program.

Pre-kindergarten in the United States

The number of four-year-olds entering pre-kindergarten programs in the United States has steadily increased since 1965. Indeed, from 1965 to 2001, the percentage of four-year-olds entering pre-kindergarten jumped fifty percent (October Current Population Survey 1965-2002). While rising pre-kindergarten attendance rates are many times associated with mothers entering the workforce, recent research has begun to contradict this assertion (Barnett et al. 2004). The rising number of working women in the United States is correlated with a rise in the number of children entering pre-kindergarten programs, but a similar pattern emerges when observing stay-at-home mothers. Thus, as Barnett et al. (2004, 13) explain, while working mothers' "child care demand[s] play some role in increased pre-kindergarten participation, it appears to be of decidedly secondary importance."

However, mothers' educational attainment levels do appear to affect pre-kindergarten participation rates. Approximately 49 percent of mothers that dropped out of high school have four-year-olds that attend pre-kindergarten. Similarly, 76 percent of mothers that graduated with a four-year degree send their children to pre-kindergarten (Barnett et al. 2004). Further, pre-kindergarten attendance appears to be bimodal with respect to familial income and not simply a luxury shared by wealthier children. Poorer children also participate in public/private pre-kindergarten programs. Indeed, while 49 percent of families with incomes between $10,000 and $20,000 send their children to pre-kindergarten, only 41 percent of families with incomes between $40,000 and $50,000 place their children in pre-kindergarten (Barnett and Yarosz 2004). Expectedly, the number of families sending their children to pre-kindergarten rises significantly if such families hold incomes above $50,000; from salaries ranging from $50,000 to $60,000 to those over $100,000 per year, the percentage of families sending their children to pre-kindergarten increases 59 percent and 78 percent, respectively (Barnett and Yarosz 2004).

Pre-kindergarten enrollment has shifted away from private sector programs and toward publicly-funded programs. Although both private and public sectors have expanded since the 1960s, privately-owned pre-kindergarten attendance has declined since 1990 (U.S. Statistical Abstract; CPS Oct. 2001). This decline may be attributed to actual or perceived declines in

curriculum standards within the private sector or to the lower cost to parents of public programs. By some standards, the educational quality of private pre-kindergarten programs tends to be lower than public programs (Barnett et al. 2004, 15). Similarly, federally-funded early childhood education programs—primarily Head Start—many times fall far short of quality standards established within state-funded education programs. We suspect many of these problems are due to decreasing teaching standards and salaries; federal law permits up to half of Head Start teachers to not hold any college degree, and most salaries fall far short (roughly 50 percent) of public teacher salaries (Barnett 2003).

While the number and quality of publicly-funded pre-kindergarten programs have increased, many states have been slow to implement pre-kindergarten for all children. Indeed, most states have either familial income requirements or disability prerequisites for pre-kindergarten attendance (Barnett et al. 2004). While those thought to hold the greatest need are typically given the opportunity to enter pre-kindergarten for little or no cost to the family, a vast majority of states do not provide pre-kindergarten for *all* children.

However, since the early 1990s, educational activists and academics have recognized the importance of early childhood education, and they have encouraged continued growth in public pre-kindergarten education for at-risk children, children with disabilities, and, recently, all children of pre-kindergarten age. Indeed, since Georgia's creation of a universal pre-kindergarten program in 1995, Oklahoma, West Virginia, New York, Florida, and Massachusetts have all passed legislation calling for the implementation of universal pre-kindergarten education in their own states (Barnett et al. 2004).

The State of Pre-Kindergarten Education in Texas

History and Guidelines

The Texas Legislature established the Texas Public School Pre-kindergarten Initiative in 1984. The goal of the Initiative was to build a solid foundation in pre-kindergarten in order to prevent remediation and failure in higher grades (Education Commission of the States 2005). Within one year, 302 school districts began offering pre-kindergarten programs to over 34,500 children; within nine years, 688 school districts offered pre-kindergarten classes to over 103,000 children (TEA 1995). In 2004-05, 953 public school districts in Texas offered pre-kindergarten classes (Barnett et al. 2005).

The initiative provides both half-day and full-day services primarily to lower socioeconomic status children each academic year (187 days). Those children able to qualify for the state's Free and Reduced Lunch Program also qualify for entry into the pre-kindergarten program. Moreover, homeless children or those that cannot speak and understand the English language qualify. Typically, half-day pre-kindergarten classrooms provide three hours of classroom instruction per day, and full-day programs provide approximately six hours per day. Some districts provide wrap-around services, such as before- or after-school care, through either their own district employees or a private company. Funding for wrap-around programs is provided through local sources or pre-kindergarten expansion grants offered by the state (Barnett et al. 2004; Education Commission of the States 2005).

While many pre-kindergarten programs are funded through state and/or local sources, those school districts substituting Head Start or a privately-owned child care program for their own public pre-kindergarten program may receive funding from both the state and federal governments. Those districts with more than fifteen eligible children (four-year-olds) are required by the Texas Legislature to provide pre-kindergarten services. In some districts three-year-olds are allowed to enter the program, depending on the availability of local and state funding. Some school districts allow additional children that would not qualify under the guidelines established by the Texas Legislature if sufficient facility space exists within the program (Barnett et al. 2004).

Typically, funding for pre-kindergarten programs is provided through state compensatory education funds, federal compensatory education and migration education funds, and Head Start funds (Strayhorn 2001). However, to receive such funding, children must still meet the eligibility criteria of the pre-kindergarten program enacted by the State. Whether ineligible families can offset the costs associated with sending their children to public pre-kindergarten by paying tuition is unclear. While some argue that charging families for public education violates the Texas Constitution, others argue that sliding payment scales are appropriate and constitutional (Strayhorn 2001). Nonetheless, neither qualifying nor non-qualifying families are currently subject to tuition payments based on a sliding payment scale (Barnett et al. 2005).

Demographics of Current Program

According to the Texas Education Agency (TEA) (2005) Hispanics make up 45 percent of all pre-kindergarten students in Texas. Caucasian students average 41 percent of all public pre-kindergarten students, and Asian and Native American students average 2.5 percent and 0.3 percent of all pre-kindergarten students, respectively.

A number of pre-kindergarten students in the state are economically disadvantaged. TEA (2005) reports that 36.6 percent of current pre-kindergarten students are economically disadvantaged. Fifty percent of Hispanic and 49 percent of African-American students are economically disadvantaged. However, we suspect that the percentage of total economically disadvantaged students is much higher than listed because economically disadvantaged status is determined by qualification for the Free and Reduced Lunch Program, and many pre-kindergarten programs are half day with no lunch offered (TEA 2005). Indeed, TEA data for 1995 showed that 86 percent of students were economically disadvantaged.

Program Evaluation

The last evaluation of pre-kindergarten that the State of Texas conducted was in 1995, and it found that the program in Texas is statistically quite effective. In the *Texas Evaluation Study of Pre-kindergarten Programs*, the TEA performed a longitudinal study that examined roughly 2000 pre-kindergarten students enrolled during the 1989-1990 school year. Comparing students enrolled in the Texas public pre-kindergarten program with 600 eligible students that chose not to enter the program, the TEA concluded that those enrolled in pre-kindergarten programs performed better in school throughout the remainder of the study. Children that were not enrolled in the program were referred to special education 6.1 percent more often than

program participants, and reading comprehension and promotion to the next grade level also increased less amongst those students not enrolled in the program than those enrolled. In addition, the TEA concluded that the pre-kindergarten program increased cognitive learning behaviors and socialization skills amongst pre-kindergarten students (TEA 1995).

Environmentally, public pre-kindergarten classrooms in Texas have changed dramatically. Whereas in 1992 most pre-kindergarten classrooms resembled elementary classrooms, in 1994 most classrooms reflected the developmental and creative characteristics of pre-kindergarten students (TEA 1995). Extensive qualitative and quantitative increases occurred in classroom space, children's personal space, and materials (TEA 1995). Moreover, the number of available "learning centers" increased between 1992 and 1994. Learning centers allow students to learn basic subjects and content areas through meaningful activities like measuring ingredients, building with blocks, sorting materials, or singing (TEA 1995).

NIEER Study

The National Institute for Early Education Research (NIEER) recently concluded an evaluative study of all states that provide some form of state-funded pre-kindergarten to three and four-year-olds. Coined *The State of Preschool: 2005 State Preschool Yearbook*, the study provides a critical assessment of Texas' implementation of public pre-kindergarten throughout the state. According to NIEER, Texas ranks third out of thirty-eight states on program accessibility for four-year-olds, twenty-seventh on available resources, and satisfies four out of ten possible quality standards (Barnett, et al. 2005).

Accessibility

The number of families placing three and four-year-olds in public pre-kindergarten is increasing in Texas. From 2001-2002 to 2004-2005, the number of four-year-olds entering state-funded pre-kindergarten increased by 33,206 children, and roughly 46 percent of all four-year-olds in Texas are currently enrolled in public pre-kindergarten (Barnett et al. 2005). During the 2004-05 school year, 175,633 three, four, and five-year-olds were enrolled in state-funded pre-kindergarten programs, and 86 percent (892 of 1,037) of all traditional public school districts offered pre-kindergarten programs (TEA AEIS Data 2005; Barnett, et al. 2005).

Within Texas, 46 percent of all four-year-olds were enrolled in state-funded pre-kindergarten in 2004-2005, and 60.2 percent of all four-year-olds were enrolled in state-funded pre-kindergarten, Head Start, or IDEA Pre-kindergarten Grants Programs (Barnett, et al. 2005). The state of Texas does not fund pre-kindergarten programs provided through Head Start (Barnett et al. 2005). Rather, the federal government fully funds Head Start programs in Texas even when such programs are located within public schools. In 2004-2005, 61,890 pre-kindergarten students were enrolled in federally-funded Head Start programs in Texas (Barnett, et al. 2005).

Resources

Compared to most states, Texas spends a lot on public pre-kindergarten education. While New Mexico spent approximately $1.02 million on pre-kindergarten programs in 2004-2005, Texas spent $478 million, more than 468 times that amount (Barnett et al. 2005). In fact, Texas, Georgia, New York, New Jersey, and California combined constitute nearly 60 percent of all national spending on pre-kindergarten education (Barnett et al. 2005). However, Texas' ranking drops dramatically when we look at pre-kindergarten spending on a per-capita basis. Spending $2,721.58 per child enrolled in 2004-05, Texas ranks 27th out of 38 states that have a public pre-kindergarten program (Barnett et al. 2005; TEA AEIS Data 2005; author's calculation).

The Texas Legislature provided $478,000,000 for the Texas Public School Pre-kindergarten Initiative in 2004-2005. Such funding—including a $92.5 million grant funding full-day pre-kindergarten programs—allowed approximately 160,869 four-year-olds and 175,633 three, four, and five-year-olds to attend public pre-kindergarten programs in 2004-2005 (Barnett et al. 2005; TEA AEIS Data 2005; author's calculation). Additionally, the federal government provided $474,091,773 in 2003-2004 for federal Head Start programs operating within the state; such funds allowed 23,639 three-year-olds and 33,903 four-year-olds to enter Head Start pre-kindergarten programs, as well (Barnett et al. 2005).

Quality Standards

According to NIEER, Texas pre-kindergarten programs satisfy four out of ten quality standards: comprehensive curriculum standards, Bachelor of Arts degree requirements for teachers, required teacher in-service for at least 15 hours per year, and specialized pre-kindergarten training for teachers (Barnett et al. 2005). However, how one defines public pre-kindergarten programs can alter the number of quality standards met by the current Texas program. Indeed, public pre-kindergarten programs in Texas can take two forms: one operated by individual school districts and subject to the rules and regulations of the TEA and one operated by Head Start through individual school district facilities and private facilities (Sharon Jackson Interview).[2] Variations between the two programs have caused much confusion about the state of pre-kindergarten in Texas. Not only are Head Start programs not subject to all TEA regulations, but also, some services offered to pre-kindergarteners enrolled in public pre-kindergarten are not offered to children enrolled in Head Start facilities (Sharon Jackson Interview). Conversely, those in Head Start programs are offered different services from those in public pre-kindergarten.

Thus, because discrepancies exist between the two programs, NIEER may not have given Texas pre-kindergarten programs the credit they are due. In essence, their delegation of standards may be somewhat faulty. Indeed, our evaluation (presented in Table 3.1) of public pre-kindergarten and Head Start shows that Texas pre-kindergarten programs may satisfy as few as six quality standards or as many as ten quality standards.

Table 3.1: Public Pre-kindergarten vs. Head Start Program for Four-Year-Olds

Standards	NIEER	Regulated by the TEA	Head Start Program
Comprehensive Curriculum Standards	☻	☻ (Designated by school district)	☻ (Designated by Fed. govt.)
Teacher has Bachelor of Arts/Science	☻	☻	Varies (Depends on grant program, demographics, and the needs of community; Fed. govt. mandates Associates degree for percentage of teachers)
Specialized Training in Pre-K	☻	☻	(Within public school – yes; Within independent Head Start facility – varies)
Assistant Teacher has CDA or Equivalent			Varies (Education requirements vary by program)
At Least 15hrs/yr In-service Training	☻	☻	Varies (If not in public school district – yes; If in public school district – varies)
Maximum Class Size Less than 20			☻ (For four-year-olds)
Staff-Child Ratio 1:10 or Better			☻
Vision, Hearing, Health Screening		☻	☻
At Least 1 Support Service		☻	☻
At Least 1 Meal		☻	☻
Quality Standards Checklist Sum 2002-2003	4	7	6 – 10

Source: Barnett et al. 2005; Personal interviews with Amy Jones, Program Coordinator for Child Development Program at Blinn College in Bryan, Texas and Sharon Jackson, Head Start Director for College Station Independent School District in College Station, Texas.

Changes Required to Implement CPC Quality Standards

Despite the positive results of the TEA's 1995 report on public pre-kindergarten education and our own concerns about NIEER's assessment of the quality of pre-kindergarten in Texas, public pre-kindergarten in Texas is far from perfect. Many CPC quality standards must either be newly implemented within the existing pre-kindergarten system or the existing pre-kindergarten system's standards must be elevated above their current levels in order to improve the quality of the state's pre-kindergarten program. As discussed in Chapter 2, a quality pre-kindergarten program should include classrooms with low student-teacher ratios, superlative teacher qualifications, concentrated and long-lasting intervention, adequate communication

between teachers and parents, and an exceptional curriculum concentrating on language arts and mathematics skills (Frede 1995; GAO 1998; Currie 2000). In several respects, the current pre-kindergarten program within Texas fails to adequately address the abovementioned criteria for quality instruction within pre-kindergarten classrooms (see Table 3.1).

While some similarities between the current Texas pre-kindergarten program and the CPC program currently exist (such as program eligibility for low socioeconomic status children, head teacher requirements, and the inclusion of health screening services), many other aspects of the current Texas program must be enhanced through the introduction of a universally-accessible pre-kindergarten program that meets or exceeds all CPC guidelines. For instance, the CPC program and the typical pre-kindergarten program in Texas include half-day instruction, five days per week. However, the existing pre-kindergarten program lacks much more consistency between school districts than was present within the CPC program. The existing pre-kindergarten system currently allows school districts to provide full-day classroom instruction should school districts desire or be financially able to do so. A universally-accessible public pre-kindergarten program solves such inconsistency and mandates full-day (7 hours) classroom instruction. Not only does full-day instruction allow parents to more easily enter the workforce as full-time employees, but also, full-day instruction has been shown to improve school readiness (see Chapter 2).

Additionally, while both the 1995 TEA report and NIEER indicate the presence of comprehensive curriculum standards within pre-kindergarten classrooms throughout Texas' school districts, the CPC's emphasis on language arts and mathematics far surpasses the current curriculum taught in Texas pre-kindergarten classrooms (Reynolds et al. 2002). The quality of classroom exercises, small group instruction, and individualized learning activities should increase with the implementation of a universally-accessible pre-kindergarten program. In essence, given improvements in teacher experience and instruction, educational materials for both new and existing facilities, improved classroom space, and increased evaluation measures, the program under evaluation exceeds the curriculum-based standards of both the current public pre-kindergarten program and Head Start.

Both the CPC program guidelines and the existing pre-kindergarten program in Texas require a pre-kindergarten teacher to hold a Bachelors degree and an early childhood education certificate. Nonetheless, considerable differences exist between those programs and the recommended universally-accessible pre-kindergarten program, especially when Head Start teachers are included within the analysis. Importantly, neither the CPC program nor Texas' existing pre-kindergarten program require that teachers have prior teaching experience. Our analysis presumes, on the other hand, that a pre-kindergarten teacher would have three years of teaching experience in addition to a Bachelors degree and a certificate in early childhood education. Public pre-kindergarten programs run by Head Start require far less. The federal government mandates that a certain percentage of Head Start teachers hold an Associates degree, but the vast majority of Head Start teachers are not required to hold a higher education degree at all (Sharon Jackson Interview). In addition, the current Texas pre-kindergarten program does not require an assistant teacher in every classroom. A universally-accessible pre-kindergarten program in Texas would require teaching assistants in *every* classroom, and that such assistants hold, at the very least, an Associates degree from an accredited institution.

Significantly, somewhat large differences exist between CPC program guidelines on classroom size and current state guidelines mandated by the Texas Legislature. While the CPC program requires a student to teacher/teaching assistant ratio of 17:2, Texas currently mandates that kindergarten classroom ratios be no larger than 22 students to 1 teacher, and recommends that pre-kindergarten classrooms maintain similar ratios (TEA). Thus, not only are public pre-kindergarten and Head Start classrooms historically larger than the CPC program suggests, but also, no teaching assistant is required to be in classrooms within the current Texas pre-kindergarten system. Because smaller classroom ratios and the presence of teaching assistants enable a relatively intensive child-centered approach to early childhood development, a universally-accessible pre-kindergarten fulfills CPC's requirement for a student to teacher/teaching assistant ratio of 17:2 per classroom.

Texas state law does not regulate the staff-pupil ratio or offer recommendations on the number of teacher-parent conferences teachers should schedule each year, and no monitoring requirements are statutorily required by the state (Barnett et al. 2004). However, Texas *does* provide statutory guidance for privately-owned child care centers and educational facilities. For instance, child care centers must maintain child-staff ratio of 18:1 for four-year-olds and 15:1 for three-year-olds. The maximum number of children in a classroom in child care centers must not exceed 35 four-year-olds or 30 three-year olds. Moreover, despite no requirement for prior experience, teachers in private child care centers must undergo pre-service training and must maintain 15 hours of state early childhood training per year. Child care center directors are required to have 2 years of experience in child care and hold a Child Development Associate Certificate (CDA) (Barnett et al. 2004; Amy Jones and Sharon Jackson Interviews).

Survey of Privately-Owned Pre-kindergarten and Child Care Facilities

Such statutory requirements do not, however, guarantee high-quality pre-kindergarten instruction in either privately-owned pre-kindergarten or child care centers. Like Texas' current public pre-kindergarten program, the average privately-owned child care facility in the state is far from adequate and does not fulfill the quality guidelines established by the CPC program. A survey of 448 accredited private schools and privately-owned child care facilities within Texas was conducted by our research team (41 centers gave no response)[3]. The private school database was acquired through the TEA from the Texas Education Directory, and the database of privately-owned child care facilities in Texas was acquired from the Department of Family and Protective Services. The research team asked eight survey questions that were designed to uncover both quantitative and qualitative characteristics of cost and qualify of privately-owned child care centers and schools in the state.

A bleak picture of private pre-kindergarten instruction emerges when one analyzes the collected data, and our own research team's anecdotal impressions of privately-owned child care after speaking to directors and instructors support those findings, as well. Of the privately-owned child care centers contacted, 23 percent represented pre-kindergarten facilities and 77 percent included privately-owned child care facilities. The analysis shows that privately-owned child care centers enroll approximately 21 four-year-olds per year, and they maintain a student-teacher ratio of 12 to 1. This shows that privately-owned child care centers maintain a student-

teacher ratio that is significantly better than the state mandated requirement for public pre-kindergarten programs; however, the average student-teacher ratio is still much higher than what the CPC program requires (17:2).

In addition, our analysis illustrates that roughly 41 percent of all privately-owned child care centers and pre-kindergarten facilities employ teaching assistants to aid in the instruction and child care of participants. Thus, approximately 59 percent of all privately-owned programs do not have teaching assistants on staff. Moreover, while 41 percent of privately-owned child care centers and pre-kindergarten facilities have teaching assistant(s) on staff, our analysis does not specify whether those programs actually have a teaching assistant in each classroom or whether those teaching assistants float from classroom to classroom. We suspect the latter is the case for a majority of privately-owned child care facilities.

Furthermore, 45 percent of privately-owned child care centers and pre-kindergarten facilities sampled indicated that their facility was accredited through a national accrediting body, such as the National Association for the Education of Young Children (NAEYC). However, we strongly believe that this percentage overestimates the actual number of private programs that are accredited in Texas. When asked about the actual accrediting body used, a large number of privately-owned programs listed accreditation sources that were invalid. For instance, many directors confused approved curriculums with accreditation when, in fact, accrediting bodies scrutinize all aspects of a private program and its facilities before accrediting an institution.

The percentage of private pre-kindergarten schools that are accredited is much higher than the percentage of accredited child cares. In addition, many child cares responded that they were unfamiliar with the concept of accreditation. Price was almost 50 percent higher for private pre-kindergarten schools than day cares, which is usually a market indicator of quality. More than half of the private child cares have no teachers with a bachelor's degree. The number of private child care facilities is much higher than the number of private pre-kindergarten schools in the state and the quality indicators are much lower for child care facilities, which explain that the majority of children in the state of Texas are not enrolled in programs that would meet CPC standards.

CHAPTER 4: COSTS ASSOCIATED WITH UNIVERSALLY-ACCESSIBLE PRE-KINDERGARTEN EDUCATION IN TEXAS

The following cost estimates were developed following the methodology in Golin, Mitchell, and Wallen's (2003) report, *The Cost of Universal Access to Quality Preschool in Illinois* and *The Price of School Readiness: A Tool for Estimating the Cost of Universal Preschool in the States* by Golin, Mitchell, and Gault (2004). Though not the only models available, we selected the abovementioned models because we believe they are the most thorough and comprehensive cost models available for costing out a universally-accessible pre-kindergarten program.

The Texas Universally-accessible Pre-kindergarten Education Program

The Texas Universally-accessible Pre-kindergarten Education Program will erect itself on top of the existing pre-kindergarten education system for four-year-olds currently operating within the state. However, because the new program will follow the educational guidelines established under the Chicago Child-Parent Centers (CPC) program, significant quantitative and qualitative aspects of the current Texas pre-kindergarten program will need to be improved. Teacher certification and in-service training, increasing salary expenditures, improved facility space, enhanced educational materials, and improved evaluation methods will significantly increase the cost of pre-kindergarten education in Texas (Belfield et al. 2005). In fact, Belfield et al. (2005) found that, in Wisconsin, creating a high-quality pre-kindergarten program for four-year-olds would increase the state's current provision for early childhood education by a factor of three. Other reports find high-quality pre-kindergarten education increases states' annual pre-kindergarten budgets by approximately twenty-seven percent (Marshall et al. 2002).

While privately-owned child care and educational facilities are encouraged to participate in the program, only existing Head Start and public pre-kindergarten programs will be required to enter the Texas program. Should privately-owned facilities choose to enter the state program and upgrade their existing curriculum to meet CPC standards, a public-private partnership may be created to minimize both parents and privately-owned facilities' expenses. As aforementioned, the program will apply only to four-year-olds and maintain a full-day (7:45am-2:45pm) and ten month (187 days[4]) schedule.

The Texas Universally-accessible Pre-kindergarten Education Program will require one teacher (Bachelors degree; three years of teaching experience; and a certification in early childhood education) and one teaching assistant (Associate's degree) per pre-kindergarten classroom for seven hours per day. The requirement that teachers hold a Bachelors degree, three years of experience, and an early childhood education certificate not only fulfills CPC's requirement for high-quality student instruction, but it also surpasses the National Association for the Education of Young Children's (NAEYC) requirement for pre-kindergarten teachers. Moreover, recognizing the Government Accountability Office's (GAO) contention that "caregiver education and training [is] one of the most critical areas for ensuring and improving the quality of child care[,]" we believe our teacher requirements will provide the best possible instruction for Texas pre-kindergarten students (GAO 1998, 4). "Specifically," GAO (1998, 4) argues, "research shows that effective education and training related to child development is associated with more caregiver interaction with the children and with task persistence and cooperation among children." Both teachers and teaching assistants should be paid according to their local school district pay scale.

Additionally, each classroom will include a student to teacher/teaching assistant ratio of 17:2.[5] Scholarship has shown that "low [classroom] ratios and small group sizes are important for facilitating positive interactions between staff and children" and, therefore, our student-teacher/teaching assistant ratio exceeds the requirement set by NAEYC and meets the CPC standard (GAO 1998, 5). To determine the number of four-year-olds in Texas in 2004-2005, we utilized the U.S. Census Population Estimate for the State of Texas and found that approximately 349,715 four-year-olds lived in Texas during the 2004-2005 school year (Barnett et al. 2005). Moreover, we assumed, at a minimum, that seventy percent of all four-year-olds will participate in the Texas Universally-accessible Pre-kindergarten Education Program during the Program's first year. Some children will remain in privately-owned pre-kindergarten facilities that choose not to enter the public-private partnership, and other children will simply not go to pre-kindergarten at all. The features of the proposed pre-kindergarten program are listed in Table 4.1.

Table 4.1: Features of a High-Quality, Universally-accessible Pre-kindergarten Program in Texas

Feature	Proposed Program in Texas
Participant Eligibility	Voluntary program for all four-year-olds
Provider Eligibility	All public facilities; privately-owned facilities that meet program requirements
Program Length	187 days; 7:45 a.m. to 2:45 p.m.; 1,309 hours per year
Maximum Class Size	17 participants
Child-Teacher/Teaching Assistant Ratio	17:2
Teacher Qualifications	Bachelors degree; early childhood certification; three years teaching experience
Teacher Assistant Qualifications	Associates degree
Facility Space Requirements	Existing facilities and new portable space
Funding	Public funds
Comprehensive Curriculum Standards	Curriculum meets CPC quality standards
Educational Materials	Educational materials meet CPC quality standards
Evaluation Procedures	Included
Vision, Hearing, Health Screening	Included

Estimating the Current Cost of Pre-kindergarten Education in the State

To determine the average cost of privately-owned child care and educational facilities across Texas, we utilized a survey of privately-owned child care and educational providers (see Chapter 3) from the Texas Education Agency (TEA) and the Department of Child Protective Services. The results of the survey show that the average cost of privately-owned pre-kindergarten or child care for four-year-olds in Texas is $2,408.56 per child per year.[6]

For the 2004-2005 school year, the State of Texas spent $478,000,000 (including a $92.5 million state grant for full-day expansion) on its existing public pre-kindergarten program and served 175,633 pre-kindergarten students (TEA AEIS Data 2005; Barnett et al. 2005). Dividing the state's 2004-2005 pre-kindergarten expenditures by the number of children served yields a cost to the state of $2,721.58 per child per year.

When the annual privately-owned and public costs per child are averaged based on the number of children enrolled in privately-owned or public facilities, the result is $2,568.67 per student per year.[7] The average current cost per child per year for both public and privately-owned pre-kindergarten can then be multiplied by the total number of four-year-olds in public and privately-owned pre-kindergarten in Texas (Barnett et al. 2005). The resulting figure, $807,800,222.07, gives us the total current expenditures for both privately-owned and public pre-kindergarten in the State of Texas.[8]

Estimating the Direct and Indirect Costs of the Texas Universally-Accessible Pre-kindergarten Education Program

The direct and indirect costs of a universally-accessible pre-kindergarten program that meets or exceeds CPC quality standards are estimated below. In an effort to be conservative, all cost estimates are overestimated. For example, the quality standards utilized within the proposed pre-kindergarten program's cost estimates surpass CPC quality standards in many instances. Pre-kindergarten teachers, for instance, are required to hold three years of teaching experience within the proposed program, and, therefore, the costs associated with teacher salaries are higher. Further, we estimated an increase in infrastructure costs from the *total* number of pre-kindergarten participants expected to enter the program. However, many of those participants will enter privately-owned programs, and, therefore, public school facilities will not need to expand their infrastructure as much as the cost estimates allow. Once the direct and indirect costs are calculated, the total cost of a universally-accessible pre-kindergarten program can be subtracted from both the economy's current expenditures and the state's public pre-kindergarten outlays to find the total cost to the state economy and the State of Texas. Appendix 1 provides detailed support for such calculations.

Estimating Direct Costs

The first component of the cost formula is direct costs. Direct costs include teacher, teaching assistant, and administrator salaries, fringe benefits, and material costs. All direct cost components vary depending on the number of four-year-olds estimated within the State of Texas. As aforementioned, the U.S. Census Population Estimate approximates that 349,715 four-year-olds resided within Texas during the 2004-2005 school year (Barnett et al. 2005). Multiplied by an expected participation rate of seventy percent, we estimate that approximately 244,800 four-year-olds will participate in the universally-accessible pre-kindergarten program during the first year. Costs per pupil would be slightly higher if a greater percentage of four-year-olds participated (see Appendix 1).

Labor Cost

CPC quality standards require all pre-kindergarten teachers to hold a Bachelors degree and an early childhood education certificate.[9] The predicted salary for a Texas teacher that meets the requirements of the CPC program and that has three years of experience is $3,512 per month, or $35,120 per school year (10 months).[10] PEIMS data acquired from the TEA was utilized to determine the mean salaries for teachers and teaching assistants within the State of Texas.

Specifically, the average salary of a teacher fulfilling CPC standards was found by regressing teaching salaries (adjusted to full-time equivalent) for kindergarten and pre-kindergarten teachers against their level of education (Master's degree, PhD, and no degree), the presence of an early childhood education certificate, and an indicator for whether a teacher currently taught kindergarten. Doing so allowed us to predict the wage of a pre-kindergarten teacher holding a Bachelors degree and an early childhood education certificate ($3,512 per month). When multiplied by 10 months and the number of teachers needed for a universally-

accessible pre-kindergarten program in Texas (14,400.03), teaching salaries equate to $505,729,032.94 per year.

Teaching assistants should hold, at the very least, an Associates degree from an accredited institution. The average salary for a teaching assistant has been calculated in the same manner as teacher salaries above, and, similarly, the dataset was acquired through PEIMS data from the TEA. The mean salary of a teaching assistant is $1,502 per month, or $15,020 per school year (10 months). Like teacher salaries, we multiplied the average teaching assistant salary by the number of new teaching assistants needed (14,400.03) to find the cost of improving the current pre-kindergarten program. The total cost of hiring teaching assistants is estimated at $216,288,450.60 per year.

Further, administrators must be hired to oversee the additional staff employed and maintain the current administrator to teacher ratio in the state. In the 2004-2005 school year, 16,219.20 individuals held campus leadership positions (TEA AEIS Data 2005). Dividing the total number of teachers (294,258) in the state in 2004-2005 by the current number of administrators yields a teacher-administrator ratio of roughly eighteen to one (TEA AEIS Data 2005). Applying the teacher-administrator ratio (18.1:1) to the number of teachers needed for a universally-accessible pre-kindergarten program in Texas (14,400) demonstrates that approximately 795.58 administrators will be necessary. The average administrator salary in Texas is roughly $61,612 per year (TEA AEIS Data 2005), and multiplying the average administrator salary by the total number of administrators needed reveals a cost of approximately $49,017,274.96 per year.

Fringe benefits must also be included in an estimate of direct costs. A common rule of thumb is that fringe benefits equal roughly 28 percent of an organization's total labor costs. Thus, we multiplied total labor costs ($771,034,758.50) by 28 percent and found that roughly $215,889,732.38 should be allocated to fringe benefits per year.

Material Costs

Additional furniture, educational equipment, art supplies, and a myriad of other educational goods must be accounted for in order to upgrade the quality of the existing Texas pre-kindergarten program to fit the standards of the CPC program. Golin et al. (2003) based their material cost estimates on educational supply catalogs, such as the Kaplan Early Learning Company catalog. Existing classrooms were allotted $250 per child, or $262.66 in 2005 dollars, and new classrooms were allocated $950, or $998.09 in 2005 dollars, per child. Multiplying seventeen students per classroom by $262.66, the cost of upgrading existing classrooms is $4,465.22 per classroom. When multiplied by the current number of pre-kindergarten teachers (roughly 8,200) in the state, the total cost to improve educational materials in existing pre-kindergarten classrooms is approximately $36,614,804 (authors' calculation from TEA dataset).

As abovementioned, new classrooms are allotted $998.09 per child for educational materials. The total number of expected students requiring new classrooms is estimated at roughly 83,931.6 students, yielding an additional material cost of $83,771,290.64. When the

material costs for existing and new classrooms are combined, the resulting total is $120,386,094.64.[11]

The ensuing total for labor costs, fringe benefits, and material costs is $1,107,310,585.52 for the first year.

Estimating Indirect Costs

Indirect costs constitute those outlays not directly associated with the intended mission of a universally-accessible pre-kindergarten program, such as labor or educational material costs that directly affect students' ability to learn. Indirect costs include infrastructure, technical assistance, quality assurance, evaluation, and administrative costs.

Estimating Infrastructure Improvement Costs

Expanding both the number of children served and the quality of curriculum offered will increase educational infrastructure costs within Texas.[12] Whether this includes building a new structure, adding on to existing schools, or placing additional portables on school properties, an appropriate measure of expected costs must be formulated. While other options are feasible, we cost out the construction of portable space within our cost estimate due, on average, to a lower cost per square foot for portable space than other general construction techniques. Infrastructure cost estimates include only public school facilities because there are no reliable estimates for existing private school facilities. We use the infrastructure cost estimates for public facilities as our proxy for the costs of upgrading or establishing private facilities.

The State of Texas mandates that each public school have a minimum of thirty-six square feet per pre-kindergarten student (TAC §61.1033,(d),(2),(A),(i)). With an expected increase of 83,931.60 students, 3,021,537.6 additional square feet will be necessary to accommodate rising enrollment. On average, portable buildings cost $32 per square foot in rural areas and $39 per square foot in urban areas, and fourteen percent of the state's school-aged population resides in rural areas while eighty-six percent live in urban areas (Taylor et al. 2005). Using a weighted average of the costs per square foot in both urban and rural areas, we calculate a statewide average of $38.02 per square foot. When the average cost per square foot is multiplied by the number of additional square feet needed, the result is a total infrastructure cost of $114,878,859.55.

Estimating Technical Assistance Costs

Technical assistance providers will be needed to ensure quality curriculum, program design, and financial management during and after the implementation of a universally-accessible pre-kindergarten program in Texas. Golin et al. (2003) establish that one consultant is needed for every fifteen-hundred children. Assuming a participation rate of seventy percent, the number of children participating in the program is estimated to be 244,800 four-year-olds. When the number of expected participants is divided by fifteen-hundred, an additional 163.2 technical assistants will be necessary.

The salary for a technical assistance provider is assumed to be the average wage of a person in Texas holding a Bachelors degree. In 2000, the salary of an individual in Texas with a Bachelors degree equaled $45,688.86; in 2005 dollars, the salary is estimated at $50,739.22 per year (U.S. Census 2000) (author's calculation). The total cost for technical assistance providers is found by multiplying $50,739.22 by the number of technical assistance providers needed. The resulting cost is $8,280,640.70 per year.

Estimating Quality Assurance Costs

On-site monitors should be hired in order to ensure that public schools maintain CPC quality standards and comply with any pre-kindergarten regulations year after year. Each monitor can supervise fifty programs, or roughly 3,750 students per year (Golin et al. 2003). With 244,800.5 children participating in the universally-accessible pre-kindergarten program, 65.28 quality assurance monitors will be necessary in the state. Like the salary calculations for technical assistance providers, quality assurance monitors' salaries are assumed to be the average wage of an individual in Texas holding a Bachelors degree ($50,739.22). The resulting cost is $3,312,256.28 per year.

Estimating Evaluation Costs

Based on the Early Childhood Environmental Rating Scale Evaluation Program, a percentage of the total cost of a universally-accessible pre-kindergarten program should be allocated to evaluation measures in order to ensure quality instruction and increasing aptitudes amongst pre-kindergarten students (Golin et al. 2003). Golin et al. (2003) and other scholars suggest that approximately five percent of a program's total cost should be allocated to evaluation costs whereby an independent organization would evaluate both the implementation and effectiveness of a universally-accessible pre-kindergarten program in Texas. Taking five percent of only those costs directly related to the mission of the universally-accessible pre-kindergarten program in Texas (direct costs), an annual evaluation cost of $55,365,529.28 is estimated.

Estimating Administration Costs

A state agency will need to administer the universally-accessible pre-kindergarten program in Texas. It is reasonable to assume that some education agency will administer the program with the assistance of additional staff members. While Golin et al. (2004) suggest the addition of 3 staff members and one supervisor for a universally-accessible pre-kindergarten program, additional staff members may be necessary given Texas' larger geographic area compared to that of Illinois. Nonetheless, the estimated salary for a staff member is approximately $82,160 and $123,240 for a supervisor in 2005 dollars (Golin et al. 2004). Given three staff members and one supervisor, a total administration cost of $369,720 is expected.

The total indirect cost for a universally-accessible pre-kindergarten program is $182,207,005.81.

Estimating Regulatory and Transportation Costs

While Golin et al. (2003; 2004) do not include regulatory or transportation costs within their cost formulas, many early child education advocates have raised concerns over the importance of such costs in Texas. Certainly, universally-accessible pre-kindergarten programs, such as the one proposed in Texas, will increase both regulatory and transportation costs within states; whether the burden of such costs are borne by states, municipalities, school districts, or parents, however, varies from state to state.

In Texas, a large public education infrastructure currently exists and, consequently, alleviates many of the concerns regarding transportation or regulatory costs. Indeed, while we estimate 244,800 additional pre-kindergarten students will enter the universally-accessible pre-kindergarten program in the first year, rising enrollment will transpire over an extensive geographic area and, therefore, minimally affect transportation costs. Many families will opt not to send their four-year-olds to pre-kindergarten on buses, and those that do will likely live in a school district that already owns a sufficient number of vehicles to transport additional pre-kindergarten students to school. In most cases in Texas where school buses are not filled to capacity, we expect the marginal transportation costs to be low. Additionally, without sufficient data on the current number of children traveling on school buses, we are unable to appropriately estimate the number of additional school buses needed or the amount of gasoline/maintenance costs that will be required given rising enrollment in pre-kindergarten. Nonetheless, because we believe most school districts in Texas own a sufficient number of school buses to meet the demand for transportation to and from schools, we trust the marginal costs will be low.

Similarly, regulatory costs (in both time and money) will increase across Texas with rising enrollment in pre-kindergarten. Administrators, technical assistance providers, and on-site monitors will surely be concerned with a variety of state regulations covering health and safety issues to maximum student-teacher ratios. Moreover, quality standards in educational environments and instruction will surely be monitored, adding to the cost of regulation. However, because we have overestimated the number of administrators, technical assistance providers, and on-site monitors that will be required after the implementation of a universally-accessible pre-kindergarten program in Texas, we believe the additional regulatory costs resulting from a universally-accessible pre-kindergarten program have largely been included within our analysis already. Moreover, we assume that public school administrators will largely be able to deal with any regulatory issues that may result given a universally-accessible pre-kindergarten program because the number of participating children will be sufficiently expansive over the entire state.

Estimating Wrap-Around and Full-Day Kindergarten Costs

To capitalize on the marginal benefit to parents of pre-kindergarten children from increased earnings, wrap-around care costs have been included within our analysis. While the total cost for wrap-around care is not included within our baseline cost estimate (see Appendix 1) and is not stipulated as a cost to the state or to parents, the total wrap-around cost is included within our second cost estimate (see Appendix 2).

Because the universally-accessible pre-kindergarten program operates from 7:45am to 2:45pm, wrap-around programs should operate from 2:45pm to 5:45pm so that parents are given ample time to work a full day (8 hours) and pick up their children after work. Education research has shown that the average cost per hour for wrap-around care is approximately $3 per hour (NIEER 2006). Given a cost of $3 per hour and three hours of wrap-around care per day, we then multiplied $9 by the number of days within a Texas school year (187 days). Lastly, the total cost per child per school year is multiplied by the number of expected four-year-old children (244,800.5) in the first year. The total cost for wrap-around care for pre-kindergarten students is estimated at $411,999,241.50 per year. Furthermore, including wrap-around care within the baseline cost estimate increases the annual cost per student to $6,920.63 (see Appendix 2).

Given that the recommended universally-accessible pre-kindergarten program in Texas provides full-day instruction, several early education advocates have expressed concern over the current kindergarten schedule in the state. Indeed, kindergarten within Texas currently operates on a half-day schedule (roughly 3 hours). Not only does a full-day pre-kindergarten program and a half-day kindergarten program not make logistical sense, but also, some loss in our expected benefits to students, parents, and employers is likely to occur. However, while a cost estimate of full-day kindergarten is discussed within our analysis, we chose not to include the cost within our baseline estimate because it was not within the scope of this project to estimate the benefits that accrue to full-day kindergarten students.

Due to kindergarten's half-day schedule, the TEA currently calculates the cost per kindergarten student as half of the approximate cost per student in grades one thru twelve. The operating expenditure per student in the 2004-2005 school year was $7,084, and, therefore, the operating expenditure per kindergarten student in the 2004-2005 school year was approximately $3,542 (TEA AEIS Data 2005). Bringing the cost per kindergarten student up to $7,084 and multiplying that cost by the number of kindergarten students in 2004-2005 (333,530) equals $1,181,363,260, or the approximate annual cost to the state to lengthen the school day for kindergarten students from half-day to full-day instruction.

Lastly, to again capitalize on the marginal benefit to parents of kindergarten children from increased earnings, wrap-around care costs for kindergarten students have been included within our analysis (see Appendix 2). Using the same calculation methods presented above, we multiplied the number of kindergarten children in 2004-2005 (333,530) by $1,683, the cost per school year (187 days) per child for wrap-around care. Wrap-around care for kindergarten students is estimated to cost approximately $561,330,990 per year. Similar to extending kindergarten instruction from a half- to full-day, we do not include wrap-around care for kindergarten students within our cost estimates; however, we do support its implementation.

Conclusion

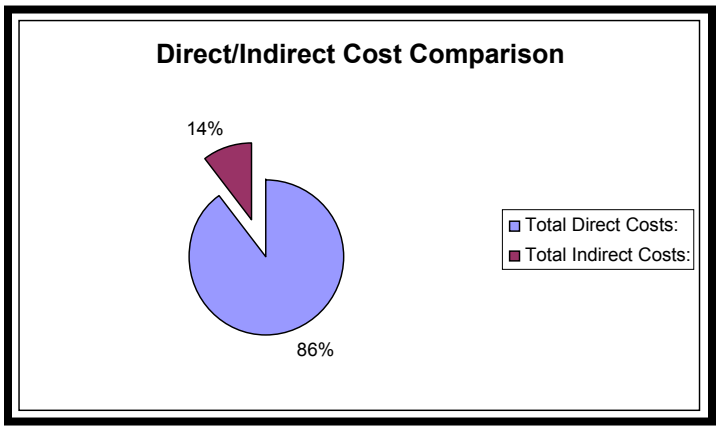
Table 4.2 summarizes the direct and indirect costs for implementing a universally-accessible pre-kindergarten program in Texas. As shown in Table 4.2, the total annual direct and indirect costs equal $1,107,310,585.52 (eighty-six percent) and $182,207,005.81 (fourteen

percent), respectively. The total annual cost of a universally-accessible pre-kindergarten program in Texas is approximately $1,289,517,591.33, or $5,267.63 per student per year.

Table 4.2: Summary of Costs

Direct Costs:	
Teacher Salaries:	$505,729,032.94
Teaching Assistant Salaries:	$216,288,450.60
Administrator Salaries:	$49,017,274.96
Improved Material Costs:	
Existing Classrooms:	$36,614,804.00
New Classrooms:	$83,771,290.64
Fringe Benefits:	$215,889,732.38
Total Direct Costs:	**$1,107,310,585.52**
Indirect Costs:	
Infrastructure Costs:	$114,878,859.55
Technical Assistant Costs:	$8,280,640.70
Quality Assurance Costs:	$3,312,256.28
Evaluation Costs:	$55,365,529.28
Administrative Costs:	$369,720.00
Total Indirect Costs:	**$182,207,005.81**
Total Annual Direct and Indirect Cost:	**$1,289,517,591.33**
Total Current Cost of Public/Private Pre-k in Texas:	
Average Cost of Public/Private Pre-k:	$2,568.67
Number of 4-year-olds in Public/Private Pre-k:	314,481.90
Total Current Cost of Public/Private Pre-k in Texas:	**$807,800,222.07**
Annual Cost to Texas Economy:	**$481,717,369.26**
Annual Increase in Government Expenditures:	
Cost per Student (public) per Year:	$2,721.58
Number of 4-year-olds in Public Pre-k:	160,868.90
Annual Increase in Government Expenditures:	**$851,700,010.47**

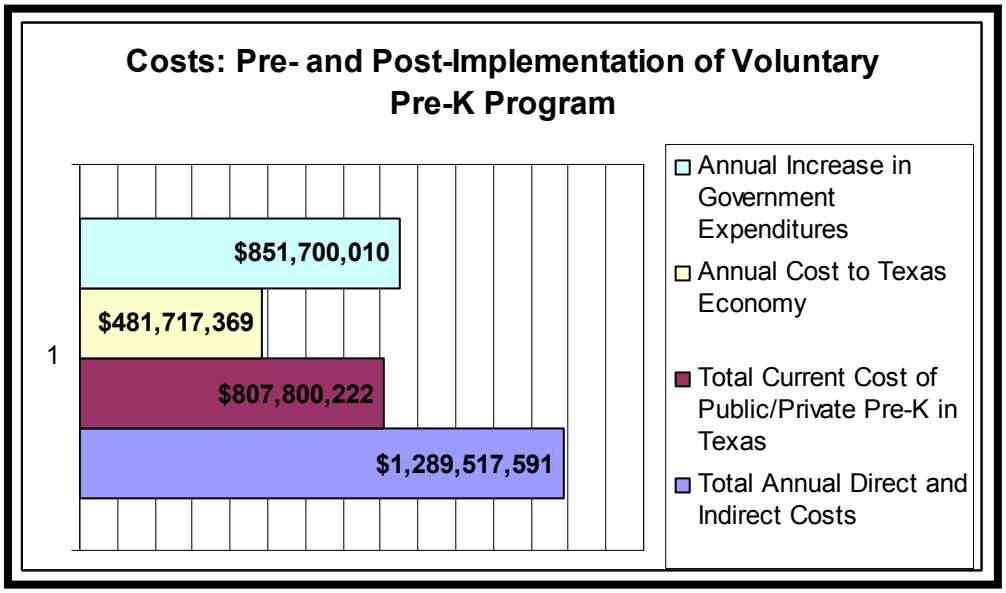
Figure 4.1:



Since the total current expenditure in Texas on both public and privately-owned pre-kindergarten is $807,800,222.07, the difference between the current expenditure and the estimated cost of a universally-accessible pre-kindergarten program in Texas ($1,289,517,591.33) is $481,717,369.26, or a difference of 59.6 percent. Lastly, the annual increase in government expenditures can be found by subtracting the total cost of a universally-accessible pre-kindergarten program from $437,817,580.86, or the current level of expenditures by Texas for public pre-kindergarten for four-year-olds. The result is $851,700,010.47, or an increase of 66 percent. The aforementioned results are presented in Figure 4.2.

Should the state adopt the recommended pre-kindergarten program and incur the annual increase in government expenditures for pre-kindergarten programs, Texas should be able to use some of the federal and state Child Care and Development Funds (CCDF) allocated to four-year-olds to offset the cost of implementing the program. During 2004-2005, for instance, the federal government allocated $391,328,745 in CCDF to Texas; the state provided $113,964,190 in CCDF (Barnett et al. 2005). Because both the federal government and the Texas Workforce Commission's (TWC) allocation methods for CCDF are unclear and appear to be based on age cohorts rather than individual ages, we do not subtract a portion of the CCDF earmarked for four-year-olds from the annual increase in government expenditures. Moreover, while we may assume that all four-year-olds will enter the universally-accessible pre-kindergarten program, some families may still decide to place their four-year-olds in privately-owned facilities that are not within the proposed pre-kindergarten program. Thus, even with clear allocation methods, we would still be forced to make assumptions about the number of four-year-olds—currently enrolled in privately-owned child care facilities—enrolling in the proposed program. Nonetheless, some portion of those funds should still be subtracted from the annual increase in government expenditures.

Figure 4.2:


Costs: Pre- and Post-Implementation of Voluntary Pre-K Program
1
$851,700,010
$481,717,369
$807,800,222
$1,289,517,591
Annual Increase in Government Expenditures
Annual Cost to Texas Economy
Total Current Cost of Public/Private Pre-K in Texas
Total Annual Direct and Indirect Costs

CHAPTER 5: BENEFITS OF UNIVERSALLY-ACCESSIBLE PRE-KINDERGARTEN IN TEXAS

This chapter will describe the benefits to various individuals and groups that would be positively affected by the implementation of a high quality prekindergarten program. The benefits include direct and indirect benefits to students, parents or program participants, employers, school system, and the juvenile justice system.

Benefits to Program Participants

The participants in a high-quality pre-kindergarten program realize significant personal benefits both during and after the school-age years. Cost benefit analysis is an increasingly useful means for arguing the importance of implementing a certain policy or program in an economically driven environment, such as the state policymaking arena. The following discussion outlines benefits included in the analysis and those we chose not to quantify.

Increased Educational Attainment and Increased Lifetime Earnings

The most significant measurable benefit to participants and society results from increased lifetime earnings that stem from higher educational attainment. Employers pay higher wages to more educated workers most likely because they are both perceived as being more productive and they tend to hold more experience than uneducated individuals (Mincer 1979). Educational attainment is directly linked to earnings potential. Studies have shown that a more educated worker enjoys higher annual earnings than a less skilled worker both because their wage rates are higher and they spend more time being employed (Mincer 1979).

Today, the overall educational attainment of women and men is quite similar. However, compensation and labor force participation are both significantly lower for women. Mincer (1979, 18) found that "more educated women generally spend more time in the labor market[, but] they are more likely to reduce their market work to take care of their children, particularly when they are of preschool age." A high-quality pre-kindergarten program could simultaneously allow the participants to benefit from increased educational attainment and the mothers to re-enter the labor force.

The most significant tangible gain to participants of a high-quality pre-kindergarten program, such as the CPC Program, is found in the increased lifetime earnings that result from increases in educational attainment. The mean household income in Texas in 2004 was $45,600 (U.S. Census 2004). However, there are large discrepancies between the incomes of Anglos and those of minority groups. Given the changing population in Texas, these discrepancies will most

likely become a detriment to the overall economy in Texas if such gaps in overall educational attainment are not lessened.

To project gains in lifetime earnings of individuals associated with additional schooling, we calculated current wages for different ethnicities (including white non-Hispanic, black, Hispanic, other, and those of mixed ethnicities), ages, and geographic locations in Texas based on personal income earnings in 2004 dollars.

We base our wage determination on three basic factors, as described by Taylor (2005), including educational attainment, work experience, and location. Workers with advanced levels of education and more work experience should earn higher incomes, holding all other things equal. Likewise, workers in areas with lower costs of living (i.e. rural Texas) may be more willing to accept lower nominal wages than workers in areas with high costs of living (Taylor 2005).

These data were used to calculate the expected lifetime earnings differential (ages 16 to 65) between those that graduated from high school and those that did not, discounting future earnings at a 3 percent real interest rate. Such results can be used to find the possible lifetime earnings benefits across the state. To accomplish this, the resulting earnings differentials are weighted by the racial/ethnic composition of Texas children ages 0 to 4 in 2004, thereby reflecting the future demographics of the Texas workforce. In addition to workers of different education levels, ethnic groups, ages, and sexes, we also sought to differentiate between workers in rural and urban populations. The lifetime earnings gain from graduating from high school for a non-minority student is less than for a minority student, which indicates that the benefits of universal pre-kindergarten may be greater for minority students. Such estimates should be conservative, as the value of education has been steadily increasing over previous years.

Table 5.1

Ethnicity	Percent of Four-year-old Population	Lifetime Earnings: Gain from Graduating		Dollar Amounts
		(percent)		
White non-Hispanic	42.16	15.90	or	$82,440.69
Hispanic	23.00	21.20		$89,866.17
Black	11.00	18.10		$81,174.25
Other	2.72	14.60		$70,950.42
Mixed race	21.06	19.30		$85,265.66

Source: U.S. Census Data (2004); population based on cohort of children ages 0 to 4

Weighted by the appropriate ethnic groups, the average Texas participant in the program, as described above, would realize an increase of $84,281.89 in lifetime earnings by graduating from high school.

As previously discussed, the CPC program enabled an 11 percentage point gain in graduation rates. However, the program mainly applied to minority children. Therefore, we conservatively estimate that White, non-Hispanic participants will only experience roughly one-third of the benefit, or a 3.67 percentage point gain as indicated below.[13]

Table 5.2

Ethnicity	2004 Completion Rate	CPC Completion Rate
	(percent)	(percent)
White non-Hispanic	89.40	93.07
Hispanic	78.40	89.40
Black	82.80	93.80
Other	87.50	98.50
Mixed race	81.80	92.80

Source: Completion rates as reported by the TEA 2004

U.S Census Population Estimates indicate 349,715 four-year olds would be eligible to attend a universal pre-kindergarten program in Texas, such as the one proposed here. Of this four-year-old population, the ethnic breakdown is as follows:

Table 5.3

Ethnicity	Percent of Population	Total	70%	80%
White non-Hisp.	43.47	152,021	106,415	121,617
Hispanic	22.88	80,015	56,010	64,012
Black	11.19	39,133	27,393	31,306
Other	2.56	8,953	6,267	7,162
Mixed Race	19.90	69,593	48,715	55,675
TOTAL:	100.00	349,715	244,801	279,772

Source: Based on U.S. Census data (2004), Barnett et al, 2005; author's calculations

Utilizing official demographic projections for the state, we can estimate the number of participants in the proposed program at both 70 and 80 percent participation. Both estimates are reasonable considering the already high participation rates in pre-kindergarten in Texas. If we assume the increases in graduation rates for these populations, we can determine the benefit to Texas as a whole from increases in lifetime earnings to be $1.7 billion with 70 percent participation and approximately $1.9 billion with an 80 percent participation rate in 2000 dollars.

Table 5.4: Gains in Lifetime Earnings for the State of Texas, 2000

Participation	Ethnicity	Graduates at 2004 rate	Graduates at CPC Rate	Improvement	Gains in lifetime earnings
	White non-Hispanic				
70%	106415	95135	99040	3905	$321,965,711.52
80%	121617	108725	113189	4463	$367,960,813.17
	Hispanic				
70%	56,010	43,912	50,073	6,161	$553,677,963.33
80%	64,012	50,185	57,227	7,041	$632,774,815.23
	Black				
70%	27,393	22,682	25,695	3,013	$244,598,256.41
80%	31,306	25,922	29,365	3,444	$279,540,864.47
	Other				
70%	6,267	5,484	6,173	689	$48,910,254.39
80%	7,162	6,267	7,055	788	$55,897,433.59
	Mixed Race				
70%	48,715	39,849	45,208	5,359	$456,911,638.04
80%	55,675	45,542	51,666	6,124	$522,184,729.18
TOTALS:					
70% Participation	**244801**	**207061**	**226189**	**19128**	**$1,626,063,823.69**
80% Participation	**279772**	**236641**	**258502**	**21860**	**$1,858,358,655.65**

Source: Data extracted from U.S. Census data (2000); current graduation rates as reported by the TEA; all dollars have been discounted to present day value at a 3-percent interest rate, unless otherwise noted; author's calculations

After inflating these gains to 2004, we find a $1.8 billion and a $2.03 billion gain to the state, depending on participation. Based on these calculations, we find the benefit to a participant in the program, including both those that would have graduated from high school without such a program and those that would not have graduated, to be $7,280.07 per pupil. Our calculations differ from those in the RAND report for California; many of the differences are methodological:

- Our research utilizes U.S. Census data and is based on wage models that predicts an hourly wage rate, rather than mean annual earnings.

- Like RAND, we allowed for a 0.05 percent rate of growth in real annual income based on growth in productivity.

- Because Texas is a low wage state, we do not account for growth in income due to fringe benefits. Texans are underinsured, and, for this reason, we assume that employers in Texas are not as likely to provide fringe benefits at the level that RAND assumed in California.

Other differences in the populations and wages within Texas and California account for the aforementioned differences in gains to lifetime earnings. The differentials in California should be much larger in nominal dollars because the wages in that state are much higher than in Texas. Our assessment of the differences in earnings is conservative because we assume that all workers are employed full-time. Moreover, the differences are likely to be much larger because those without high school diplomas are much more likely to be unemployed or underemployed. Our assessment is also conservative because high school graduates are more likely to be insured than high school dropouts.

The findings regarding gains to lifetime earnings are similar for Texas and California because this benefit is derived wholly from the improvement in quality of the existing program. Therefore, drastic differences in participation rates do not apply here. We are assuming these benefits to be zero within the existing model, and that these benefits accrue only with a high-quality pre-kindergarten program, such as the CPC program.

Gains in Tax Revenue, Less Reliance on Public Assistance, and an Improved Economy

Increases in the income of participants in the program will benefit all Texans in the form of increased tax revenues that fund public programs. Although the State of Texas does not utilize an income tax, the state still benefits greatly from increases in the incomes of Texas families. As families experience increases in income, they also increase their expenditures. Texas should realize increased revenues in the form of consumption taxes and local property taxes (Murdock and Klineberg 2005). Based on the real income of Texans, as reported in 2004, and sales tax revenue collected by the state, according to State Comptroller's Office, we find that the effective tax rate is 2.2 percent (Texas Revenue Estimates FY 2006-2007). If we experience 70 percent participation in the proposed program, the gain in tax revenue will total roughly $39 million. Likewise, an 80 percent participation rate will likely generate $45 million in sales tax dollars for the State of Texas.

Increased income also indicates less reliance on public assistance or welfare programs. This reduction means cost savings to the tax-paying public in funding such programs. Pre-kindergarten education may also engender a reduction in a child's lifetime use of welfare. The CPC Study did not find a change in child welfare usage; however, the High Scope Perry Preschool Project did. The Perry Preschool program, which served minority, high-risk children, found a 21 percent reduction in participant's welfare usage when compared to the control group

(Schweinhart et al. 1993). Like the RAND study, however, we do not include the welfare calculation in our analysis because the CPC study did not find similar results. Although the benefits will not be calculated in our analysis, they do, nonetheless, deserve to be mentioned. The RAND study estimated that the Perry Preschool program found a $4,039 per child savings to taxpayers and a $3,635 reduction in present value income to each participant; this results in a $404 net benefit to society (RAND 2005, 85). Karoly and Bigelow (2005, 85) believe that their analysis underestimates government benefits, and that the benefits to participants are overestimated by negating the welfare reduction calculation. Nonetheless, the overall benefit to society would be negligible.

Furthermore, increased lifetime earnings affect more than increased government revenues and less reliance on public assistance programs. Increased income certainly affects the economy of Texas. An environment in which educational attainment and human capital are high, coupled with higher compensation rates, is an attractive environment to high-quality employees and firms within Texas and throughout the United States. Increasing the quality of the economic environment in Texas benefits all current Texans and attracts individuals to the state.

Reduction in Child Maltreatment

An evaluation of the CPC study, conducted by Reynolds and colleagues (2004), found that the children involved in the CPC program were only half as likely to be victims of child maltreatment, such as neglect and abuse (5 percent of participants vs. 10 percent of others).

Previous studies have made it possible to measure tangible savings to families that might be involved in cases of abuse or neglect. Involvement in such cases not only adds to the cost of social service and investigation programs and court fees within government, but also, Miller, Cohen, and Weirsema (1993, 10) found that both the victims and families involved in cases of abuse and neglect experience tangible losses associated with lost productivity, medical treatment, and mental health care. The largest portions of tangible costs associated with abuse and neglect are in lost productivity and mental healthcare costs. Those experiencing abuse and neglect lose wages for unpaid workdays, fringe benefits, housework, and school days. Miller et al. (1993, 12) found that mental healthcare usage rates for victims of child abuse are between 25 and 50 percent, while victims of other crimes use healthcare at much lower rates (1 to 4 percent).

After bringing the costs, as identified by Miller, Cohen, and Weirsema, forward to 2004 dollars, the cost of each case of abuse to families is $13,134.24; cases of neglect average $2,565 per case. In 2004, 35 percent of cases were classified as abuse, and the remaining 65 percent of cases were neglect in Texas (DFPS Databook 2004). If we weight those costs by the percentages of abuse and neglect cases in Texas in 2004, we find that the average case costs a family $6264.48 in the state. Therefore, if involvement in a high-quality pre-kindergarten program reduces the percentage of children involved in child maltreatment cases, we can hope to produce the same percentage of savings to families that are spared the costs of such involvement.

In 2004, the child population in Texas numbered 6,189,777 and the number of confirmed cases of abuse or neglect numbered 43,666 (DFPS Databook 2004). The rate of abuse is, thus, 8.2 children out of every 1,000 selected. If the incidence of child abuse and neglect are cut in

half for participants in the proposed program, we can assume that the ratio will drop to 5 children for every 1,000 children selected. We are assuming that 70 percent of all eligible four-year-olds, or approximately 233,400 children, will participate in a high-quality pre-kindergarten program modeled after the CPC Program. Before the implementation of such a program, we would expect that 1,914 children would be victims of either abuse or neglect, incurring a total cost to families and individuals involved of $11,989,743.88.

According to Reynolds (2000), we can expect the number of victims and the cost associated with those victims to be cut in half. After implementing such a program, we expect 957 fewer children to be victims of abuse or neglect, and the overall savings to those victims in the state of Texas would total $5,994,871.94. Though such cases are, once again, costly to the state in the form of law enforcement, medical, investigative, and administrative costs and costly to the families involved, such cases are much more costly to individual victims. Such costs include a child's physical and emotional well-being. Though emotional well being and development are difficult to quantify successfully, it is important to consider them and other intangible benefits of the proposed pre-kindergarten program.

Intangible Benefits to Participants

Some of the benefits of a high-quality pre-kindergarten program are not easily quantifiable. Indeed, high-quality pre-kindergarten education realizes significant quantifiable benefits to society, participants, and all levels of government, but many important outcomes are intangible. Decision makers must personally weigh the importance of qualitative and quantitative benefits accruing to participants when evaluating the worth of a proposed public program. Some qualitative benefits to participants include cognitive and social development, reduced involvement in criminal activities, and increased self-sufficiency.

Cognitive and Social Development

Involvement in a high-quality early childhood education program has been shown to enable participants to enjoy numerous benefits that are not always quantifiable in monetary terms, at least not to the individual participant. A study of participants in the CPC program suggested that, at age 9, "those who participated in the CPC had significantly higher reading and math achievement scores, lower rates of grade retention, and higher ratings of parental involvement" (Karoly 1998, 4). These benefits result in monetary savings to the state based on less grade repetition, etc., but they are also beneficial to children in the form of appropriate behavior and cognitive development. Such benefits are enjoyed socially and psychologically by participants and also monetarily in the form of cost savings to taxpayers as discussed later in this chapter.

Early childhood education programs have attempted to measure a wide array of outcomes; however, none have chosen to measure the same outcomes. This poses a problem when researchers seek to compare the quality of different programs and assess the merits of implementing such programs. For example, the CPC study did not measure intelligence levels (IQ) or trips to the emergency room; Perry Preschool study did, however. Moreover, the Perry Preschool study chose not to look at behavioral development while CPC did (Karoly 1998, 67).

One could infer that similar programs would have similar benefits, but we cannot say with confidence that these programs will produce outcomes that have never been measured in relation to the program. The result is a general idea of the possible benefits that could accrue with the implementation of a high-quality universal pre-kindergarten program. We are unable, however, to attribute all of these benefits to a single program that has been studied thus far.

Reduced Involvement in Criminal Activities

In addition to the cognitive and emotional development benefits mentioned above, participants experience "lower incidence and seriousness associated with juvenile offenses" (Karoly 1998, 67). Participants in these programs are less likely to experience the negative social and financial effects of being involved with the juvenile justice system and being incarcerated. Reduced involvement in criminal activities will be discussed in greater detail later in the report.

Self-sufficiency

Increases in income that result from increased educational attainment allow participants to become increasingly self-sufficient, allowing them to participate more in the labor force, pay more taxes, and lessen their welfare usage.

In 1999, King et al. acknowledged reported benefits to health in the form of fewer visits to the emergency room and a lower incidence of teen pregnancy (Karoly 1999). The possible intergenerational effects identified by King et al. can be described as parental benefits that stem from the program's efforts to involve the entire family. These effects could lead to benefits from "enhanced self-esteem to earning and output effects from their own increased work effort" (Karoly 1999, 11). In addition to the parents, King et al. acknowledge that siblings that are not involved in the program could likely experience similar benefits, as parents may implement some of the lessons learned via their child in pre-kindergarten (Karoly 1999, 11). Finally, King et al. argue that increased civic participation is a possible due to the increased economic well-being of participating families and children.

The positive benefits of implementing a universally-accessible pre-kindergarten program are dispersed across individual participants and their families, state, local, and federal governments, and society overall. Participants may experience a wide range of social, cognitive, and health related benefits in addition to increased educational attainment and increased lifetime earnings.

Benefits to Parents

Parents of children who participate in a pre-kindergarten program will benefit both directly and indirectly. These benefits are derived from the fact that pre-kindergarten may be substituted for or be held in conjunction with child care services that were previously being provided. The direct benefit to parents is that they either no longer have to pay for child care services or their overall child care costs are significantly reduced if they work more than 8 hours a day or also have other children in child care at the same time. Indirectly, parents benefit from

the freeing up of their time to work or do other activities that the parent would normally not be able to do if the pre-kindergarten program was not available. Additionally, by returning to work sooner, parents are also able to increase their lifetime earnings.

Direct Benefits to Parents

According to our model's cost-benefit analysis methodology, benefits to parents only take into account direct returns from the participation of their child in the program. The direct benefit that participants' parents receive is the provision of child care services during the time that their child is in the pre-kindergarten program (Reynolds et al. 2002, 12). Continuing with the CPC's methodology, an hour of child care is valued at the minimum wage rate. This rate is set at $5.15 per hour in the State of Texas. Accordingly, if the pre-kindergarten program provides 1,309 hours of child care, then the resulting benefit to parents is a savings of $6,741.35 for each year of pre-kindergarten.

Indirect Benefits to Parents

Although the CPC Program did not include other potential benefits to participants' parents, other studies suggest that there are indirect benefits that may accrue to them as a result of their child's participation in a high-quality pre-kindergarten program. Evaluations of the CPC program did not include these benefits because they were not measured. These figures are typically omitted because analyses of pre-kindergarten programs tend to focus primarily on benefits specifically related to participants, such as reductions in youth-related problems like child abuse, delinquency, and high school drop out rates. Most importantly, the parents in the CPC program were required to participate in the program, which did not allow parents free time to work as in the program under evaluation (Reynolds et al. 2002). However, program evaluators note that parents generally did not fulfill their participation obligations, so the benefits of the CPC program clearly do not hinge on parental participation during the regular school day.

An example of a program that offers full-day, year-round care and non-mandatory parental participation is the Abecedarian program. Although this program provides care for children from a few months after birth until kindergarten, the importance of this example stems from the improved education level, occupational status, and earnings of participants' mothers over mothers whose children did not participate in the program. Thus, mothers of children who participate in a high-quality pre-kindergarten program not only have the potential to generate income by working, but also, they have the potential to increase their lifetime earnings by having an additional year of work experience (Masse and Barnett 2002).

Increased Income for Mothers

While several cost-benefit analyses have been conducted on various early childhood development and pre-kindergarten programs, no single analysis has been broad enough to capture the full range of benefits from such programs (CED 2004). To fully capture the benefits to parents of pre-kindergarten program participants, we must consider other ways in which parents would benefit besides having a child care alternative. These benefits accrue from the changes in outcomes for the parents as a result of their children's participation in the program.

One potential benefit to parents results from their increased ability to participate in the labor force. If pre-kindergarten takes the place of parental child care, then the parental child care provider is free to do other activities with his or her time, such as working. We assume that this benefit to parents is derived from the mother's ability to work since it is generally the mother who stays at home to take care of the children. Therefore, women whose youngest child in the household is age 4 will be free to take on at least a part-time job if desired. These women are usually mothers who were unable to work and/or did not want to work because they had children below school age. Oftentimes, the rationale is that they cannot afford high-quality child care for their children, and/or they choose to take care of their children until they are old enough to go to school. In 2004, there were approximately 183,700[14] Texas women of working age whose youngest child in the household was age 4.

A review of the literature shows that, all things equal, women who are more educated are more likely to work, although they may temporarily leave the labor market for child care and rearing purposes (Hartmann 2004). Additionally, there is evidence that there is a correlation between wage rates and education levels; as women attain higher levels of education over the years, their wage rates increase. Thus, highly educated women and women with higher potential wage rates are more likely to remain in the labor force after childbirth because of the opportunity cost associated with non-market, homemaking activities (Brayfield 1995, 190). In addition, the hourly participation of married women in the labor force has increased from 869 hours in 1979, less than a half-time job, to 1,255 hours, an increase equivalent to working ten additional weeks of full-time work (Hartmann 2004, 228). Nevertheless, a single mother is more likely to work than a married mother. Furthermore, family income has been shown to be an influential factor in whether or not a mother will stay home to care for her children. Generally, in a two parent home the income is higher, or the father can work longer and more hours to support the family. On the other hand, in a low-income household the mother will more likely decide to go back to work or go on federal assistance in order to provide for their livelihood while she takes care of the child (Anderson and Levine 1999; Brayfield 1995; Bub and McCartney 2004). Our analysis indicates that 61.62 percent[15] of Texas mothers whose youngest child in the household is 4 years of age work outside the home. This figure is based upon labor force participation responses in the 2000 U.S. Census.

Several studies demonstrate that there is a relationship between women's labor force participation and the cost and availability of child care. While estimates vary, an average approximation "is that a 10 percent reduction in child care costs will lead to a 2 percent increase in the labor participation rate of mothers with young children, with an even larger effect for low-wage women" (Karoly and Bigelow 2005, 124). Additionally, reduced child care costs have higher effects on single mothers' labor force participation rates than on those for married mothers (Han and Waldfogel, 2001). After applying those assumptions to a universally-accessible public pre-kindergarten program, a reduction in child care costs to zero for mothers whose youngest child in the home is 4-years-old would result in a 20 percent[16] increase in their labor force participation rate. Although a universally-accessible pre-kindergarten program only offers care for 7 hours each weekday, parents have the option of paying for wrap-around care for after school hours. These women could potentially increase their individual household earnings by at least $10,300 a year if they were to work a full-time job at minimum wage.

In essence, Head Start and public school fully subsidize education, which in effect reduces the price of child care to zero for that period of time (Anderson and Levine 2000, 4; Gelbach 2002).[17] In his analysis, *Schooling for Young Children and Maternal Labor Supply*, Gelbach (2002) found that a child's enrollment in kindergarten at a public school leads an unmarried mother whose youngest child is age 5 to increase her labor force participation. These single mothers' annual weeks worked increased by 12.4 weeks, and hours worked per week increased by 8.3 hours. Additionally, enrollment of their child in a public kindergarten program increased their likelihood of employment by 19.1 percent and their annual wage and salary income by $6,892[18] (Gelbach 2002, 312). Somewhat smaller effects were found for married women (313). Although these findings are for mothers whose youngest child is age 5, Gelbach (2002, 320-321) also found that enrollment of 4-year-olds in pre-kindergarten, whether public or private, similarly yielded significant effects on a single mother's employment.

Another study by Lemke et al. (2000) examines the relationship between work participation of Massachusetts welfare recipients and kindergarten programs. Specifically, they found that the availability of full-day kindergarten significantly increased the probability that current and former welfare recipients will work. This likeliness to work was higher in areas with full-day kindergarten versus areas with part-day or no kindergarten. Likewise, they found that the decreased probability to work was associated with part-day, part-year Head Start and Pre-K programs (2000, 2). Interestingly, Lemke et al. (2000, 24) found that the stability and quality of child care has a larger effect on the probability of work than cost for low income women.

Increased Lifetime Earnings for Mothers

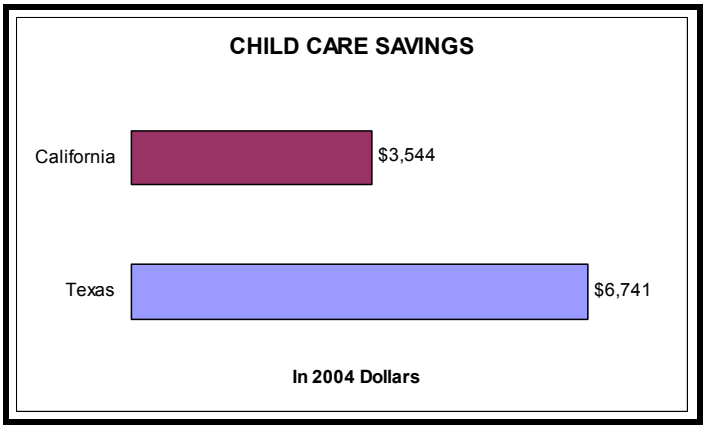
As previously mentioned, full-day pre-kindergarten programs allow mothers the freedom to participate in the work force. By joining the work force when their child is 4, instead of 5-years-old, these mothers gain an additional year of work experience in their lifetime. This means that mothers of pre-kindergarten children who decide to go to work not only earn income in that year, but also more money each additional year that they work.

While many researchers agree that working today will increase wages over a person's lifetime, some debate whether the "standard human capital model applies to low-skill workers" (Grogger 2005, 1-2). In his study, Grogger (2005, 2) discusses the validity of the returns to experience for low-skill workers and finds that many studies on welfare recipients include selection bias that causes returns to experience to be lower than they actually are (2005, 2). By using a group that has a bias towards the likelihood of not working, the actual returns to experience are diminished by a sporadic work history. After controlling for selection bias, it was found that welfare recipients in the study who returned to work "enjoyed a return of roughly 5.6 percent per year of experience" (2005, 21, 23). Other research on samples with similar levels of experience find returns ranging from 4 percent to 7 percent, with most around 5 percent (Gladden and Taber 1999; Loeb and Corcoran 2001; Ferber and Waldfogel 1998; and Light and Ureta 1995). Mothers of four-year-olds in our sample were on average 32.5 years old and had a high school education. After applying Grogger's findings to the characteristics of our sample, we can say that mothers who decide to join the workforce can potentially increase the present discounted value of lifetime earnings by at least $45,629.[19] We can expect these findings to be

the same without regard to high school completion (Gladden and Tabor 1999) or welfare use (Loeb and Corcoran 2001). It should also be noted that these women will not experience a 5.6 percent return each additional year that they work, but rather a diminishing return as they age. Thus, it is possible that potential increases to lifetime earnings may be slightly less than predicted.

Conclusion

Figure 5.1



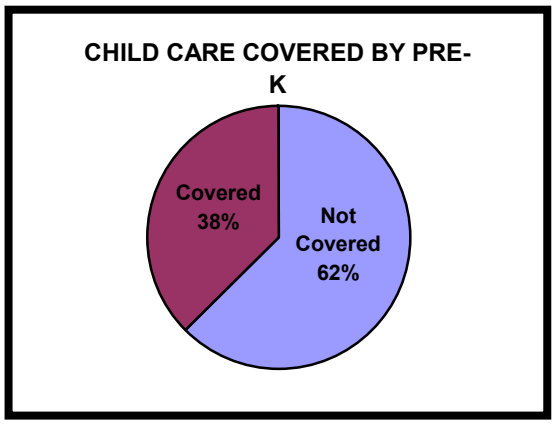
In review, in a world were no pre-kindergarten exists, parents can save at least $6,741 in out-of-pocket expenses for each year of pre-kindergarten from placing their four-year-old in a high-quality, universally-accessible, public pre-kindergarten program, as well as with qualifying privately-owned child care providers. In addition, if those parents have another child below school age, those resources can be shifted towards the payment of that child's care. However, Texas does have both public and private pre-kindergarten programs, as well as a significant participation rate in child care. Given that we want to implement a high-quality program within the current system, parents who choose to use public facilities will gain this full benefit. Users of qualifying privately-owned pre-kindergarten facilities or child care centers may reap a portion of the savings through the use of a public-private partnership system. In comparison, it is estimated that Californians will have a child care savings of $3,544. Although Californians have an hourly value of child care that is $1.60 more than Texas, this difference in savings of $3,197 can be explained by the fact that California's pre-kindergarten program will provide 525 annual hours as opposed to the 1,309 hours that we propose (Karoly and Bigelow 2005, 84).

Furthermore, studies on child care and labor force participation rates of mothers suggest that some mothers may decide to join the labor force if stable, low-to-moderate cost, high-quality child care were available to them. This is especially true if the pre-kindergarten program lasts a full-day. Moreover, reductions in child care costs lead to increases in women's labor force participation rates. If child care costs for four-year-olds dropped to zero we estimate that the labor participation of mothers whose youngest child is four will increase by approximately 20 percent. Considering that a Texas family with at least one four-year-old has, on average, 0.55 other children in the household, it is more likely that child care costs will reduce by approximately 37.53 percent, for those needing child care during the typical 8 a.m. to 5 p.m.

work shift. With this expected reduction in child care costs, we approximate that labor force participation of mothers with four-year-olds will increase by 7.51 percent[20], or 4.70 percentage points[21].

Financially speaking, it can also be surmised that participation in this pre-kindergarten program for family's whose youngest child in the home is four-years-old may increase their household income by a minimum of $10,300 that year, should the mother decide to work full-time. The increased income for those 4.70 mothers, distributed to all pre-kindergarten students, results in a benefit of approximately $484.33 per child[22]. With this being said, it should be kept in mind that all mothers may not decide to join the workforce, despite the freeing up of their time for other things besides child care. Married women have a higher tendency to remain out of the labor force, while mothers with high levels of education have a higher likelihood of returning to the work force.

Figure 5.2



Increased earnings for mothers during the year that their child is in pre-kindergarten also lead to increased earnings over their lifetime. The rationale is that an additional year of work today results in an additional year of work experience, which in turn, allows the mother to earn more money in the future. Our sample of mothers whose youngest child is four-years-old had an average age of 32.5 years and on average had a high school education level. From that age until 65 years old—the federal retirement age—mothers had lifetime earnings of $814,806. Returning to work when their child is in pre-kindergarten, instead of kindergarten, increases their lifetime earnings by $45,629, or 5.6 percent.[23] While we do expect for their earnings to increase over their lifetime, we anticipate that their will be a diminishing return to work experience and the 5.6 percent increase each year will eventually taper off. The benefit of increased lifetime earnings for mothers distributed to all pre-kindergarten students results in a benefit of $2,145.60 per child. These lifetime earnings figures have been discounted to present values.

Table 5.5

BENEFITS TO PARENTS			
	Texas - No Pre-kindergarten	**Texas - Current Program**	**California/Rand**
Value of Child Care	$6,741	$6,741	$3,544
Increased Income for Mothers	$484	$0	$0
Increased Lifetime Earnings for Mothers	$2,145	$0	$0

Benefits to Employers

While a cost-benefit analysis establishes one aspect of the economic case for a universally-accessible pre-kindergarten program in Texas, it does not completely capture the full range of potential economic and non-economic benefits that may accrue from investing in such a program. To capture the benefits to Texas employers, we must also consider other ways that employers would gain from a universally-accessible pre-kindergarten program. Specifically, this section will focus on future term benefits to employers as they relate to Texas' competitiveness in the nationwide economy.

Indirect Benefits to Employers

The implementation of a universally-accessible pre-kindergarten program in Texas can potentially increase the size of the workforce, as well as improve its performance. These benefits to employers would immediately accrue as a result of changes in the ability of parents to participate in employment activities. Since changes in outcomes of the participants' parents are not typically measured in the evaluation of pre-kindergarten programs, spillover benefits to employers and the economy from these changes are likewise typically left out of pre-kindergarten cost-benefit analyses.

In order to address the benefits to employers, it is important that one have an understanding of the labor force issues that employers will face in the years to come. By understanding the implications of these issues, one can contextualize the value of the benefits that accrue to employers from a universally-accessible pre-kindergarten program. According to Karoly and Panis (2004), there has been a slowdown in the overall growth rate of the workforce over the last twenty years. "The U.S. labor force grew at an annual rate of 1.6 percent during the 1980s and then slowed to 1.1 percent during the 1990s. While the Bureau of Labor Statistics projects no change from the 1990s during the current decade, the rate is predicted to slow down to 0.4 percent in the 2010s and 0.3 percent in the 2020s" (Karoly and Bigelow 2005, 122). This slowdown stems from the aging of the baby boom generation, which is expected to show significant growth, and from a decrease in immigration (Fullerton and Toossi 2001).

In Texas, over the last five years, the labor force rate of growth has decreased by 0.25 percent compared to a 0.5 percent slow down for the nation as a whole.[24] The average age of the total population in Texas is 34.32, and the average age of the working population is 43.18.[25] The implication of this slow down in the rate of labor growth is that it will be difficult to recruit workers during periods of strong economic growth (Karoly and Panis 2004, 16). The only way to ease pressures to sustain the economic growth rates experienced in the past is to increase the size of the labor force (Karoly and Bigelow 2005, 122). The labor force growth slowdown can be counteracted by increasing the labor force participation of the current population (Karoly and Panis 2004, 52).

Increased Ability to Recruit Labor for Employers

One course of action to counteract the slowdown in labor force growth is to increase the size of the labor force. As discussed earlier, some strategies to increase the size of the labor force are to increase the current participation rate of the Texas population or attract workers from other states and countries. This section explores the latter strategy of increasing the attractiveness of the state to potential workers. This strategy not only involves attracting potential workers to current employment positions, but also, includes attracting businesses to develop more employment options for all workers. While there are several factors that influence a worker's decision to choose a certain community over another as well as several factors that influence a business' decision to locate in a particular place, the quality of life is a major factor for both. In particular, a review of the literature shows that education is an area of considerable interest in regard to economic development decisions (Weiss 2004).

Although the United States is a technologically advanced economy, some technologically-heavy companies in southern parts of the country have raised the issue of a shortage of available quality labor (Weiss 2004, 8-9). As recent economic trends and increased global economic competition drive decision makers to explore avenues to improve the local economy and attract businesses, education is increasingly being seen as one method for addressing these issues (Weiss 2004, 4-5). A high-quality pre-kindergarten program has the potential to attract skilled workers with young children to Texas over other communities that do not offer such a program (Karoly and Bigelow 2005, 123). While no studies currently exist that examine the potential impact of a universally-accessible pre-kindergarten program on location decisions, there is an emerging literature that investigates how quality of life considerations, including the quality of the education system, influence both business and worker location decisions (Weiss 2004, 16).

Evidence suggests that there is a relationship between an employer's need for an existing educated workforce and the need for a quality local education system. Accordingly, in making their decisions about where to locate, the ability of a community to provide an educated labor pool is taken into account. Similarly, in attracting new workers to an area, public schools are also taken into consideration in the assessment of the quality of life in that area (Weiss 2004, 16). As we evolve from an economy based on natural resources and physical labor into one based on knowledge for economic growth, competitive advantage no longer goes to regions that can best reduce firm costs and provide cheap physical labor (Florida 2000, 8). In particular, skilled workers, such as those in the technology industry, take quality of life into consideration when

deciding where to live. Regional advantage goes to those who can generate, retain, and attract talent for high technology industries through a mix of amenities, lifestyle options, and environmental quality that a place offers (Florida 2002; Florida 2000, 8-9). In his study of the location decisions of "knowledge workers", Florida (2000, 20) finds that workers ranked good public schools as the fourth most important of thirty-seven factors in deciding where to live. Likewise, high technology firms ranked good schools the fourth highest of twelve amenities in location decisions, and a survey of all firms ranked quality of public schools as the most important consideration (Florida 2000, 17).

Economic developers are increasingly recognizing the importance of quality of life in business location decisions. Quality of life has been deemed particularly influential for companies involved in research and development and high technology, and in enterprises employing highly skilled workers in information or knowledge-based services and production (Love and Crompton 1999, 212). Evidence of this observation is a study conducted by Love and Crompton (1999, 213) in which they surveyed 174 decision makers of businesses that had initiated, expanded, or relocated to Colorado in the previous five years. Their finding was that quality of primary and secondary education was extremely important to 10 percent, very important to 29 percent, and somewhat important to 21 percent of the survey respondents in regards to (re)location decisions (1999, 216). Furthermore, quality of life was considered the second most important factor for prompting the business move and not selecting a specific community, as well as the third most important factor in the final selection of a specific community (1999, 218). A number of other surveys also indicate that K-12 education is one of the most important quality of life indicators for an increasingly "high technology and high skilled knowledge industry" and labor force (Salvesen and Renski 2003).

It should be noted that businesses focus on quality of life considerations when making location decisions because they are relevant for attracting a high-quality workforce. The lack of empirical studies on the effects of pre-kindergarten on quality of life considerations prevents an estimation of the potential impact of a universally-accessible pre-kindergarten program in Texas on location decisions of either workers or firms (Karoly and Bigelow 2005, 123). Nevertheless, the information that is available suggests that the quality of the K-12 education system in a community plays a major role in the decision of an individual or business to locate in a particular community. Moreover, the limited data suggests that the addition of a high-quality universally-accessible pre-kindergarten program could potentially increase the attractiveness of Texas to both workers and employers. These studies also suggest that improved educational opportunities would be more attractive for college educated, professional workers who are the most likely to value quality of life considerations. Labor costs are lower in locations that offer attractive amenities for workers.

Improved Workforce Performance

Another benefit to employers from the provision of a high-quality pre-kindergarten program is improvement in workforce performance. This benefit accrues from the fact that if such a program were available for at least a half-day or longer, working parents would have access to stable, convenient, high-quality care for their pre-kindergarten aged children (Karoly and Bigelow 2005, 125). Many parents—primarily female—have difficulty maintaining a job

while their children are below school age. Some women are unable to work because they cannot afford high-quality child care, while others choose not to work because of the lack of high-quality child care available. Those parents that do choose to work often times perform worse than their co-workers who do not have children below school age or those who do not have any children at all. This reduced performance is the result of disruptions in the work day due to unreliable child care providers. The availability of a high-quality universally-accessible pre-kindergarten program provides a safe, secure, and stimulating child care environment. Thus, a high-quality pre-kindergarten program allows working parents to improve their work place performance by minimizing disruptions in their work schedules, lowering levels of stress, and diminishing concern about the well-being of their children during working hours (Karoly and Bigelow 2005, 125). Although such a program benefits parents of participants as well as their employers, improved workforce performance is included as a benefit to employers because they are the ones who monetarily benefit from the performance improvements. Specifically, employers benefit from a reduction in absenteeism and job turnover as well as an associated improvement in productivity that is related to improvements in the abovementioned areas.

A review of the literature on child care and the labor market did not uncover any studies that specifically examined the benefits of a universally-accessible pre-kindergarten program on workforce performance. However, from the studies that do exist on the topic and through examination of the data on employers that offer child care access to their employees, we can generalize the likely benefits that would ensue from the high-quality pre-kindergarten program. Most of the studies on child care and employment focus primarily on the effect of child care costs, and in some instances quality, on the decision of whether or not a woman works. However, there are recent studies that explore the affects of access, cost, and stability of child care arrangements on work outcomes. Findings reveal that regardless of income level, having young children contributes both directly and indirectly to employment termination among women. Young children reduce the rewards and raise the cost of employment, in addition to raising the risk of firing or dismissal due to inability to fulfill attendance requirements (Felmlee 1984; Pavetti 1993). However, Hofferth et al. (1991) find that formal child care arrangements (e.g., center-based care) are more dependable than informal arrangements, such as a sitter in the child's home. Correspondingly, absenteeism was lower for users of formal child care services because parents did not lose as much time from work that would have resulted from the unavailability of an unstable provider, as experienced by users of informal child care arrangements. Nevertheless, even if formal child care is the more desirable mode, child care arrangements in general can be hard to find and can be quite costly, which substantially reduces its benefits and the probability of a mother working (Hayes, et al. 1990).

As discussed in the previous section, the availability, cost, and stability of child care arrangements can also affect job turnover outcomes. Hofferth and Collins' (2000, 380) analysis of job exit suggests that the number and ages of children affect a mother's ability to maintain stable employment. While the characteristics of child care in an area, such as fees, average child/staff ratios, the number of programs, or actual child care expenditures did not seem to have a significant bearing on the likelihood of a mother's job exit, the type and convenience of that care did. "Mothers using only parental care were 2.2 times more likely to leave a job than mothers using center-based care. In addition, mothers who reported that a center was 10 or more minutes away are more likely to leave the work force than those who reported that a center was

within 10 minutes from home. It should be noted that convenience, as measured by distance to care, is only apparent for center-based care" (Collins et al. 2000, 381). These findings highlight the importance of formal, non-parental child care arrangements as well as convenient access to center-based programs. Moreover, instability in child care arrangements, such as the sudden termination of services, can also be a reason for work exit. However, moderate- and high-wage mothers are more sensitive to the sudden termination of a child care arrangement than low-wage mothers (2000, 383). Unexpectedly, moderate-wage mothers are mostly likely to exit the workforce due to cost and instability in arrangements than low income mothers (2000, 389).

Recent studies show that as a result of the increase in the share of employees with children from single-parent households and dual-earner households, more employers are responding to the need of their employees to balance the demands of family life and work (Burud and Tumolo 2004). As it becomes harder to overlook the importance of enhancing the work-life balance, employers have sought to improve access to, or lower the cost of, child care. Employees have benefited through child care referral services, reserved child care spaces, subsidized child care, backup child care for sick children, and onsite employer-sponsored child care centers. While these efforts are not wide-spread among employers, it is a reality that they will have to face if they wish to attract and keep employees.

Several studies attempt to measure the effects of employer related child care benefits on employee performance. The research of Traill and Wohl (2003) and Burud and Tumolo (2004) finds that several companies that implemented child care benefits for their employees reported reductions in turnovers and improvements in retention. While there seems to be a relationship between child care benefits and turnovers and retention, the examples from the two studies are mainly descriptive, relying mostly on company data or benefits reported in surveys of employees, and they lack statistical analysis to support the findings. Such studies leave themselves open to challenges due to possible biases in the self-selected samples. Karoly and Bigelow (2005) state that the flaw in this literature is the potential selectivity of which employers offer child care benefits to their employees as well as the selectivity of the employees who take up the various benefits. While there is no randomized experiment that would overcome these potential biases from observational studies, there are several analyses that try to account for potential selection biases using statistical techniques, despite relatively small samples in selected geographic locales.

To analyze absenteeism and turnover, Milkovich and Gomez (1976) compared a sample of 30 mothers with pre-kindergarten-aged children in an employer-subsidized, high-quality child care center against 30 mothers of children the same age who were not enrolled in a formal child care arrangement. All mothers held similar jobs. Mothers whose children were in the center had significantly lower rates of turnover and absenteeism than their counterparts. Further examination also revealed that the rates of absenteeism for mothers of children who were not in a formal child care facility exhibited greater variability than mothers of child care participants, which suggests that the mothers who did not have their young children enrolled in a child care exhibited less stable work habits (1976, 113). On the other hand, Kossek and Nichol (1992) challenge those findings by comparing absenteeism among employees who use employer sponsored onsite child care and employees who used a formal child care facility outside of the employer center. They found that the use of the employer center did have an affect on

absenteeism if the employee was using a formal arrangement prior to entry into the center. This can be explained by the fact that formal-center based child care tends to be a reliable and stable child care provider, unlike informal arrangements. While both studies are important, the difference in the type of control group in the Milkovich and Gomez (1976) study produced a sharper contrast in results. Kossek and Nichol's (1992) findings are consistent with Goff, Mount, and Jamison (1990). They also found that access to reliable, quality care, regardless of whether it is provided by the employer, has the greatest impact on work performance. They found no evidence that on-site child care reduces work-family conflict and absenteeism in employed parents. Rather lower levels of absenteeism and work/family conflict were found to be associated with employee satisfaction of the quality of their child's care, regardless if provided by the employer or not (Goff et al. 1990, 804).

More recently, researchers have examined the effect of other family-friendly benefits that employers are offering employees with children. In a survey of 120 employees that took place between October 2000 and January 2001, Baughman, DiNardi, and Holtz-Eakin (2003) explored such benefits in Onondaga County, New York. They did not find evidence that the majority of family supportive benefits increase worker productivity. The exception is that employers offering flexible sick leave and child care assistance have significantly lower turnover rates. While the small sample size in the study does make it difficult to make generalizations, the findings do confirm widely held beliefs about the relationship between child care and job turnover. It should be noted that family benefit packages are often implemented in response to problems with turnover, recruiting, and absenteeism. Thus, the researchers adjusted models to account for the bias inherent in employers that offer such programs (Baughman et al. 2003, 258).

While there are many articles that discuss the relationship between high-quality pre-kindergarten programs and employment outcomes, such as absenteeism and turnover, there is little literature that makes qualitative estimates of the potential dollar benefits to employers from a universally-accessible pre-kindergarten program. Nevertheless, there is evidence that suggests that it is possible to deduce the quantitative advantages to employers from turnover and absenteeism reduction. Phillips (1990) produced a study that estimated that employee turnover costs an employer 1.5 times the annual salary of exempt employees and 0.75 times the annual salary of nonexempt workers. These are the costs associated with the lost productivity of departing employees as they leave, lost productivity while the position remains vacant, and the costs of recruiting and training a replacement (Karoly & Bigelow 2005).

Absenteeism, especially days lost due to family responsibilities, is also costly to employers. CCH International (2004), in their annual survey of employers, finds that workplace absenteeism costs employers $610 annually per employee. After personal illness, which accounts for 38 percent of absenteeism on the job, family issues rank second, with 23 percent of absenteeism associated with the need to care for elderly relatives (Karoly & Bigelow 2005). However, this study does not make a distinction between family related absenteeism regarding children, spouses, or elderly relatives.

Conclusion

In review, high-quality, universally-accessible pre-kindergarten is seen as a possible solution to many employer problems. First, as employers face labor shortages, pre-kindergarten may be a way to entice mothers to join the labor force sooner and increase the amount of labor available. Secondly, labor supply shortages will also increase competition for high-skilled, educated workers. The attractiveness of a high-quality, universally accessible pre-kindergarten enables Texas' to keep its high skilled workers, as well as, to attract workers from other states. The logic behind this assumption is that a high-quality, universally-accessible pre-kindergarten program will influence a worker's, or business', decision to locate in one place over another. Furthermore, a quality local education system is associated with a high quality of life for workers, as well as, the availability of an educated labor pool for future hiring needs. For Texas, more workers and employers provide an expanded tax base and facilitate economic development.

Thirdly, a high-quality pre-kindergarten program can potentially improve workforce performance by providing workers access to stable, convenient, high-quality care for their pre-kindergarten aged children. Without such a program, many female parents may not be able to work, maintain a job and have satisfactory work performance because of unreliable child care providers. Thus, a high-quality pre-kindergarten program allows working parents to improve their work place performance by minimizing disruptions in their work schedules, lowering levels of stress, and diminishing concern about the well-being of their children during working hours. While there is research on the relationship between pre-kindergarten programs and employment outcomes, few articles attempt to quantify potential benefits to employers. Nevertheless, there is one article estimated that employee turnover costs an employer 1.5 times the annual salary of exempt employees and 0.75 times the annual salary of nonexempt workers. These are the costs associated with the lost productivity of departing employees as they leave, lost productivity while the position remains vacant, and the costs of recruiting and training a replacement. Another study found that workplace absenteeism costs employers $610 annually per employee with family issues ranking as the second reason for absenteeism. However, this study does not make a distinction between family related absenteeism regarding children, spouses, or elderly relatives.

Benefits to Schools

The implementation of a universally-accessible pre-kindergarten program in Texas would provide numerous benefits to students, parents, the state, and the school system. This section discusses identified benefits to the school system. While some benefits exist that cannot be measured, there are other areas in which measured benefits may occur. The measured benefits described here are dropout rates, special education, and grade retention. The immeasurable benefits discussed are accrued through decreased Limited English Proficiency (LEP), federal standards outlined in No Child Left Behind (NCLB), and improved child behavior. Dropout rates, special education, and grade retention are the three areas that the RAND report focused on.

Measurable Benefits

The following benefits are recognized in several studies, including RAND, and are, therefore, calculated in our estimation of benefits recognized to Texas. Where RAND recognized benefits to low, middle, and high income students, our benefits are calculated to low and non-low income students. RAND (2004) recognized similar benefits of the CPC program in estimating their benefits, where low income students assume 100 percent of the benefits of pre-k, middle income students assume 50 percent, and high income students assume 25 percent. Since it was not possible for our study to distinguish between middle and high income students, we assumed all non-low income students would recognize 33 percent of the benefits of CPC.

Dropout Rates

One benefit of instituting a universally-accessible pre-kindergarten program in Texas is a reduction in the dropout rate. The reported four year dropout rate in Texas for school year 2004-2005 was 3.9 percent (TEA 2005, 8). This rate is calculated by the number of students who did not enroll in school year 2004-2005 divided by the number of students enrolled in school year 2000-2001. According to the TEA, the average high school dropout leaves during grade 10 (TEA 2005a, 11). We use the TEA's dropout rate and the NCES estimation for the average grade of dropout because it is closest to the evaluation used by the CPC.

The cost to the state of keeping one student from dropping out in the 10th grade in present value terms is listed in Table 5.6[26] The costs to the state are broken down by special education and regular education dropouts, limited English proficiency dropouts, and low SES dropouts.

Table 5.6

	Regular	**Special**
Not Low SES	$11,800.81	$25,777.32
Low SES	$14,160.97	$30,932.79

Higher achievement in school is related to a lower probability of dropping out. If it can be assumed that four-year-old pre-kindergarten students have higher achievement than those that do not enter pre-kindergarten, it would follow that a benefit of pre-kindergarten enrollment is a lower incidence of dropping out. While there is an additional cost to the state to educate a student who does not drop out, the benefits, as discussed in the previous section, far exceed those costs. For example, the student is less likely to enter a juvenile justice program, and the lifetime earning potential for the students is increased.

According to dropout rates reported for school year 2004-05, of the 3.9 percent of total dropouts 6.33 percent of them were low SES special education students, 48.27 percent were low income regular education students, 5.27 percent were special education students, and 40.13 percent were regular education students (TEA 2005, 8). Given these percentages, we calculated that the state saves $65,019.05[27] per 100 children for those that drop out of school each year. The CPC study indicates that pre-kindergarten attendance lowered dropout rates by 15 percent. Therefore, the benefit of pre-kindergarten attendance increases costs to the state by 15 percent

each year for four years, beginning 10 years from now, for low SES and special education students. Benefits to regular, not low SES students will not be recognized at the same rate, and they are, therefore, calculated at only a 5 percent reduction. Given this reduction in dropout rates, we estimate the savings to the state of not educating dropouts to be $55,645.05.[28] The difference in these costs is the reduction in the savings to the state, given the effects of pre-kindergarten attendance, of $9,374 per hundred students. In other words, the lower expected dropout rate increases expected state expenditures by $94 per child.

Special Education

During the 2004-2005 school year, 506,391 of the over 4,300,000 students in Texas were enrolled in special education programs (TEA 2005, 1). The average per pupil cost of regular education in Texas is $5,606.74.[29] According to the state's finance formula, the cost of special education programs per pupil per year is $12,247.20[30] (TEA 2005). The Wisconsin study contends that benefits accrue to students from pre-kindergarten attendance, and such benefits decrease the number of students who are placed in special education classes as well as the number of years that students are in special education programs (Belfield & Winters 2004). Moreover, the Aos study shows that pre-kindergarten attendance reduces the number of years individuals are enrolled in special education classes by four years; on average, individuals enter special educations classes at eight years of age (Aos, et al., 2004).

Using this information, we can determine the present value of reducing the number of students who are enrolled in special education. Since the state will be educating these students within regular education classrooms, rather than special education classrooms, the difference in the cost is the amount of benefit realized. The cost savings from the reduction in special education enrollment can be seen in Table 5.7.[31]

Table 5.7

	Special
Not Low SES	$22,588.66
Low SES	$27,106.39

Reductions in the number of low income and LEP students enrolled in special education programs should reflect similar reductions found by the CPC study. Therefore, we assume reductions in special education enrollment by 41 percent for low income, special education children. Similar to dropout rates, we assume one-third of these benefits for not low income students. Therefore, our calculations show reductions in special education students of 13.67 percent.

Table 5.6

	% of Population	# Reduction in Special Ed per 100	Cost
Low Special	6.3063	2.58558	$70,085.79
Not Low Special	5.2437	0.71664	$16,187.91
Total			$86,273.70

Based on the above table, we find a savings to the state from a reduction in the number of students enrolled in special education to be $86,273.70[32] per 100 children, or a benefit from lower expected special education participation of $863 per child.

Grade Retention

Numerous studies, including RAND, recognize decreased grade retention as a benefit to schools gained from attendance in pre-kindergarten programs (Barnett 1995; Belfield & Winters 2004). The exact benefit from reduced grade retention varies by state as the per pupil cost varies. The RAND report uses a study by Aos, et al. (2004) for their analysis on grade retention. Aos, et al. (2004) assume that the average age of retention is 17 years of age, and that the average student retains one year (2004, 70). The Wisconsin study calculates their grade retention benefits in a similar fashion (Belfield and Winters 2004). The TEA similarly claims that a benefit of pre-kindergarten instruction for four-year-olds would be less grade retention; moreover, those that do repeat grades would repeat fewer grades. According to the TEA, the percentage of students that repeated a grade in 2004-2005 was highest in first grade for regular education students and kindergarten for special education students. The benefits of reduced retention would be recognized in year 13 for the additional year of schooling (see Table 5.11).[33] The benefits are recognized in the thirteenth year because they are not graduating in the twelfth year and must spend an additional, thirteenth year, in school. Consistent with the CPC study, the present values are calculated per student in 2004 dollars at a 3 percent discount rate.

Table 5.7

	Regular	Special
Not Low SES	$3,706.72	$8,096.84
Low SES	$4,448.06	$9,716.21

The probability that a child will be retained in a grade depends on whether a student is in special education or in non-special education. The rate at which students are retained in Texas from kindergarten to grade eight can be seen in Table 5.8.[34] The CPC study estimates that pre-kindergarten decreases grade retention by 40 percent. Since we are assuming those same benefits for special education and approximately one-third of those benefits for regular education, the rates at which pre-kindergarten attendance would decrease grade retention are shown in Table 5.9.[35]

Table 5.8

Grade	Regular Edu. Retained	Regular Edu. Not Retained	Special Edu. Retained	Special Edu. Not Retained	Not Econ. Disadvantaged Retained	Not Econ. Disadvantaged Not Retained	Econ. Disadvantaged Retained	Econ. Disadvantaged Not Retained
K	2.90%	97.10%	11.30%	88.70%	3.40%	96.60%	3.90%	96.10%
1	6.00%	94.00%	9.70%	90.30%	4.00%	96.00%	8.10%	91.90%
2	3.60%	96.40%	4.00%	96.00%	2.00%	98.00%	4.90%	95.10%
3	2.70%	97.30%	2.00%	98.00%	1.30%	98.70%	3.60%	96.40%
4	1.70%	98.30%	1.30%	98.70%	0.90%	99.10%	2.20%	97.80%
5	0.90%	99.10%	1.50%	98.50%	0.70%	99.30%	1.30%	98.70%
6	1.50%	98.50%	1.60%	98.40%	0.90%	99.10%	2.00%	98.00%
7	2.30%	97.70%	2.20%	97.80%	1.40%	98.60%	3.10%	96.90%
8	1.70%	98.30%	3.00%	97.00%	1.30%	98.70%	2.50%	97.50%
Total:		**78.89%**		**68.39%**		**85.13%**		**72.36%**

Table 5.9

Grade	Regular Edu. Retained	Regular Edu. Not Retained	Special Edu. Retained	Special Edu. Not Retained	Not Econ. Disadvantaged Retained	Not Econ. Disadvantaged Not Retained	Econ. Disadvantaged Retained	Econ. Disadvantaged Not Retained
K	2.52%	97.48%	6.78%	93.22%	2.96%	97.04%	2.34%	97.66%
1	5.22%	94.78%	5.82%	94.18%	3.48%	96.52%	4.86%	95.14%
2	3.13%	96.87%	2.40%	97.60%	1.74%	98.26%	2.94%	97.06%
3	2.35%	97.65%	1.20%	98.80%	1.13%	98.87%	2.16%	97.84%
4	1.48%	98.52%	0.78%	99.22%	0.78%	99.22%	1.32%	98.68%
5	0.78%	99.22%	0.90%	99.10%	0.61%	99.39%	0.78%	99.22%
6	1.31%	98.70%	0.96%	99.04%	0.78%	99.22%	1.20%	98.80%
7	2.00%	98.00%	1.32%	98.68%	1.22%	98.78%	1.86%	98.14%
8	1.48%	98.52%	1.80%	98.20%	1.13%	98.87%	1.50%	98.50%
Total:		**81.40%**		**79.89%**		**86.95%**		**82.51%**

The 40 percent reduction in grade retention that the CPC found is utilized in our calculation of the cost savings per 100 children who participated in pre-kindergarten. To estimate a reduction in the benefit for regular education children, we estimated approximately one-third of the benefit, thus finding a 13.3 percent reduction in grade retention for regular education. Given this, we were able to estimate cost savings per hundred children for those who had attended pre-kindergarten minus those who had not attended pre-kindergarten. A cost savings of $32,642.70 per 100 children who are not retained in a grade for one year is found (see Table 5.10).

Table 5.10

Low SES	Individual PV Cost	% of the Pop	# Retained no Pre-K	# Retained Pre-K	Difference
Reg	$4,448.06	48.27	13.34	8.44	$21,788.88
Special	$9,716.21	6.33	2.00	1.27	$7,076.03
Low SES	**Individual PV Cost**	**% of the Pop**	**# Retained no Pre-K**	**# Retained Pre-K**	**Difference**
Reg	$3,706.72	40.13	5.97	5.24	$2,707.85
Special	$8,096.84	5.27	1.11	.98	$1,069.93
				Total:	**$32,642.70**

Immeasurable Benefits to Schools

While three additional benefits to schools have been recognized by other studies, they have not been given actual benefit estimates in this study. We recognize the impact that a high-quality pre-kindergarten program would have on the following three areas; however, because we cannot conservatively estimate such benefits, we simply do not attempt to do so. We do, however, examine each benefit qualitatively.

English as a Second Language

Arguments exist both for and against teaching Spanish speaking pre-kindergarten students the English language. Costs to the state increase due to the increased cost of bilingual curriculum and the cost of certifying and hiring dual language teachers. The estimated cost to the state of serving bilingual students is approximately 19 percent higher than serving students who are not in Limited English Proficiency classrooms (Gronberg et al. 2005). Alternatively, some communities in Texas feel that it is important for students to preserve their native language and, therefore, such communities dislike English only curriculums. Further, they feel a dual language program would be most beneficial to building a system that is culturally sensitive to the Spanish language, its culture, and its values (PEW Hispanic Studies 2004). Since the research in this area is limited, however, further studies on the effects of teaching Spanish speaking 4-year-olds how to speak the English language should be completed before a comprehensive analysis on the costs and benefits of bilingual education is completed.

No Child Left Behind

The passage of the No Child Left Behind Act in 2002 created standards for national public school accountability. This standardization allowed states to receive or be denied federal dollars. According to the U.S. Department of Education (USDOE), states are given discretion in how they measure the academic progress of both schools and students. Within Texas, the TAKS test serves as the standard measurement technique. If Texas passes its Adequately Yearly Progress (AYP) standards—determined by the USDOE—it receives its federal allocation of Title I funding. This funding is very important to students in Texas who are enrolled in Title I

schools. As of 2004, roughly $1,110,705,516 in funding was withheld by the USDOE, and its allocation to the state was conditional on Texas' passage of the AYP standards (USDOE).

Neither the RAND nor the Wisconsin studies discuss benefits directly related to standardized testing. The benefits of universally-accessible pre-kindergarten have recently gained prominence as the debate over educational accountability gains popularity. A study by Conner and Morrison (2004) recognizes that developing basic skills early, such as math and grammar skills, can predict future school success. Belfield and Winters (2004) claim that the benefits of pre-kindergarten extend through the sixth grade. On the other hand, Magnuson et al. (2004) claim that the benefits of pre-kindergarten extend only through first grade. A dollar value can be placed on the passage of standardized tests if the academic benefits of four-year-old pre kindergarten students can be extended from first to third grade. Given the amount of federal money at risk, researchers should determine if pre-kindergarten enrollment positively influences achievement on third grade TAKS tests.

Child Behavior

The behavior of students in the classroom may influence teachers and the school system, as well. Belfield and Winters (2004) claim, for instance, that when teachers are satisfied with their jobs lower turnover and absenteeism results. Teacher satisfaction, therefore, lowers hiring costs and substitute teacher salaries. Currie (2004) maintains that self-control skills taught in pre-kindergarten can improve social and behavioral skills in elementary school and can ultimately lead to academic success, as well. In fact, Heckman and Rubinstein (2001) argue that such social skills can be as or more important to future successes than the cognitive skills pre-kindergarten students learn in the classroom. Conversely, Witte & Trowbridge (2004) claim that pre-kindergarten programs reduce self-control and increase behavioral problems through students' middle elementary years.

The Total Benefit to Schools

We have identified and estimated several benefits to schools in our analysis. The estimated benefits arising from the reduction in the number of school dropouts, special education classes, and grade retention due to the implementation of a universally-accessible pre-kindergarten program can be seen in Table 5.11. However, further research is needed to determine possible cost benefits from behavior, Limited English Proficiency, and the long-term benefits arising from the passage of the No Child Left Behind Act. Based on our calculations, we assume a total cost benefit to schools of $109,542.40 per 100 kids.

Table 5.11

	Cost per 100 Children
Dropouts	($9,374)
Special Education	$86,273.70
Grade Retention	$32,642.70
Total	$109,542.40

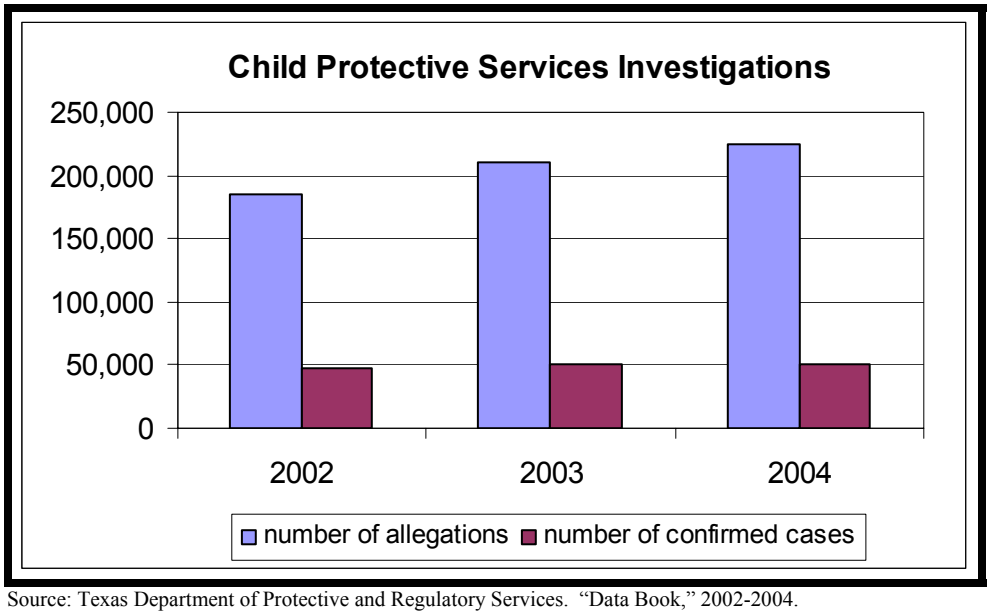
Reducing the Prevalence of Child Abuse and Juvenile Delinquency

Historically, research has suggested that early childhood education has a positive effect on educational attainment, which, in turn, reduces the likelihood of juvenile delinquency. One of the most recognized studies of juvenile delinquency was conducted by Sheldon and Eleanor Glueck in 1950 and was reproduced in 1993 by Robert J. Sampson and John H. Laub. These studies found that early socialization through interaction with other toddlers and the controls that exist within formative institutions, such as schools, foster an environment for intellectual, mental, and physical growth that provides benefits to the child even into adulthood, including reduced likelihood of criminal behavior as a juvenile or an adult (Sampson and Laub 1993). This section evaluates the benefits to children by means of increased enrollment in high-quality pre-kindergarten programs in terms of a reduced incidence of abuse and delinquency and an increase in educational attainment, all of which can result in significant savings to the state of Texas and society-at-large.

The State of Child Welfare in Texas

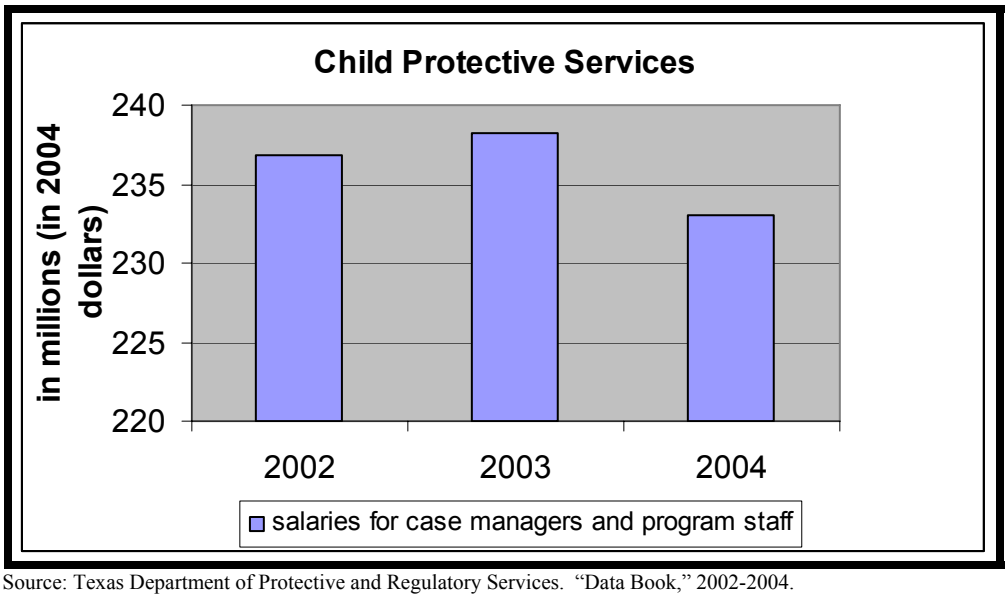
Child abuse and neglect are significant problems that continue to cost the state millions of dollars each year. One proposed solution to the rising costs of child abuse investigations is early detection. If more children began school at an earlier age, teachers and administrators would be more likely to notice signs of abuse and neglect. For the 2006 fiscal year, over $247 million was allotted to Child Protective Services for salaries of direct care staff, intake services, and program staff. The predicted number of abuse cases for the 2006 fiscal year is approximately 216,000 cases and 20 percent of those cases (43,666) are expected to be confirmed abuse cases (Legislative Budget Board 2005; see Figures 5.3 and 5.4).

Figure 5.3



Source: Texas Department of Protective and Regulatory Services. "Data Book," 2002-2004.

Figure 5.4



Source: Texas Department of Protective and Regulatory Services. "Data Book," 2002-2004.

While primary funding for child abuse investigations is received through the state, funding is also available through local and federal sources. Approximately 50 percent of funding is received from the federal government (Geen, Boots, and Tumlin 1999). Each case that remains open for investigation of abuse or neglect costs the state $136.73 per month (in 2004 dollars) (Legislative Budget Board 2005). Other researchers suggest that the cost to the state per investigation could be as high as $942.18 (in 2004 dollars) (Courtney 1998). While cases of abuse should be taken seriously and investigated, at least three-fourths of these cases are found to be unsubstantiated each year. Due to the limited resources of the state, these resources must be

used in a more efficient manner. The RAND Corporation estimates that the incident of abuse and neglect could decrease by approximately five percentage points for participants in a high-quality pre-kindergarten program, as compared with non-participants (Karoly and Bigelow 2005). Measures taken by teachers and schools would not only improve the well-being of the child, but also could possibly improve his or her home environment by providing training resources and counseling for the parent and child (Courtney 1998). Long-term health improvements can lead to more educational attainment, which, in turn, increases the benefits to the state. Healthier adults are able to remain in the workforce longer, with less absenteeism, which increases the returns for initial education outlays for early childhood education and primary and secondary schooling (Elias 2004).

Costs Incurred by Abuse and Neglect Victims and the State

Reducing the prevalence of criminal activity also reduces tangible and intangible costs to the state and crime victims. As discussed earlier, research has shown that enrolling children in a high-quality pre-kindergarten program increases the likelihood of abuse detection and could potentially reduce the number of abuse cases, which leads to cost savings for the state. Additionally, studies have linked high-quality pre-kindergarten to increased graduation rates, and Greenwood et al. (1998) argue that increased graduation rates leads to a reduction in juvenile delinquency. In short, researchers argue that the most effective intervention is early intervention.

While crime reduction can lead to significant savings to the state and society, decreased victim costs and increased intangible benefits, such as mental and physical well-being, may also occur. One of the largest outlays of government funds is to child victims and their families due to abuse and neglect. Included in the cost estimates are out-of-pocket expenses, decreased productivity, and pain and suffering. Physical abuse of a child results in direct costs of $13,134.24 per incident (in 2004 dollars), which encompasses social services, medical expenses, and counseling services. Intangible costs of abuse, such as a reduction in quality of life, can lead to a loss of $75,170 per incident. Neglect of a child results in direct costs of $2,353.08 per incident (in 2004 dollars). Emotional abuse can lead to direct costs totaling $7,451.42 per incident, but the inclusion of intangible costs totaling $27,450 per incident brings the total cost of each incident of abuse to nearly $34,901.42 (in 2004 dollars). For a majority of families with health insurance, a significant portion of these costs will be borne by their employer's insurance company. A smaller portion of the costs are borne by the government in the form of retributive and emergency costs. Families that cannot afford health insurance may receive assistance from Medicaid and Medicare, which will cover medical expenses and counseling services. The largest proportion of intangible costs (77 percent) is borne by victims and their families (Miller, Cohen, and Weirsema 1996). These examples illustrate not only the negative effects on the lives of those subject to abuse, but it also demonstrates the difficulties in accurately calculating victim costs.

Potential Savings to the Child Welfare System

The increase in the number of four-year-olds entering pre-kindergarten programs can provide significant benefits to their own well-being, as well as helping to decrease the prevalence of abuse and neglect. Contact with teachers and administrators may signal the need for family intervention by means of in-home services and counseling. Early intervention can help ensure that the family remains intact, decreasing the emotional strain on the child and also reducing state spending on out-of-home placements, such as foster care and adoption.

Child Protective Services reports that 0.82 of every 100 children will be the victims of abuse and neglect, and as reported earlier, RAND (2004) suggests that this rate could decrease by up to five percentage points. Child Protective Services (2004) also reports that 35 percent of children in confirmed cases were victims of abuse and 65 percent of children were victims of neglect. Considering that the rate of foster care was 0.11 per 100 children in 2004, the potential savings to the state of a 50 percent reduction in abuse cases, as reported in the CPC study, is $1,924.20 per 100 children enrolled in a pre-kindergarten program (Legislative Budget Board 2005).[36] Similarly, the rate of adoption was 0.05 per 100 children in 2004, leading to a potential savings of $245.37 per 100 children enrolled in a pre-kindergarten program (Legislative Budget Board 2005).[37] Child Protective Services frequently places children in confirmed abuse cases in the care of a relative. The potential savings from reduced family substitute care placements, based on the 50 percent reduction rate, is $393.61 per 100 children enrolled in a pre-kindergarten program (Department of Family and Protective Services 2004).[38] Overall, the application of the various prevalence rates results in savings to the state and victims and their families of $ 26.56 per child enrolled in pre-kindergarten.

Table 5.12: Summary of the Benefits in Terms of Reduced Abuse and Neglect (in 2001)

	In Pre-K	Not in Pre-K	Rand Estimates
In-home care	$3.05	$6.11	
Family substitute care	$3.94	$7.87	
Foster care	$19.24	$38.48	
Adoption	$2.45	$4.91	
Total cost to the state per child			**$52.00**
Cost to abuse victims and families	$14.14	$28.28	$51.00
Cost to neglect victims and families	$5.25	$10.50	
Total savings per child (state and families)	$26.56		**$51.00**

Child Protective Services frequently attempts to keep the family intact through the utilization of their family preservation program, or in-home services. Based on a prevalence rate of .22 per 100 children, the potential savings to the state if fewer families require in-home services are $305.42 per 100 children enrolled in a pre-kindergarten program (Department of

Family and Protective Services 2004).[39] This brings the total savings to the state from reduced child abuse and neglect to $2,868.61 per 100 children.

While there are recognized benefits to the state in terms of potential savings from the reduction in child abuse and neglect cases, there are also potential benefits that can be realized by children and their families. If the incidence of abuse is reduced by 50 percent, as reported by the CPC study, this can lead to a savings of $1,413.95 per 100 children enrolled in a pre-kindergarten program (Miller, Cohen, and Wiersema 1996).[40] Similarly, a reduction in the prevalence of neglect can lead to a savings of $525.18 per 100 children enrolled in a pre-kindergarten program (Miller, Cohen, and Wiersema 1996).[41]

The State of Juvenile Justice in Texas

One long-term benefit of participation in high-quality pre-kindergarten programs that can be realized by the child, the state, and society is the reduced prevalence of juvenile delinquency. To provide an accurate depiction of juvenile delinquency in the state of Texas, relevant data for referrals to the juvenile probation system, commitments to a youth detention facility, and the costs associated with each.

Budget reports for the 2005 fiscal year show that the average cost to the state for each referral to the juvenile probation system is $374.92 per case. If a youth is under "intensive supervision" by a probation officer, which means that the youth is required to meet regularly with the probation officer and demonstrate progress towards the completion of set educational and rehabilitative goals, the cost to the state is $14.60 per day, or $5,329 per year. Alternatively, if the youth receives residential placement in a non-TYC facility the cost to the state is $83.29 per day, with an average commitment of less than six months, which brings the total state cost to $15,200.43 (Legislative Budget Board 2004). Compare this to the cost of housing a youth in a TYC facility—with an average length of commitment of 20 months—which is $9.68 per day for correctional treatment ($3,533.20 per year) and $15.44 per day for specialized treatment, or $5,635.60 per year. Further, the state cost for correctional programs offered at TYC is $76.75 per day for each youth, or $28,013.75 per year (Legislative Budget Board 2004).

A longitudinal study using a pre-kindergarten cohort in 1962, conducted by Virgil and Velma Williams, indicates that children who were enrolled in high-quality pre-kindergarten programs similar to the Perry/High Scope model were arrested for half as many felonies or misdemeanors as compared with the control group, which did not participate in the program.[42] The reduction in criminal activity observed in the experimental group leads to an increase in earnings and productivity in the labor force. While the difference in earnings cannot be solely contributed to criminal behavior, engaging in these activities causes other setbacks, such as a reduction in educational attainment and an inconsistent work record if the arrests resulted in a jail or prison sentence.

Potential Savings to the Juvenile Justice System

According to a 2002 study produced by Arthur Reynolds et al., participation in a CPC program can reduce the likelihood of juvenile arrests by 33 percent. The potential savings are

$293.50 per 100 children enrolled in a high-quality pre-kindergarten program.[43] A decrease in the number of arrests could also lead to a proportionate decrease in the number of juveniles under intensive supervision by a probation officer. Therefore, the potential savings are $4,432.56 per 100 children enrolled in a pre-kindergarten program.[44] Application of the CPC benefits leads to a total savings from reduced arrest rates of $4,726.05 per 100 children enrolled in a pre-kindergarten program.

Even more substantial reductions in government expenditures can be realized by correctional facilities such as TYC, considering the annual cost of housing, educational programs, and specialized treatment programs. CPC studies also estimate that a 43 percent reduction in the number of correctional outlays can occur as a result of increased participation in pre-kindergarten programs. This could lead to a savings of $1,427.15 in housing and educational programs per 100 children enrolled in pre-kindergarten.[45] Further, 75 percent of TYC inmates also receive specialized treatment for drug addictions, mental health problems, and rehabilitation for sexual offenses (2005). The reduction in the number of incarcerated juveniles requiring specialized treatment could lead to a state savings of $254.95 per 100 children enrolled in pre-kindergarten.[46] This brings the total housing and rehabilitation costs to a total of $1,682.50 per 100 children enrolled in pre-kindergarten. Overall, number of contacts with the justice system would be reduced by 1.09 per 100 children enrolled in a pre-kindergarten program. (See Table 5.13 for a summary of all juvenile justice related benefits).

Table 5.13

Summary of the Juvenile Justice Benefits of Pre-Kindergarten in Texas and California			
	Those not in pre-k	**Those in pre-k**	**RAND**
Arrest rate	3.32 per 100 juveniles	2.23 per 100 juveniles	
Incarceration rate	0.15 per 100 juveniles	0.09 per 100 juveniles	
Cost per referral to juvenile Probation	$269.51*		
Cost per juvenile receiving Probation	$4,070.30*		
Cost per juvenile receiving Treatment	$3,952.70*		
Cost per juvenile housed (in a Youth facility)	$22,126.40*		$49,200.00
Total savings per child		$70.00	$508.00
*present discounted value of reduced crime in 2016			

The estimated savings to the juvenile justice system likely do not capture all of the benefits to the newly enrolled pre-kindergarten students because the observed arrest and incarceration rates also include children that are already in a pre-kindergarten program. Taking this into consideration, the benefits of pre-kindergarten could actually be much higher.

Juvenile Justice Victim Costs

Crimes committed by juveniles, especially felonies, can lead to significant tangible and intangible victim costs. According to TYC, the most common felonies committed by youths are burglary, robbery, petty theft (larceny), drug offenses, assault, sexual assault, and motor vehicle theft (Texas Youth Commission 2005). According to Miller, Cohen and Wiersema (1996) the cost to victims of various criminal acts can be quite substantial. The cost for each burglary case is $1,437.99, with a reduction in quality of life of $392.18 (in 2004 dollars). The tangible cost to a robbery victim is $3006.71, and the intangible cost equals $7451.42 (in 2004 dollars). Larceny, commonly referred as petty theft, can lead to a tangible loss of $483.69 (in 2004 dollars) for each victim. Drug offenses, particularly those involving possession of an illegal substance, do not result in victim costs, but spillover effects of drug use can occur if the juvenile attempts to distribute an illegal substance or steal from individuals to purchase the drugs. Each assault case costs an average of $1,960.90, with a subsequent loss of quality of life totaling $10,196.68. Even more substantial losses occur from sexual assault, which leads to an estimated tangible loss of $6667.06 per victim and an intangible loss of $113,732 (in 2004 dollars) due to the emotional trauma associated with this type of crime. Motor vehicle theft, which results in relatively minor intangible costs of $392.18, leads to tangible costs of approximately $4,575.43 per offense (in 2004 dollars). While arson only accounts for 1 percent of commitments to a TYC facility, the tangible cost to victims is $25,492 with a comparable intangible loss of $23,531 (Miller, Cohen, and Wiersema 1996). Compared with the total costs for child abuse cases, these figures may appear less significant, but these costs are compounded by the costs of referral to the juvenile probation system, court costs, and housing of the offenders if committed to a detention facility.

The reduction in the number of juvenile offenders also leads to a reduction in the costs imposed on their victims. Considering the average cost imposed on a victim for each of these crimes, as well as the frequency of each, the potential savings is $1,400.28 per crime averted.[47] While the frequency of murder committed by a juvenile offender is quite low, representing 1 percent of offenses in 2004, the cost of a human life is quite significant. The possible savings for every murder averted is $28,055.20.[48] It should also be noted that these estimated savings are based on the assumption that the juvenile commits only one crime before he or she comes to the attention of law enforcement authorities. In practice, a juvenile is likely to commit more than one offense before he or she is arrested and charged with a crime(s).

Adult Crime Costs

Texas incarcerates the highest percentage of adult criminals in the U.S, with California running close behind with the second largest incarcerated population. Further, a disproportionate number of inmates are of African American or Hispanic descent. Initiatives to increase safety in Texas, such as mandatory sentencing laws, have shown to be unsuccessful, as demonstrated by the negligible decrease in the crime rate in the late 1990's through the present (Center on Juvenile and Criminal Justice 2002). The current situation merits more strategic intervention, including initiatives promoting increased educational attainment. Further, research has shown that evading juvenile crime also has an impact on adult criminal behavior.

The current housing rate for adults between the ages of 20 and 44 is 1.63 per 100.[49] The net present value of housing an adult offender (at age 20) for one year is $12,228.03. However, more than half of the offenders that are currently housed in a Texas prison are serving a sentence of nine or more years. This leads to a total housing cost of $98,065.04, which includes support services and medical expenses (Texas Department of Criminal Justice 2004; Legislative Budget Board 2003).

Potential Savings to the Criminal Justice System

According to Reynolds, Temple, Robertson, and Mann (2001), the CPC study estimated that the adult arrest and incarceration rate was 80 percent of the observed juvenile rates. Applying this approach to Texas would result in a 34.4 percent reduction in adult housing costs for children who participate in a high-quality pre-kindergarten program (Reynolds et al. 2001, 16). The savings to the criminal justice system in reduced housing costs for one year is $6,873.50 per 100 children.[50] Considering that a large proportion of inmates are serving sentences of nine years or more, reducing adult criminality can lead to a reduction in costs of $55,123.37 for every 100 children enrolled in a pre-kindergarten program.[51]

Criminal Justice Victim Costs

To calculate the victim costs for adult crimes, the same approach for calculating juvenile victim costs was adopted, including the use of Miller, Cohen, and Wiersema's estimates. However, the prevalence of certain crimes differed for adult criminals, increasing the overall costs as well as potential savings from a reduction in each of the crimes noted above. Most notably, 11 percent of current adult inmates committed murder, as compared with 1percent of juvenile justice offenders (Texas Department of Criminal Justice 2004). However, FBI Uniform Crime Reports indicate a homicide rate of 0.12 percent.[52] The prevalence of violent and property crimes, as reported in the Uniform Crime report, were used to derive a conservative estimate of adult victim crime savings. The potential savings per adult crime averted is $3,284.33.[53]

Health Benefits

Unlike many of the benefits created by a statewide pre-kindergarten program, health benefits cannot be easily calculated. Much of the early education literature, including the RAND report, either discusses the possibility of health benefits without attaching a numerical amount, or it focuses on study results that are difficult to extrapolate to the general population. The studies with quantifiable health benefits are often include both early education components *and* outside intervention programs. The addition of these services makes it difficult to attribute the health benefits to a single aspect of the program. In addition to relying on studies that concentrate on early education programs, the literature fails to acknowledge the possibility of health benefits being associated with increased earnings, early hearing and vision screening, and immunizations. Therefore, the health savings to the participant, society, and the government that are associated with universally-accessible pre-kindergarten are vastly underestimated.

Existing Literature

Early education literature discusses two major studies—the Carolina Abecedarian and the High/Scope Perry Preschool projects—that discuss the health benefits of pre-kindergarten to children. Although it would be unwise to calculate a monetary value for an increase in Texas health benefits based on such studies, they deserve attention because they illuminate the possibility of increasing child health though education. The High/Scope Perry Preschool project group showed a reduction in the number of teenage births by age nineteen. According to Karoly et al. (1998), the pregnancy rate for the test group was 64 live births per 100 females, while the control group rate was 119 live births per 100 females. The Abecedarian study found that its participants were less likely to become teenage parents or smoke cigarettes (Campbell et al. 2002). Children who participated in the Abecedarian program were nineteen percent less likely to become a teenage parent and sixteen percent less likely to smoke cigarettes than non-participants. The reduction in smoking translates into an estimated savings of $19,931 per child (in 2005 dollars) to society from a mortality reduction (Masse and Barnett 2002, 45). The benefits cannot be translated to the Texas program because the programs are vastly different from the proposed program. While the Abecedarian program begins in infancy and encompasses not only educational activities, but also includes nutritional and social services for each family, the proposed program does not. The Perry Preschool project served minority, high-risk children in an early education program that required weekly 90 minute home visits (Karoly et al. 1998, 35). Attributing the same benefits to a vastly different Texas system would detract from the solidity of our argument because it is impossible to isolate the effect of pre-kindergarten from other early childhood interventions.

Increased Earnings

Increased educational attainment and earnings create secondary health effects, as well. The additional earnings derived from universally-accessible pre-kindergarten can have a great impact upon future children. This additional income may reduce the future number of families in poverty. Reducing the number of children living in poverty will have a positive effect on the overall health of future school age children (Alaimo et al. 2000, 785). According to Alaimo et al. (2000), children from low income families not only suffer from generally known poverty consequences, such as stunted growth and reduced cognitive development, but also she found that these children were more likely to be malnourished or hungry. This food insufficiency is also directly correlated with poor health, such as frequent stomach aches or headaches (Alaimo et al. 2000, 784). Lastly, the researchers found that hungry children were more likely to lack health insurance and to live in a family headed by a parent without a high school education (Alaimo et al. 2000, 782).

Vision and Hearing Screening

Enrolling children in either licensed child care or government sponsored pre-kindergarten will ensure that they receive state-mandated vision and hearing screenings. Current Texas law requires that four-year-olds enrolled in any licensed child care center, licensed child care home, or school program be screened within 120 days of admission (Texas Health Safety Code, Chapter 36). The law requires that each facility screen for vision and hearing problems and to report the data to the state yearly; however, this law does not capture children that are in

unlicensed or unregulated homes. The Texas Department of Family and Protective Services regulates three categories of facilities: listed family homes, registered facilities, and licensed facilities. The listed family homes and registered facilities are not licensed and, therefore, are not required to offer vision and hearing screening (TXDFPS). Moving children from these types of facilities into a structured program will ensure that they are receiving important screenings at an earlier age.

Hearing screenings are important because a delay in the discovery of hearing problems can cause developmental delays, including language skill and educational performance delays (Morbidity and Mortality Weekly Report 1997). Hearing screenings and diagnoses allow children to receive rehabilitative services that can mitigate losses to language development and reduce the impact on educational performance (National Institutes of Health). Vision screenings also identify disorders in children that can delay their development in the academic world (Ciner et al. 1999). The discovery of vision and hearing problems will increase a child's educational achievement.

Immunizations

Enrollment in pre-kindergarten programs has profound, yet unquantifiable, implications for immunization benefits for four-year-olds. Texas currently requires all pre-kindergarten age children to receive the following vaccines: Diphtheria, Measles/Mumps/Rubella, Polio, Haemophilus influenza type B, hepatitis A, and chicken pox (Hodge 2002). Nationally, ninety-five percent of school age children are immunized, however it is unknown how many four-year-olds are vaccinated (Hodge 2002). Vaccinations are only a requirement for licensed facilities; therefore, children in unlicensed facilities are beyond the vaccination safety net. It is unknown how many four-year-olds are in unlicensed facilities. Creating a state-wide pre-kindergarten program will require immunizations one year earlier and, thereby, reduce childhood susceptibility to preventable diseases.

Moving uncounted children into a structured program with vaccination requirements will allow the state to capture the benefits of reducing childhood susceptibility to preventable, communicable diseases and strengthen the "school safety net" against disease (Hodge 2002). Keeping children up to date on vaccinations reduces the risks of preventable disease outbreaks and the costs such outbreaks incur. Immunizing the entire four-year-old population will also increase the "herd immunity" of the total population (Bumpers et al. 2004). Lastly, while not included within this study, immunization of the four-year-old population produces some quantifiable benefits; we recommend such benefits be studied further.

CHAPTER 6: CONCLUSIONS

The cost-benefit analysis of universally-accessible pre-kindergarten in Texas indicates that the combined benefits to the participants, society, and the government exceed the costs of such a program. The analysis shows that for every $1.00 invested in the proposed high-quality program, a return of $3.50 per participant is expected, based on the enrollment of seventy percent of four-year-olds in the state. The rate of return fluctuates based on the actual enrollment of students because it is more expensive to establish new classrooms than to upgrade existing classrooms; however, an increase in expected students to ninety percent only decreases the return on investment to $3.31 per participant (see Table 6.1). This calculation is fairly conservative because we excluded benefits that are characterized by incomplete literature and data, such as reductions in welfare dependency and improved health conditions over participants' life spans.

Benefit Accrual

Although the costs of a universally-accessible pre-kindergarten program will begin immediately, certain benefits will begin immediately while others will be realized throughout a participant's lifetime. Only two benefits—increased earnings to mothers and the value of child care—will occur during the first year of the program. These benefits begin immediately because pre-kindergarten will allow mothers to enter the workforce, and pre-kindergarten will save families the out-of-pocket child care costs associated with privately-owned facilities. While mothers will receive benefits during the program's first year, the state will receive savings from special education, grade retention, and dropout reductions throughout the student's academic career. The remainder of the benefits—increased participant earnings and justice system savings—will materialize during the student's academic career and post-academic life.

Table 6.1: Texas Investment Return per Child

	70% Enrollment	80% Enrollment	90% Enrollment
Program Costs	-$5,268	-$5,446	-$5,585
Education Outcomes	$1,096	$1,096	$1,096
Increased Earnings	$7,280	$7,280	$7,280
Current Increased Income for Mothers	$484	$484	$484
Increased Lifetime Earnings for Mothers	$2,145	$2,145	$2,145
Juvenile Justice System Costs	$70	$70	$70
Juvenile Crime Victim Costs	$30	$30	$30
Adult Justice System Costs	$550	$550	$550
Adult Crime Victims Costs	$18	$18	$18
Child Welfare Numbers	$48	$48	$48
Value of Child care	$6,741	$6,741	$6,741
Total Benefits	$18,462	$18,462	$18,462
Rate of Return	$3.50	$3.39	$3.31

Texas vs. California

Even with a fairly conservative methodology, the presented Texas analysis results far exceed Karoly and Bigelow's (2005) calculation of a $2.62 return per California participant. The divergence between the two analyses results due to three primary differences: program differences, benefit marginalization, and key component costs.

First, significant differences exist between the program components being evaluated. The RAND analysis, for instance, includes a half-day pre-kindergarten program with a 20:2 pupil-teacher ratio. Our analysis includes a full-day program with a 17:2 pupil-teacher ratio. A full-day program produces higher costs, but it also produces larger benefits, such as the value of child care and the increased earnings of parents.

Second, RAND evaluated only the marginal costs and benefits of the California program, while our analysis evaluates the total costs and benefits of the proposed Texas program. Marginal benefit analysis requires additional and largely arbitrary assumptions about the benefits received under the existing pre-kindergarten system

Finally, significant differences in the costs of key study components exist, including labor costs, juvenile justice system costs, and the allocation of benefits to program participants' mothers. Admittedly, the Texas analysis does not include benefits from college attendance, which created an additional -$173 benefit within the RAND report; however, our analysis does produce larger benefits than the RAND study from increased lifetime earnings for participants, increased earnings for mothers, and the value of child care. Overall, the Texas analysis calculates a benefit of $18,462 per child, compared to benefit of $11, 374 per child within the RAND report (see Table 6.2). The following sections will explore the differences between marginal benefit and total benefit analyses, and they will illuminate the methodology differences between the RAND report and our own analysis.

Table 6.2: Texas and RAND Comparison (80 percent enrollment)

	Texas Total Effects	RAND
Program Costs	-$5,446	-$4,339
Education Outcomes	$1,096	$876
Increased Earnings	$7,280	$5,801
Current Increased Income for Mothers	$484	
Increased Lifetime Earnings for Mothers	$2,145	
Juvenile Crime Outcomes	$100	$1,220
Child Welfare Outcomes	$48	$102
Value of Child Care	$6,741	$2,406
College Attendance		-$173
Adult Crime Outcomes	$568	$1,143
Total Benefits	$18,462	$11,375
Total Costs	-$5,446	$4,339
Rate of Return	$3.39	$2.62

Marginal vs. Total Benefits

Although we consider our total benefit estimates more reliable than estimates based on marginal benefits, it is helpful to consider the marginal benefits and costs of the Texas system when comparing our results to those of RAND. In so doing, we must make assumptions about the impact of quality improvements on children already in the system. RAND assumed that children not otherwise expected to attend pre-kindergarten would reap the most benefit from the policy change, children already attending public school programs would generally receive half the benefits of children not in pre-kindergarten, and children already attending private programs would not experience any gain in the quality of their pre-kindergarten experience (RAND 2005, pg. xxii). Thus, RAND implicitly assumed that private school quality was generally comparable to CPC quality and much higher than public school quality. Those assumptions were purely arbitrary and, arguably, inappropriate within a Texas-specific analysis. In particular, our survey of private providers offered little evidence that privately-owned child care and educational facilities are of higher quality than public pre-kindergarten programs, and the survey strongly suggests that privately-owned facilities often fall far short of CPC quality. Because there is no definitive way to adjust the estimates of student benefits based on differences in quality between the existing system and the CPC program, we consider three alternative analytical frameworks.

In the first, we assume that all pre-kindergarten students in state-funded pre-kindergarten programs are already reaping the full benefits of high-quality pre-kindergarten instruction, while those outside of the state-funded system (including those in Head Start programs) are not currently receiving the benefits of a high-quality pre-kindergarten program. In all likelihood, this approach greatly underestimates the benefits of quality improvement in the existing state-funded system, and it may overstate the gains received by students in privately-owned schools and child care facilities. Given that more than half of all Texas four-year-olds are already enrolled in state-funded pre-kindergarten and, therefore, would receive no benefit under this analytic approach, these estimates are presented as the lower bound on the returns to investment in universally-accessible high-quality pre-kindergarten.

In the second framework, we follow RAND's assumptions regarding the distribution of benefits across students currently in public, private, and family care. In the third framework, we extend the RAND analysis to assume that all students currently in public or privately-owned pre-kindergarten already receive half the potential benefits of pre-kindergarten and that quality improvements would provide participants only the remaining half. In all three frameworks, we estimate the costs and benefits of a universally-accessible pre-kindergarten program with an 80 percent participation rate (The RAND analysis also presumes an 80 percent pre-kindergarten participation rate—70 percent in public pre-kindergarten and another 10 percent in privately-owned facilities).

Table 6.3 presents the marginal benefit comparisons between the Texas and California studies. Because Texas already has approximately 160,000 four-year-olds enrolled in state-funded pre-kindergarten at a cost of $2,721.58 per pupil (Barnett et al. 2005), the state would only need to spend an additional $3,804 per pupil when upgrading and expanding the program so that 80 percent of all four-year-olds in the state are enrolled in a high-quality public or private pre-kindergarten program. Assuming that 70 percent of Texas four-year-olds are already in

some sort of pre-kindergarten or child care setting, we are already receiving most the benefit associated with mothers' labor force participation. Therefore, estimates of this benefit must be revised sharply downward under any marginal benefit scenario.

Table 6.3: Comparing Marginal Effects (80 percent enrollment)

	Texas Total Effects	Texas Marginal Effects Lower Bound	Texas Marginal Effects RAND Equivalent	Texas Marginal Effects 50% Benefit	RAND
Program Costs	$5,446	$3,804	$3,804	$3,804	-$4,339
Education Outcomes	$1,096	$435	$467	$616	$876
Increased Earnings	$7,280	$2,890	$3,105	$4,095	$5,801
Increased Income for Mothers	$484	$61	$61	$61	
Increased Lifetime Earnings for Mothers	$2,145	$268	$268	$268	
Juvenile Justice System Costs	$70	$28	$30	$39	$508
Costs to Victims of Juvenile Crime	$30	$12	$13	$17	$711
Child Welfare Numbers	$48	$19	$21	$27	$102
Value of Child Care	$6,741	$4,709	$4,709	$4,709	$2,406
College Attendance					-$173
Adult Crime Outcomes	$550	$218	$235	$309	$1,143
Costs to Victims of Adult Crime	$18	$7	$8	$10	
Total Benefits	$18,462	$8,646	$8,915	$10,151	$11,374
Rate of Return	$3.39	$2.27	$2.34	$2.67	$2.62

As Table 6.3 illustrates, assuming no marginal from upgrading a state-funded public school system greatly lowers the estimate of net benefits arising from a universally-accessible high-quality pre-kindergarten program in the state. Assuming no marginal benefits from upgrading privately-owned child care and educational facilities also greatly lowers the estimate of net benefits. However, even under these very conservative assumptions, the benefits of universally-accessible high-quality pre-kindergarten still outweigh the program's costs.

Differences in the Estimates of Cost and Benefit Components

In addition to the aforementioned differences between our own analysis and the RAND analysis, the Texas-specific analysis includes estimation differences within both the cost and benefit sections. Key differences are found within our estimation of non-personnel operating costs, school system impacts, lifetime earnings estimates, juvenile justice system benefits, child abuse cases, and mothers' labor force participation rates.

Non-personnel Operating Costs

Based on an analysis by Golin et al. (2003), RAND assumed that non-personnel operating costs would total 31 percent of total costs. Following the methodology presented within Golin et al. (2003) to generate specific cost estimates for the components of non-personnel costs—including technical assistance, quality assurance, evaluation, and administration costs—we found that the RAND analysis, surprisingly, did not include such cost components within their cost estimate. Moreover, we chose to measure each cost component separately, instead of as a fraction of total investment costs, because we feel that measuring each

component independently yields a more exact estimate of costs and allows us to distinguish between recurring (such as quality assurance) and sunk (such as the purchase of equipment for new classrooms) costs. As such, our approach allows us to present a more complete picture of the cost of implementing a universally-accessible pre-kindergarten program in Texas. Overall, we estimate that non-personnel costs would total 23 percent of the total program cost in the first year of implementation.

School System Impacts

Socioeconomic stratification provides another major difference between the Texas and California studies. The RAND study categorizes children by low, middle, and high risk, while the Texas analysis categorizes children as low and non-low income. Both analyses assume low income children will receive 100 percent of the benefits. Although RAND calculates that 50 percent of the recognized benefits will be realized by middle income children and 25 percent of the recognized benefits will be realized by high income children, we cannot reliably determine the number of four-year-olds who are middle or high income. Therefore, we group all non-low income children together and assume that they will receive 33 percent of all education benefits.

Most of the differences in results, however, originate from differences in the application of the CPC results. RAND based its analysis on percentage point differences between the treatment and control groups in the CPC analysis. We based our analysis on percentage differences. For example, Reynolds (2002) found that high-quality pre-kindergarten reduced the dropout rate from 55.0 percent to 46.7 percent, a difference of 8.3 percentage points or 15 percent. RAND presumed that high-quality pre-kindergarten would lower the dropout rate by 8.3 percentage points; we presumed that it would lower the dropout rate by 15 percent. Among low-income students, the reported dropout rate in Texas for 2004-2005 was 5.9 percent. If we were to simply apply the 8.3 percentage point decrease observed in the CPC study, the dropout rate would be negative. A 15 percent reduction in the dropout rate is equivalent to a 0.9 percentage point reduction, not an 8.3 percentage point drop. Our approach is, therefore, much more conservative and defensible than RAND's approach.

Lifetime Earnings

Our analysis differs from the RAND study in several important ways. The data set used in our analysis was produced using Individual Public Use Microdata from the 2000 U.S. Census, while RAND used data from the Current Population Survey. The U.S. Census (2000) data allows us to generate a more precise breakdown of gains from education to a diverse population. In addition, we included individual data for indicators such as location, sex, age, and race/ethnicity, rather than mean data. In California, because the mean annual income is much higher than in Texas, the absolute differences will be greater between those with and without high school diplomas. Furthermore, we did not include increases realized from fringe benefits to the employee because Texas is a low wage and underinsured state, which implies that many employers do not offer fringe benefits at the level assumed by RAND. This approach yields lower estimates of gain because those without high school diplomas are more likely to be unemployed or employed part-time, compared to those with higher educational attainment.

Juvenile Justice

The differences between the justice system costs within the program under evaluation and RAND's proposal can largely be attributed to more expensive adjudication and housing of juveniles in a youth facility in the state of California. For example, the cost of housing a juvenile in a Texas Youth Facility (TYC) for one year was $31,547 in 2004. Conversely, RAND reports that one year in a California Youth Authority (CYA) facility cost $49,200 in 2003. Indeed, the proposed program under evaluation reports a savings of $64 per child, while RAND reports a $508 savings per child, which would only apply to the new participants in a pre-kindergarten program. Further, our reduction rate in juvenile arrests and commitment rates are based on Reynolds' (2002) estimate of a 33 percent reduction rate in juvenile arrests and a 43 percent reduction in costs to the juvenile justice system, which is largely attributed to a decrease in housing costs. Reynolds (2002) also found that the number of arrests per child fell by 0.33. RAND used this latter figure to develop their estimates. Given that there were only 0.03 arrests per child in Texas in 2003, following RAND's approach and assuming that arrests would fall by 0.33 per child would greatly overstate the potential benefits to the juvenile justice system in Texas.

Child Abuse

The main similarities and differences between the proposed program under evaluation and RAND's proposal with regard to abuse and neglect can be attributed to the differences between the average cost to the state and the point prevalence rate for the placement of children in various programs. For example, the cost to Texas for in-home services within one family, for an average of 7.8 months, was $3,315.39 (in 2004 dollars), which was surprisingly similar to the cost of in-home care in California ($3,400 in 2003 dollars). RAND also estimated the cost of one year of foster care, including the receipt of subsidies, at $19,000 (in 2003 dollars). The cost of one year of foster care in Texas was $18,923.16 (in 2004 dollars). The two reports diverge in terms of other program costs, such as family substitute care and adoption, both of which are absent from the RAND report. Another noticeable difference between the two states is the prevalence rate of abuse and neglect. In Texas, 35percent of children were victims of abuse and 65percent of children were victims of neglect in 2004, whereas RAND reported that 61percent of children were victims of abuse and 39percent were victims of neglect in 2003 (Karoly and Bigelow 2005). Since abuse cases generally incur higher costs than neglect cases, the different rates of each between the two states may help explain the differences between the estimates of the total savings per child.

Mothers' Labor Force Participation Rates

Unlike the previous costs and benefits, which merely differed in methodology, the mother's labor force participation is an entirely new calculation. The Texas analysis created a new methodology to address both the current and future earnings to the mother benefit because the RAND report only addressed the issue through a literature review. This additional calculation comprises over 14 percent of the total benefit, $2,629.

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Conclusions

Labor quality issues are very important within Texas. Publicly–financed, universally-accessible pre-kindergarten education is one proposed solution to the problem. Our analysis of the relative costs and benefits of a high-quality universally-accessible pre-kindergarten program suggests that even under very conservative assumptions, the benefits of such a program in Texas greatly outweigh its costs. Furthermore, our analysis suggests that many of the benefits of high-quality pre-kindergarten accrue long before participants enter the labor force. Full-day, high-quality pre-kindergarten has a significant effect on Texas' K-12 public education system, its participants, the juvenile justice system within the state, and on the labor force participation of parents.

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END NOTES

[1] Most of this summary information of the CPC study came from the "Success in Early Intervention: The Chicago Child-Parent Centers," by Arthur J. Reynolds 2000.
[2] The Texas Early Education Model (TEEM) is a relatively new program that also provides pre-kindergarten instruction.
[3] A survey of private child care/educational facilities was conducted because no data currently exists that shows the number of children enrolled in private facilities in Texas. The survey also allows us to understand how the cost of private care is related to the quality of services provided. Four hundred one responses were gathered and 46 centers gave no response to the survey questions.

The survey was conducted over the telephone, with interviewers asking a series of questions regarding cost and quality that would be commonly available to any interested parent. The mean cost per week of private pre-k in Texas is $101.09, and ninety five percent of the centers surveyed fell between $96.75 and $105.43 per child per week. The average number of four year olds per center was 21.1. The centers were also asked if they provided after school care, to which 76% said yes. The average cost per week of after school care was $53.28 and lasted for 3.33 hours.

In order to assess the quality of child care provided, the survey addressed the student-teacher ratio, curriculum accreditation, and certification and education of the teachers. None of the quality indicators were shown to have any statistically significant effect on the cost of pre-k education.

A final consideration was the location of the center because we believed that centers in metropolitan areas would have a higher cost per child. We created a variable for metropolitan areas that included all centers within the counties determined to be metropolitan areas by the Census Bureau. We found that centers in metropolitan areas had a statistically significant effect on the cost of child care and many of the quality indicators were collinear to the metropolitan centers.
[4] Mandated by the Texas Legislature.
[5] CPC requires a student-teacher/teaching assistant ratio of 17:2.
[6] See footnote 3.
[7] Average Cost per Student per Year for Public/Private Pre-K:

153,613 (number of 4 year olds in private pre-k) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 48.5%

160,868.90 (349,715 (total 4-year old pop.) X 46% (percentage of total 4-year old population in public school 2004-2005)) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 51.15%

($2,408.56 X 48.5%) + ($2,721.58 X 51.15%) = $2,568.67 per student per year for 187 days at 7 hrs. per day

Total Current Cost of Public/Private Pre-k in Texas - $2,568.67 (avg. cost of current public/private pre-k in Texas) X

(160,868.90 (number of 4 year old pre-k students in public school in 2004-2005 school year) + 153,613 (avg. number of pre-k students in private school)) = $807,800,222.07

[9] Our analysis includes the following early childhood education certificates: bilingual pre-kindergarten/kindergarten (in French, German, Korean, Mandarin Chinese, Spanish and Vietnamese), Early Childhood Education, Early Childhood Education – Handicapped, Early Childhood Education for the Handicapped, Elementary English as a Second Language, Kindergarten, Kindergarten/Early Childhood English as a Second Language, Kindergarten/Early Childhood Education, Special Education/Elementary.

[10] Teacher and teaching assistant salaries were calculated using PEIMS data from the TEA. The dataset included 272,444 observations and information about salary, experience, education, classes taught, and certifications. We first determined the full-time equivalent salary by squaring the years of experience for pre-kindergarten and kindergarten teachers in the data set. A log of salary was then created by dividing the earnings by the number of effective days worked, and then multiplying that by the number of effective days in each teacher's full-time contract. The mean of the log of salary was 8.30, with a minimum of 5.4 and a maximum of 4.9. A dummy variable for teaching kindergarten was also created, where 1 equals those teachers who taught kindergarten. Of the teachers who taught pre-k or kindergarten, 75% taught kindergarten only. The years of experience squared and dummy variables for teaching kindergarten, holding a masters' degree, PhD, or no degree, teaching only kindergarten, and the presence of any of the early education certificates (kindergarten certification, early childhood handicapped, bilingual kindergarten, and special education kindergarten), and the teachers' fixed effects salary and benefits index (a geographic adjustment for the State of Texas based on the prevailing wage in each labor market). The mean for masters' degree was .22, PhD was .005, and no degree was .008. The mean for early education certification was .166.

All of the variables were then averaged by district, and the masters' degree, PhD, no degree, teaching kindergarten, and teaching kindergarten only variables were zeroed out, leaving only pre-kindergarten teachers with bachelors' degrees. All certificates except for early childhood education were zeroed out, and the years of experience squared were changed to three and nine. The result was pre-kindergarten teachers with a bachelor's degree, an early childhood education certificate, and three years of experience. Three years of experience was chosen because the National Center on Education Statistics calls all teachers with less than three years of experience a "beginning teacher." After taking the logs of all of the variables and then taking their exponents, the result is $3512. This is the average wage across all labor markets in the state for a qualified pre-kindergarten teacher.

[11] New Classrooms:

244,800.5 (number of pre-k students expected) – 160,868.90 (number of 4 year old pre-k students enrolled in 2004-2005 school year) = 83,931.60 students requiring new classrooms

83,931.60 X $998.09 (cost of new classroom materials per child in 2005 dollars) = $83,771,290.64

$36,614,804.00 + $83,771,290.64 = $120,386,094.64 to upgrade existing classrooms' materials and outfit new classrooms with necessary materials

[12] The current age of many school district facilities in Texas causes crowding concerns, as well. Half of all educational buildings within Texas were built before 1978, and 75% were built before 1994 (Taylor et al. 2005). As urban and rural communities continue to grow, the age of many school buildings suggests that they are smaller than they currently should be to properly handle the increasing influx of students. Although structurally, "more than half of the useful life of the average Texas school building remains[,]" both their age (acting as a proxy for size) and the fact that "15 percent of the general purpose buildings have exceeded their expected lifetimes" suggest that crowding problems may grow after the initiation of the pre-kindergarten program (Taylor et al. 2005, 9). In fact, despite fewer numbers of four-year-olds, the problem may affect rural schools more than urban ones as rural school buildings are far more likely to have surpassed their expected utility.

The previous notwithstanding, however, our concerns over rural school facilities may be overstated. Taylor, et al. (2005, 12) found that "districts with older buildings tend to have smaller pupil-teacher ratios" than districts with newer facilities, signifying that rural areas may have room to grow. Not only does the average student in Texas have approximately 151 square feet of space, but that figure is 71 square feet more than the state-mandated minimum of 80 square feet per child (Taylor et al. 2005). Moreover, smaller districts (less than 500 students) have roughly 100 more square feet per child than do districts with more than 5000 students (Taylor et al. 2005). This suggests that student crowding may be more of an urban issue than a rural one. Lastly, definite incongruities exist between urban educational capital and rural educational capital; educational capital includes both facility valuations and educational equipment used in classroom instruction. While rural school districts hold roughly $22,090 in educational capital per student, urban school districts hold considerably less. In fact, urban school districts hold nearly $4,500 less in educational capital per child than do rural school districts, suggesting that overcrowding and facility degradation is more of an urban than rural problem (Taylor et al. 2005).

[13] The percentage points increase discussed translate into the following percentage changes: White non Hisanic-4%, Hispanic-14%, Black 13%, Other- 12.5%, Mixed Race-13.4%. The percentage change method would have produced graduation rates in excess of 100%. The percentage point increase is a much more conservative estimate.

[14] 8,523 (5% IPUM 2000 U.S. Census figure for women with at least 16 years of age or greater) * 20= 170,460 2000 figure * 0.077678064 growth rate = 13,241 increase + 170,460 = 2004 population estimate. Growth rate derived from Census population estimates for Texas.

[15] 5,251 working moms of 4 yr olds/8,523 mothers with 4 yr olds = labor force participation rate.

[16] (100% reduction/10%)*2% rate of increase = 20% increase in labor force participation.

[17] Other programs that also subsidize pre-kindergarten education include the child care provisions under Temporary Assistance to Needy Families program (TANF).

[18] Figure adjusted for inflation using the Bureau of Labor Statistics' Inflation Calculator. Figure before adjustment was $2,649 in 1979 dollars.

[19] $814,806 (lifetime earnings from age 32.5 to 65) * 5.6% = increased lifetime earnings over that period of time.

[20] (37.53% reduction/10%)*2% rate of increase = 7.51% increase in female labor force participation.

[21] 62.18% current female labor force participation rate * 7.51% percent increase in rate = 4.70 percentage point increase

[22] 4.70 women * $10,300 income in the year that child goes to preschool/100 children = $484.33 benefit/child

[23] Source: IPUMS 2000 U.S. Census 5% Sample and authors' calculations

[24] Figures derived from Federal Reserve Bank of Dallas' Economic Data for Texas and the United States

[25] Figures derived from IPUMS 2000 U.S. Census Sample

[26] The present value of dropout rates were calculated in 2004 dollars using the equation, (X/((1+0.03)^11)+X/((1+0.03)^12)+X/((1+0.03)^13)), where savings are recognized in the 11th, 12th, and 13th year after the year spent in pre-school. Where X is $5,606.74 for Regular not low SES; $6,728.09 for Regular low SES; $12,247.20 for Special not low SES; $14,696.64 for Special low SES.

[27] 3.9% of the dropout population was divided by the percentages of students in Texas. It was then divided by the percentages of students in Texas and multiplied by the present value of dropouts (6.33% Low SES Special, 48.27% Low SES Regular, 5.27% Not Low SES Special, and 40.13% Not Low SES Regular). ((.399*$30,932.79)+(2.848*$14,160.97)+(.332*$25,777.32)+ (.321*$11,800.81))

[28] A 15% reduction for special and low SES students, and a 5% reduction for regular edu. Students was taken from 3.9% of the dropout population. It was then divided by the percentages of students in Texas and multiplied by the present value of dropouts. (6.33% Low SES Special, 48.27% Low SES Regular, 5.27% Not Low SES Special, and 40.13% Not Low SES Regular). ((.339*$30,932.79)+(2.42*$14,160.97)+(.282*$25,777.32)+ (.305*$11,800.81))

[29] $7084-$865 = $6219; (6219/(45.4+1.2*54.6))*100

[30] $3,729,870,123/506,391 = $7365.59 + $6219 = $13,584.59; $13,584.59/(45.4+(1.2*54.6)*100

[31] The present value of special education was calculated in 2004 dollars using the equation, ((X/(1+0.03)^4)+(X1+0.03)^5)+(X/(1+0.03)^6)+(X/(1+0.03)^7)), where savings are recognized at age 8 (four years after the year spent in preschool) for four years. The savings in special education is then found by subtracting the cost of special ed from regular ed. Where X is $5,606.74 for Regular not low SES; $6,728.09 for Regular low SES; $12,247.20 for Special not low SES; $14,696.64 for Special low SES

[32] The reduced number of students enrolled in special education programs after pre-kindergarten attendance was calculated by taking the percentage of currently enrolled special education students (11.55) and multiplying it by the percentage of the student population who is economically disadvantaged, and the percent not economically

disadvantaged. We then assumed the reduction found by Rand, of 41% for low income students and 33% of that, or 13.67 for not low income students. Multiplying that figure by the present value cost of special education we found that the savings to the state would be $16,187.91 for not low income students and $70,085.79 for low income students, a total savings of $86,273.70.
Not low income: ((.454*11.55) * (.41/3))* $22,588.65 = $16,187.91
Low Income: ((.546*11.55) * (.41)) * $27,106.38 = $70,085.79

[33] The present value of grade retention was calculated in 2004 dollars using the equation, (X/((1+0.03)^14)), where savings are recognized in the 14th year after the child spends one year in preschool. Where X is $5,606.74 for Regular not low SES; $6,728.09 for Regular low SES; $12,247.20 for Special not low SES; $14,696.64 for Special low SES.

[34] Retention numbers for regular and special education children were taken from the Texas Education Agency State school report for 2004-05. The retention numbers for economically disadvantaged children was taken from the Texas Education Agency, Grade-Level Retention in Texas Public Schools, 2003-04.

[35] After one year in preschool, we assume that retention will reduce by 40% for special education and economically disadvantaged students, and 13% for regular education and not economically disadvantaged students.

[36] This amount was calculated by multiplying the net present value of foster care in 2010, based on a child spending an average length of 28.39 months in a foster home, by the percent of children that are placed in foster home (11%). This amount was then multiplied by the reduction rate of 50%, as reported in the CPC study.

[37] This amount was calculated by multiplying the net present value of adoption in 2010, based on a child spending an average length of 25.9 months with an adopted family, by the percent of children that are granted adoption (5%). This amount was then multiplied by the reduction rate of 50%, as reported in the CPC study.

[38] This amount was calculated by multiplying the monthly rate for family substitute care ($226.83) by the average number of months a child remains in the custody of relatives (11.2 months), which is then reported when the child turns 10. The net present value of the cost of the program per child is then multiplied by the prevalence rate (.37 per 100 children) and the reduction rate of 50%, as reported in the CPC study.

[39] This amount was calculated by multiplying the prevalence rate by the 50% reduction rate. This value was then multiplied by the net present value of in-home services for an average of 7.8 months ($2,776.59).

[40] This amount was calculated by multiplying the net present value of the tangible cost of abuse to a victim in 2010 by the prevalence of abuse .287 per 100 kids. This amount is then multiplied by the reduction rate of 50%.

[41] This amount was calculated by multiplying the prevalence of neglect (.533 per 100 children) by the 50% reduction rate, as reported in the CPC study. This figure was then multiplied by the net present value of the tangible cost to neglect victims ($1970.67).

[42] Please note that while our study focuses primarily on the Chicago-Child Parent Center (CPC) the description of the Williams and Williams study addresses the effectiveness of the Perry/High Scope preschool model. This model was instituted in 1962, five years prior to the development of the CPC. This brief summary of the longitudinal study is included, because the children in the study was chosen based on the income level of the parents, as do other studies included in this report, and the benefits claimed from the study are able to be generalized. That is, the researchers do not conclude that the benefits are specifically associated with the Perry/High Scope model, but rather the increased participation by parents, also found in the CPC, and the increased educational attainment of the children.

[43] This amount was calculated by first establishing the juvenile criminality rate for Texas in 2003, which is represented as the total number of referrals to the juvenile justice system in 2003 divided by the total population between the ages of 10 and 19 in 2003, as reported by the 2003 American Community Survey. This rate was then multiplied by the expected reduction rate of 33%. The product from this calculation was then multiplied by the cost of referral per juvenile, which was computed by using the net present value based on a 3% discount rate for the cost in 2015 (the year children of the age of 4 in 2004 will turn 16). 2003 was the base year for the referral costs and this data was obtained from the Legislative Budget Board's (LBB) 2004 appropriations bill entitled "Article V: Public Safety and Criminal Justice."

[44] This amount is based on the same criminality rate and reduction rate, but the net present value for one year of intensive supervision is $4070.30 in 2015. The 2004 LBB appropriations bill was also used to calculate the intensive supervision cost per juvenile.

[45] This amount was calculated by dividing the number of juveniles housed in a TYC facility in 2003 by the Texas population between the age of 10 and 19 in 2003 (Texas Youth Commission 2005). This rate was then multiplied by the reduction rate of 43%. This product was then multiplied by the net present value of one year incarceration in a TYC facility in 2016 ($22,126.40).

[46] This extra component to the correctional costs by calculated by multiplying the rate of incarceration by the reduction rate, both of which were then multiplied by the net present value of specialized treatment in 2016 ($3,952.70).
[47] This figure was computed by multiplying the net present value for 2016 of the cost incurred by a victim of burglary, robbery, petty theft (larceny), drug offenses, assault, sexual assault, arson, and motor vehicle theft , which is then multiplied by the percent of juveniles committed to TYC that were convicted of each crime in 2004 (Texas Youth Commission 2005). The resulting figures were added together to get a total cost of crime victimization. It is realized that this total only represents 68% of juvenile convictions, but this does represent the crimes for which victims costs are quantifiable.
[48] This amount was calculated based on a value of human life at $4,000,000, with a net present value of 2,805,519.52 in 2016, which is then multiplied by 1%.
[49] This figure is calculated by dividing the total number of adult inmates in 2004 (132,366) by the total adult population between the ages of 20 and 44 (8,100,528). The population was determined by using census data, which can be found at <http://factfinder.census.gov/servlet/ADPTable?_bm=y&-context=adp&-ds_name=ACS_2004_EST_G00_&-tree_id=304&-all_geo_types=N&-_caller=geoselect&-geo_id=04000US48&-format=&-_lang=en>.
[50] This figure was calculated by multiplying the housing rate (1.634 per 100) by the 34.4% reduction in incarceration by the net present value of annual housing costs of $12,228.03.
[51] This figure was calculated by multiplying the housing rate by the reduction in incarceration by the net present value for nine years of housing an inmate of $98,065.04.
[52] This is figured based on the percentage of the total adult population that committed murder.
[53] This figure was calculated by multiplying the net present value of each crime in 2020 by the percentage of offenders that committed a particular crime and each of these figures was added together for an overall savings per crime averted.

APPENDICES: APPENDIX 1

Universal Pre-kindergarten Cost Estimate (70% enrollment):

Average Cost per Student per Year for Public/Private Pre-K in Texas -

Survey of Private Pre-K in Texas: $101.09 per week (authors' calculation) X 49.6 weeks (248 days (Golin et al. 2003) / 5 days per week) = $5,014.06 per student per year (11 hrs. per day)

$5,014.06 X 153,613 (number of 4 year olds in private pre-k) = $770,225,413.23 per year at 11 hrs. per day

$770,225,413.23 / 49.6 wks. (248 days) = X / 37.4 wks. (187 days)

$28,806,430,454.90 = 49.6X

X = $580,774,807.56 (cost of current private pre-k in Texas for 187 days rather than 248 days and 11 hrs. per day)

$580,774,807.56 / 153,613 = $3,780.77 per student per year for 187 days at 11 hrs. per day

($3,780.77 / 187 days) / 11 hrs. = $1.84 per hour

($1.84/hr X 7) X 187 = $2,408.56 per student per year for 187 days at 7hrs. per day

Public Pre-K in Texas: $478,000,000 (Barnett et al. 2005) (funding for 2004-2005 school year with $92.5 million expansion grant for full-day programs) / 175,633 (TEA AEIS Data 2005) (number of preschoolers in 2004-2005 school year) = $2,721.58 per student per year for 187 days at 7 hrs. per day

Average Cost per Student per Year for Public/Private Pre-K: 153,613 (number of 4 year olds in private pre-k) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 48.5%

160,868.90 (349,715 (total 4-year old pop.) X 46% (percentage of total 4-year old population in public school 2004-2005)) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 51.15%

($2,408.56 X 48.5%) + ($2,721.58 X 51.15%) = **$2,568.67 per student per year for 187 days at 7 hrs. per day**

Direct Costs -

CCPC Program Teachers:

$3,512.00 (avg. monthly salary for Texas Pre-K teacher with bachelor's degree and three years experience in 2004-2005) X 10 months = $35,120 per teacher per year

244,800.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 14,400.03 teachers needed

14,400.03 X $35,120 = $505,729,032.94 per year for teachers' salaries

Teachers' Assistants:

$1,502.00 (avg. monthly salary for Texas Pre-K teachers' assistants with associate's degree in 2004-2005) X 10 months = $15,020 per teacher's assistant per year

244,800.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 14,400.03 teachers' assistants needed

14,400.03 X $15,020 = $216,288,450.60 per year for teachers' assistants' salaries

Administrators:

16,219.20 (current number of administrators in Texas in 2004-2005) / 294,258.30 (number of teachers in Texas in 2004-2005 school year) (TEA AEIS Data 2005) = 1 (administrator) to 18.1 (teachers)

14,400.03 (pre-k teachers needed) / 18.1 = 795.58 (number of administrators needed)

795.58 X $61,612.00 (TEA AEIS Data 2005) (avg. salary of Texas administrators in 2004-2005) = $49,017,274.96 per year for administrators' salaries

Improved Material Costs:

Existing Classrooms: $262.66 (cost of upgraded materials per child in 2005 dollars) X 17 (number of pre-k students in class) = $4,465.22

$4,465.22 X 8,200 (approximate number of FTE pre-k teachers in 2004-2005) (author's calculation from TEA data) = $36,614,804.00 to improve materials in existing classrooms

New Classrooms: 244,800.5 (number of pre-k students expected) – 160,868.90 (number of 4 year old pre-k students enrolled in 2004-2005 school year) = 83,931.60 students requiring new classrooms

83,931.60 X $998.09 (cost of new classroom materials per child in 2005 dollars) = $83,771,290.64

$36,614,804.00 + $83,771,290.64 = $120,386,094.64 to upgrade existing classrooms' materials and outfit new classrooms with necessary materials

Fringe Benefits: $771,034,758.50 X 28% (percentage of all salaries for fringe benefits) = $215,889,732.38

Total Direct Costs:

CCPC Program Teachers' Salaries -	$505,729,032.94
Teacher's Assistants' Salaries -	$216,288,450.60
Administrators' Salaries -	$49,017,274.96
Fringe Benefits -	$215,889,732.38
Material Costs -	$120,386,094.64

	$1,107,310,585.52

Indirect Costs -

Infrastructure Costs: 83,931.60 (students requiring new classrooms) X 36 (state mandated minimum square feet per child) = 3,021,537.60 additional square feet needed

($32 (avg. sq. ft. cost of portables in rural areas) X 14% (percent of 4 year olds in rural areas)) + ($39 (avg. sq. ft. cost of portables in urban areas) X 86% (percent of 4 year olds in urban areas)) = $38.02 avg. cost per square foot of portable space in Texas

3,021,537.60 X $38.02 = $114,878,859.55 in infrastructure costs

Technical Assistant Costs: 244,800.50 (number of pre-k students expected) / 1,500 (1,500 pre-k students to 1 technical assistant) = 163.20 technical assistants needed

163.20 X $50,739.22 (avg. salary of individual with Bachelor's degree in Texas in 2005 dollars) = $8,280,640.70 per year for technical assistants' salaries

Quality Assurance Costs: 244,800.50 (number of pre-k students expected) / 3,750 (3,750 pre-k students to 1 quality assurance monitor) = 65.28 quality assurance monitors needed

65.28 X $50,739.22 (avg. salary of individual with bachelor's degree in 2005 dollars) = $3,312,256.28 per year for quality assurance monitors' salaries

Evaluation Costs: 5% (percentage of total direct costs allocated for evaluation) X $1,107,310,585.52 (Direct Costs) = $55,365,529.28

Administration Costs: (3 (minimum number of staff members) X $82,160 (est. salary of staff member in 2005 dollars)) + (1 (minimum number of directors) X $123,240 (est. salary of director in 2005 dollars)) = $369,720 per year for administration costs

Total Indirect Costs:

Infrastructure Costs -	$114,878,859.55
Technical Assistant Costs -	$8,280,640.70
Quality Assurance Costs -	$3,312,256.28
Evaluation Costs -	$55,365,529.28
Administration Costs -	$369,720

	$182,207,005.81

Kindergarten (Half- to Full-Day) –

$7,084.00 (TEA AEIS Data 2005) (operating expenditures per student 2004-2005) / 2 (kindergarten student roughly

equals half a student in Texas according to TEA calculations) = $3,542.00 per kindergarten student in 2004-2005

$3,542.00 X 2 (to get to full-time equivalent) = $7,084.00 per full-time kindergarten student in 2004-2005

$7,084.00 X 333,530 (TEA AEIS Data 2005) (number of kindergarteners in 2004-2005) = $2,362,726,520.00 per year for full-time kindergarten

$3,542.00 X 333,530 = $1,181,363,260.00 per year for half-time kindergarten

$2,362,726,520.00 - $1,181,363,260.00 = $1,181,363,260.00 additional per year for full-day kindergarten instruction

Total Annual Direct and Indirect Cost (excluding Kindergarten calculations) -

$1,107,310,585.52
\+ **$182,207,005.81**

$1,289,517,591.33

Total Annual Cost per Student Expected -

$1,289,517,591.33 / 244,800.50 =

$5,267.63

Total Current Cost of Public/Private Pre-k in Texas -

$2,568.67 (avg. cost of current public/private pre-k in Texas) X (160,868.90 (number of 4 year old pre-k students in public school in 2004-2005 school year) + 153,613 (avg. number of pre-k students in private school)) =

$807,800,222.07

Annual Cost to Texas Economy -

$1,289,517,591.33
\- $807,800,222.07

$481,717,369.26

Annual Increase in Government Expenditures -

$2,721.58 (cost per student per year for 187 days at 7 hrs. per day) X 160,868.90 (number of 4 year olds in public pre-k 2004-2005) = $437,817,580.86

$1,289,517,591.33
- $437,817,580.86

$851,700,010.47

Universal Pre-kindergarten Cost Estimate (80% enrollment):

Average Cost per Student per Year for Public/Private Pre-K in Texas -

Survey of Private Pre-K in Texas:

$101.09 per week (authors' calculation) X 49.6 weeks (248 days (Golin et al. 2003) / 5 days per week) = $5,014.06 per student per year (11 hrs. per day)

$5,014.06 X 153,613 (number of 4 year olds in private pre-k) = $770,225,413.23 per year at 11 hrs. per day

$770,225,413.23 / 49.6 wks. (248 days) = X / 37.4 wks. (187 days)

$28,806,430,454.90 = 49.6X

X = $580,774,807.56 (cost of current private pre-k in Texas for 187 days rather than 248 days and 11 hrs. per day)

$580,774,807.56 / 153,613 = $3,780.77 per student per year for 187 days at 11 hrs. per day

($3,780.77 / 187 days) / 11 hrs. = $1.84 per hour

($1.84/hr X 7) X 187 = $2,408.56 per student per year for 187 days at 7hrs. per day

Public Pre-K in Texas:

$478,000,000 (Barnett et al. 2005) (funding for 2004-2005 school year with $92.5 million expansion grant for full-day programs) / 175,633 (TEA AEIS Data 2005) (number of preschoolers in 2004-2005 school year) = $2,721.58 per student per year for 187 days at 7 hrs. per day

Average Cost per Student per Year for Public/Private Pre-K:

153,613 (number of 4 year olds in private pre-k) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 48.5%

160,868.90 (349,715 (total 4-year old pop.) X 46% (percentage of total 4-year old population in public school 2004-2005)) / 314,481.90 (number of 4 year olds currently in

private/public pre-k) = 51.15%

($2,408.56 X 48.5%) + ($2,721.58 X 51.15%) = **$2,568.67 per student per year for 187 days at 7 hrs. per day**

Direct Costs -

CCPC Program Teachers:

$3,512.00 (avg. monthly salary for Texas Pre-K teacher with bachelor's degree and three years experience in 2004-2005) X 10 months = $35,120 per teacher per year

279,772 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 16,457.18 teachers needed

16,457.18 X $35,120 = $577,976,037.65 per year for teachers' salaries

Teachers' Assistants:

$1,502.00 (avg. monthly salary for Texas Pre-K teachers' assistants with associate's degree in 2004-2005) X 10 months = $15,020 per teacher's assistant per year

279,772 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 16,457.18 teachers' assistants needed

16,457.18 X $15,020 = $247,186,790.59 per year for teachers' assistants' salaries

Administrators:

16,219.20 (current number of administrators in Texas in 2004-2005) / 294,258.30 (number of teachers in Texas in 2004-2005 school year) (TEA AEIS Data 2005) = 1 (administrator) to 18.1 (teachers)

16,457.18 (pre-k teachers needed) / 18.1 = 909.24 (number of administrators needed)

909.24 X $61,612.00 (TEA AEIS Data 2005) (avg. salary of Texas administrators in 2004-2005) = $56,019,877.03 per year for administrators' salaries

Improved Material Costs:

Existing Classrooms: $262.66 (cost of upgraded materials per child in 2005 dollars) X 17 (number of pre-k students in class) = $4,465.22

$4,465.22 X 8,200 (approximate number of FTE pre-k teachers in 2004-2005) (author's calculation from TEA data) = $36,614,804.00 to improve materials in existing classrooms

New Classrooms: 279,772 (number of pre-k students expected) – 160,868.90 (number of 4 year old pre-k students enrolled in 2004-2005 school year) = 118,903.10 students requiring new classrooms

118,903.10 X $998.09 (cost of new classroom materials per child in 2005 dollars) = $118,675,995.08

$36,614,804.00 + $118,675,995.08 = $155,290,799.08 to upgrade existing classrooms' materials and outfit new classrooms with necessary materials

Fringe Benefits: $881,182,705.27 X 28% (percentage of all salaries for fringe benefits) = $246,731,157.48

Total Direct Costs:

CCPC Program Teachers' Salaries -	$577,976,037.65
Teacher's Assistants' Salaries -	$247,186,790.59
Administrators' Salaries -	$56,019,877.03
Fringe Benefits -	$246,731,157.48
Material Costs -	$155,290,799.08

	$1,283,204,661.83

Indirect Costs -

Infrastructure Costs: 118,903.10 (students requiring new classrooms) X 36 (state mandated minimum square feet per child) = 4,280,511.60 additional square feet needed

($32 (avg. sq. ft. cost of portables in rural areas) X 14% (percent of 4 year olds in rural areas)) + ($39 (avg. sq. ft. cost of portables in urban areas) X 86% (percent of 4 year olds in urban areas)) = $38.02 avg. cost per square foot of portable space in Texas

4,280,511.60 X $38.02 = $162,745,051.03 in infrastructure costs

Technical Assistant Costs: 279,772 (number of pre-k students expected) / 1,500 (1,500 pre-k students to 1 technical assistant) = 186.51 technical assistants needed

186.51 X $50,739.22 (avg. salary of individual with Bachelor's degree in Texas in 2005 dollars) = $9,463,608.71 per year for technical assistants' salaries

Quality Assurance Costs: 279,772 (number of pre-k students expected) / 3,750 (3,750 pre-k students to 1 quality assurance monitor) = 74.61 quality assurance monitors needed

74.61 X $50,739.22 (avg. salary of individual with bachelor's degree in 2005 dollars) = $3,785,443.48 per year for quality assurance monitors' salaries

Evaluation Costs: 5% (percentage of total direct costs allocated for evaluation) X $1,283,204,661.83 (Direct Costs) = $64,160,233.09

Administration Costs: (3 (minimum number of staff members) X $82,160 (est. salary of staff member in 2005 dollars)) + (1 (minimum number of directors) X $123,240 (est. salary of director in 2005 dollars)) = $369,720 per year for administration costs

Total Indirect Costs:

Infrastructure Costs -	$162,745,051.03
Technical Assistant Costs -	$9,463,608.71
Quality Assurance Costs -	$3,785,443.48
Evaluation Costs -	$64,160,233.09
Administration Costs -	$369,720.00

	$240,524,056.31

Kindergarten (Half- to Full-Day) –

$7,084.00 (TEA AEIS Data 2005) (operating expenditures per student 2004-2005) / 2 (kindergarten student roughly equals half a student in Texas according to TEA calculations) = $3,542.00 per kindergarten student in 2004-2005

$3,542.00 X 2 (to get to full-time equivalent) = $7,084.00 per full-time kindergarten student in 2004-2005

$7,084.00 X 333,530 (TEA AEIS Data 2005) (number of kindergarteners in 2004-2005) = $2,362,726,520.00 per year for full-time kindergarten

$3,542.00 X 333,530 = $1,181,363,260.00 per year for half-time kindergarten

$2,362,726,520.00 - $1,181,363,260.00 = $1,181,363,260.00 additional per year for full-day kindergarten instruction

Total Annual Direct and Indirect Cost (excluding Kindergarten calculations) -

$1,283,204,661.83
\+ **$240,524,056.31**
$1,523,728,718.14

Total Annual Cost per Student Expected -

$1,523,728,718.14 / 279,772 =

$5,446.32

Total Current Cost of Public/Private Pre-k in Texas -

$2,568.67 (avg. cost of current public/private pre-k in Texas) X (160,868.90 (number of 4 year old pre-k students in public school in 2004-2005 school year) + 153,613 (avg. number of pre-k students in private school)) =

$807,800,222.07

Annual Cost to Texas Economy -

$1,523,728,718.14
\- $807,800,222.07

$715,928,496.07

Annual Increase in Government Expenditures -

$2,721.58 (cost per student per year for 187 days at 7 hrs. per day) X 160,868.90 (number of 4 year olds in public pre-k 2004-2005) = $437,817,580.86

$1,523,728,718.14
- $437,817,580.86

$1,085,911,137.28

Universal Pre-kindergarten Cost Estimate (90% enrollment):

Average Cost per Student per Year for Public/Private Pre-K in Texas -

Survey of Private Pre-K in Texas:

$101.09 per week (authors' calculation) X 49.6 weeks (248 days (Golin et al. 2003) / 5 days per week) = $5,014.06 per student per year (11 hrs. per day)

$5,014.06 X 153,613 (number of 4 year olds in private pre-k) = $770,225,413.23 per year at 11 hrs. per day

$770,225,413.23 / 49.6 wks. (248 days) = X / 37.4 wks. (187 days)

$28,806,430,454.90 = 49.6X

X = $580,774,807.56 (cost of current private pre-k in Texas for 187 days rather than 248 days and 11 hrs. per day)

$580,774,807.56 / 153,613 = $3,780.77 per student per year for 187 days at 11 hrs. per day

($3,780.77 / 187 days) / 11 hrs. = $1.84 per hour

($1.84/hr X 7) X 187 = $2,408.56 per student per year for 187 days at 7hrs. per day

Public Pre-K in Texas:

$478,000,000 (Barnett et al. 2005) (funding for 2004-2005 school year with $92.5 million expansion grant for full-day programs) / 175,633 (TEA AEIS Data 2005) (number of preschoolers in 2004-2005 school year) = $2,721.58 per student per year for 187 days at 7 hrs. per day

Average Cost per Student per Year for Public/Private Pre-K:

153,613 (number of 4 year olds in private pre-k) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 48.5%

160,868.90 (349,715 (total 4-year old pop.) X 46% (percentage of total 4-year old population in public school 2004-2005)) / 314,481.90 (number of 4 year olds currently in

private/public pre-k) = 51.15%

($2,408.56 X 48.5%) + ($2,721.58 X 51.15%) = **$2,568.67 per student per year for 187 days at 7 hrs. per day**

Direct Costs -

CCPC Program Teachers:	$3,512.00 (avg. monthly salary for Texas Pre-K teacher with bachelor's degree and three years experience in 2004-2005) X 10 months = $35,120 per teacher per year 314,743.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 18,514.32 teachers needed 18,514.32 X $35,120 = $650,223,042.35 per year for teachers' salaries
Teachers' Assistants:	$1,502.00 (avg. monthly salary for Texas Pre-K teachers' assistants with associate's degree in 2004-2005) X 10 months = $15,020 per teacher's assistant per year 314,743.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 18,514.32 teachers' assistants needed 18,514.32 X $15,020 = $278,085,086.40 per year for teachers' assistants' salaries
Administrators:	16,219.20 (current number of administrators in Texas in 2004-2005) / 294,258.30 (number of teachers in Texas in 2004-2005 school year) (TEA AEIS Data 2005) = 1 (administrator) to 18.1 (teachers) 18,514.32 (pre-k teachers needed) / 18.1 = 1,022.89 (number of administrators needed) 1,022.89 X $61,612.00 (TEA AEIS Data 2005) (avg. salary of Texas administrators in 2004-2005) = $63,022,336.12 per year for administrators' salaries

Improved Material Costs:

Existing Classrooms: $262.66 (cost of upgraded materials per child in 2005 dollars) X 17 (number of pre-k students in class) = $4,465.22

$4,465.22 X 8,200 (approximate number of FTE pre-k teachers in 2004-2005) (author's calculation from TEA data) = $36,614,804.00 to improve materials in existing classrooms

New Classrooms: 314,743.5 (number of pre-k students expected) – 160,868.90 (number of 4 year old pre-k students enrolled in 2004-2005 school year) = 153,874.6 students requiring new classrooms

153,874.6 X $998.09 (cost of new classroom materials per child in 2005 dollars) = $153,580,699.51

$36,614,804.00 + $153,580,699.51 = $190,195,503.51 to upgrade existing classrooms' materials and outfit new classrooms with necessary materials

Fringe Benefits: $991,330,464.87 X 28% (percentage of all salaries for fringe benefits) = $277,572,530.16

Total Direct Costs:

CCPC Program Teachers' Salaries -	$650,223,042.35
Teacher's Assistants' Salaries -	$278,085,086.40
Administrators' Salaries -	$63,022,336.12
Fringe Benefits -	$277,572,530.16
Material Costs -	$190,195,503.51

	$1,459,098,498.54

Indirect Costs -

Infrastructure Costs: 153,874.60 (students requiring new classrooms) X 36 (state mandated minimum square feet per child) = 5,539,485.60 additional square feet needed

($32 (avg. sq. ft. cost of portables in rural areas) X 14% (percent of 4 year olds in rural areas)) + ($39 (avg. sq. ft. cost of portables in urban areas) X 86% (percent of 4 year olds in urban areas)) = $38.02 avg. cost per square foot of portable space in Texas

5,539,485.60 X $38.02 = $210,611,242.51 in infrastructure costs

Technical Assistant Costs: 314,743.5 (number of pre-k students expected) / 1,500 (1,500 pre-k students to 1 technical assistant) = 209.83 technical assistants needed

209.83 X $50,739.22 (avg. salary of individual with Bachelor's degree in Texas in 2005 dollars) = $10,646,559.79 per year for technical assistants' salaries

Quality Assurance Costs: 314,743.5 (number of pre-k students expected) / 3,750 (3,750 pre-k students to 1 quality assurance monitor) = 83.93 quality assurance monitors needed

83.93 X $50,739.22 (avg. salary of individual with bachelor's degree in 2005 dollars) = $4,258,623.92 per year for quality assurance monitors' salaries

Evaluation Costs: 5% (percentage of total direct costs allocated for evaluation) X $1,459,098,498.54 (Direct Costs) = $72,954.924.93

Administration Costs: (3 (minimum number of staff members) X $82,160 (est. salary of staff member in 2005 dollars)) + (1 (minimum number of directors) X $123,240 (est. salary of director in 2005 dollars)) = $369,720 per year for administration costs

Total Indirect Costs:

Infrastructure Costs -	$210,611,242.51
Technical Assistant Costs -	$10,646,559.79
Quality Assurance Costs -	$4,258,623.92
Evaluation Costs -	$72,954.924.93
Administration Costs -	$369,720.00

	$298,841,071.15

Kindergarten (Half- to Full-Day) –

$7,084.00 (TEA AEIS Data 2005) (operating expenditures per student 2004-2005) / 2 (kindergarten student roughly equals half a student in Texas according to TEA calculations) = $3,542.00 per kindergarten student in 2004-2005

$3,542.00 X 2 (to get to full-time equivalent) = $7,084.00 per full-time kindergarten student in 2004-2005

$7,084.00 X 333,530 (TEA AEIS Data 2005) (number of kindergarteners in 2004-2005) = $2,362,726,520.00 per year for full-time kindergarten

$3,542.00 X 333,530 = $1,181,363,260.00 per year for half-time kindergarten

$2,362,726,520.00 - $1,181,363,260.00 = $1,181,363,260.00 additional per year for full-day kindergarten instruction

Total Annual Direct and Indirect Cost (excluding Kindergarten calculations) -

$1,459,098,498.54
\+ **$298,841,071.15**
$1,757,939,569.69

Total Annual Cost per Student Expected -

$1,757,939,569.69 / 314,743.5 =

$5,585.31

Total Current Cost of Public/Private Pre-k in Texas -

$2,568.67 (avg. cost of current public/private pre-k in Texas) X (160,868.90 (number of 4 year old pre-k students in public school in 2004-2005 school year) + 153,613 (avg. number of pre-k students in private school)) =

$807,800,222.07

Annual Cost to Texas Economy -

$1,757,939,569.69
\- $807,800,222.07

$950,139,347.62

Annual Increase in Government Expenditures -

$2,721.58 (cost per student per year for 187 days at 7 hrs. per day) X 160,868.90 (number of 4 year olds in public pre-k 2004-2005) = $437,817,580.86

	$1,757,939,569.69
-	$437,817,580.86
	$1,320,121,988.83

APPENDICES: APPENDIX 2

Universal Pre-kindergarten Cost Estimate (with wrap-around) (70% enrollment):

Average Cost per Student per Year for Public/Private Pre-K in Texas -

Survey of Private Pre-K in Texas:

$101.09 per week (authors' calculation) X 49.6 weeks (248 days (Golin et al. 2003) / 5 days per week) = $5,014.06 per student per year (11 hrs. per day)

$5,014.06 X 153,613 (number of 4 year olds in private pre-k) = $770,225,413.23 per year at 11 hrs. per day

$770,225,413.23 / 49.6 wks. (248 days) = X / 37.4 wks. (187 days)

$28,806,430,454.90 = 49.6X

X = $580,774,807.56 (cost of current private pre-k in Texas for 187 days rather than 248 days and 11 hrs. per day)

$580,774,807.56 / 153,613 = $3,780.77 per student per year for 187 days at 11 hrs. per day

($3,780.77 / 187 days) / 11 hrs. = $1.84 per hour

($1.84/hr X 7) X 187 = $2,408.56 per student per year for 187 days at 7hrs. per day

Public Pre-K in Texas:

$478,000,000 (Barnett et al. 2005) (funding for 2004-2005 school year with $92.5 million expansion grant for full-day programs) / 175,633 (TEA AEIS Data 2005) (number of preschoolers in 2004-2005 school year) = $2,721.58 per student per year for 187 days at 7 hrs. per day

Average Cost per Student per Year for Public/Private Pre-K:

153,613 (number of 4 year olds in private pre-k) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 48.5%

160,868.90 (349,715 (total 4-year old pop.) X 46% (percentage of total 4-year old population in public school 2004-2005)) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 51.15%

($2,408.56 X 48.5%) + ($2,721.58 X 51.15%) = **$2,568.67 per student per year for 187 days at 7 hrs. per day**

Direct Costs -

CCPC Program Teachers:	$3,512.00 (avg. monthly salary for Texas Pre-K teacher with bachelor's degree and three years experience in 2004-2005) X 10 months = $35,120 per teacher per year 244,800.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 14,400.03 teachers needed 14,400.03 X $35,120 = $505,729,032.94 per year for teachers' salaries
Teachers' Assistants:	$1,502.00 (avg. monthly salary for Texas Pre-K teachers' assistants with associate's degree in 2004-2005) X 10 months = $15,020 per teacher's assistant per year 244,800.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 14,400.03 teachers' assistants needed 14,400.03 X $15,020 = $216,288,450.60 per year for teachers' assistants' salaries
Administrators:	16,219.20 (current number of administrators in Texas in 2004-2005) / 294,258.30 (number of teachers in Texas in 2004-2005 school year) (TEA AEIS Data 2005) = 1 (administrator) to 18.1 (teachers) 14,400.03 (pre-k teachers needed) / 18.1 = 795.58 (number of administrators needed)

795.58 X $61,612.00 (TEA AEIS Data 2005) (avg. salary of Texas administrators in 2004-2005) = $49,017,274.96 per year for administrators' salaries

Improved Material Costs:

Existing Classrooms: $262.66 (cost of upgraded materials per child in 2005 dollars) X 17 (number of pre-k students in class) = $4,465.22

$4,465.22 X 8,200 (approximate number of FTE pre-k teachers in 2004-2005) (author's calculation from TEA data) = $36,614,804.00 to improve materials in existing classrooms

New Classrooms: 244,800.5 (number of pre-k students expected) – 160,868.90 (number of 4 year old pre-k students enrolled in 2004-2005 school year) = 83,931.60 students requiring new classrooms

83,931.60 X $998.09 (cost of new classroom materials per child in 2005 dollars) = $83,771,290.64

$36,614,804.00 + $83,771,290.64 = $120,386,094.64 to upgrade existing classrooms' materials and outfit new classrooms with necessary materials

Fringe Benefits: $771,034,758.50 X 28% (percentage of all salaries for fringe benefits) = $215,889,732.38

Total Direct Costs:

CCPC Program Teachers' Salaries -	$505,729,032.94
Teacher's Assistants' Salaries -	$216,288,450.60
Administrators' Salaries -	$49,017,274.96
Fringe Benefits -	$215,889,732.38
Material Costs -	$120,386,094.64

	$1,107,310,585.52

Indirect Costs -

Infrastructure Costs: 83,931.60 (students requiring new classrooms) X 36 (state mandated minimum square feet per child) = 3,021,537.60 additional square feet needed

	($32 (avg. sq. ft. cost of portables in rural areas) X 14% (percent of 4 year olds in rural areas)) + ($39 (avg. sq. ft. cost of portables in urban areas) X 86% (percent of 4 year olds in urban areas)) = $38.02 avg. cost per square foot of portable space in Texas 3,021,537.60 X $38.02 = $114,878,859.55 in infrastructure costs
Technical Assistant Costs:	244,800.50 (number of pre-k students expected) / 1,500 (1,500 pre-k students to 1 technical assistant) = 163.20 technical assistants needed 163.20 X $50,739.22 (avg. salary of individual with Bachelor's degree in Texas in 2005 dollars) = $8,280,640.70 per year for technical assistants' salaries
Quality Assurance Costs:	244,800.50 (number of pre-k students expected) / 3,750 (3,750 pre-k students to 1 quality assurance monitor) = 65.28 quality assurance monitors needed 65.28 X $50,739.22 (avg. salary of individual with bachelor's degree in 2005 dollars) = $3,312,256.28 per year for quality assurance monitors' salaries
Evaluation Costs:	5% (percentage of total direct costs allocated for evaluation) X $1,107,310,585.52 (Direct Costs) = $55,365,529.28
Administration Costs:	(3 (minimum number of staff members) X $82,160 (est. salary of staff member in 2005 dollars)) + (1 (minimum number of directors) X $123,240 (est. salary of director in 2005 dollars)) = $369,720 per year for administration costs
Wrap-around Costs:	244,800.50 (number of pre-k students expected) X 3 hours per day (2:45pm – 5:45pm) X $3 per hour X 187 days (NIEER 2006) = $411,999,241.50

Total Indirect Costs:		
	Infrastructure Costs -	$114,878,859.55
	Technical Assistant Costs -	$8,280,640.70
	Quality Assurance Costs -	$3,312,256.28
	Evaluation Costs -	$55,365,529.28
	Administration Costs -	$369,720
	Wrap-around Costs -	$411,999,241.50

		$594,206,247.31

Kindergarten (Half- to Full-Day) –

$7,084.00 (TEA AEIS Data 2005) (operating expenditures per student 2004-2005) / 2 (kindergarten student roughly equals half a student in Texas according to TEA calculations) = $3,542.00 per kindergarten student in 2004-2005

$3,542.00 X 2 (to get to full-time equivalent) = $7,084.00 per full-time kindergarten student in 2004-2005

$7,084.00 X 333,530 (TEA AEIS Data 2005) (number of kindergarteners in 2004-2005) = $2,362,726,520.00 per year for full-time kindergarten

$3,542.00 X 333,530 = $1,181,363,260.00 per year for half-time kindergarten

$2,362,726,520.00 - $1,181,363,260.00 = $1,181,363,260.00 additional per year for full-day kindergarten instruction

Wrap-around Care (Full-day Kindergarten) –

333,530 (TEA AEIS Data 2005) (number of kindergarten students in 2004-2005) X 3 hours per day (2:45pm – 5:45pm) X $3.00 per hour X 187 days = $561,330,990.00 per year

Total Annual Direct and Indirect Cost (excluding Kindergarten calculations) -

$1,107,310,585.52
\+ **$594,206,247.31**

$1,701,516,832.83

Total Annual Cost per Student Expected -

$1,701,516,832.83 / 244,800.50 =

$6,950.63

Total Current Cost of Public/Private Pre-k in Texas -

$2,568.67 (avg. cost of current public/private pre-k in Texas) X (160,868.90 (number of 4 year old pre-k students in public school in 2004-2005 school year) + 153,613 (avg. number of pre-k students in private school)) =

$807,800,222.07

Annual Cost to Texas Economy - $1,701,516,832.83

\- $807,800,222.07

$893,716,610.76

Annual Increase in Government Expenditures -

$2,721.58 (cost per student per year for 187 days at 7 hrs. per day) X 160,868.90 (number of 4 year olds in public pre-k 2004-2005) = $437,817,580.86

\- $1,701,516,832.83
$437,817,580.86

$1,263,699,251.97

Universal Pre-kindergarten Cost Estimate (with wrap-around) (80% enrollment):

Average Cost per Student per Year for Public/Private Pre-K in Texas -

Survey of Private Pre-K in Texas:

$101.09 per week (authors' calculation) X 49.6 weeks (248 days (Golin et al. 2003) / 5 days per week) = $5,014.06 per student per year (11 hrs. per day)

$5,014.06 X 153,613 (number of 4 year olds in private pre-k) = $770,225,413.23 per year at 11 hrs. per day

$770,225,413.23 / 49.6 wks. (248 days) = X / 37.4 wks. (187 days)

$28,806,430,454.90 = 49.6X

X = $580,774,807.56 (cost of current private pre-k in Texas for 187 days rather than 248 days and 11 hrs. per day)

$580,774,807.56 / 153,613 = $3,780.77 per student per year for 187 days at 11 hrs. per day

($3,780.77 / 187 days) / 11 hrs. = $1.84 per hour

($1.84/hr X 7) X 187 = $2,408.56 per student per year for 187 days at 7hrs. per day

Public Pre-K in Texas:

$478,000,000 (Barnett et al. 2005) (funding for 2004-2005 school year with $92.5 million expansion grant for full-day programs) / 175,633 (TEA AEIS Data 2005) (number of preschoolers in 2004-2005 school year) = $2,721.58 per student per year for 187 days at 7 hrs. per day

Average Cost per Student per Year for Public/Private Pre-K:

153,613 (number of 4 year olds in private pre-k) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 48.5%

160,868.90 (349,715 (total 4-year old pop.) X 46% (percentage of total 4-year old population in public school 2004-2005)) / 314,481.90 (number of 4 year olds currently in

private/public pre-k) = 51.15%

($2,408.56 X 48.5%) + ($2,721.58 X 51.15%) = **$2,568.67 per student per year for 187 days at 7 hrs. per day**

Direct Costs -

CCPC Program Teachers:

$3,512.00 (avg. monthly salary for Texas Pre-K teacher with bachelor's degree and three years experience in 2004-2005) X 10 months = $35,120 per teacher per year

279,772 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 16,457.18 teachers needed

16,457.18 X $35,120 = $577,976,037.65 per year for teachers' salaries

Teachers' Assistants:

$1,502.00 (avg. monthly salary for Texas Pre-K teachers' assistants with associate's degree in 2004-2005) X 10 months = $15,020 per teacher's assistant per year

279,772 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 16,457.18 teachers' assistants needed

16,457.18 X $15,020 = $247,186,790.59 per year for teachers' assistants' salaries

Administrators:

16,219.20 (current number of administrators in Texas in 2004-2005) / 294,258.30 (number of teachers in Texas in 2004-2005 school year) (TEA AEIS Data 2005) = 1 (administrator) to 18.1 (teachers)

16,457.18 (pre-k teachers needed) / 18.1 = 909.24 (number of administrators needed)

909.24 X $61,612.00 (TEA AEIS Data 2005) (avg. salary of Texas administrators in 2004-2005) = $56,019,877.03 per year for administrators' salaries

Improved Material Costs:

Existing Classrooms: $262.66 (cost of upgraded materials per child in 2005 dollars) X 17 (number of pre-k students in class) = $4,465.22

$4,465.22 X 8,200 (approximate number of FTE pre-k teachers in 2004-2005) (author's calculation from TEA data) = $36,614,804.00 to improve materials in existing classrooms

New Classrooms: 279,772 (number of pre-k students expected) – 160,868.90 (number of 4 year old pre-k students enrolled in 2004-2005 school year) = 118,903.10 students requiring new classrooms

118,903.10 X $998.09 (cost of new classroom materials per child in 2005 dollars) = $118,675,995.08

$36,614,804.00 + $118,675,995.08 = $155,290,799.08 to upgrade existing classrooms' materials and outfit new classrooms with necessary materials

Fringe Benefits: $881,182,705.27 X 28% (percentage of all salaries for fringe benefits) = $246,731,157.48

Total Direct Costs:

CCPC Program Teachers' Salaries -	$577,976,037.65
Teacher's Assistants' Salaries -	$247,186,790.59
Administrators' Salaries -	$56,019,877.03
Fringe Benefits -	$246,731,157.48
Material Costs -	$155,290,799.08

	$1,283,204,661.83

Indirect Costs -

Infrastructure Costs: 118,903.10 (students requiring new classrooms) X 36 (state mandated minimum square feet per child) = 4,280,511.60 additional square feet needed

($32 (avg. sq. ft. cost of portables in rural areas) X 14% (percent of 4 year olds in rural areas)) + ($39 (avg. sq. ft. cost of portables in urban areas) X 86% (percent of 4 year olds in urban areas)) = $38.02 avg. cost per square foot of portable space in Texas

4,280,511.60 X $38.02 = $162,745,051.03 in infrastructure costs

Technical Assistant Costs: 279,772 (number of pre-k students expected) / 1,500 (1,500 pre-k students to 1 technical assistant) = 186.51 technical assistants needed

186.51 X $50,739.22 (avg. salary of individual with Bachelor's degree in Texas in 2005 dollars) = $9,463,608.71 per year for technical assistants' salaries

Quality Assurance Costs: 279,772 (number of pre-k students expected) / 3,750 (3,750 pre-k students to 1 quality assurance monitor) = 74.61 quality assurance monitors needed

74.61 X $50,739.22 (avg. salary of individual with bachelor's degree in 2005 dollars) = $3,785,443.48 per year for quality assurance monitors' salaries

Evaluation Costs: 5% (percentage of total direct costs allocated for evaluation) X $1,283,204,661.83 (Direct Costs) = $64,160,233.09

Administration Costs: (3 (minimum number of staff members) X $82,160 (est. salary of staff member in 2005 dollars)) + (1 (minimum number of directors) X $123,240 (est. salary of director in 2005 dollars)) = $369,720 per year for administration costs

Wrap-around Costs: 279,772 (number of pre-k students expected) X 3 hours per day (2:45pm – 5:45pm) X $3 per hour X 187 days (NIEER 2006) = $470,856,276.00

Total Indirect Costs:

Infrastructure Costs -	$162,745,051.03
Technical Assistant Costs -	$9,463,608.71
Quality Assurance Costs -	$3,785,443.48
Evaluation Costs -	$64,160,233.09
Administration Costs -	$369,720.00
Wrap-around Costs -	$470,856,276.00

	$711,380,332.31

Kindergarten (Half- to Full-Day) –

$7,084.00 (TEA AEIS Data 2005) (operating expenditures per student 2004-2005) / 2 (kindergarten student roughly equals half a student in Texas according to TEA

calculations) = $3,542.00 per kindergarten student in 2004-2005

$3,542.00 X 2 (to get to full-time equivalent) = $7,084.00 per full-time kindergarten student in 2004-2005

$7,084.00 X 333,530 (TEA AEIS Data 2005) (number of kindergarteners in 2004-2005) = $2,362,726,520.00 per year for full-time kindergarten

$3,542.00 X 333,530 = $1,181,363,260.00 per year for half-time kindergarten

$2,362,726,520.00 - $1,181,363,260.00 = $1,181,363,260.00 additional per year for full-day kindergarten instruction

Wrap-around Care (Full-day Kindergarten) –

333,530 (TEA AEIS Data 2005) (number of kindergarten students in 2004-2005) X 3 hours per day (2:45pm – 5:45pm) X $3.00 per hour X 187 days = $561,330,990.00 per year

Total Annual Direct and Indirect Cost (excluding Kindergarten calculations) -

$1,283,204,661.83
\+ **$711,380,332.31**

$1,994,584,994.14

Total Annual Cost per Student Expected -

$1,994,584,994.14 / 279,772 =

$7,129.32

Total Current Cost of Public/Private Pre-k in Texas -

$2,568.67 (avg. cost of current public/private pre-k in Texas) X (160,868.90 (number of 4 year old pre-k students in public school in 2004-2005 school year) + 153,613 (avg. number of pre-k students in private school)) =

$807,800,222.07

Annual Cost to Texas Economy -

$1,994,584,994.14
- $807,800,222.07

$1,186,784,772.07

Annual Increase in Government Expenditures -

$2,721.58 (cost per student per year for 187 days at 7 hrs. per day) X 160,868.90 (number of 4 year olds in public pre-k 2004-2005) = $437,817,580.86

- $1,994,584,994.14
$437,817,580.86

$1,556,767,413.28

Universal Pre-kindergarten Cost Estimate (with wrap-around) (90% enrollment):

Average Cost per Student per Year for Public/Private Pre-K in Texas -

Survey of Private Pre-K in Texas:

$101.09 per week (authors' calculation) X 49.6 weeks (248 days (Golin et al. 2003) / 5 days per week) = $5,014.06 per student per year (11 hrs. per day)

$5,014.06 X 153,613 (number of 4 year olds in private pre-k) = $770,225,413.23 per year at 11 hrs. per day

$770,225,413.23 / 49.6 wks. (248 days) = X / 37.4 wks. (187 days)

$28,806,430,454.90 = 49.6X

X = $580,774,807.56 (cost of current private pre-k in Texas for 187 days rather than 248 days and 11 hrs. per day)

$580,774,807.56 / 153,613 = $3,780.77 per student per year for 187 days at 11 hrs. per day

($3,780.77 / 187 days) / 11 hrs. = $1.84 per hour

($1.84/hr X 7) X 187 = $2,408.56 per student per year for 187 days at 7hrs. per day

Public Pre-K in Texas:

$478,000,000 (Barnett et al. 2005) (funding for 2004-2005 school year with $92.5 million expansion grant for full-day programs) / 175,633 (TEA AEIS Data 2005) (number of preschoolers in 2004-2005 school year) = $2,721.58 per student per year for 187 days at 7 hrs. per day

Average Cost per Student per Year for Public/Private Pre-K:

153,613 (number of 4 year olds in private pre-k) / 314,481.90 (number of 4 year olds currently in private/public pre-k) = 48.5%

160,868.90 (349,715 (total 4-year old pop.) X 46% (percentage of total 4-year old population in public school 2004-2005)) / 314,481.90 (number of 4 year olds currently in

private/public pre-k) = 51.15%

($2,408.56 X 48.5%) + ($2,721.58 X 51.15%) = **$2,568.67 per student per year for 187 days at 7 hrs. per day**

Direct Costs -

CCPC Program Teachers:	$3,512.00 (avg. monthly salary for Texas Pre-K teacher with bachelor's degree and three years experience in 2004-2005) X 10 months = $35,120 per teacher per year 314,743.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 18,514.32 teachers needed 18,514.32 X $35,120 = $650,223,042.35 per year for teachers' salaries
Teachers' Assistants:	$1,502.00 (avg. monthly salary for Texas Pre-K teachers' assistants with associate's degree in 2004-2005) X 10 months = $15,020 per teacher's assistant per year 314,743.5 (number of pre-k students expected) / 17 (classroom ratio of 17:2) = 18,514.32 teachers' assistants needed 18,514.32 X $15,020 = $278,085,086.40 per year for teachers' assistants' salaries
Administrators:	16,219.20 (current number of administrators in Texas in 2004-2005) / 294,258.30 (number of teachers in Texas in 2004-2005 school year) (TEA AEIS Data 2005) = 1 (administrator) to 18.1 (teachers) 18,514.32 (pre-k teachers needed) / 18.1 = 1,022.89 (number of administrators needed) 1,022.89 X $61,612.00 (TEA AEIS Data 2005) (avg. salary of Texas administrators in 2004-2005) = $63,022,336.12 per year for administrators' salaries

Improved Material Costs:

Existing Classrooms: $262.66 (cost of upgraded materials per child in 2005 dollars) X 17 (number of pre-k students in class) = $4,465.22

$4,465.22 X 8,200 (approximate number of FTE pre-k teachers in 2004-2005) (author's calculation from TEA data) = $36,614,804.00 to improve materials in existing classrooms

New Classrooms: 314,743.5 (number of pre-k students expected) – 160,868.90 (number of 4 year old pre-k students enrolled in 2004-2005 school year) = 153,874.6 students requiring new classrooms

153,874.6 X $998.09 (cost of new classroom materials per child in 2005 dollars) = $153,580,699.51

$36,614,804.00 + $153,580,699.51 = $190,195,503.51 to upgrade existing classrooms' materials and outfit new classrooms with necessary materials

Fringe Benefits: $991,330,464.87 X 28% (percentage of all salaries for fringe benefits) = $277,572,530.16

Total Direct Costs:

CCPC Program Teachers' Salaries -	$650,223,042.35
Teacher's Assistants' Salaries -	$278,085,086.40
Administrators' Salaries -	$63,022,336.12
Fringe Benefits -	$277,572,530.16
Material Costs -	$190,195,503.51

	$1,459,098,498.54

Indirect Costs -

Infrastructure Costs: 153,874.60 (students requiring new classrooms) X 36 (state mandated minimum square feet per child) = 5,539,485.60 additional square feet needed

($32 (avg. sq. ft. cost of portables in rural areas) X 14% (percent of 4 year olds in rural areas)) + ($39 (avg. sq. ft. cost of portables in urban areas) X 86% (percent of 4 year olds in urban areas)) = $38.02 avg. cost per square foot of portable space in Texas

5,539,485.60 X $38.02 = $210,611,242.51 in infrastructure costs

Technical Assistant Costs: 314,743.5 (number of pre-k students expected) / 1,500 (1,500 pre-k students to 1 technical assistant) = 209.83 technical assistants needed

209.83 X $50,739.22 (avg. salary of individual with Bachelor's degree in Texas in 2005 dollars) = $10,646,559.79 per year for technical assistants' salaries

Quality Assurance Costs: 314,743.5 (number of pre-k students expected) / 3,750 (3,750 pre-k students to 1 quality assurance monitor) = 83.93 quality assurance monitors needed

83.93 X $50,739.22 (avg. salary of individual with bachelor's degree in 2005 dollars) = $4,258,623.92 per year for quality assurance monitors' salaries

Evaluation Costs: 5% (percentage of total direct costs allocated for evaluation) X $1,459,098,498.54 (Direct Costs) = $72,954,924.93

Administration Costs: (3 (minimum number of staff members) X $82,160 (est. salary of staff member in 2005 dollars)) + (1 (minimum number of directors) X $123,240 (est. salary of director in 2005 dollars)) = $369,720 per year for administration costs

Wrap-around Costs: 314,743.5 (number of pre-k students expected) X 3 hours per day (2:45pm – 5:45pm) X $3 per hour X 187 days (NIEER 2006) = $529,713,310.50

Total Indirect Costs:

Infrastructure Costs -	$210,611,242.51
Technical Assistant Costs -	$10,646,559.79
Quality Assurance Costs -	$4,258,623.92
Evaluation Costs -	$72,954,924.93
Administration Costs -	$369,720.00
Wrap-around Costs -	$529,713,310.50

	$828,554,381.65

Kindergarten (Half- to Full-Day) –

$7,084.00 (TEA AEIS Data 2005) (operating expenditures per student 2004-2005) / 2 (kindergarten student roughly equals half a student in Texas according to TEA

calculations) = $3,542.00 per kindergarten student in 2004-2005

$3,542.00 X 2 (to get to full-time equivalent) = $7,084.00 per full-time kindergarten student in 2004-2005

$7,084.00 X 333,530 (TEA AEIS Data 2005) (number of kindergarteners in 2004-2005) = $2,362,726,520.00 per year for full-time kindergarten

$3,542.00 X 333,530 = $1,181,363,260.00 per year for half-time kindergarten

$2,362,726,520.00 - $1,181,363,260.00 = $1,181,363,260.00 additional per year for full-day kindergarten instruction

Wrap-around Care (Full-day Kindergarten) –

333,530 (TEA AEIS Data 2005) (number of kindergarten students in 2004-2005) X 3 hours per day (2:45pm – 5:45pm) X $3.00 per hour X 187 days = $561,330,990.00 per year

Total Annual Direct and Indirect Cost (excluding Kindergarten calculations) -

$1,459,098,498.54
\+ **$828,554,381.65**

$2,287,652,880.19

Total Annual Cost per Student Expected -

$2,287,652,880.19 / 314,743.5 =

$7,268.31

Total Current Cost of Public/Private Pre-k in Texas -

$2,568.67 (avg. cost of current public/private pre-k in Texas) X (160,868.90 (number of 4 year old pre-k students in public school in 2004-2005 school year) + 153,613 (avg. number of pre-k students in private school)) =

$807,800,222.07

Annual Cost to Texas Economy -

$2,287,652,880.19
- $807,800,222.07

$1,479,852,658.12

Annual Increase in Government Expenditures -

$2,721.58 (cost per student per year for 187 days at 7 hrs. per day) X 160,868.90 (number of 4 year olds in public pre-k 2004-2005) = $437,817,580.86

- $2,287,652,880.19
$437,817,580.86

$1,849,835,299.33

APPENDICES: APPENDIX 3

Child-Care Center Survey Response Form

Name of Center: _____

County: _____

Hi, I'm (name) and I have some questions about your programs and charges. Can I speak to your program director or business associate? [If asked, say that I don't have a 4 year old, but I'm trying to get some information for a project at Texas A&M.]

1. What do you charge per month for a 4 year old child? _____
2. How many hours per day do you provide care for that price? _____
3. Do you have a different price during the summer? Yes No

   If yes, what is it? _____
4. Do you provide after school care (wrap-around program)? Yes No

   What is the cost of this service? _____

   How many hours of after school care are provided? _____
5. How many 4 year olds are currently enrolled? _____
6. What is your pupil-teacher ratio for four year old classrooms? _____

   Are teaching assistants in every classroom as well? Yes No
7. Is your curriculum accredited? Yes No

   By whom? _____

8. How many of your teachers are certified for early childhood development?

_____

How many of them have an associate's degree? _____

How many have a bachelor's degree? _____

Thank you so much for your time and consideration. I really appreciate this information.

APPENDICES: APPENDIX 4

Calculated Retention Rates

Low SES	Individual PV	% of the Pop	# Retained no Pre-K	# Retained Pre-K	Difference
Reg	$4,581.50	48.27	13.34	8.44	$22,442.53
Special	$10,007.70	6.33	2.00	1.27	$7,288.31
Low SES	**Individual PV**	**% of the Pop**	**# Retained no Pre-K**	**# Retained Pre-K**	**Difference**
Reg	$3,817.92	40.13	5.97	5.24	$2,789.09
Special	$8,339.75	5.27	1.67	1.06	$5,056.53
					$37,576.47

Texas Enrollment Rates, School Year 1996-97 to 2004-05

	2004-2005	%	2003-2004	%	2002-2003	%	2001-2002	%	2000-2001	%	1999-2000	%	1998-1999	%	1997-1998	%	1996-1997	%
African American	623,534	14	616,050	14	608,045	14	595,543	14.4	585,609	14.4	576,083	14.4	567,998	14.4	559,708	14.4	549,018	14.3
Hispanic	1,969,097	45	1,894,108	44	1,818,531	43	1,728,059	41.7	1,646,508	40.6	1,578,967	39.6	1,523,769	38.6	1,476,008	37.9	1,432,546	37.4
White	1,660,392	38	1,676,987	39	1,693,598	40	1,694,297	40.9	1,706,989	42	1,721,969	43.1	1,741,690	44.1	1,750,561	45	1,746,560	45.6
Native American	14,350	0.3	13,791	0.3	13,162	0.3	12,739	0.3	12,091	0.3	11,265	0.3	11,904	0.3	10,562	0.3	9,908	.3
Asian/Pac. Islander	133,271	3	127,092	2.9	122,485	2.9	116,015	2.8	108,422	2.7	103,499	2.6	100,006	2.5	95,038	2.4	90,943	2.4
Total	**4,400,644**		**4,328,028**		**4,255,821**		**4,146,653**		**4,059,619**		**3,991,783**		**3,945,367**		**3,891,877**		**3,828,975**	