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The Economics of Investing in Universal Preschool Education in California

———— Executive Summary ————

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Preface

There is increased interest in California and other states in providing universal access to publicly funded preschool education for one or two years prior to kindergarten entry. In considering such a program, policy-makers and the public focus on the potential benefits from a universal preschool program, as well as the estimated costs. This study, conducted by RAND Labor and Population, a unit of the RAND Corporation, aims to inform such deliberations by conducting an analysis of the economic returns from investing in preschool education in the state of California. Specifically, we focus on the following two questions:

- What are the expected direct costs and benefits for the public sector and society as a whole of implementing a high-quality universal preschool program in California?
- What are the other potential indirect economic and noneconomic benefits for California that may be associated with such a program?

The analysis builds on prior research at RAND on the costs and benefits of early childhood programs, and it draws on other related studies that have examined the economic returns from preschool programs. The analysis is tailored, as much as possible, to account for the California context in terms of demographics, costs of public-sector programs and services, and other aspects of the California economy.

Funding for this project was provided by The David and Lucile Packard Foundation as part of their “Preschool for All” program. This

study should be of value to decisionmakers in the public and private sectors, as well as the public more generally, who are interested in the returns to society and other stakeholders from investing in preschool education in California and throughout the United States.

Summary

Research has shown that well-designed early education programs serving disadvantaged children in the year or so prior to kindergarten entry can generate benefits to government and the rest of society that outweigh the costs of the program services. As a result of this evidence and the conviction that children benefit from structured programs preparing them for school entry, enthusiasm for public-sector investment in preschool education has been growing among business leaders, policymakers, and the public.

Within this context, there is growing interest in universal preschool education in California. In considering such a program, policymakers and the public focus on the potential benefits from a universal preschool program, as well as the estimated costs. This study aims to inform such deliberations by conducting an analysis of the economic returns from investing in preschool education in California. In particular, we focus on two questions:

- What are the expected direct costs and benefits for the public sector and society as a whole of implementing a high-quality universal preschool program in California?
- What are the other potential indirect economic and noneconomic benefits for California that may be associated with such a program?

We summarize our analysis here. After a brief overview of the status of preschool education in the United States, we review the research on the benefits of preschool education so that we can infer potential

benefits a high-quality universal program would generate in California. We then present our benefit-cost analysis and consider other economic benefits, as well as noneconomic benefits, from such a program. We conclude with the implications for policy. With respect to our two questions above, our key findings are as follows:

- Using our preferred assumptions, a one-year high-quality universal preschool program in California is estimated to generate about \$7,000 in net present value benefits per child for California society (public and private sectors) using a 3 percent discount rate. This equals a return of \$2.62 for every dollar invested, or an annual rate of return of about 10 percent over a 60-year horizon.
- Assuming a 70 percent participation rate in the universal preschool program, each annual cohort of California children served generates \$2.7 billion in net present value benefits to California society (using a 3 percent discount rate).
- These estimates from our benefit-cost model are sensitive to assumptions about the distribution of benefits that accrue to more- and less-disadvantaged children from participating in a high-quality preschool program. When we consider a range of assumptions from the more conservative to the less conservative (where our baseline results above fall in between), we find that California is estimated to gain at least two dollars for every dollar invested and possibly more than four dollars.
- Our estimates of benefits to society are likely understated because we do not account for some potential benefits due to data limitations. These include reductions in the intangible costs experienced by victims of child maltreatment and crime, improved health and well-being of preschool participants, and the potential intergenerational transmission of favorable benefits. When we incorporate the best available estimates of intangible victim costs, net present value benefits increase nearly 50 percent for California society and 36 percent for U.S. society, and the rate of return increases about 3 percentage points.
- Other potential economic and noneconomic benefits to California are not incorporated in the benefit-cost analysis. Broader

benefits from investing in a universal preschool program include near-term labor force benefits for California businesses in terms of labor force recruitment, participation rates, and workforce performance, as well as longer-term benefits for the state in terms of economic growth and competitiveness and economic and social equality.

The Status of Preschool Education in the United States

Preschool education is increasingly the normative experience of 4-year-olds in the United States, and to a lesser extent, of 3-year-olds as well. As of 2001, 43 percent of U.S. 3-year-olds and 66 percent of 4-year-olds were enrolled in some form of preschool program. These percentages are three times as high for 3-year-olds and twice as high for 4-year-olds as they were in 1970. However, the current enrollment rates are subject to large variations across groups of children, depending on race/ethnicity, family income, parental education, and other factors. For example, enrollment rates are lowest for Hispanic children, and lower for families with incomes below poverty compared with families at the top of the income scale. One of the sharpest contrasts is by mothers' education, with just 38 percent of 3- to 5-year-olds whose mothers have less than a high school education enrolled in early education programs compared with 70 percent of those whose mothers have at least a college degree.

Preschool education is funded through the federal government, state and local governments, and private sources. The federal government supports preschool education targeted to disadvantaged children primarily through the Head Start program, which serves about 900,000 3- and 4-year-olds annually. Thirty-eight states provide further funding for another 700,000 children, primarily 4-year-olds. All but two of those target their funding to disadvantaged children. Only Georgia and Oklahoma have preschool programs available to all 4-year-olds whose families choose to enroll them, but other states and localities are aiming for universal programs in the future. California's program

for children at risk of school failure reached 9 percent of the state's 4-year-olds in 2002–2003, about one-seventh the state-funded program enrollment rate in Oklahoma in the same year.

The state preschool programs vary considerably in quality and per-child spending. Twelve of the thirty-eight states with programs met fewer than five of the ten research-based quality standards identified by the National Institute on Early Education Research (NIEER). For example, only about half of the state programs (20 out of 38) require the lead classroom teacher to have a bachelor's degree, a requirement in every state kindergarten program. California does not meet this standard, nor does it meet five of the other ten standards.

To evaluate the costs and benefits of a high-quality universal preschool program in California, we make assumptions about the key features of such a program. Table S.1 summarizes these features. Notably, the benefits and costs we calculate for universal preschool in California are for a part-day, voluntary program enrolling all 4-year-olds. We also assume that NIEER standards associated with high-quality programs (e.g., class sizes, staff ratios, and staff qualifications) are met.

The Benefits of Preschool Education

We now review the benefits of preschool education, so that we may put them in monetary terms. Benefits for disadvantaged children—which are the most studied and where results are more dramatic—are discussed separately from benefits for lower-risk children. We conclude by quantitatively inferring total benefits for a universal California program. First, however, a few words about acceptable program evaluation approaches are in order.

Methods for Program Evaluation

An extensive literature provides evidence of the potential effects of center-based early childhood programs that serve children in the year or two prior to kindergarten entry. This literature cannot be taken at face value; studies using appropriate methodologies must be culled, as must those measuring a range of outcomes over a period of time.

Table S.1
Features of a Universal Preschool Program in California

Feature	Specifics
Eligibility	Voluntary program for all age-eligible children
Children served	Program enrolls 4-year-olds
Program intensity	Approximately 525 hours per year
“Wraparound” care	Extended-day care available financed by other sources
Class size and staff-child ratios	Maximum class size of 20; staff-child ratio of 1:10
Teacher qualifications	Head teacher in each classroom has bachelor’s-level education with an early childhood education credential; assistant teacher in each classroom has associate’s-level degree
Facilities	Programs use existing or new facilities run by private or public providers
Financing	Full funding with public funds

SOURCE: Based on Golin et al. (forthcoming).

By “appropriate methodologies,” we mean that evaluations must use either experimental or strong quasi-experimental methodologies. In the first of these, children are randomly assigned to either the program being evaluated or to no program. The progress of both sets of children is tracked over the course of time and compared. While experiments are the “gold standard” for evaluation, they are not always practical. Quasi-experimental studies involve comparing educational and other outcomes between children who happen to take a preschool program and children who happen not to. Here, the children are not assigned randomly, so the two groups of children may differ in important ways. However, efforts to control or account for these differences using the best nonexperimental methods can increase the confidence that the impacts of the program, and not some other confounding factor, have been measured. In both cases, the more helpful evaluations measure not only short-term educational benefits but also those accruing over the long term, even into adulthood, and attend to nonacademic benefits—socio-emotional functioning, physical health, crime reduction—as well.

Benefits for Disadvantaged Children

A number of preschool program targeting disadvantaged children have been evaluated using scientifically sound techniques. Of those, the most relevant to an analysis of a high-quality universal program in California is the Chicago Child-Parent Centers (CPC) program. The CPC program is large scale, publicly funded, and has been operating for over 30 years. It is a half-day program with well-qualified staff and good staff-child ratios. The quasi-experimental Chicago Longitudinal Study compared almost 1,000 low-income minority children born in 1980 who went through the CPC with 550 children who did not (most of whom did not attend any other preschool). Most children in both the CPC program and comparison groups faced risks to healthy development—e.g., living in a family with only one parent and/or having an unemployed parent.

As discussed in the body of our study, several features of the CPC evaluation design and the associated analyses generate high confidence that the evaluation is measuring true program effects, without bias due to selectivity into the program. The evaluation, which has followed children until age 20 or 21, shows that the CPC program had a range of statistically significant, meaningful effects:

- Advantages in reading achievement scores as late as age 14
- Lower likelihood of retention in grade by age 15
- Reduced use of special education through age 18
- Lower incidence of child abuse and neglect from ages 4 to 17
- Lower likelihood of involvement in the juvenile justice system by age 18
- Greater likelihood of high school completion by age 20.

Children participated in the program for either one or two years; evaluations showed that the second year produced smaller incremental benefits beyond those obtained from the first year.

Three other targeted preschool programs with sound evaluations generally corroborate these findings:

- The Early Training Project, implemented in Murfreesboro, Tennessee, between 1962 and 1965 with 65 black children of low

socioeconomic status randomly assigned to the program or a control group. Advantages of the project, measured as of age 19, include a lower rate of special education use and a higher rate of high school completion.

- The High/Scope Perry Preschool Project, which studied 123 black children (randomly assigned to treatment and control groups) with low IQs and socioeconomic status in Ypsilanti, Michigan, from 1962 to 1967. Educational advantages of this high-quality program were similar to those in the Early Training Project, but long-term follow-ups also showed less contact with the criminal justice system and a higher employment rate and earnings average when the participants were observed at both ages 27 and 40.
- Head Start. A nationally representative experimental study has only recently been initiated. The results for earlier studies have been mixed, though some do show educational advantages similar to the Early Training and Perry Preschool projects. Longer-term studies indicate higher rates of high school completion and college attendance for whites and a lower rate of criminal justice system involvement for blacks.

Further useful information is provided by a meta-analysis by the Washington State Institute for Public Policy of 48 evaluations of targeted preschool programs published between 1967 and 2003. This analysis generally confirms the gist of the findings summarized above. The CPC program evaluation results fall between the meta-analysis (on the low side) and the Perry Preschool evaluation (on the high side), and the CPC program is large scale and similar in important respects to what we assume for a high-quality universal preschool program in California. We thus base our estimates of the benefits of such a program for disadvantaged children on the CPC program results.

Benefits for More-Advantaged Children

The literature is more limited in providing scientifically sound evidence of the long-term benefit of high-quality preschool programs for more-advantaged children. Because disadvantaged children have more room for improvement on school achievement and other measures,

one might suspect that preschool would be more important for them and less helpful for more-advantaged children. However, because the latter are more numerous, small gains might accumulate to substantial benefits across the whole population.

We identified one experimental evaluation of preschool for lower-risk children. In that program, a university-affiliated preschool, boys showed higher achievement test scores in several domains than boys who did not participate, whereas girls did not show higher achievement. In the absence of longer-term follow-up, this study is silent about whether these advantages translate into improved outcomes in other domains, such as educational attainment, earnings, crime, and delinquency.

The Georgia and Oklahoma universal preschool programs have been assessed in short-term quasi-experimental evaluations. The Georgia evaluation showed that children participating in the state program progressed at a rate similar to those participating in Head Start or private programs. However, these groups were not compared with children not participating in preschool. Likewise, the Oklahoma evaluation has indicated gains from participating in the state program in cognitive test scores as of kindergarten entry. The measured gains accrued to diverse groups of children defined by race/ethnicity and eligibility for free or reduced-price lunches (a proxy for poverty status), but again there was no control group with no participation in the state preschool program.

Evidence for short-term preschool benefits also comes from studies of participants in the Early Childhood Longitudinal Study. The use of statistical models with extensive controls heightens confidence in the findings, which suggest higher school readiness and kindergarten performance among preschool participants than among nonparticipants. Notably, the data indicate stronger effects for more-disadvantaged children—whether defined by poverty status, low maternal education, single-parent headship, or mothers who do not speak English—compared with their more-advantaged peers.

These studies suggest that, at least in the short-term (e.g., in terms of school readiness or early test scores), more-advantaged children may also benefit from high-quality preschool programs but to a lesser

extent than more-disadvantaged children. We identified one quasi-experimental study of longer-term benefits of untargeted preschool. This study found that children participating in preschools not targeted to disadvantaged children were no better off in terms of high school or college completion, earnings, or criminal justice system involvement than those not going to any preschool.

Potential Benefits from a California Program

From the preceding review of the evidence for preschool benefits, we infer a set of potential benefits from a one-year high-quality universal preschool program in California, which we can then convert into monetary terms to compare with the costs of such a program. Simplistically, we might take the CPC program benefits and assume those would be realized by the average child attending a universal program in California. Such an assumption would be too optimistic for two reasons. First, the CPC program was for disadvantaged children, while a universal program would include many lower-risk children, for whom benefits have been found to be lower. Second, most children in the comparison group in the CPC program evaluation did not go to preschool. In California, 65 percent of 4-year-olds are already in preschool. To the extent that those children are realizing some benefits from their preschool attendance, the gain from switching to a state program would be less than the gains resulting from the CPC program. We thus adjust the CPC program benefits for these two differences.

Indicators suggesting risk of school failure apply to a sizeable fraction of California children. For instance, 18 percent of children under 5 live with a single parent, 13 percent are Hispanic and living in poverty, and nearly half have a foreign-born parent. Based on analyses presented in the body of our study, we assume that 25 percent of California children of preschool age are high risk, like the CPC program children; 55 percent are low risk; and 20 percent are in between. Based on the Georgia and Oklahoma experience, we postulate that 70 out of every 100 California 4-year-olds will enroll in a universal state program. Of those, we calculate that 18 will be high-risk children, 14 medium risk, and 38 low risk. (Another 10 children out of every 100 are assumed to be in the private preschool system for a total participation rate among all 4-year-olds of 80 percent.)

The benefits gained by these children depend on what their preschool experience would have been without the program. We base our calculations on current and predicted enrollment in public and private programs. Of the 70 children enrolling in the universal program, we estimate that 15 would not have gone to preschool in the absence of such a program, 33 would have gone to another public program, and 22 would have gone to a private program.

The percentages of the CPC program benefit assumed to be realized are given in Table S.2 and discussed more fully in the body of our study. As suggested by the percentages in the table, we assume that children otherwise attending no preschool (first column) would realize the highest benefits. In particular, we assume high-risk children who move from no preschool to preschool would experience 100 percent of the CPC program gains, while medium- and low-risk children would experience 50 percent and 25 percent of the CPC program gains, respectively. Children otherwise attending current public programs would realize some benefit (if not low risk) because we assume the new state program would be higher in quality than most current public programs. Finally, children otherwise attending private programs (third column) are assumed not to experience any gain in the quality of their preschool experience—hence no gain from switching to the public program. Some might argue that these assumptions are too conservative, while others might claim they are not conservative enough. As we discuss below, we reestimate our model using both more- and less-conservative assumptions than those in Table S.2.

By applying the CPC program gains according to the Table S.2 percentages across a single-year cohort of 4-year-old California children, the total benefits can be calculated. As seen in Table S.3, we estimate that there would be 13,764 fewer children ever retained in a grade if the universal program were implemented, 62,563 fewer years spent in special education, 10,010 additional high school graduates, 4,737 fewer cases of abuse or neglect, and 7,329 fewer children against whom a juvenile petition would ever be filed. These absolute changes are roughly estimated to represent reductions over current levels ranging from 9 percent (child maltreatment) to 19 percent (grade repetition).

Table S.2
Percentages of CPC Program (Maximum) Benefits Realized by Children of Differing Risk and Alternative Preschool Destination

Risk	What Kind of Preschool the Child Would Have Attended Without a Universal Program		
	None	Public	Private
High	100%	50%	0%
Medium	50%	25%	0%
Low	25%	0%	0%

Table S.3
Estimated Impacts for a California Single-Year Cohort of 4-Year-Olds Participating in Universal Preschool

Outcome	Change Assuming Distribution of Benefits Among Participants
Education processes and attainment	
Reduction in the number of children ever retained in grade	13,764
Reduction in the number of children ever using special education	9,116
Reduction in the number of child years of special education use	62,563
Increase in the number of high school graduates	10,010
Increase in the number of child years of education	29,494
Child maltreatment	
Reduction in the number of children with report of child abuse or neglect	4,737
Juvenile crime	
Reduction in the number of children with a juvenile petition (court filing)	7,329
Reduction in the number of children with a juvenile petition (court filing) for a violent offense	5,631
Reduction in the number of juvenile petitions (court filings)	29,494

NOTES: The California annual cohort of 4-year-olds is assumed to be 550,000 children, and 70 percent of children are assumed to participate in the universal preschool program.

Benefit-Cost Analysis

We now convert preschool benefits into dollar terms and compare them with program costs. We begin with an overview of benefit-cost methodology, show how the benefits and costs of a California universal preschool program were estimated, and present the results under varying assumptions.

Overview

We begin by reviewing the essential elements of benefit-cost methodology and summarizing the findings of other benefit-cost studies of preschool programs. In benefit-cost analysis, the stream of benefits flowing from a project and the costs accruing to it over a number of years are expressed in common units—typically, dollars inflated or deflated to a common base year and discounted to the present. Discounting is done by applying a constant annual rate—we use 3 percent—to all future benefits and costs to account for people’s preference for near-term benefits (and distaste for near-term costs) over longer-term benefits. The results of the analysis can then be expressed in terms of net benefits (the present value of benefits minus that of costs), a benefit-cost ratio, or an internal rate of return on the “investment” in the program. While benefit-cost analysis is a powerful tool, we must keep in mind its disadvantages: Some benefits may not be measured in the program evaluations, others are not easily translated into dollar values, and this type of analysis does not account for distributional concerns or altruistic values that people may place on benefits to others.

The various types of preschool benefits—educational attainment, lower child maltreatment rates, lower involvement in crime—can be either expressed as or converted into dollar-denominated forms. For example, lower grade retention can be measured in terms of fewer years spent in K–12 education, and a year of K–12 education has a cost. Lower child maltreatment rates generate savings through reductions in the costs of the child maltreatment system and in medical and other tangible costs to victims. Some unobserved benefits can be projected from benefits observed in the evaluations. For example, increased educational attainment

has a payoff in the form of increased lifetime earnings. The various benefits (and costs) accrue to different stakeholders, namely various levels of government, program participants, and the rest of society (nonparticipants). For example, increased earnings are realized by program participants, and those generate higher taxes for government.

Using this approach, it has been shown that the CPC program generated \$47,559 in benefits to society as a whole for the average child participating over the course of a year and a half, versus program costs of \$6,692 (in 1998 dollars discounted to the present at 3 percent per year). The benefit-cost ratio is thus 7.14¹. The benefit-cost ratio for the Perry Preschool program, which also served children for about one and a half years on average, has been estimated as a ratio of almost 9 as of the child's age 27, when the large but difficult-to-value savings in intangible costs of crime are included, and a ratio of 4 when they are not. The recent age 40 follow-up suggests a benefit-cost ratio for Perry that exceeds 17. (For both programs, the ratio is higher for one year of preschool compared with two years.) The 48-study meta-analysis mentioned above yielded a composite benefit-cost ratio of 2.36 for targeted preschool programs, while a recent estimate for a universal preschool program in Ohio suggests a ratio that ranges from 1.38 to 1.91.

Estimating Benefits in Dollar Terms

In most cases, the preschool benefits given above can be expressed in dollar terms (we convert all figures to 2003 dollars). Wherever possible, we use data for California to estimate the benefits (in some cases, costs) associated with the following domains:

- *Remedial education services and educational attainment.* Dollar values are identified for government savings due to the reduction in grade repetition and the decrease in years of special education. The increase in the high school graduation rate and the increased college attendance concomitant with the latter result in offsetting higher public education costs.

¹ This and similar ratios throughout the text are the return for each dollar invested. In this case, the return for every dollar invested is \$7.14.

- *Child welfare.* We estimate the savings to government and victims associated with reduced child abuse and neglect. These are based on the cost to the child maltreatment system of a substantiated case, as well as the tangible costs to the victim associated with treating physical injuries or resulting mental conditions.
- *Criminal justice.* The savings to government and victims of crime are estimated for the reduction in juvenile crime. In the case of the latter, we restrict our savings estimates to tangible victim costs. In addition, there is a probability of an adult criminal career, with an associated estimated cost, that can be linked with the measured reduction in juvenile crime, so savings in terms of adult justice system and tangible victim costs can be projected (in our case up to age 44).
- *Compensation and taxes.* The CPC program results include differences in educational attainment between those attending preschool and those not. From data on mean annual earnings by level of educational attainment and age, we infer the lifetime earnings gains to preschool participants (up to age 65). These earnings differentials also allow the calculation of differences in taxes accruing to the government.
- *Value of child care.* We value the time the child spends in preschool at the minimum wage to yield a benefit to participating families from the time they now have available for work or other activities.

For all domains, we differentiate between benefits to California state and local governments versus the federal government. For example, taxes from increased earnings produce more income tax revenue for California, as well as income and Social Security taxes for the federal government.

The total benefits we estimate by summing the preceding categories must be regarded as conservative, because there are some benefits we omit. For example, welfare use in families with children attending preschool were not measured in the CPC program evaluation. Lower welfare use should result in savings to government and nearly offsetting losses to participants. The CPC program evaluation also did not mea-

sure gains to mothers of participating children, such as improved educational level, occupational status, and earnings. Such improvements have not been demonstrated for preschool but have occurred with longer-term, more intensive center-based child care. Children's higher educational attainment could also result in health improvements over their life course, better consumption choices in adulthood, improved fertility choices, and second-generation effects. Again, demonstrations of such effects for preschool are limited, but other research suggests these benefits for participants, and the associated government savings, could be sizeable. Finally, intangible crime costs (e.g., pain and suffering and fear of crime) have been estimated as 1.4 to more than 3 times the tangible costs, while the ratio for child abuse is almost 8. While such benefits are not included in our baseline model, we do incorporate them as part of a sensitivity analysis.

Estimating Costs

Our cost estimates follow closely those already established in another recent study of a universal preschool program in California. We make certain assumptions regarding day length, weeks per year, classroom space required and amortization, instructional staff required (at a child-staff ratio of 10:1), administrative staff required, and salaries. The resulting cost is approximately \$5,700 per child per year. This must be offset by the money now spent on preschool in California to obtain an incremental cost to compare with the incremental benefits anticipated. Our estimate is that current spending would offset \$1,100 in spending per child in a universal preschool program with a 70 percent participation rate. The marginal cost of \$4,600 per child, when discounted, equals the \$4,339 figure reported as program costs in our results below.

Benefit-Cost Results Under Alternative Assumptions

We begin with the results under the assumed distribution of benefits given in Table S.2. This is followed by more- and less-conservative assumptions. We also incorporate the value of reduced intangible victim costs, and we allow for the effects of migration out of state and for the possibility of charging a fee on an income-dependent sliding scale.

Table S.4 shows the various categories of costs and benefits in 2003 present value dollars that accrue to California society as a whole and U.S. society as a whole under the baseline assumptions. Results for each are shown per child and per single-year age cohort. Total benefits to California society as a whole from universal preschool in California are estimated to total nearly \$11,400 per participating child. That is the estimated gain in benefits over those now realized in California's various preschool programs at current participation levels. It is offset by the \$4,339 in incremental costs to yield \$7,036 in net benefits per child, for a 2.62 benefit-cost ratio. The internal rate of return (IRR) for California society is estimated at 10.3 percent. In other words, Californians would earn an annual rate of return (or interest) of about 10 percent over a 60-year horizon on the upfront preschool investment. Net benefits for California society, in present value terms, from serving a single-year age cohort total \$2.7 billion. After adding benefits—mainly the increased federal income and Social Security taxes—that accrue to the federal government alone, net benefits to U.S. society as a whole for a single-year age cohort total \$3.6 billion in present value dollars. The United States benefit-cost ratio is 3.15 and the IRR is 11.2 percent.

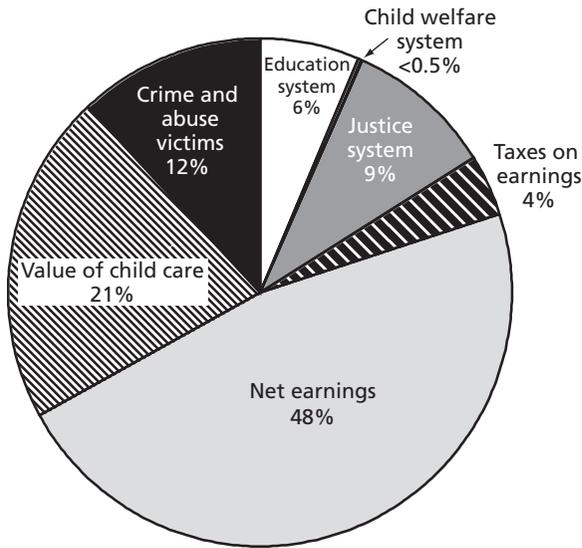
However, benefits (and net benefits) are distributed unevenly across the various stakeholders. As seen in Figure S.1, 19 percent of the benefits to California society are realized by the public sector in the form of savings to the education, child welfare, and justice systems and in the form of higher taxes. Forty-eight percent of the benefits are in the form of increased earnings (net of taxes and higher education costs) of participants in adulthood, while another 21 percent of the benefits stem from the value of child care to the parents. The remaining 12 percent of benefits accrue to participants and the rest of society in the form of savings from reduced child abuse and crime. After accounting for costs, net benefits are highest for the groups that bear none of the costs: Participants themselves gain the most, followed by nonparticipants (other members of society), and the federal government. Net benefits are negative for California state and local governments, which are assumed to bear the full costs of the program. However, as we discuss in the concluding section of the Summary, investments in public education are not necessarily justi-

Table S.4
Present Value Costs and Benefits for Universal Preschool in California in Baseline Model, Dollars per Child and Dollars per Cohort of 4-Year-Olds

Source of Costs or Benefits	Benefits (Costs) to Society— California Only		Benefits (Costs) to Society— U.S. Total	
	Dollars per		Dollars per	
	Dollars per Child	Cohort (millions)	Dollars per Child	Cohort (millions)
Program costs	-4,339	-1,671	-4,339	-1,671
Program benefits				
Education outcomes (measured)	876	337	992	382
Child welfare outcomes (measured)	102	39	141	54
Juvenile crime outcomes (measured)	1,220	470	1,220	470
Value of child care (measured)	2,406	926	2,406	926
Total measured benefits	4,604	1,772	4,759	1,832
College attendance (projected)	-173	-67	-173	-67
Labor market earnings (projected)	5,801	2,234	7,940	3,057
Adult crime outcomes (projected)	1,143	440	1,143	440
Total projected benefits	6,772	2,607	8,910	3,430
Total benefits	11,375	4,379	13,669	5,262
Net benefits	7,036	2,709	9,329	3,592
Benefit-cost ratio (\$/\$1)		2.62		3.15
Internal rate of return (%)		10.3%		11.2%

NOTES: Unless otherwise indicated, all amounts are in 2003 dollars and are the present value of amounts over time where future values are discounted to age 3 of the participating child, using a 3 percent annual real discount rate. Dollars per child figures are from the final two columns in Table 3.2. Dollars per cohort figures assume a cohort of 4-year-olds of 550,000 children and a 70 percent preschool participation rate. Numbers may not add because of rounding.

Figure S.1
Distribution of Present-Value Benefits for California Society in Baseline Model



SOURCE: Table 3.2. See Appendix A for details.

NOTES: The percentage distribution is per child based on 2003 dollars. The dollars are the present value of amounts over time where future values are discounted to age 3 of the participating child, using a 3 percent annual real discount rate. California values exclude benefits/costs to the federal government. Numbers may not add because of rounding.

RAND MG349-S.1

fied because they generate a positive return for the state and local government sector but because they generate positive net benefits to society as a whole.

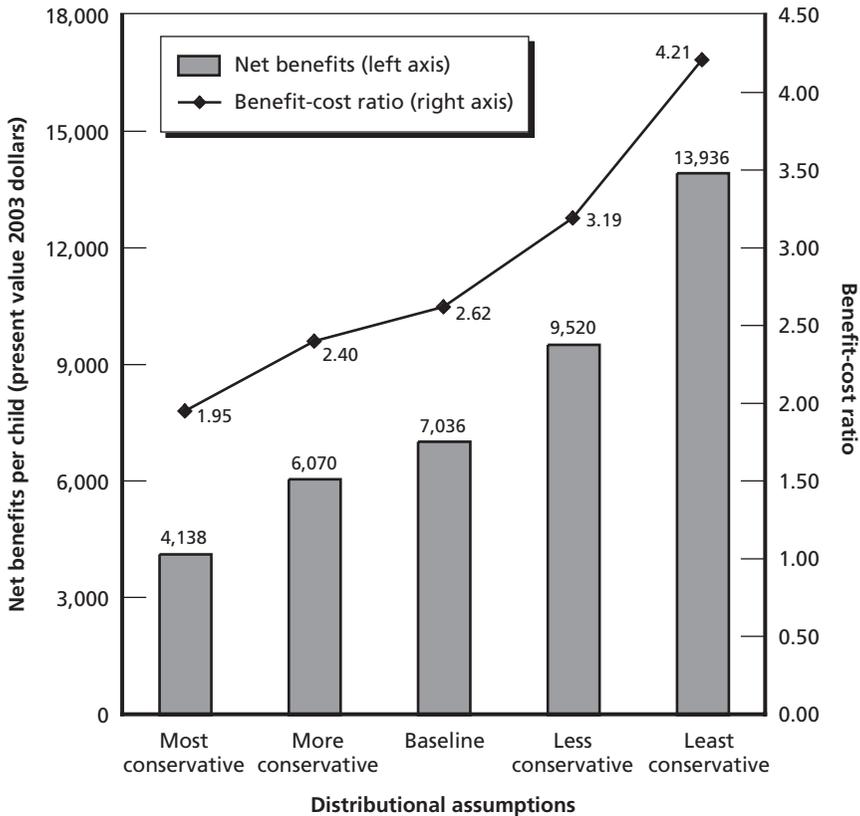
We made two assumptions that were more pessimistic and two that were more optimistic regarding the distribution of benefits, relative to those shown in Table S.2. The most pessimistic assumption was that no benefits would accrue to low- and medium-risk children. The most optimistic assumption was that children moving from other public preschools to the universal program would realize the same benefit gain as those moving from no preschool. There was also some assumption of benefits for low- and medium-risk children moving from private schools. Figure S.2 shows the net benefits per child and benefit-

cost ratio, both for California society, as the distributional assumptions range from more conservative to less conservative. (The baseline model falls in the middle.) For the least conservative assumption, the benefit-cost ratio is just over 4, but even for the most conservative assumption, it is just under 2. Net benefits increase more than threefold in going from the more conservative to less conservative assumptions. The IRR for California society (not shown) increases from 7.9 percent to 14.8 percent. Figures for the United States as a whole follow a similar pattern and are even larger.

These results from the baseline model include only the tangible benefits from reducing child maltreatment and crime. Intangible benefits associated with reduced pain and suffering, fear of crime, and so on are not included in the baseline model. However, because some other benefit-cost analyses of preschool programs include estimates of these benefits, we present them here. These benefits accrue only to participants (as potential victims of child maltreatment) and the rest of society (as potential victims of crime), so there is no effect on the bottom-line figures for the public sector. For California and U.S. society as a whole, the inclusion of intangible victim costs raises the net present value benefits by about \$3,400 per child. This is nearly a 50 percent increase in net benefits for California society and a 36 percent increase for U.S. society. The benefit-cost ratio increases to 3.40 for California (from 2.62) and 3.93 for the U.S. (from 3.15). The IRR ranges from 14.2 to 14.8 percent, about 3 percentage points higher than in the baseline model. While these results suggest the magnitude of potential underestimation of our benefit-cost results, there is considerably more uncertainty about the dollar value attached to these intangible victim costs. Thus, we continue to be conservative in excluding them for the additional sensitivity analyses we conduct.

The results presented so far do not take migration into account. Approximately 1.4 percent of Californians move out of state every year. This migration presents the possibility for a significant drain of California preschool benefits to other states while Californians pay all the costs. Under the baseline benefit distribution assumptions from Table S.2, the benefit-cost ratio when migration is taken into account is 1.89, as opposed to almost 2.62 when migration is ignored. Of course, if

Figure S.2
Benefit-Cost Results for California Society with Alternative Distributional Assumptions



SOURCE: Table 3.5. See Appendix A for details.

NOTES: Net benefits are per child in 2003 dollars and are based on the present value of amounts over time where future values are discounted to age 3 of the participating child, using a 3 percent annual real discount rate. California values exclude benefits/costs to the federal government.

RAND MG349-S.2

other states adopt similar high-quality universal preschool programs, in-migration of persons having attended preschool in other states will offset California’s losses from out-migration.

Thus far, we have assumed that a universal preschool program would be free to anyone who wanted to participate. What if a fee were charged, perhaps on a sliding scale reflecting ability to pay? If families of

low-risk children paid 50 percent of the cost, those of medium-risk children 25 percent, and those of high-risk children nothing, the weighted-average present-value fee per child would be approximately \$1,700 for a one-year preschool program. This would drop the state cost per child by the same amount and allow the state to almost break even—i.e., net benefits, negative without a fee, would be just about zero.

We present results separately from the perspectives of California governments (state and local), of all government combined, of California society as a whole, and of the U.S. society as a whole. In interpreting these results, we note that investments made by state and local governments are not always justified in terms of the in-state government savings or in-state societal benefits that accrue. Indeed, if that were the case, states and localities would under invest in many programs that have larger societal benefits beyond the state's own borders (just as individuals would under invest if there are societal benefits of an investment beyond the private returns to the individual). Thus, while it is of interest to consider net benefits from the California state perspective—either in the form of California government savings or benefits for California society—it is also important to consider the benefits to all levels of government and U.S. society as a whole.

Indirect Benefits

While the benefit-cost analysis presents an economic case for investing in a one-year high-quality universal preschool program in California, there are benefits it does not account for, some economic and some not. These include near-term labor force benefits for California businesses and longer-term benefits for the state in terms of economic growth and competitiveness and economic and social equality.

Labor Force Benefits

Demographic trends will soon slow the rate of labor force expansion in California, as they have already done in the last several decades. This slowdown in the growth rate of the labor force will cause pressure to increase the size of the labor force in order to sustain rates of economic growth experienced in the past. A preschool program could affect labor

force recruitment and participation rates, as well as workforce performance, through its effects on the parents of preschool participants.

One approach for expanding the size of the future workforce is to increase the attractiveness of the state of California to potential workers. The quality of K–12 education is known to be a quality-of-life factor in relocation decisions, particularly for skilled workers and the firms employing them. A high-quality universal preschool program would be expected to draw such workers and firms to California, although the research base does not support a quantitative estimate of this potential effect.

Another way to keep the state's labor force growing is to draw on more women with young children who do not currently participate at high rates, in part because they lack access to or cannot afford high-quality child care. Studies have shown a relationship between higher participation rates, as well as greater work hours, and the availability of public kindergarten programs. It would seem reasonable to hypothesize that a universal preschool program would have a similar benefit.

Finally, a universal preschool program would essentially provide reliable, accessible high-quality child care. By minimizing disruptions due to unreliable child care providers and by providing a safe, secure, and stimulating environment, a universal preschool program could help working parents experience less disruption in their work schedules, lower levels of stress, and diminished concern about the well-being of their children during working hours. A number of studies suggest this in turn would lead to reductions in employee absenteeism and workforce turnover, both costly drags on productivity. With about 15 percent of the California female workforce having children under age 6 as of 2000, the potential gains to employers of a universal preschool program in terms of the performance of today's workers are likely to be modest but still meaningful.

Macroeconomic Benefits

We have already quantified the future earnings benefits related to educational attainment gains by preschool participants. Here we consider the implications of educational gains for overall economic growth and competitiveness in the global economy. These are social returns earned

in the future from the investment in the preschool education of children today.

Higher educational attainment of the population has been quantitatively associated with faster economic growth, as has the quality of schooling as measured by achievement test scores. The investment in the human capital of the workforce can raise economic growth by making labor a more productive input in the economy and by improving the ability of the workforce to develop, implement, and adopt new technologies. Even small differences in economic growth rates over time can have a large cumulative impact on future per-capita income and living standards.

The education and skills of the workforce increasingly determine the ability of an economy to compete in the global marketplace. California, with the sixth largest economy in the world and one on the leading edge of globalization, is no exception. The rising return to education in California, evidenced by the doubling of the wage premium earned by a college graduate relative to a high school graduate in the past 30 years, signals the strong demand for a highly skilled workforce as a result of technological change and globalization. Yet, the challenges of producing a highly skilled workforce are especially salient in California, given the high proportion of immigrants to the state and the corresponding large fraction of minorities and those with limited English language skills.

Many of the United States' economic competitors in Europe make substantial investments in high-quality early care and education. The United Kingdom, France, and Italy, among others, serve almost all 4-year-olds through voluntary programs fully supported with public funds. Compared with those in other developed countries, U.S. students and adults do not score well on tests of school achievement and workplace literacy, and disparities in U.S. scores are wider than in most other countries. A connection between subpar, widely dispersed test results and less-than-universal early education is at least plausible. An investment by California in preschool education could help the state boost education and skill levels so that it remains competitive in the international economy and with other states making such investments.

Consequences for Economic and Social Equality

Income disparities between low- and high-income families have been growing in the United States and in California in recent decades. One contributor to this trend has been the increase in education's returns to income, and in California, the diversity of the state's demographic makeup also affects the distribution of income. Beyond differences in economic well-being, the rise in inequality has wider implications in terms of disparities that affect family functioning, neighborhood quality, education, health, crime, and political participation. Improving educational attainment for future cohorts of California children will help reduce income disparities, lower poverty, and narrow the gaps in economic and social outcomes across racial and ethnic groups. A universal preschool program that raises educational attainment overall, and improves educational outcomes for more-disadvantaged children, will contribute toward such benefits.

Conclusions

The benefit-cost analysis undertaken in this study indicates that there can be substantial returns for California society from investing in a one-year high-quality universal preschool program. Our baseline estimate, which is arguably conservative, is that every dollar invested by the public sector beyond current spending will generate \$2.62 in returns. And this estimate does not account for an array of other benefits not captured in our analysis because of data limitations. Those benefits include lower intangible losses from crime and child abuse and neglect averted, reduced reliance on public welfare programs, improved labor market outcomes for parents of preschoolers, improved health and well-being of preschool participants, and the intergenerational transmission of favorable benefits. Broader economic and noneconomic benefits are expected in other areas as well, including labor force recruitment and participation rates, workforce performance, economic growth, international competitiveness, and the distribution of economic and social well-being. We conclude with consideration of a few issues relevant to policymakers and their constituents considering such an investment.

Preschool as Economic Development

Given the mounting evidence of long-term economic benefits from investing in high-quality preschool education, this policy is increasingly framed by economists and business leaders in the context of economic development strategies more generally. To promote economic activity, a larger tax base, and better jobs, states and localities spend an estimated \$20 billion to \$50 billion annually on local infrastructure, business assistance, and workforce education and training. Yet little effort has been devoted to rigorously examining the economic impact of such investments, and the little available evidence for some of them is not promising. In many cases, economists who study these policies note that jobs would have been created anyway, or jobs gained in one community are at the expense of another community with no net positive gain. In contrast, preschool has been scientifically demonstrated to generate a wide range of benefits, which can be conservatively valued as exceeding program costs.

In addition to the size of the returns potentially associated with high-quality early childhood investments, it is worth noting that these investments may have additional advantages over typical investments designed to promote economic development. Notably, in the case of early childhood investments, the net gains to government and society as a whole are not zero sum but constitute real benefits in terms of lower government outlays, a more skilled future workforce, and a more responsible future citizenry. Moreover, these conclusions rest on scientific evidence that these outcomes are attributable to the investment in preschool education itself and would not occur under the status quo.

Key Choices for States Funding Preschool Programs

We have made certain assumptions regarding a preschool program in California. Faced with alternatives, in other words, we have made choices that some policymakers might make differently. Let us briefly consider the implications of some of those choices for the economics of preschool investments:

- *Universal Versus Targeted.* A program targeted at disadvantaged children would be expected to produce higher returns per dollar

invested than a universal program because the impacts of preschool are generally larger for at-risk children. However, there are disadvantages to targeted programs: administrative costs of determining eligibility and addressing changes in eligibility over time, stigma associated with participation, unavailability of missing some children who could benefit but do not meet the criteria or are confused about eligibility rules. Universal programs avoid these problems and allow children to participate in economically integrated programs. Political support may also be stronger for programs available to all children, and they may be more likely to be funded at the level required for high quality. If the program is to be universal but funding constraints preclude immediately achieving that goal, it might be phased in through a focus in the early years on communities with large numbers of high-risk children.

- *One Year or Two.* Some high-quality preschool programs, including the Chicago CPC, have served children for more than one year. It appears from evidence collected to date that the second year generates smaller benefits than what is gained from the first year. In other words, benefit-cost analyses show a higher return per dollar invested for a one-year program than for a two-year program. This suggests that, when resources are limited, it is more beneficial to serve a greater number of children in a high-quality one-year program rather than serving a smaller number of children for two years.
- *Preschool Quality.* There have been no scientifically sound studies comparing the long-term benefits of high-quality preschool programs and preschool programs that save money by cutting back on such features as teacher qualifications and staff-child ratios. Presumably, benefits would be less, but by how much is unknown.

Policymakers must also decide upon a number of implementation issues, e.g., the ability to use existing funding streams, which agency to put in charge, the range of providers offering state-sponsored preschool programs, and methods for ensuring program quality. Effects on benefits and costs are possible but of unknown extent.

Extending the Investment in Public Education

For a variety of reasons, public-sector investments in K–12 education have been justified as a critical investment in human capital with long-term benefits at the individual and societal levels. Notably, the investment made today at the K–12 level is a universal benefit available to all children, regardless of the ability of their families to finance the educational investment privately. The arguments supporting K–12 investment could be extended to universal preschool, which also pays off to individual participants and society at large.

While preschool enrollment rates have been rising over time, in our current system of mixed public- and private-sector financing, a substantial fraction of children do not attend one or more years of preschool prior to kindergarten entry. Moreover, enrollment rates are relatively low for disadvantaged children, a group that has been demonstrated to receive long-lasting benefits from a high-quality preschool experience. And many of the children who are currently enrolled in preschool programs do not receive the same high-quality experience associated with programs that have demonstrated significant benefits. The bottom line is that benefits from preschool participation for children, their families, and society as a whole go unrealized.

A one-year high-quality universal preschool program, available to all children, regardless of circumstance, can allow families who choose to participate to reap the reward from a high-quality program. Public funds are used to make an investment that has a long-term payoff for society as well, whether in the form of lower government outlays or a higher future standard of living. In this way, society collectively makes an investment today that pays off down the road.