



LABOR AND POPULATION

THE ARTS
CHILD POLICY
CIVIL JUSTICE
EDUCATION
ENERGY AND ENVIRONMENT
HEALTH AND HEALTH CARE
INTERNATIONAL AFFAIRS
NATIONAL SECURITY
POPULATION AND AGING
PUBLIC SAFETY
SCIENCE AND TECHNOLOGY
SUBSTANCE ABUSE
TERRORISM AND
HOMELAND SECURITY
TRANSPORTATION AND
INFRASTRUCTURE
WORKFORCE AND WORKPLACE

This PDF document was made available from www.rand.org as a public service of the RAND Corporation.

[Jump down to document](#) ▼

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world.

Support RAND

[Browse Books & Publications](#)

[Make a charitable contribution](#)

For More Information

Visit RAND at www.rand.org

Explore [RAND Labor and Population](#)

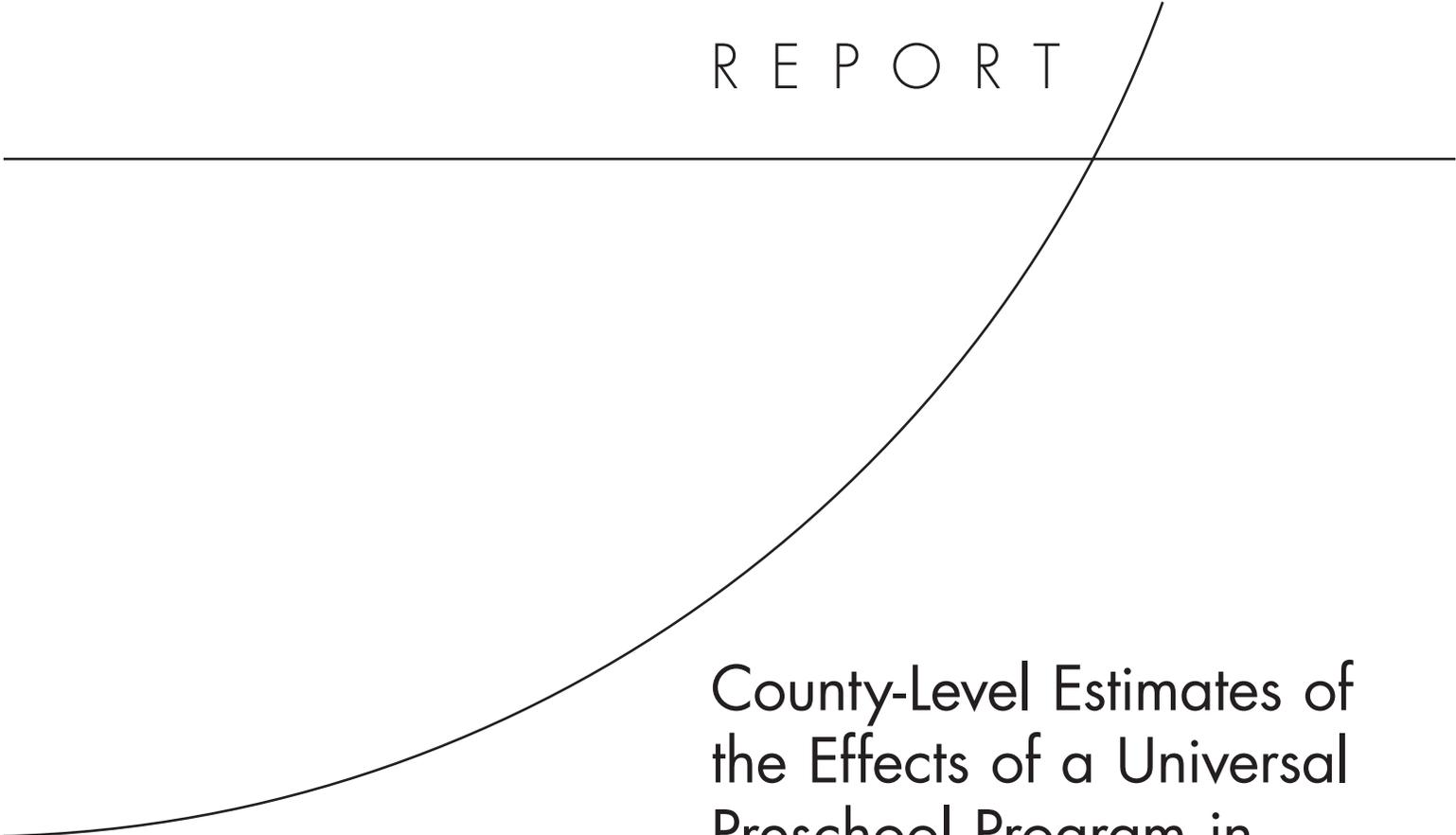
View [document details](#)

Limited Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law as indicated in a notice appearing later in this work. This electronic representation of RAND intellectual property is provided for non-commercial use only. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use.

This product is part of the RAND Corporation technical report series. Reports may include research findings on a specific topic that is limited in scope; present discussions of the methodology employed in research; provide literature reviews, survey instruments, modeling exercises, guidelines for practitioners and research professionals, and supporting documentation; or deliver preliminary findings. All RAND reports undergo rigorous peer review to ensure that they meet high standards for research quality and objectivity.

R E P O R T



County-Level Estimates of the Effects of a Universal Preschool Program in California

Lynn A. Karoly

Prepared for The David and Lucile Packard Foundation



LABOR AND POPULATION

The research described in this report was sponsored by The David and Lucile Packard Foundation.

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

RAND® is a registered trademark.

© Copyright 2005 RAND Corporation

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from RAND.

Published 2005 by the RAND Corporation
1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
201 North Craig Street, Suite 202, Pittsburgh, PA 15213-1516
RAND URL: <http://www.rand.org/>
To order RAND documents or to obtain additional information, contact
Distribution Services: Telephone: (310) 451-7002;
Fax: (310) 451-6915; Email: order@rand.org

Summary

Growing interest in universal preschool education has prompted researchers to examine the potential costs and benefits of making high-quality preschool available for all children one or two years before kindergarten entry. The analysis reported here builds on a previous RAND study which estimated that a high-quality, one-year, voluntary universal preschool program in California would generate \$2.62 in benefits for California society for every dollar of cost (Karoly and Bigelow, 2005). Assuming that 70 percent of each year's group of eligible 4-year-olds participate in the program (approximately 385,000 out of 550,000 children), the study estimated that California society would receive \$2.7 billion in present-value net benefits.

The above estimates pertain to the state of California as a whole. In the present study, we extend one component of the statewide analysis to generate estimates at a more disaggregated level. The goal is to provide methodologically sound estimates of the likely magnitude of the effects of a high-quality, one-year, universal preschool program for counties and county groups on outcomes that represent important aspects of the well-being of children. In particular, we estimate the effects of such a program on the following key outcomes: grade repetition, use of special education, high school dropouts, child abuse and neglect, and juvenile crime. Where possible, these estimated effects are compared with current outcomes so that the improvements can be placed in perspective.

County-level estimates in California must reflect several important factors. First, there is tremendous variation across California's 58 counties in population size and thus in the number of 4-year-olds that would be expected to participate in a universal preschool program. Second, prior studies have indicated that the effects of a universal preschool program are expected to be largest for the least-advantaged children (e.g., children in poverty and children whose parents have little education) and for those children who do not already attend preschool or who attend a lower-quality preschool. There is considerable variation across California counties in the fraction of disadvantaged children and in current preschool participation rates. The effects of a universal preschool program at the county level can therefore be expected to vary given these differences.

In this summary, we briefly review our approach and highlight key findings. Important limitations on the study results are also noted. Our key findings are as follows:

- Consistent with the results of our earlier study, for each annual cohort of 4-year-olds served, a universal preschool program in California is estimated to lead to about 14,000 fewer children ever retained in grade, 9,100 fewer children ever using special education, 63,000 fewer years of special-education use, 10,000 fewer high school dropouts, almost 30,000 additional years of child education, 4,700 fewer children with substantiated cases of abuse or neglect, 7,300 fewer children with juvenile petitions (i.e., juvenile arrests that lead to court filings), 5,600 fewer children with juvenile petitions for violent crimes, and nearly 30,000 fewer juvenile petitions. In percentage terms, for each cohort, California can expect a 5 to 9 percent reduction in special-education use, a 14 percent improvement in dropout rates, a 15 percent reduction in the gap in years of schooling due to dropping out, a 6 to 7 percent reduction in the number of children ever abused or neglected, a 7 to 10 percent reduction in the number of children ever with a juvenile petition, and a 19 percent reduction in the number of juvenile petitions.
- Estimates for individual counties and county groups vary around these statewide averages, reflecting differences in the distribution of children by risk status and current preschool participation rates. For the most part, the percentage effects of the largest counties—Los Angeles, San Diego, and Orange counties—do not deviate much from the statewide average. The effects for geographic units that have higher incomes (and typically higher preschool participation rates)—Santa Clara, Alameda, Contra Costa, and Ventura counties and the Bay Area—are estimated to be more attenuated than the state average, so their percentage effects tend to be smaller as well. In contrast, the geographic units with lower incomes (and therefore lower current preschool participation rates)—Fresno and Kern counties and the Central Valley—are estimated to have less-attenuated effects. Thus, their percentage effects are generally above the statewide average. The exceptions to these patterns tend to arise due to extremes in the baseline estimates for counties whose baseline rates for specific outcomes are relatively high or low compared with those of similar counties.
- While the level and percentage effects for the outcomes analyzed in this study are of interest in their own right, they are also associated with

significant dollar benefits to various stakeholders, including local, state, and federal governments; the preschool participants and their families; and the rest of society at large. Our earlier study demonstrated that the cumulative effects of changes in the outcomes examined here would generate dollar savings to California society that exceed the cost of providing a high-quality, universal preschool program.

Approach

As we did in our earlier study, we estimate the effects of providing a voluntary, high-quality, universal preschool program to all 4-year-olds in the state of California. We assume that the publicly funded program will operate on a part-day basis for approximately 525 hours per year. (Extended-day care, financed by other sources, may be provided.) The program features are consistent with research-based quality standards for class size (maximum of 20 children), staff/child ratio (maximum of 1/10), and teacher qualifications (lead teacher with a bachelor's degree). Notably, these quality standards exceed those required for public preschool programs in California (e.g., Head Start and the California state preschool program), as well as those of many privately funded programs. Services would be delivered by public or private providers in new or existing facilities. We assume that 70 percent of each 4-year-old cohort in the state would participate in the program.

Since this analysis is extended to a more-disaggregated level, the results account for population size differences across California counties, as well as distributional differences (i.e., the size of the at-risk population and preschool participation rates). Population data are based on California Department of Finance projections for 4-year-olds by county for the 2006–2015 period. Data from the 2000 Census are used to estimate the size of the at-risk population and preschool participation rates. Census sample-size considerations led us to limit our analysis to the California counties with the 13 largest projected populations of 4-year-olds over the next decade. The counties are (in descending order of size) Los Angeles, San Diego, Orange, Riverside, San Bernardino, Santa Clara, Sacramento, Alameda, Fresno, Contra Costa, Kern, San Joaquin, and Ventura. These 13 counties include 80 percent of the state's 4-year-olds and are each projected to have populations of at least 10,000 4-year-olds annually.¹

¹ The remaining 45 counties, which include 20 percent of California's 4-year-olds, are projected to have an average of 2,300 4-year-olds annually over the next decade.

In addition to generating estimates for specific counties, we also produce estimates for five county groups representing different regions of the state:²

- Bay Area: Nine-county region comprising Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Sonoma counties.
- Capital Region: Five-county region comprising El Dorado, Placer, Sacramento, Solano, and Yolo counties.
- Central Coast: Five-county region comprising Monterey, San Benito, San Luis Obispo, Santa Barbara, and Ventura counties.
- Central Valley: Eight-county region comprising Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties.
- Inland Empire: Two-county region comprising Riverside and San Bernardino counties.

Together, the 13 counties and five county groups include 96 percent of California's 4-year-olds.

The estimates at the county and county-group level are derived using the methodology employed in our prior study to estimate the effects of a statewide program. In short, our estimates of the specific effects of a high-quality universal preschool program are based on those estimated for the Chicago Child-Parent Centers (CPC) program, a large-scale, publicly funded preschool program serving disadvantaged children in the Chicago public school system. The outcomes we consider therefore mirror those analyzed in the benefit-cost analysis of the Chicago CPC program, specifically, the following nine outcomes pertaining to education process and attainment, child maltreatment, and juvenile crime:

- Education processes and attainment
 - (1) Reduction in the number of children ever retained in grade
 - (2) Reduction in the number of children ever using special education
 - (3) Reduction in the number of child years of special-education use
 - (4) Reduction in the number of high school dropouts

² The county groups include many, but not all, of the 13 individual counties.

- (5) Increase in the number of child years of education
- Child maltreatment
 - (6) Reduction in the number of children with substantiated reports of child abuse or neglect
- Juvenile crime
 - (7) Reduction in the number of children with juvenile petitions (court filings)
 - (8) Reduction in the number of children with juvenile petitions (court filings) for violent offenses
 - (9) Reduction in the number of juvenile petitions (court filings)

In generating estimates for a universal program in California, we attenuate the CPC estimates to account for the broader population of children served (not just disadvantaged children) and to account for diminished benefits for those already attending preschool. At the state level, the baseline assumptions used in our previous study assumed that the benefits of a universal program would be about 23 percent of the level measured in the targeted CPC program. Given the distributional differences across counties, the equivalent attenuation factors we estimate in this study range from 11 to 35 percent for counties and from 13 to 32 percent for county groups. The attenuation of benefits is largest for geographic units that have higher average income (Santa Clara, Alameda, and Contra Costa counties and the Bay Area county group), while it is smallest for those with lower average income (Fresno and Kern counties and the Central Valley group).

Where feasible, using various California data sources, we have tried to put the estimated effects for each outcome and geographic unit in context by considering the estimated improvements in relation to the current baseline. This allows us to estimate both levels and percentage effects. Here again, the estimates vary across counties or county groups, in part because of differences in current outcomes across counties (e.g., in the extent of special-education use or in the high school dropout rate). Because of limitations in data sources, we are unable to generate baseline estimates for grade repetition and children with juvenile petitions for violent crimes (outcomes 1 and 8). For other outcomes—specifically, use of special education, substantiated reports of child abuse and neglect, and children with juvenile petitions (outcomes 2, 6, and 7)—given uncertainties in the baseline, the estimated percentage effects are reported as ranges. Even for those

outcomes where we estimate a single percentage effect, the result should be viewed as approximate given the problems of determining baseline values at the county level.

Findings

Table S.1 presents the results for the three largest counties (Los Angeles, San Diego, and Orange) and the five county groups. Results for the other 10 counties, each of which is included in a county group, are given in the body of the report. Estimates for the entire state are given as well. Results in the top panel are shown for the estimated change in level effects for each outcome, while the bottom panel reports the effects in percentage terms (in some cases, a range of percentage effects) where such estimates were possible.

The estimated effects presented in Table S.1 are for each cohort of 4-year-olds that would participate in the program, representing the average for each annual cohort of preschool participants over the 2006–2015 period. Each of these measures can be considered to be cumulative, capturing changes in outcomes for each annual cohort between the end of preschool and age 18. For example, the first column shows that Los Angeles County would have 4,461 fewer children ever retained in grade for each annual cohort. The measure does not capture which grades would not be repeated as a result of a universal preschool program, nor does it determine how many repeated grades would be saved in all.

Moreover, the changes measured for each outcome will likely be spread out over a number of years, and for some outcomes, it will take time for the effects for a given cohort to appear. For example, the reduction in the number of high school dropouts is realized at approximately age 18, 13 years after the universal preschool program ends. Likewise, juvenile crime is typically measured starting at age 10, but the incidence is very low until later in the teenage years. Thus, it is relevant to view these outcomes as capturing the history for a given cohort of 4-year-olds from ages 5 to 18.

The estimates in Table S.1 are for each annual cohort of 4-year-olds, and the effects will be replicated for each successive cohort. Thus, for example, the estimated effects in levels for the first 10 cohorts of children in a universal preschool program would be 10 times the values in Table S.1 (assuming there are

no spillover effects as each successive cohort attends preschool). Extending this example, for the first 10 cohorts of 4-year-olds in Los Angeles County, a total of 44,610 fewer children would ever repeat a grade. The estimated percentage effects in Table S.1, however, would be unchanged in the case of multiple cohorts (since the numerator and the denominator would increase by the same multiple).

Another interpretation is possible for the three outcomes that measure cumulative effects, i.e., child years of special education, child years of education, and the number of juvenile petitions (outcomes 3, 5, and 9). In a population that is relatively stable in size, when the first entrants in the universal preschool program have reached age 18 (i.e., at each age between 5 and 18, the children would have had access to the universal preschool program at age 4), the cumulative outcomes in each cohort shown in Table S.1 will approximately equal the total annual effect for that outcome. In other words, in Los Angeles County, each cohort of 4-year-olds is estimated to require 20,278 fewer years of special education in the course of its schooling. But once the program reaches maturity, Los Angeles County can be expected to have approximately 20,000 fewer children in special education each year across all grades. This would represent an 11 percent reduction over current annual levels, consistent with the percentage reduction for each 4-year-old cohort shown in Table S.1.

Keeping in mind these issues associated with interpreting the estimates, consider first the results for California. The results in levels are consistent with our earlier study, which estimated that a high-quality, one-year, universal preschool program in California would lead to about 14,000 fewer children ever retained in grade, 9,100 fewer children ever using special education, 63,000 fewer years of special-education use, 10,000 fewer high school dropouts, almost 30,000 additional years of child education, 4,700 fewer children with substantiated cases of abuse or neglect, 7,300 fewer children with juvenile petitions, 5,600 fewer children with juvenile petitions for violent crimes, and nearly 30,000 fewer juvenile petitions. In percentage terms, California could expect a 5 to 9 percent reduction in special-education use, a 14 percent improvement in dropout rates, a 15 percent reduction in the gap in years of schooling due to dropping out, a 6 to 7 percent reduction in the number of children ever abused or neglected, a 7 to 10 percent reduction in the number of children ever with a juvenile petition, and a 19 percent reduction in the number of juvenile petitions.

Table S.1—Estimated Effects of a Universal Preschool Program for Each 4-Year-Old Cohort in California Counties and County Groups

Geographic Unit	Reduction in Children Ever Retained in Grade (1)	Reduction in Children Ever Using Special Education (2)	Reduction in Child Years of Special Education (3)	Reduction in High School Dropouts (4)	Increase in Number of Child Years of Education (5)	Reduction in Children Ever Abused or Neglected (6)	Reduction in Children Ever with Juvenile Petitions (7)	Reduction in Children Ever with Juvenile Petitions for Violent Offenses (8)	Reduction in Juvenile Petitions (9)
a. Change in Level Effects									
Counties									
Los Angeles	4,461	2,955	20,278	3,245	9,560	1,535	2,375	1,825	9,560
San Diego	1,005	666	4,569	731	2,154	346	535	411	2,154
Orange	769	509	3,494	559	1,647	265	409	314	1,647
County Groups									
Bay Area	1,352	896	6,148	984	2,898	465	720	553	2,898
Capital Region	878	581	3,989	638	1,880	302	467	359	1,880
Central Coast	570	377	2,591	414	1,221	196	303	233	1,221
Central Valley	2,214	1,466	10,063	1,610	4,744	762	1,179	906	4,744
Inland Empire	1,886	1,249	8,573	1,372	4,042	649	1,004	772	4,042
California	13,808	9,146	62,764	10,042	29,589	4,752	7,352	5,649	29,589
b. Change in Percentage Effects									
Counties									
Los Angeles	—	6 – 11	11	11	11	8 – 9	10 – 14	—	26
San Diego	—	5 – 7	8	11	14	5 – 5	6 – 9	—	17
Orange	—	4 – 7	7	21	24	4 – 5	7 – 9	—	18
County Groups									
Bay Area	—	3 – 5	5	11	11	6 – 7	4 – 6	—	11
Capital Region	—	5 – 8	8	13	14	4 – 5	7 – 9	—	18
Central Coast	—	5 – 7	8	28	42	7 – 8	6 – 8	—	15
Central Valley	—	8 – 13	13	22	25	6 – 7	7 – 9	—	17
Inland Empire	—	6 – 10	10	16	16	6 – 7	8 – 11	—	21
California	—	5 – 9	9	14	15	6 – 7	7 – 10	—	19

NOTE: The range of percentage effects for ever using special education (outcome 2) is based on repeat rates of special-education use of 80 and 90 percent. The range for children ever abused or neglected (outcome 6) is based on recurrence rates of child maltreatment of 13 and 25 percent. The range for children ever with a juvenile petition is based on recidivism rates of 40 and 60 percent. The percentage change for outcome 5 measures the fraction of the gap that would be closed between years of schooling attained with a 100 percent high school graduation rate and years attained with current dropout patterns.

Key results for each geographic unit shown in Table S.1 are as follows:

- Los Angeles County. Due to its size alone, Los Angeles County, with a projected total of nearly 150,000 4-year-olds each year over the next decade, is estimated to experience the largest effects of a universal preschool program. In addition, the effects are less attenuated than the statewide average given Los Angeles County's relatively lower level of income. As a result, with the exception of outcomes 4 and 5 (measuring dropouts and years of schooling), the percentage effects for Los Angeles County are somewhat larger than the state average.¹ The range of estimated effects extends from a 6 to 11 percent reduction in special-education use to a 26 percent reduction in the number of juvenile petitions. There is more uncertainty in the juvenile crime estimate given the limited information available to establish the baseline.
- San Diego County. San Diego County is the second largest county in California, with a projected total of about 44,000 4-year-olds annually, one-third the number in Los Angeles County; the estimated effects of a universal preschool program in San Diego are naturally smaller than those in Los Angeles County. The results for San Diego County are slightly more attenuated than those of California as a whole. Consequently, the percentage effects shown in Table S.1 are slightly below the statewide average for every outcome. They range from a 5 percent reduction in the number of children ever abused or neglected to a 17 percent reduction in the number of juvenile petitions.
- Orange County. The projected population of 4-year-olds for Orange County over the next decade is nearly identical to that for San Diego County. However, the estimated effects of a universal preschool program are smaller in absolute terms, because Orange County has a relatively higher average income, so the effects are more attenuated. Since the baseline is also lower for Orange County for most outcomes, in percentage terms, the effects there are similar to those for San Diego County, and in some cases, they are even larger. Notably, the percentage effects for high school dropouts and years of education are 21 and 24 percent,

¹ The dropout-related outcomes (outcomes 4 and 5) have lower percentage effects because Los Angeles County has a relatively high dropout rate, nearly 19 percent. Consequently, the estimated changes are smaller relative to the baseline than those of counties with lower dropout rates.

respectively, far above the statewide average. This occurs because the baseline dropout rate for Orange County is reported to be 6 percent, even lower than that of other counties with similar income levels. Because it is possible that there are inconsistencies in the way dropout figures are calculated and reported at the county level, these larger effects should be interpreted with caution.

- Bay Area. For this nine-county region, the population of 4-year-olds over the next decade is projected to be about 92,000 per year. The higher income level in this region means that the estimated effects of a universal preschool program are more attenuated than the statewide effects. As a result, the estimated percentage effects are lower than or, in the case of child abuse and neglect, equal to the statewide average. This region would be estimated to experience a 3 to 5 percent drop in children ever using special education, a 5 percent reduction in child years of special-education use, an 11 percent reduction in high school dropouts and an equal percentage closing the gap in years of schooling due to dropping out, a 6 to 7 percent reduction in the number of children ever abused or neglected, a 4 to 6 percent reduction in children who ever have a juvenile petition, and an 11 percent drop in the number of juvenile petitions. This region includes three counties—Santa Clara, Alameda, and Contra Costa—for which we generated county-level estimates that are reported in the body of this report. The percentage effects for these counties bracket those shown in Table S.1 for the Bay Area region, typically with differences of ± 1 to 3 percentage points.
- Capital Region. The five counties in this group are projected to have a population of nearly 39,000 4-year-olds annually over the next decade. The distribution of children by risk status and current preschool participation closely matches that for the entire state. Consequently, the attenuation factor is similar to that for the state, and the estimated percentage effects shown in Table S.1 are within about 1 percentage point of the statewide average. Results for Sacramento County, the largest county in the group, with about 23,000 4-year-olds per year projected over the next decade, are presented in the body of the report. Because Sacramento County has relatively lower income, the effects there are not as attenuated as those for the entire region, and the estimated percentage effects are generally larger than they are for the whole Capital region, ranging from 4 to 5 percent for reduction in child abuse and neglect to 26 percent for reduction in the number of juvenile petitions. The latter effect

may be due to data anomalies, however, as the estimated baseline rate of juvenile arrests is low given the county's demographics.

- Central Coast. The Central Coast region consists of five counties that together will have a population of about 27,000 4-year-olds in the next decade, or about 5 percent of the statewide total (the smallest share among the county groups). The Central Coast group has a relatively small share of 4-year-olds in the highest-risk group, similar to the distribution in the Bay Area. Hence, like the Bay Area, the resulting effects are generally more attenuated than are those for the state as a whole. Two notable exceptions to this pattern are the high school dropout measures (outcomes 4 and 5), which are among the largest estimated: a 28 percent reduction in high school dropouts and a 42 percent reduction in the schooling gap. The large percentage effects for these two outcomes result from the fact that Ventura County and the other, larger counties in the Central Coast region have very low reported 4-year high school dropout rates. For example, Ventura County has a reported 4-year dropout rate of 4 percent, in contrast to Contra Costa County, which has a similar income distribution but a dropout rate of nearly 13 percent. It is very likely that the differences in these rates, and hence the reported percentage effects in Table S.1, are partly the result of anomalies in the way the dropout rates are computed at the county level. This report also provides estimates for Ventura County, the smallest of the 13 counties we analyzed. Generally, the results are similar to those for the Central Coast county group, including the exceptionally high percentage effects for the outcomes related to high school dropouts.
- Central Valley. The eight-county Central Valley region is projected to have a population of about 68,000 4-year-olds per year in the next decade. The Central Valley has the largest share of low-income children among the regions we examined, so the effects of a universal preschool program there are less attenuated than the statewide average. The resulting percentage effects are therefore above those estimated for California as a whole by several percentage points, but only for the educational outcomes. For outcomes 2 through 5 in Table S.1, the Central Valley region is estimated to experience an 8 to 13 percent decline in children ever using special education, a 13 percent drop in child years of special-education use, a 22 percent decrease in high school dropouts, and a 25 percent closing of the gap in years of schooling due to dropping out. The estimated percentage effects for the outcomes measuring child

maltreatment and juvenile crime are about the same as the statewide average. This group includes Fresno, Kern, and San Joaquin counties, for which we provide county-specific estimates in the body of the report. In most cases, the effects for these counties are 1 to 3 percentage points above or below the regional effect. The differences are more substantial for the two measures related to high school dropouts. In particular, San Joaquin County has a relatively low dropout rate (7 percent), which leads to large estimated percentage changes. With small counties such as San Joaquin, there is more uncertainty in our estimates, so such large effects should be given less weight.

- Inland Empire. Riverside and San Bernardino counties constitute the Inland Empire region, with a projected population of nearly 68,000 4-year-olds annually over the next decade (almost evenly split between the two counties). This region has relatively lower income than the state as a whole, so the effects of a universal preschool program are not as attenuated as the statewide average. The estimated effects are therefore 1 to 2 percentage points larger than they are for the state as a whole. They range from about 6 percent for child abuse and neglect to 21 percent for the number of juvenile petitions. The effects reported for the two counties separately in the body of the report show that they are similar for the two measures of special education, while the effect on child abuse and neglect is larger for San Bernardino (8 to 9 percent) than for Riverside (4 to 5 percent). The percentage changes for the dropout and juvenile crime effects are largest for Riverside County. Notably, Riverside's baseline dropout rate and juvenile arrest rate are low relative to those of other counties with similar demographics. Again, this may be due to inconsistencies in measurement of these baseline rates across counties.

While some of the changes in outcomes may appear to be modest in percentage terms, it is important to note that the improved outcomes estimated in Table S.1 are associated with substantial dollar benefits that accumulate across outcomes and over time. While a benefit-cost analysis of a universal preschool program at the county or county-group level is beyond the scope of this study, it is worth noting that the effects associated with the outcomes in Table S.1 generate dollar benefits to various stakeholders, including local, state, and federal governments; the preschool participants and their families; and the rest of society at large.

Based on our earlier study, Table S.2 shows the dollar benefits (appropriately discounted) associated with several of the outcomes shown in Table S.1. For

example, each year of special-education use that is avoided is estimated to save California taxpayers \$8,421. A high school graduate was estimated to earn \$132,000 more than a high school dropout, in present-value earnings over a lifetime (earnings projected through age 65). The California public sector

Table S.2—Estimated Present-Value Dollar Benefits Associated with Improved Outcomes

Outcome	Benefits (2003 present-value dollars)
California public sector costs per year of special education	8,421
Lifetime earnings differential per high school graduate (versus those of a high school dropout)	131,848
California tax revenue per high school graduate (associated with the lifetime-earnings differential for a high school graduate)	5,512
California public sector costs of child welfare system per case of child maltreatment	5,174
Tangible victim costs per case of child maltreatment	5,079
California public sector costs of juvenile justice system per juvenile petition	9,204
Tangible victim costs per juvenile petition	12,873

SOURCE: Karoly and Bigelow (2005).

NOTE: All dollar figures are present-value 2003 dollars, where future benefits are discounted to age 3 of the child, using a 3 percent real discount rate. The public sector savings are for California; they exclude any savings to the federal government.

also benefits from the higher lifetime earnings in the form of higher tax revenue: more than \$5,000 in present-value dollars for each additional high school graduate. In addition, each case of child maltreatment that is prevented is estimated to save \$5,174 in California public sector funds, plus an additional \$5,079 in tangible costs to victims. Finally, each juvenile petition that is avoided is estimated to save California taxpayers \$9,204 in costs to the juvenile justice system and \$12,873 in tangible victim costs. The figures for child maltreatment and juvenile crime do not account for any intangible victim costs (e.g., pain and suffering). Furthermore, the juvenile crime costs do not account for any subsequent lifetime savings to the criminal justice system and crime victims that result from preventing adult crime as well.

Limitations

Although we do not explicitly account for the uncertainty associated with the estimates provided in this report (e.g., by calculating error bands around the point estimates), it is important to recognize that these estimates are not intended to capture the exact effects of a universal program. The estimates provide a gauge for the approximate size of the effects and the relative size of effects across different counties and county groups. Small differences in effects across outcomes for the same geographic unit or for the same outcome across geographic units may not represent true differences once the various sources of uncertainty are accounted for.

In addition, the estimates do not take into account the effect that migration would have on the estimated outcomes of a California universal preschool program at the county or county-group level. For example, if as children age, they move from one California county to another or out of California altogether, the benefits associated with their participation in the universal preschool program provided in the county where they resided when they were 4 years old would be realized in another county or state. While counties would lose benefits associated with children who move away after preschool participation, they would benefit from other children who move into the county after participating in preschool elsewhere in the state. (California counties could also benefit from in-migration of individuals who participate in other states' high-quality preschool programs.) The net effect of migration in any given county on estimates of the effect of a universal preschool program in California will thus depend on the balance between out-migration to any location (in or out of state) and in-migration from within California.

Despite the uncertainty in the estimates, the disaggregated analysis reported in this study provides relevant local perspective for public and private sector decisionmakers considering investments in a high-quality, universal preschool program in California. The results provide a sense of the likely magnitude of the effects of universal preschool in terms of key outcomes that capture important dimensions of the well-being of children and that also have favorable economic consequences for the public sector and private individuals.