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REPORT

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

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Prepared for The David and Lucile Packard Foundation

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Preface

In March 2005, RAND Labor and Population, a unit of the RAND Corporation, published *The Economics of Investing in Universal Preschool Education in California* (Karoly and Bigelow, 2005). That study demonstrated the economic returns for California society from investing in a high-quality, voluntary, universal preschool program for all 4-year-olds. The researchers estimated that California society would gain $2.62 for every dollar of program costs, or $2.7 billion in present-value net benefits for every 4-year-old cohort served. Benefits were also estimated in terms of the improved outcomes for each cohort of 4-year-olds, assuming a 70 percent participation rate. These outcomes included nearly 14,000 fewer children ever retained in grade, 9,100 fewer children ever using special education, 10,000 fewer high school dropouts, 4,700 fewer children with substantiated cases of abuse or neglect, and 7,300 fewer children with juvenile petitions (court filings). These changes were estimated to represent improvements of 9 to 19 percent over current outcomes.

The estimates in the 2005 study all pertain to the state of California as a whole. The Packard Foundation asked RAND to extend the analysis to consider the potential effects of a universal preschool program at a more disaggregated level. In this report, we consider the potential effects of a high-quality, one-year, universal preschool program on outcomes for the largest California counties and several groups of counties. In particular, we examine the potential effects on 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.

Funding for this project was provided by The David and Lucile Packard Foundation as part of its "Preschool for California's Children" program. The analysis should be of interest to California decisionmakers in the public and private sectors at both the state and local levels.

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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.

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Abbreviations

CPC	Child-Parent Centers (Chicago program)
CPS	Current Population Survey
IPUMS	Integrated Public Use Microdata Series
NCES	National Center for Education Statistics
NHES	National Household Education Survey
PUMS	Public Use Microdata Sample (Census)

1. Introduction

Growing enthusiasm for 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. In a recent RAND study, Karoly and Bigelow (2005) estimated that California society would gain $2.62 for every dollar of program costs for providing a high-quality, voluntary, universal preschool program for all 4-year-olds in the state. For each annual cohort of 4-year-olds (i.e., each year's group of 4-year-olds eligible to participate in the program, approximately 550,000 children), the study estimated that California society would receive $2.7 billion in present-value net benefits. Benefits were also estimated in terms of the improved outcomes that would be expected for each cohort of 4-year-olds where 70 percent, or 385,000 children annually, would be assumed to participate in the preschool program. These gains include nearly 14,000 fewer children ever retained in grade, 9,100 fewer children ever using special education, 10,000 fewer high school dropouts, 4,700 fewer children with substantiated cases of abuse or neglect, and 7,300 fewer children with juvenile petitions (i.e., juvenile arrests that lead to a court filing) (see Table 1.1). These changes were estimated to result in improvements of 9 to 19 percent over current outcomes.

The estimates from Karoly and Bigelow (2005) all pertain to the state of California as a whole. This study extends one component of the statewide analysis to generate estimates at a more disaggregated level. In particular, we estimate the effects of a high-quality, one-year, universal preschool program on key outcomes for the largest California counties and several groups of counties. These estimates are calculated for each cohort of 4-year-olds for the following outcomes: grade repetition, use of special education, high school dropouts, child abuse and neglect, and juvenile crime (the outcomes shown in Table 1.1). Where possible, these estimated effects are compared with current outcomes to place the improvements in perspective.

This analysis was undertaken to provide California decisionmakers at the local level with information about the potential effects of a high-quality universal preschool program in their county or region of the state. The goal is to generate methodologically sound estimates of the likely magnitude of the effects for various outcomes that represent important aspects of the well-being of children.

As demonstrated in our earlier study, these outcomes also have economic implications for both the public sector and the private sector in terms of returns from improved outcomes during childhood and beyond.

Table 1.1—Estimated Effects for a Single-Year Cohort of 4-Year-Olds Participating in Universal Preschool in California

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

SOURCE: Karoly and Bigelow (2005), Table 2.10.
NOTE: The California annual cohort of 4-year-olds is assumed to be approximately 550,000 children, 70 percent of whom are assumed to participate in the universal preschool program.

County-level estimates can reflect several important factors. First, there is tremendous variation in population size across California's 58 counties and thus

in the number of 4-year-olds who would be expected to participate in a universal preschool program. It is projected that between 2006 and 2015, Los Angeles County—the most populous county in the state—will contain 27 percent of each 4-year-old cohort (an average of nearly 150,000 children out of approximately 552,000 statewide), while Alpine County—one of the least populous—will contain less than 0.2 percent of each cohort (an average of 10 children).[1] Thus, each county's population share affects the level of change in the various outcomes we consider.

Second, as discussed in Karoly and Bigelow (2005), the effects of a universal preschool program would be expected to be largest for the least-advantaged children (e.g., children in poverty and children whose parents have little education) and for children who do not already attend preschool or who attend a lower-quality preschool. Across California counties, there is considerable variation in the fraction of disadvantaged children and in current preschool participation rates. According to statewide Census 2000 tabulations, 25 percent of the 4-year-old children in California lived in families with incomes below $23,000. In the same year, across the 13 largest California counties for which Census 2000 data are adequate to enable reliable estimates, that fraction ranged from 10 percent in Santa Clara County to 40 percent in Fresno County. The same Census 2000 data, adjusted to reflect preschool enrollment for children by age at the time of school entry, reveal that an estimated 65 percent of 4-year-olds statewide participated in some form of preschool (the quality of the programs is not known).[2] For the 13 largest counties, that fraction ranged from 55 percent in Riverside County to 74 percent in Alameda County. The effects of a universal preschool program at the county level can therefore be expected to vary given these differences in the at-risk population and in current preschool participation rates.

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 California. We

[1] Based on data available from State of California, Department of Finance (2004). See the discussion in Chapter 2.

[2] The estimated preschool participation rates for California as a whole and for specific counties, based on the 2000 Census data, reflect an adjustment to account for the participation rate among children who were 4 years old as of October 1999 (rather than those who were 4 years old as of March 2000, when the Census data were collected). See the discussion in Chapter 2.

assume that the publicly funded program will operate on a part-day basis for approximately 525 hours per year (see Table 1.2). (Extended-day care, financed by other sources, may be provided.) The universal preschool program features are consistent with research-based quality standards for class size, staff/child ratio, and teacher qualifications. These quality standards exceed those required for public programs in California (e.g., Head Start and the California state preschool program), as well as the standards 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 statewide would participate in the publicly funded program.

Table 1.2—Features of a Universal Preschool Program in California

Feature	Specifics
Eligibility	Voluntary program for all age-eligible children
Children served	4-year-olds
Program intensity	Approximately 525 hours per year (3-hour program, 5 days a week, for a school year; or 2.14-hour program, 5 days a week, for a year-round program)
"Wraparound" care	Extended-day care available, financed by other sources
Class size and staff/child ratio	Maximum class size of 20; staff/child ratio of 1/10
Teacher qualifications	Head teacher in each classroom has a bachelor's degree and an early childhood education credential; assistant teacher in each classroom has an associate's degree
Facilities	Programs use existing or new facilities run by private or public providers
Financing	Full funding with public funds

SOURCE: Karoly and Bigelow (2005), Table 1.4.

The results of this more-disaggregated analysis 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). Given our

reliance on 2000 Census data to estimate distributional differences across counties, these estimates are most meaningful and methodologically feasible for the largest California counties. In particular, we estimate the effects of a universal preschool program for the 13 largest California counties in terms of the projected population of 4-year-olds over the next decade (2006–2015). 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 contain 80 percent of the state's 4-year-olds and are each projected to have a population of at least 10,000 4-year-olds annually. (The remaining 45 counties, containing 20 percent of all 4-year-olds, are projected to have an average population of 2,300 4-year-olds annually over the next decade.)

In addition to generating estimates for specific counties, we also produced estimates for five county groups: Bay Area region (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Sonoma counties), Capital region (El Dorado, Placer, Sacramento, Solano, and Yolo counties), Central Coast region (Monterey, San Benito, San Luis Obispo, Santa Barbara, and Ventura counties), Central Valley region (Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties), and Inland Empire region (Riverside and San Bernardino counties).

Where feasible, we have attempted to put the effects for each outcome in context by considering the estimated improvements in terms of the current baseline. This allows us to estimate both levels and percentage effects. Here again, the estimates can be expected to vary across counties or county groups, partly because of differences in current outcomes across counties (e.g., in the extent of special-education use or in high school dropout rates).

The estimates generated here are based on the methodology employed by Karoly and Bigelow (2005); interested readers are referred to that study for a discussion of the detailed methods. 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 part-day preschool program serving disadvantaged children in the Chicago public school system, which has followed participants to age 20 or 21. The CPC program shares the features assumed for a universal program in California (see Table 1.2). The outcomes we consider (listed in Table 1.1) mirror those analyzed in the benefit-cost analysis of the Chicago CPC program.

As in our prior study, we attenuate the CPC estimates to account for the broader population of children served (not just disadvantaged children) and to account for a higher level of current preschool attendance in the California population (compared with the CPC evaluation, in which most children in the comparison group did not attend preschool). Since other research evidence leads us to expect the benefits of preschool to be largest for more-disadvantaged children and for children who otherwise would not have attended preschool, we expect the benefits of a universal program in California to be less than those measured for the Chicago program. Indeed, the baseline assumptions used in Karoly and Bigelow (2005) resulted in an estimate that the statewide benefits of a universal program in California would be about 23 percent of the level measured in the targeted CPC program. Given the differences across counties in the proportion of disadvantaged children and in current preschool participation rates, the equivalent attenuation factors we estimate for counties and county groups will be larger or smaller than the statewide average, as we detail in the next chapter.

It should be noted that this analysis, unlike Karoly and Bigelow (2005), does not generate estimates of a universal preschool program's costs, benefits, net benefits, or the benefit-cost ratio at a more disaggregated level. However, the effects associated with the outcomes in Table 1.1 that we estimate for counties and county groups are associated with dollar benefits to various stakeholders, including local, state, and federal governments; the preschool participants and their families; and the rest of society at large.

Although we do not explicitly account for the uncertainty associated with the estimates generated in this study (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. Rather, they provide a gauge for the approximate size of effects across different counties.

Organization of This Report

The remainder of the report is organized as follows. In the next chapter, we expand upon these methodological details. We also discuss the geographic units we analyze and the sources of data we rely on. Chapter 3 presents our estimates of the effects of a high-quality universal preschool program for California counties and county groups, accounting for population and distributional differences. Chapter 4 summarizes our findings.

2. Methodology for County Analysis

The analysis presented in this report was undertaken to generate estimates of the effects of a one-year, voluntary, universal preschool program in California at a disaggregated level. This chapter describes the methodology employed for the analysis and discusses the geographic units analyzed and the sources of data.

Method for Generating Disaggregated Estimates

As noted in Chapter 1, our disaggregated estimates account for differences in the size of each geographic unit in terms of the number of 4-year-olds in each cohort and distributional differences across geographic units in the proportion of disadvantaged children and current preschool participation rates. We estimate the effects at the county or county-group level for the nine outcomes shown in Table 1.1 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
  - (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)

To understand our modeling approach, it is useful to first review the methodology employed by Karoly and Bigelow (2005) for the statewide analysis. The top panel of Table 2.1 shows the estimated distribution of 4-year-old children in the absence of a universal preschool program (referred to as the baseline). For example, 25 percent of children were assumed to be in the highest-risk group, 20 percent in the middle-risk group, and 55 percent in the low-risk group.[1] Based on estimates for California from the 2001 October Current Population Survey (CPS), the statewide analysis assumed that 65 percent of 4-year-olds participate in preschool, with just over half in public programs. On average, these public preschool programs were assumed to be of lower quality than our assumed universal program. Table 2.1 also shows that the preschool participation rate was assumed to increase with decreasing at-risk level, while the proportion in public programs declined. These patterns were also based on tabulations from the October CPS.

The bottom panel of Table 2.1 shows the statewide distributional assumptions with a universal preschool program. The distribution of children by risk status was assumed to remain unchanged. The participation rate in the public preschool program was assumed to be 70 percent, with 80 percent of 4-year-olds participating in either a public or a private preschool program. These assumptions imply that 88 percent of children participating in a preschool program (70 out of 80 children) would be in the publicly funded universal preschool program, and that variation of rates by risk group would be consistent with the pattern of public school participation at the K–12 level. The change in participation rates shown in Table 2.1 implies that 70 of every 100 4-year-olds would be in the universal preschool program. Of that total, 15 children in the universal preschool program would have been in no preschool program under the baseline, while 33 and 22 children would have been in a public or a private program, respectively. These 70 children were distributed across the three risk groups (for details, see Karoly and Bigelow (2005), Table 2.8).

[1] This distributional assumption was based on estimates of the fraction of children with various risk factors associated with a lack of school readiness and poor school outcomes.

Table 2.1—Estimated Statewide Distribution of Children at Baseline and with Universal Preschool, by Risk Status (percent)

Characteristic	High Risk	Medium Risk	Low Risk	Total
Baseline Assumptions				
Distribution of children	25	20	55	100
Preschool participation rate	55	65	70	65
Share of preschool participants in public programs	85	65	35	55
Assumptions with Universal Preschool				
Distribution of children	25	20	55	100
Public preschool participation rate	70	70	70	70
Preschool participation rate	74	78	82	80
Share of preschool participants in public programs	95	90	85	88

SOURCE: Karoly and Bigelow (2005), Table 2.8.

On the basis of a review of the literature, Karoly and Bigelow (2005) assumed that the benefits of preschool would be largest for children in the high-risk group (i.e., the most-disadvantaged children). They also assumed that the benefits of a universal preschool program would be largest for children who would not have attended preschool in the absence of such a program. Among those children who would have been in a preschool program at baseline, it was assumed that the benefits would be larger for those in a public program (where average program quality is likely to be lower than that of the universal program) than for those in a private program.

Estimates of the benefits for the high-risk children who otherwise would not have been in preschool were assumed to equal those measured in the evaluation of the Chicago CPC program. One advantage of relying on the results of the CPC evaluation is that the program shares the key program features assumed for a universal preschool program in California (see Table 1.2).

Table 2.2 shows the percentages of CPC program benefits assumed in Karoly and Bigelow (2005) for children by risk status and the type of preschool they would

have attended in the absence of a universal preschool program. The data illustrate how benefits were assumed to be attenuated, relative to the benefits realized in the Chicago CPC program, for children of lower risk and for children who would have attended preschool in the absence of a universal program. Based on the assumptions in Tables 2.1 and 2.2, the estimated benefits of the statewide California universal preschool program were 23 percent of the level observed in the Chicago CPC program (see Karoly and Bigelow (2005) for further details on the methodology).

Table 2.2—Percentages of CPC Program (Maximum) Benefits Realized by Children, by Risk Level and Alternative Preschool Types at Baseline

Type of Preschool Universal Program Participants Would Have Attended at Baseline	High Risk	Medium Risk	Low Risk
None	100	50	25
Public	50	25	0
Private	0	0	0

SOURCE: Karoly and Bigelow (2005), Table 2.9.

Using the assumptions in Tables 2.1 and 2.2, we estimated the statewide benefits associated with a universal preschool program for any given outcome, X, as

$$X = T^x \times A \times N^u \qquad (2.1)$$

where T^x is the estimated treatment effect for outcome X in the Chicago CPC program (i.e., the difference in outcomes between the treatment group and the control group), A is the statewide attenuation factor (i.e., the percentage of Chicago CPC benefits that were estimated to be realized), and N^u is the estimated number of 4-year-old children in the statewide universal preschool program (calculated as the 4-year-old cohort size times the universal preschool participation rate of 70 percent). This approach was used to generate the figures reported in Table 1.1.

Thus, to estimate disaggregated effects of a universal preschool program in California, we need to generate the equivalent equation at the county or county-group level, i.e., we need to estimate, for each county or county group,

$$X_c = T^x \times A_c \times N_c^u \quad . \qquad (2.2)$$

where X_c is the estimated effect for county or county group. According to Equation 2.2, we need to estimate the attenuation factor for each county or county group, A_c, as well as the number of participants in the universal preschool program, N_c^u. To estimate the attenuation factor, we adopt the assumptions in Table 2.2. As we discuss below, data from the 2000 Census are used to generate data equivalent to those in Table 2.1 for each county and county group analyzed. Population projections for California counties are used to estimate the number of children who would participate in a universal preschool program.

The final step in our methodology, after we have estimated the effects of a universal preschool program for each geographic unit, is to estimate the size of the effect in percentage terms. We therefore need an estimate, for each outcome *X* and geographic unit *c*, of the level of that outcome in the absence of a universal preschool program. For example, if 100,000 children in a cohort for geographic unit *c* would use special education in the absence of universal preschool, and a universal preschool program would reduce the number of special-education students by 10,000, the estimated reduction would be 10 percent.

Our basic strategy is to estimate the current propensity in the population for each outcome and county and apply it to the same cohort of 4-year-olds in each geographic unit who would be eligible to attend a universal preschool program, defined as N_c. Thus, for each outcome and geographic unit, X_c, if we know the baseline propensity in the population, R_c^x, then we can calculate the baseline level of X_c, X_c^0 as

$$X_c^0 = R_c^x \times N_c \quad . \qquad (2.3)$$

As discussed below, we rely on a number of data sources to generate these baseline levels, although data limitations preclude estimating percentage effects for every outcome.

Geographic Units Analyzed

Data limitations made it impossible to generate estimates for all California counties. Therefore, we generate estimates for the 13 largest California counties (in terms of the projected 4-year-old population in the 2006–2015 period) and five county groups (see Chapter 1).

Figure 2.1 is a map of the state of California, with the 13 counties analyzed shaded in gray. The five county groups are segmented and labeled, as well. Note that the county groups include many, but not all, of the 13 individual counties we examine. Notably, the three largest counties—Los Angeles, San Diego, and Orange—are not included in any of the county groups. The 26 counties that are not included in the analysis are the least populous, located in the northern and eastern parts of the state.

Data Sources

We relied on several data sources to extend the statewide analysis presented in Karoly and Bigelow (2005) to the county or county-group level. These include population projections, Census data, and other sources for generating baseline estimates of outcomes.

Population Projections

To account for population differences, we needed to know the size of the 4-year-old cohort for each geographic unit. Estimates of the population of 4-year-olds in each county or county group are based on population projections generated by the California Department of Finance (State of California, Department of Finance, 2004). In particular, we use the number of 4-year-olds projected for each county in each year, averaged over the 2006–2015 period.

Table 2.3 shows the ranking of the 13 largest California counties by the average number of 4-year-olds in each annual cohort over the next decade. It also shows the share of the state's 4-year-old population represented by each county. Los Angeles County is the largest, with a projected average of nearly 150,000 4-year-olds in each year, constituting 27 percent of the state population of 4-year-olds. The next two largest counties—San Diego and Orange—each have about 44,000 4-year-olds annually, or 8 percent of the state total. The remaining 11 counties have successively smaller numbers, with Ventura County ranked last, with nearly 11,000 4-year-olds annually, or about 2 percent of the state total. The 45 counties not shown in Table 2.3 contain about 20 percent of the state total, with an average of about 2,300 4-year-olds annually.

Figure 2.1—California Counties and County Groups Included in the Analysis

NOTE: The 13 individual counties that are analyzed are shaded in gray. The five county groups are the segmented groups of counties labeled Bay Area, Capital Region, Central Coast, Central Valley, and Inland Empire.

Table 2.3 also shows the average population size and share for the five county groups. The Bay Area group has the largest share, about 92,000 4-year-olds per year (17 percent of the state total), and the Central Coast group has the smallest share, about 27,000 4-year-olds per year (5 percent of the total). The five county groups and the three largest counties (Los Angeles, San Diego, and Orange) together contain 96 percent of the state's population of 4-year-olds over the next decade.

Table 2.3—Population Estimates for California Counties and County Groups: Average Annual 4-Year-Old Cohort, 2006–2015

Geographic Unit	Average Annual Population of 4-Year-Olds	Share (%)
Counties		
Los Angeles	149,865	27.2
San Diego	43,970	8.0
Orange	43,796	7.9
Riverside	34,902	6.3
San Bernardino	32,710	5.9
Santa Clara	24,840	4.5
Sacramento	23,437	4.2
Alameda	21,589	3.9
Fresno	15,944	2.9
Contra Costa	14,353	2.6
Kern	13,558	2.5
San Joaquin	11,908	2.2
Ventura	10,885	2.0
Rest of California	2,339	19.9
County Groups		
Bay Area	92,023	16.7
Capital Region	38,741	7.0
Central Coast	27,215	4.9
Central Valley	68,513	12.4
Inland Empire	67,612	12.3
California Total	551,775	100.0

SOURCE: Author's calculations based on State of California, Department of Finance (2004).
NOTE: Percentages may not add to 100 due to rounding.

Census Data

To account for distributional differences across counties, we needed estimates at the county level of the distribution of 4-year-old children by risk and preschool participation rates. In essence, we needed to generate comparable figures in the top panel of Table 2.1 for each county and county group. Our estimates come from the 5-Percent Public Use Microdata Sample (PUMS) of the 2000 Census; we access the data through the Integrated Public Use Microdata Series (IPUMS) online database (Ruggles et al., 2004).[2]

Our estimate of the distribution of children by risk status, the first row in Table 2.1, is based on family income. As noted above, Karoly and Bigelow (2005) assumed that 25 percent of children are in the highest-risk group, followed by 20 percent in the middle-risk group, and the remaining 55 percent in the low-risk group. In the Census 2000 data, this distribution is achieved at the statewide level by using income cutoffs of $23,000 and $39,000. In other words, as of 2000, 25 percent of California 4-year-olds lived in families with incomes below $23,000, while 55 percent lived in families with incomes of $39,000 or more. Using these same income cutoffs, we estimate the proportion of 4-year-olds in the 13 largest California counties and the five county groups in each of the three risk groups as shown in Table 2.4. [3, 4] The share of 4-year-olds in the lowest-income group ranges from 10 percent in Santa Clara County to 38 to 40 percent for Kern and Fresno counties. There is also wide variation in the share in the highest-income

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[2] The October CPS files, used in Karoly and Bigelow (2005) for statewide estimates, do not contain geographic identifiers at the county level. The sample sizes would also be too small for all but the largest counties. Thus, the CPS could not be used for this analysis.

[3] The 13 counties each achieve a minimum sample size of 100 4-year-olds in the 2000 5-Percent PUMS in each of the three income groups.

[4] Ideally, we would adjust the income cutoffs to account for cost-of-living differences across counties. The data needed to make this type of adjustment, however, do not exist. To the extent that living costs are higher in urban areas, our approach is likely to understate the share of children most at risk of poor educational outcomes (i.e., those in the lowest-income group) in urban areas and, conversely, to overstate the share at risk in rural areas. However, even if the share of children in the lowest-income group shown in Table 2.4 changed up or down in any given county by several percentage points, this would not have a large impact on our estimated effects.

Table 2.4—Estimated Distribution of 4-Year-Olds in California Counties and County Groups, by Income Group and Preschool Participation

Geographic Unit	Population Share by Family Income (%)			Preschool Participation Rate (%)	Public Share Among Preschool Participants (%)
	Less than $23,000	$23,000 to $38,999	$39,000 or More		
Counties					
Los Angeles	31	22	47	65	62
San Diego	25	20	55	66	56
Orange	16	19	65	64	42
Riverside	25	22	53	55	56
San Bernardino	31	23	46	60	65
Santa Clara	10	11	79	71	35
Sacramento	30	22	48	61	57
Alameda	16	15	69	74	48
Fresno	40	23	37	58	72
Contra Costa	15	14	71	74	46
Kern	38	25	37	56	66
San Joaquin	26	24	50	62	61
Ventura	15	20	65	67	40
County Groups					
Bay Area	14	13	73	74	42
Capital Region	24	20	56	65	53
Central Coast	18	22	60	65	51
Central Valley	36	24	40	56	68
Inland Empire	28	22	49	57	61
California Total	25	20	55	65	55

SOURCE: Author's calculations based on Census 2000 (IPUMS source).

NOTE: All figures are for 4-year-olds in 2000. The preschool participation rate is adjusted to account for the participation among children who would have been 4 years old at the start of the school year (rather than 4 years old at the time of the 2000 Census in March).

group, from 37 percent in Fresno and Kern counties to 79 percent in Santa Clara County.[5]

We also used Census data to estimate preschool participation rates for 4-year-olds at the county and county-group level (shown in the second row of Table 2.1). We made an adjustment to account for the fact that the Census measure of education enrollment (including preschool) is collected in March, so the cohort of 4-year-olds it represents is not the same cohort that would be eligible for a one-year universal preschool program (assumed to be those who are age 4 at the time of enrollment in the fall).[6] The Census estimate includes both children who were 3 years old the prior fall and those who were 4 years old. Since preschool participation rates rise with age, the rate for 4-year-olds in the Census would underestimate the preschool participation rate for the cohort of 4-year-olds of interest for this study. In contrast, the CPS data used by Karoly and Bigelow (2005) are collected in October, so they provide a more accurate estimate of the preschool participation rate for the cohort of interest. As shown in Table 2.1, using data from the October 2001 CPS, Karoly and Bigelow (2005) estimated that 65 percent of California 4-year-olds currently participate in preschool. This estimate from the 2000 Census for all California 4-year-olds is only 54 percent.

Since the Census 2000 data do not enable us to identify the sample of 4-year-olds in the fall, we assume that the Census underestimates the preschool participation rate by the same proportion at the county or county-group level as it does at the state level.[7] The resulting estimates are shown in the fourth column of Table 2.4

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[5] The family-income distribution figures for 4-year-olds in Table 2.4 are consistent with differences in median household income measured by the 2000 Census for the same counties (U.S. Census Bureau, 2005). For example, Santa Clara County had the highest median household income ($74,335), followed by Contra Costa County ($63,675) and Ventura County ($59,666). Orange County ($58,820) and Alameda County ($55,946) are next in the rank ordering. San Joaquin, San Bernardino, Los Angeles, and Riverside counties ranked near the bottom (with incomes of from $41,000 to $42,000). Fresno and Kern counties had the lowest median household income among the 13 counties (with incomes of $34,000 to $35,000).

[6] Children who are age 4 in the Census consist of one group of children who were age 4 the prior fall (those who would be eligible for a one-year universal preschool program) as well as another group who were age 3 the prior fall and have since turned 4 (and therefore are not in the universal preschool cohort). Indeed, in the Census, for the cohort age 4 in the prior fall, about half would still be age 4 in March, while the other half would be age 5.

[7] To impute the Census-adjusted preschool participation rate, the adjustment actually applies the difference at the state level in the log of the preschool participation odds ratio (preschool participation rate divided by 1 minus the preschool participation rate) between the CPS and Census to each geographic unit, in total and by income group. This ensures that the upward adjustment in the Census preschool participation rate would never exceed 100 percent, as it

in aggregate for each county and county group. The three largest counties have preschool participation rates close to the state average of 65 percent. This is to be expected, since these counties make up a large share of the state and therefore influence the statewide average. Among the other counties in Table 2.4, Riverside, Kern, Fresno, San Bernardino, and Sacramento counties have the lowest preschool participation rates (55, 56, 58, 60, and 61 percent, respectively), and Santa Clara, Contra Costa, and Alameda counties have the highest rates (71, 74, and 74 percent, respectively). Of the five county groups, the Central Valley and Inland Empire have the lowest participation rates (56 and 57 percent, respectively), and the Bay Area has the highest (74 percent). The participation-rate patterns are consistent with the county and county-group income patterns, rising with family income.

We also needed an estimate of the share of preschool participants in public programs at the county and county-group level, i.e., the third row of Table 2.1. In addition to collecting information on preschool participation rates, the Census also asks about whether the program attended is public or private. The 2000 Census found that, statewide, 55 percent of 4-year-olds in preschool programs were in public programs, the same rate found in the October 2001 CPS (and shown in Table 2.1). Thus, we used the Census, without adjustment, to estimate the share of preschool participants in public programs for each county and county group, in aggregate and by income group. The final column of Table 2.4 shows the aggregate public share for each county and county group, ranging from a low of 35 percent in Santa Clara County to a high of 72 percent in Fresno County. Among the five county groups, the share is lowest in the Bay Area (42 percent) and highest in the Central Valley (68 percent).

We used the Census 2000 data on the distribution of 4-year-olds by family income, preschool participation rates, and public share of preschool enrollments to generate a version of Table 2.1 for each county and county group. The results were used to estimate the number of children in each cell in Table 2.2. Together with the assumptions about the fraction of benefits relative to the CPC program for each cell in Table 2.2, we can determine the attenuation factor for each county or county group, i.e., the estimated effect of a universal program where 100 percent equals the effects measured in the Chicago CPC program evaluation (see the discussion above and the additional detail in Karoly and Bigelow (2005)).

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theoretically could if we applied a fixed percentage increase in the participation rate (i.e., the 20 percent difference between the CPS and Census participation rates).

Based on the estimate from our earlier study that a universal program for California would generate benefits equal to 23 percent of those observed for the Chicago CPC program, Table 2.5 shows the equivalent figures for each county and county group. The patterns shown are consistent with those in Table 2.4. Notably, Fresno and Kern counties—which have the highest share of children in the high-risk group and nearly the lowest current preschool participation rates—are estimated to generate benefits equal to 33 and 35 percent of the CPC program benefits, the highest fraction among the 13 counties. The fraction in the

Table 2.5—Attenuation Rate for California Counties and County Groups

Geographic Unit	Attenuation Rate (%)
Counties	
Los Angeles	27
San Diego	21
Orange	17
Riverside	25
San Bernardino	27
Santa Clara	11
Sacramento	27
Alameda	14
Fresno	33
Contra Costa	14
Kern	35
San Joaquin	26
Ventura	15
County Groups	
Bay Area	13
Capital Region	21
Central Coast	20
Central Valley	32
Inland Empire	27

NOTE: The attenuation rate measures the estimated effect of a high-quality, universal preschool program in California, where 100 percent equals the effects measured in the Chicago CPC program evaluation.

Central Valley region is nearly as high and is the highest among the county groups. Los Angeles, San Bernardino, and Sacramento counties, which have relatively high shares of children in the highest-risk group, are also above the statewide average, at 27 percent. In contrast, the attenuation factor for Santa Clara, Alameda, Contra Costa, and Ventura counties, all with low fractions of children in the high-risk group and high preschool participation rates, are estimated to be between 11 and 15 percent. The attenuation factor for the Bay Area region is in this same range. These differences in attenuation rates mean that counties with a high attenuation factor are estimated to experience relatively larger effects from a universal preschool program, for a given population size, than counties with low attenuation factors.

Other Data Sources

As noted above, in addition to estimating the changes in outcomes that would result from implementation of a universal preschool program, it is useful to put those changes in perspective by comparing them with the baseline for each outcome that would occur in the absence of a universal preschool program. We relied on several data sources to obtain baseline propensities, wherever possible, for the counties and county groups in our study. For most outcomes, the county-level data that are available do not provide the incidence figures needed to match the outcomes measured in the Chicago CPC evaluation (the outcomes listed in Table 1.1). Thus, as discussed below, we employed a number of assumptions to approximate the figures of interest at the county level. In all cases, the county-group baselines are derived from the sum of the baselines for the counties in the group.

Education Processes and Attainment Outcomes. Among the education processes and attainment measures, we were not able to obtain information on the current propensity for grade retention (outcome 1), either for the state of California or for counties or county groups. These data are not routinely collected in surveys or administrative sources, for California or even nationally (Alexander, Entwisle, and Dauber, 2003).[8]

[8] Data from the 1995 CPS indicate that 13.3 percent of 16- to 24-year-olds were ever retained in grade (National Center for Education Statistics (NCES), 1997). These figures are taken from a special supplement to the October CPS available for selected years (1992, 1995, and 1999). School enrollment data from the annual October CPS were also used to estimate rates of grade retention by considering children who are "below grade" for their age, although this is an imprecise proxy (Cascio, 2005). The periodic National Household Education Survey (NHES) also provides

Data on special-education use (outcome 2) for the 2004–2005 school year, along with overall school enrollments, are available for California counties from the California Department of Education (State of California, Department of Education, n.d.). According to these data, 10.8 percent of California first- to twelfth-graders, on average, were in special-education classes in the 2004–2005 school year. The data also show the proportion in special-education classes at each grade level. By summing across grade levels for each county, we obtained the average number of years a child will spend in special education between the first and twelfth grades, assuming the cross-sectional special-education rates remain relatively stable for future cohorts. This provides the baseline for outcome 3, the number of child years of special-education use. These data indicate that between the first and twelfth grades, the average student statewide would be expected to spend 1.2 years in special education.

These figures do not indicate, however, the fraction of children who will ever use special education, information needed to determine the baseline for outcome 2. This fraction depends on the continuation rate in special-education use from year to year, a rate that is not routinely calculated even for a nationally representative sample of children.[9] Given the year-to-year special-education propensities for California as a whole, if the continuation rate from one year to the next is 80 percent on average, then 30 percent of a given cohort will ever use special education and each user will accumulate an average of 4.0 years. If the continuation rate is 90 percent, then 18 percent will ever use special education and each user will accumulate an average of 6.7 years. Since these figures span the rates in the treatment and control groups in the Chicago CPC study (as well as other similar studies—see Table 2.4 in Karoly and Bigelow (2005)), we applied these two repetition rates to the pattern of special-education use in each county and county group.[10] This provides a bound on the likely baseline rate and hence a range of likely percentage effects.

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estimates of grade retention for a nationally representative population. None of these sources provide published measures of grade retention for California or California counties.

[9] One exception is Hanushek, Kain, and Rivkin (2002), who estimate the successive one-year continuation rate in special education for a sample of Texas school children observed between the fourth and seventh grades in the 1990s. The 90 percent figure we use is close to their estimate for all Texas children in special education.

[10] We were unable to identify any studies specific to California or for the United States as a whole that estimate the year-to-year recurrence rate of special-education use or the lifetime incidence of special-education use. We use benchmark continuation rates to see if they generate parameters that are consistent with studies evaluating preschool programs.

The California Department of Education provides information on dropout rates at each grade level, from ninth to twelfth grade, for the 2004–2005 school year for all California counties (State of California, Department of Education, n.d.). We used the 4-year derived dropout rate for each county, which accounts for the cumulative effects of dropping out at each successive grade, to establish the baseline dropout rate for outcome 4. For California as a whole, the 4-year dropout rate is 13.1 percent.

We also used the successive dropout rates to calculate the difference between the number of years of schooling that would be completed with a 100 percent high school graduation rate and the number of years of schooling completed given the pattern of dropout rates. For example, in a population of 100 children, if 5 percent drop out of high school in the tenth grade and another 5 percent drop out in the eleventh grade, the educational gap at the baseline would be 15 years (5 children missing 2 years each and 5 children missing 1 year each). We used this as the baseline when calculating the percentage effect for outcome 5, the increase in the number of child years of education. In other words, we measure the share of the education gap between current schooling levels and 100 percent high school graduation that would be closed by a universal preschool program.

Child Maltreatment. Information on substantiated cases of child abuse or neglect for 2004 are available for California counties from the Center for Social Services Research, University of California at Berkeley (Needell et al., 2005). The county-level data include the number of substantiated cases and the substantiation rate for children from 0 to 17 years of age. Since the outcome measure in the Chicago CPC evaluation (outcome 6) is for substantiated cases between the ages of 4 and 17, we made an adjustment to the rate based on the age distribution of child maltreatment cases for California as a whole (also available from Needell et al., 2005).[11]

However, like the measure of special-education use, the outcome for child abuse or neglect is the number of children between ages 4 and 17 ever with a substantiated report. Thus, again, we need to estimate the incidence over

[11] Child maltreatment rates decline with age (Needell et al., 2005). The rate of substantiated cases for California as a whole is 23.4 per 1,000 children under the age of 1, falling to 6.8 per 1,000 children ages 16 to 17. The rate reported by Needell et al. (2005) for all children 0 to 17 years of age is 11.5 per 1,000, while we estimate the rate for children 4 to 17 to be 10.5 per 1,000. Thus, substantiated cases for children 4 to 17 are 91.1 percent of the number of cases for children 0 to 17. We applied this adjustment to the reported substantiation rate for children ages 0 to 17 for each county to obtain an estimated rate for children ages 4 to 17.

multiple years, not just a single year. In this case, the California Children and Family Services Division, using California child welfare administrative data, reports that 13.1 percent of children with a substantiated referral had a subsequent substantiated referral within 12 months (State of California, Children and Family Services Division, 2005). We used this one-year recurrence rate and the age pattern of the incidence of substantiated cases to estimate that 128.3 out of every 1,000 California children ages 4 to 17 would ever have a substantiated report of abuse or neglect. However, this rate may overestimate the incidence during childhood if some fraction of children have a subsequent substantiated report more than one year later. Therefore, as an upper bound, we use a one-year recurrence rate of 25 percent, based on multiyear data analyzed for Missouri by Drake et al. (2003). With this upper-bound recurrence rate, we estimate that 113.1 out of every 1,000 children in California would ever have a substantiated report of abuse or neglect. With the two bounds on lifetime incidence, we computed the ratio for California of the lifetime incidence to the single-year incidence. We then applied this ratio to the single-year incidence for each county to derive the county-specific lifetime incidence.

Juvenile-Crime Outcomes. Data on the incidence of juvenile crime are available at the county level for California, although, again, the data do not provide the precise concepts to match outcomes 7, 8, and 9 in the Chicago CPC evaluation. County-level data on juvenile arrests (arrests of 10- to 17-year-olds) for 2003 are available from the State of California Department of Justice (State of California, Department of Justice, 2004a). Statewide data for California indicate that in 2003, there were 221,875 juvenile arrests, 154,954 of which resulted in probation department dispositions (State of California, Department of Justice, 2004b).[12] We applied this statewide ratio of petitions to dispositions to the arrest data for each county to estimate the baseline in each. We then used population data for 2003 from the Department of Finance for 10- to 17-year-olds in each county to calculate the annual incidence of dispositions among the juvenile population (State of California, Department of Justice, 2004a). To calculate the cumulative rate among juveniles for the baseline measure for outcome 9, we multiplied the annual rate by 8 years. For California as a whole, this resulted in an average of 0.28 dispositions per person.

[12] This is a more conservative baseline than that based on juvenile court petitions in California, which, for the same year, equaled 87,927 cases. However, the rate of court filings (i.e., petitions) in California is lower than that in other states (Little Hoover Commission, 1994). Since the results from the CPC study are for juvenile petitions in Illinois, we believe the use of juvenile dispositions provides a more comparable baseline.

The other two measures of juvenile crime provide cumulative incidence until age 18. To estimate the incidence across ages 10 to 17 for the baseline for outcome 7 (reduction in children ever with a juvenile petition), we used a range of juvenile crime recidivism of 40 to 60 percent. Such recidivism rates are not routinely and consistently calculated in general, much less for California. One estimate for Florida indicated a 40 percent rate of recidivism within one year for juvenile offenders, which is within the range we use (Florida Department of Juvenile Justice, 2004). The range we used resulted in lifetime incidence of 14 to 19 percent for California as a whole. As a comparison, the incidence for the more-disadvantaged Chicago CPC population was 17 and 25 percent for the treatment and control groups, respectively. Given the uncertainty in establishing the baseline for measures 7 and 9, which relate to petitions as a whole, we do not attempt to generate a baseline for petitions for violent crimes, outcome 8.

3. Results for Counties and County Groups

In this chapter, we present the results of our analysis of the estimated effects of a one-year, high-quality, universal preschool program in California for 13 individual counties and five county groups. We first provide an overview of the results and discuss their interpretation. We then detail specific findings for the counties and county groups. A discussion of the findings concludes the chapter.

Overview and Interpretation of Results

Table 3.1 presents the study results by county and county group and for California as a whole, in levels. Each column shows the estimated change resulting from a high-quality, one-year, universal preschool program for nine specific outcomes within three broad domains: education processes and attainment (outcomes 1 to 5), child maltreatment (outcome 6), and juvenile crime (outcomes 7 to 9).

The effects shown in Table 3.1 are best understood by comparing them to the estimated baseline that would result in the absence of a universal preschool program. Table 3.2 presents the estimated effects in Table 3.1 in terms of percentage changes over baseline. As noted above, no reliable baseline estimate is available for grade repetition and juvenile petitions for violent crime (outcomes 1 and 8) at the county level.[1] Recall also that the percentage effect measured for outcome 5, the gain in the number of child years of school, uses a different baseline. As noted in Chapter 2, for this outcome, we measured the percentage change as a 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. In addition, for use of special education, substantiated reports of child abuse and neglect, and children with juvenile petitions (outcomes 2, 6, and 7), there were sufficient issues with estimating the appropriate baseline that we report a range of estimated percentage effects.

[1] Data from the 1995 CPS indicate that 13.3 percent of 16- to 24-year-olds had ever repeated a grade. If this national rate is applied to the California cohort of 4-year-olds, the reduction of 13,800 children ever retained in grade (see Table 3.1) represents a 19 percent reduction in the baseline rate of grade retention.

Results for all the outcomes presented in Tables 3.1 and 3.2 should be viewed as approximate given the various sources of uncertainty that can affect these estimates, as discussed further below.

We also present the percentage effects given in Table 3.2 graphically in Figures 3.1 to 3.7 for the seven outcomes for which they were calculated. The results for Los Angeles, San Diego, and Orange counties are shown first, followed by the remaining 10 counties according to their county groups (the county-group result is graphed first, followed by the results for each of the counties in that group for which we generated estimates).

Before discussing the results, we should make a few points regarding the interpretation of the numbers in the two tables and the associated figures. The estimated effects, in levels or percentage terms, 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 of 4-year-olds between the end of preschool and age 18. For example, the first column in Table 3.1 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 or how many repeated grades would be saved in all.

There are measures that capture the change in the total volume of activity for special-education use, years of education, and juvenile petitions (outcomes 3, 5, and 9), but these changes 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 would end. 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.

Since the estimates in Tables 3.1 and 3.2 are for an annual cohort of 4-year-olds, the effects will be replicated for each successive cohort. Thus, for example, the estimated level effects over the first 10 cohorts of children in a universal preschool program would be 10 times the values in Table 3.1 (assuming there are no spillover effects as each successive cohort attends preschool). 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 3.2,

Table 3.1—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 a Juvenile Petition (7)	Reduction in Children Ever with a Juvenile Petition for a Violent Offense (8)	Reduction in Juvenile Petitions (9)
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
Riverside	870	576	3,953	633	1,864	299	463	356	1,864
San Bernardino	926	613	4,208	673	1,984	319	493	379	1,984
Santa Clara	305	202	1,387	222	654	105	162	125	654
Sacramento	660	437	3,000	480	1,414	227	351	270	1,414
Alameda	351	232	1,594	255	751	121	187	143	751
Fresno	539	357	2,449	392	1,154	185	287	220	1,154
Contra Costa	229	151	1,040	166	490	79	122	94	490
Kern	488	323	2,220	355	1,046	168	260	200	1,046
San Joaquin	323	214	1,466	235	691	111	172	132	691
Ventura	172	114	782	125	368	59	92	70	368
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

Table 3.2—Estimated Percentage Change from Baseline Resulting from 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 a Juvenile Petition (7)	Reduction in Children Ever with a Juvenile Petition for a Violent Offense (8)	Reduction in Juvenile Petitions (9)
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
Riverside	—	6 – 9	9	20	21	4 – 5	11 – 15	—	28
San Bernardino	—	6 – 11	10	12	12	8 – 9	6 – 8	—	16
Santa Clara	—	3 – 5	5	11	12	5 – 6	3 – 4	—	8
Sacramento	—	6 – 10	10	16	17	4 – 5	10 – 13	—	26
Alameda	—	4 – 6	6	9	8	8 – 9	5 – 7	—	13
Fresno	—	8 – 13	14	20	21	8 – 9	7 – 10	—	19
Contra Costa	—	3 – 5	5	9	7	6 – 6	6 – 8	—	16
Kern	—	8 – 14	15	22	28	5 – 6	7 – 10	—	19
San Joaquin	—	6 – 10	11	30	37	5 – 6	5 – 7	—	14
Ventura	—	3 – 6	6	29	46	8 – 9	4 – 6	—	11
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.

however, would be unchanged over multiple cohorts (because both the numerator and the denominator would increase by the same multiple).

Another interpretation is also 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 (where the children at each age between 5 and 18 had access to the universal preschool program at age 4), the cumulative outcomes in each cohort shown in Table 3.1 will approximately equal the total annual effect for that outcome. In other words, it is estimated that in Los Angeles County, each cohort of 4-year-olds will need 20,278 fewer years of special education over their schooling years. 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 be an 11 percent reduction from current annual levels, consistent with the percentage reduction for each 4-year-old cohort shown in Table 3.2.

Finally, beyond these aspects associated with interpreting the results, it is important to keep in mind that the estimates presented in Tables 3.1 and 3.2 are subject to uncertainty from several sources. As we detail further below, the estimates we present have an associated error band that accounts for statistical and modeling uncertainty. Although calculating such error bands is beyond the scope of this study, we would expect those error bands to be larger for the smaller counties (moving down the rows of the tables). Thus, small differences across geographic units may not represent true differences once the sources of uncertainty are accounted for.

Keeping in mind the issues associated with interpreting the estimates and the associated uncertainty, consider first the results for California. The results in levels are comparable to those reported in Table 1.1.[1] The estimates in Table 3.1 show that the implementation of a high-quality, one-year, universal preschool program in California would result in about 14,000 fewer children ever retained

[1] We note that the California totals for each outcome in Table 3.1 are higher by 0.3 percent than the equivalent values in Table 1.1. The calculations in Table 3.1 are based on the exact projected average number of 4-year-olds in California in the 2006–2015 period, or 551,775 children. This ensures that the county figures, if generated for every county, would add to the state total. In Karoly and Bigelow (2005), an approximate statewide cohort size of 550,000 was used, a figure that is 10.3 percent lower than the more-precise estimate.

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. Table 3.2 shows that 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.[2]

As would be expected, there is variation around the statewide averages, largely in consistent patterns. For the largest counties, the deviation in percentage effects from the statewide average is generally small. The geographic units with more-attenuated effects (i.e., low attenuation factors in Table 2.5) due to higher incomes and higher current participation rates—namely, Santa Clara, Alameda, Contra Costa, and Ventura counties and the Bay Area group—generally have percentage effects smaller than the statewide average. The percentage effects of the geographic units with the lowest incomes and lowest current participation rates and hence less-attenuated effects (i.e., high attenuation factors)—Fresno and Kern counties and the Central Valley group—generally exceed the statewide average. Of course, there are exceptions to these patterns, as discussed below.

Results for Counties and County Groups

In focusing further on the disaggregated results, we first consider the three largest counties, followed by the five county groups. The latter include the remaining individual counties so we discuss those county-specific results in the context of the regional estimates with which they are associated.

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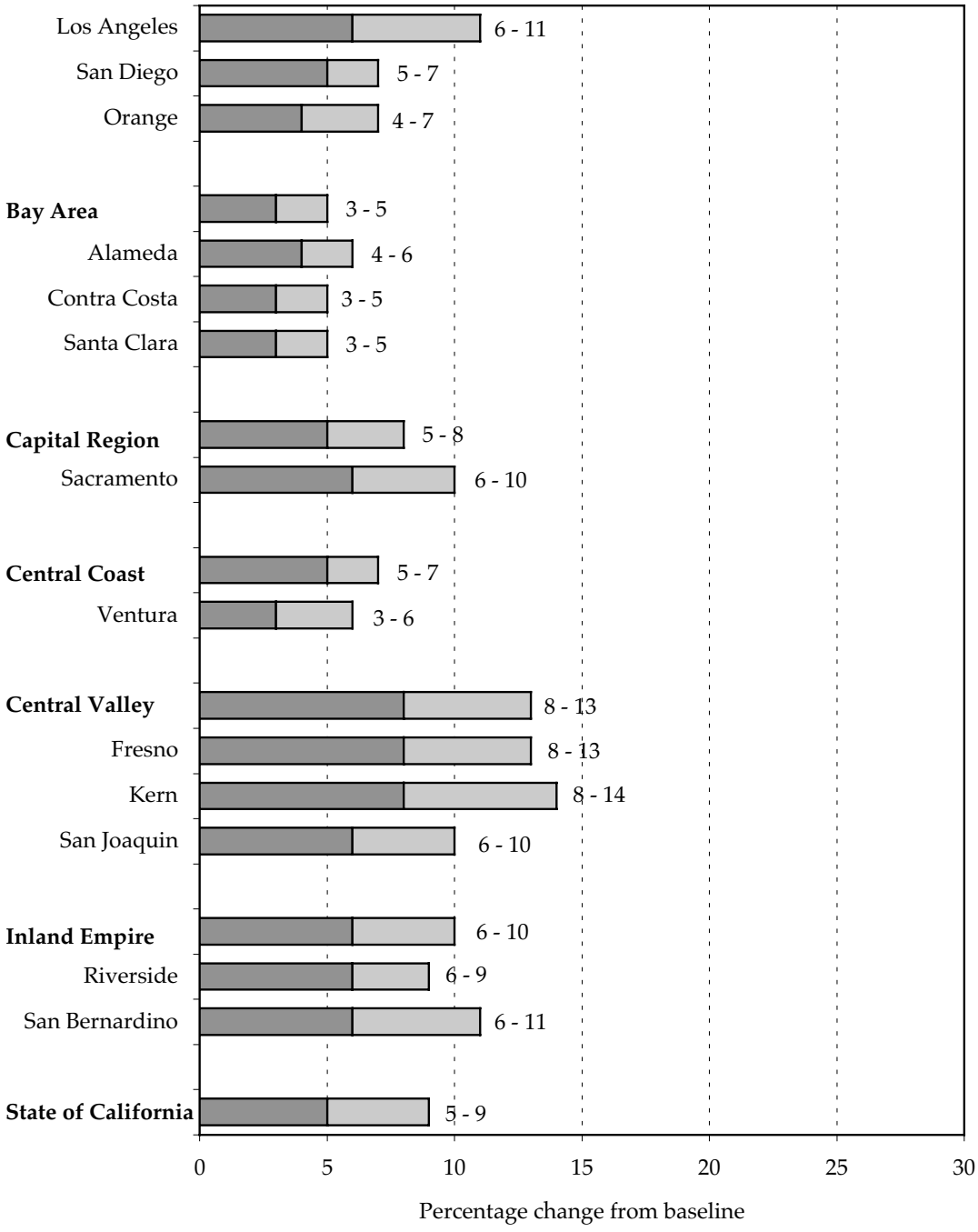
[2] The estimated percentage changes for California differ, in several cases, from those reported in Karoly and Bigelow (2005). These differences reflect alternative assumptions about single-year versus lifetime incidence of some outcomes and differences between the California-specific propensity estimates used here and the national estimates relied upon in the earlier study.

Figure 3.1—Percentage Improvement in the Number of Children Ever Using Special Education

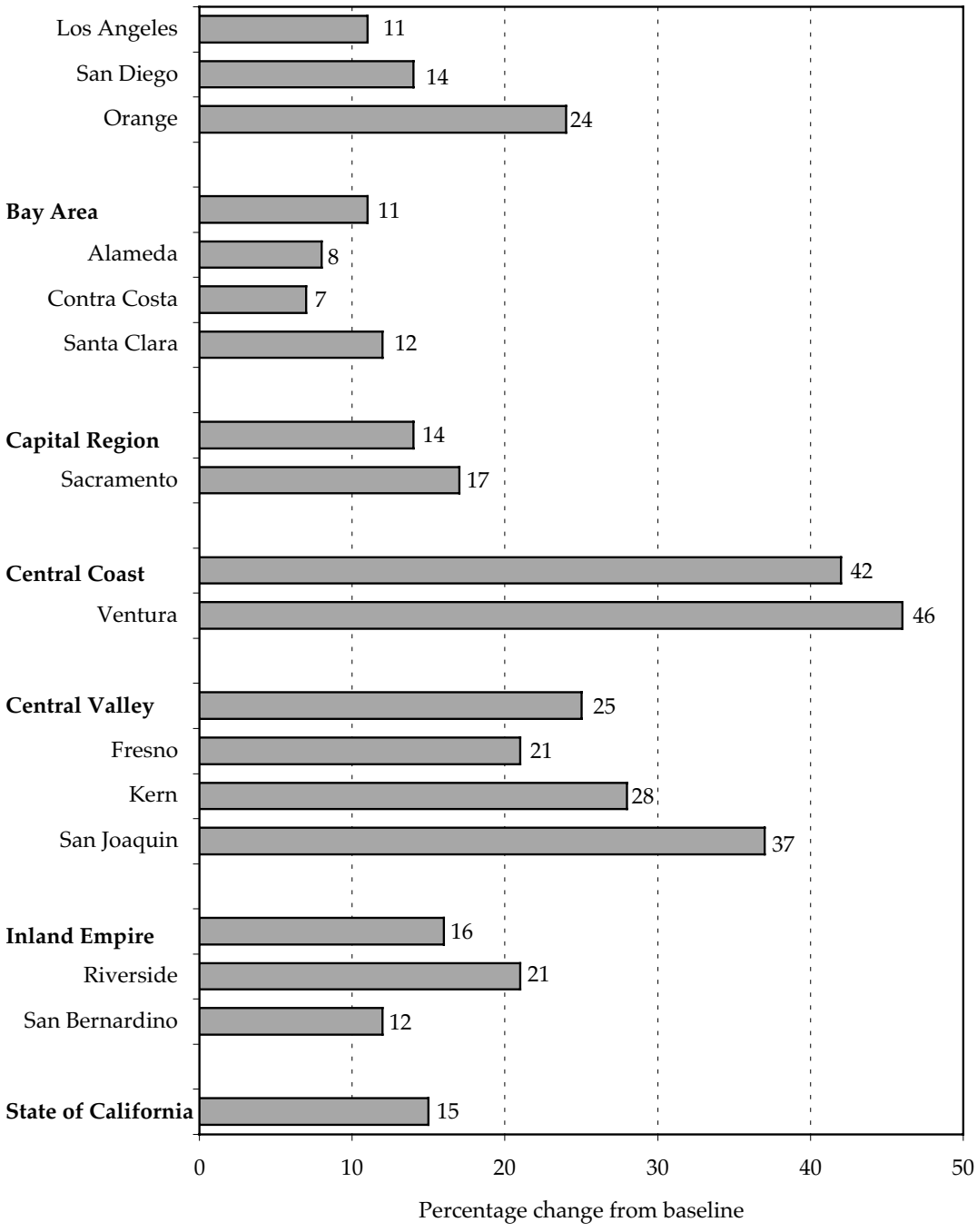


NOTE: The range of percentage effects for ever using special education (outcome 2) is based on repeat rates of special-education use of 80 and 90 percent.

Figure 3.2—Percentage Improvement in the Number of Child Years of Special Education

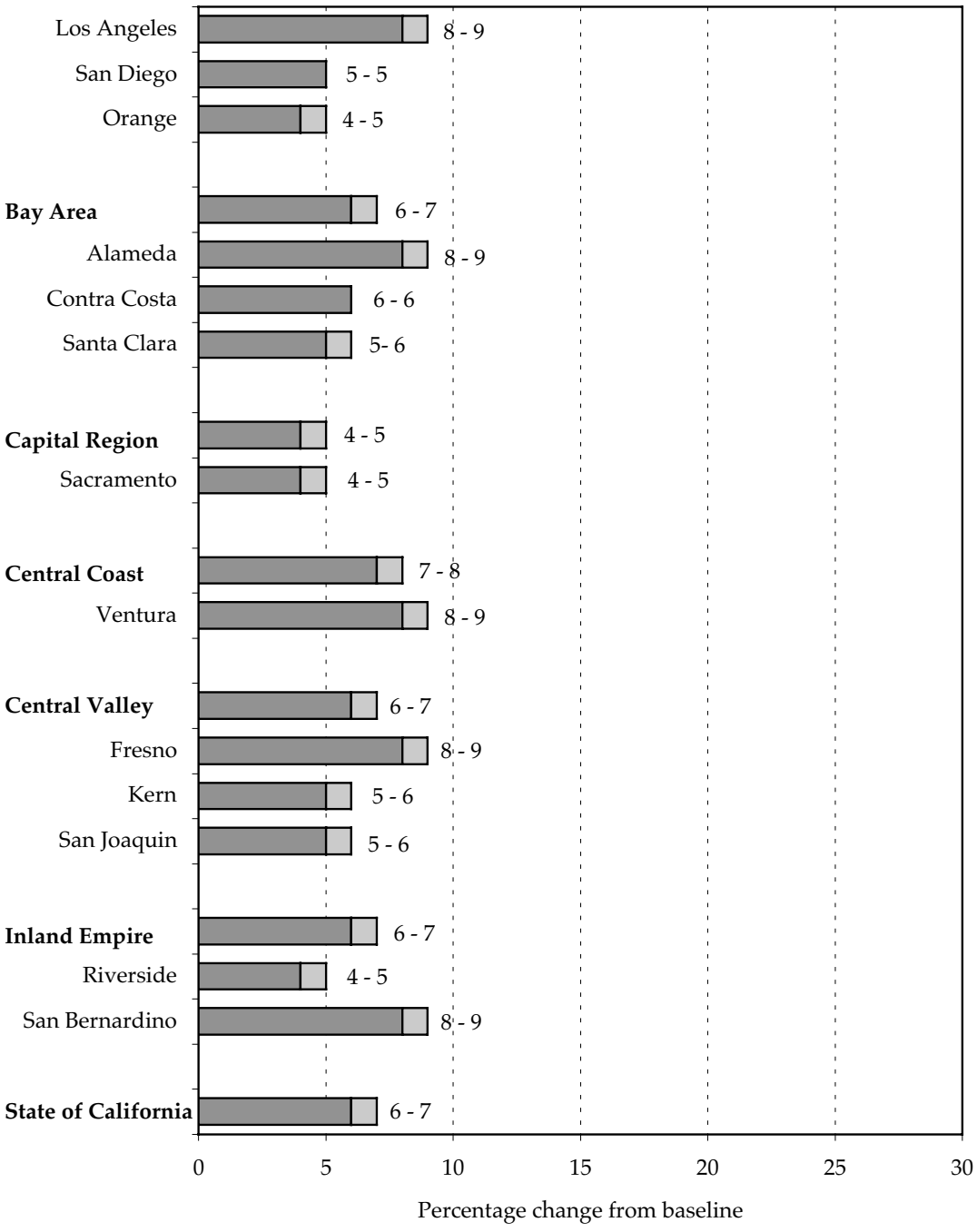
Figure 3.3—Percentage Improvement in the Number of High School Dropouts

Figure 3.4—Percentage Improvement in the Education Gap



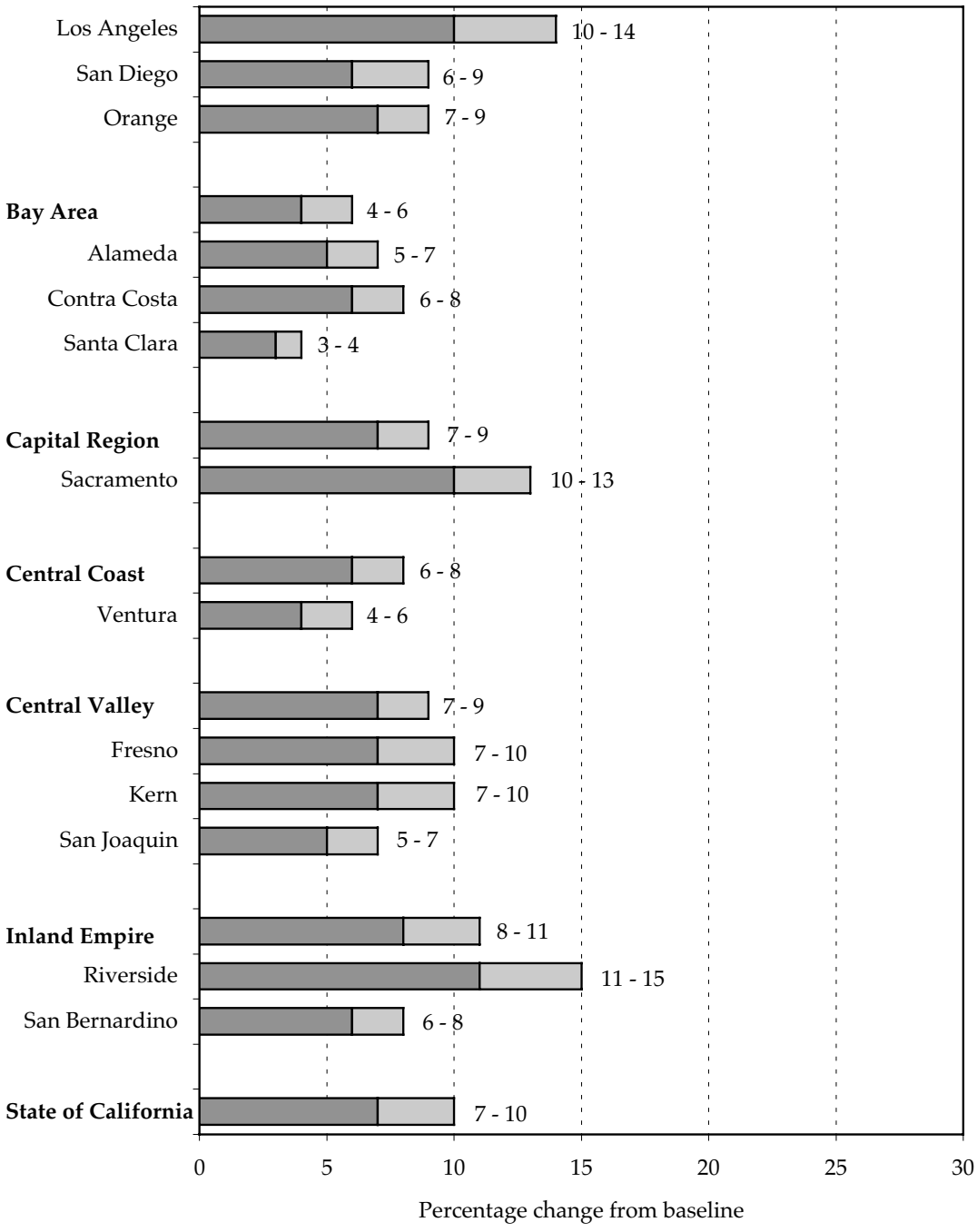
NOTE: The percentage change for outcome 5 measures the fraction of the gap that would be closed between years of schooling attained with a 100 percent high school graduation rate and years attained with current dropout patterns.

Figure 3.5—Percentage Improvement in the Number of Children Ever Abused or Neglected



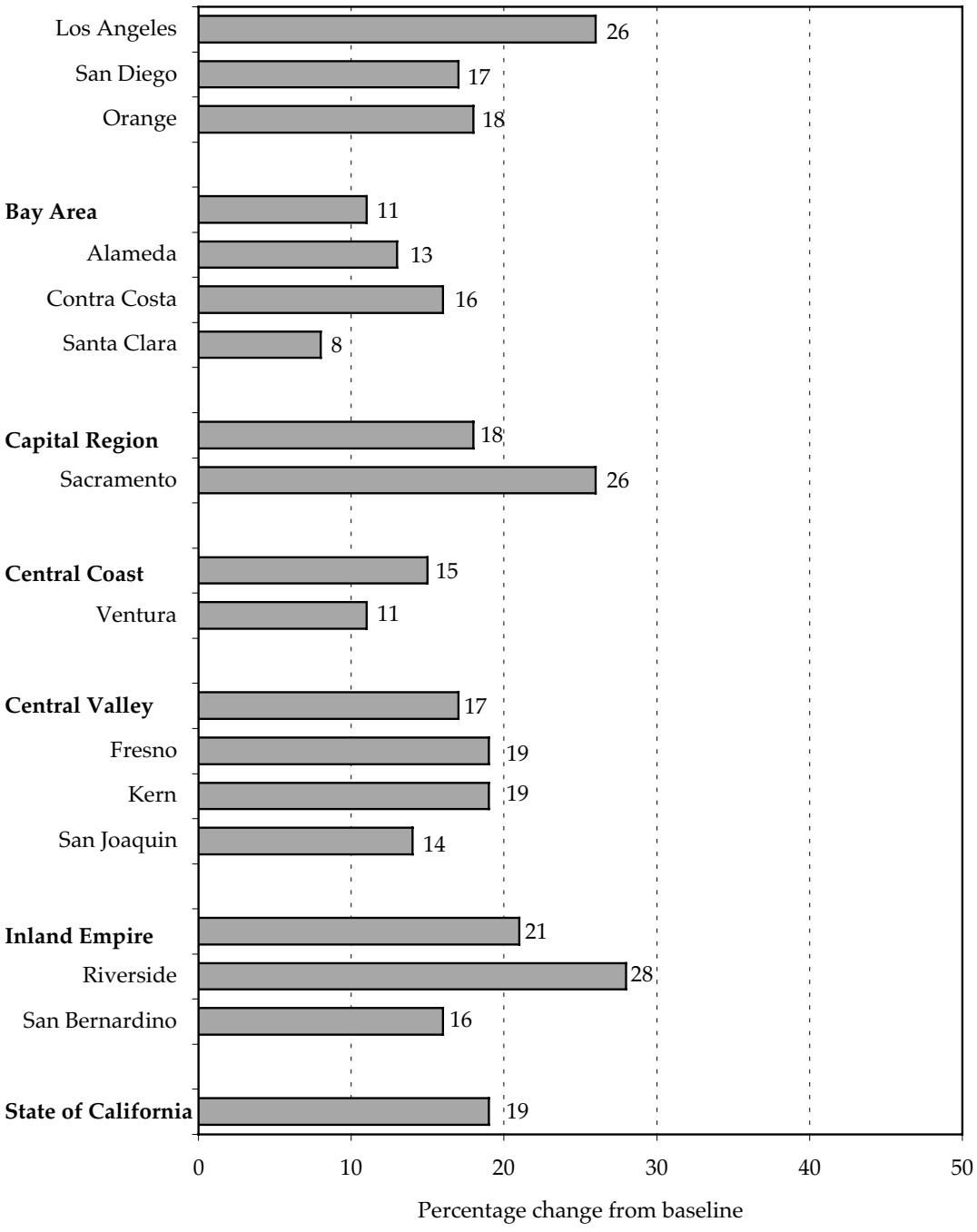
NOTE: The range of percentage effects for children ever abused or neglected (outcome 6) is based on recurrence rates of child maltreatment of 13 and 25 percent.

Figure 3.6—Percentage Improvement in the Number of Children Ever with a Juvenile Petition



NOTE: The range of percentage effects for children ever with a juvenile petition (outcome 7) is based on recidivism rates of 40 and 60 percent.

Figure 3.7—Percentage Improvement in the Number of Juvenile Petitions



Los Angeles County

Because of its size alone, with a projected total of nearly 150,000 4-year-olds each year over the next decade (see Table 2.3), Los Angeles County is estimated to experience larger absolute effects than any of the other counties studied (see Table 3.1). In addition, with an attenuation factor of 27 percent, compared with 23 percent for California as a whole, the effects are less attenuated than the statewide average given the county's relatively lower level of income. As a result, with the exception of outcomes 4 and 5 (dropouts and years of schooling, shown in Figures 3.3 and 3.4), the percentage effects for Los Angeles County are somewhat larger than the state average (see Table 3.2). For example, the estimated reduction in children using special education is 6 to 11 percent, compared with the California average of 5 to 9 percent.

The dropout-related outcomes have lower percentage effects because Los Angeles County has a dropout rate of nearly 19 percent, the highest among the counties considered here. Consequently, the estimated changes are smaller relative to the baseline than those of counties with lower dropout rates. At the other extreme, Los Angeles County has the second largest estimated percentage effects for juvenile crime outcomes (after Riverside County) (see Table 3.2 and Figures 3.6 and 3.7). In this case, the data source on juvenile arrests places the rate for Los Angeles County among the lowest for the 13 counties considered, relatively low given the county's demographics. Because of the uncertainties associated with establishing the baseline for the juvenile crime outcomes (outcomes 7 and 9), the large effects estimated for Los Angeles County may be the result of data anomalies and should be considered in that context.

San Diego County

San Diego County is the second largest county in California, having about one-third the number of 4-year-olds projected for Los Angeles County (nearly 44,000 4-year-olds annually, as reported in Table 2.3); thus the estimated effects of a universal preschool program for San Diego County are naturally smaller than those for Los Angeles County (see Table 3.1). The results for San Diego County are slightly more attenuated than those for California as a whole—21 percent versus the statewide average of 23 percent. Consequently, the percentage effects shown in Table 3.2 are slightly below the statewide average for every outcome, typically 1 or 2 percentage points (at most 3 percentage points) lower. The

estimated effects range from a 5 percent reduction in the number of children ever abused or neglected (see Figure 3.5) to a 17 percent reduction in the number of juvenile petitions (see Figure 3.7).

Orange County

The projected population of 4-year-olds in Orange County over the next decade—just under 44,000—is nearly identical to that for San Diego County (see Table 2.3). However, the estimated effects of a universal preschool program are smaller in absolute terms, because Orange County has a relatively higher income level, and thus its estimated effects (17 percent attenuation factor) are more attenuated than those of San Diego County (21 percent attenuation factor). Since the baseline is also lower for Orange County for most outcomes, the effects there in percentage terms are similar to those for San Diego County and, in some cases, even larger (see Table 3.2).

Notably, the percentage effects for high school dropouts and years of education (outcomes 4 and 5, shown in Figures 3.3 and 3.4) in Orange County are 21 and 24 percent, respectively, far above the statewide average. According to our data source for county-level dropout rates, Orange County has one of the lowest reported rates, especially compared with those of counties with similar demographics. Alameda and Contra Costa counties each have a 4-year derived dropout rate of 13 percent, while the rate in Orange County is just 6 percent. However, because it is possible that there are inconsistencies in the way dropout figures are calculated and reported at the county level, these larger percentage effects for Orange County should be interpreted with caution.

Bay Area Region (and Santa Clara, Alameda, and Contra Costa Counties)

As seen in Table 2.3, the projected number of 4-year-olds in the nine-county Bay Area region over the next decade is 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 rate. The attenuation factor for the entire Bay Area region is 13 percent. Among the three counties in this region that we consider separately, the factor is 11 percent for Santa Clara County and 14 percent each for Alameda and Contra Costa counties (see Table 2.5). Thus, the estimated percentage effects for the Bay Area region are lower than or, in the case of child abuse and neglect, equal to the statewide average.

This region is estimated to experience a 3 to 5 percent drop in children ever using special education, a 5 percent reduction in years of special-education use, an 11 percent reduction in high school dropouts and an equal percentage closing of the gap in years of schooling due to dropping out, a 6 to 7 percent reduction in 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 (see Figures 3.1 to 3.7). Table 3.2 also shows the percentage effects for the three counties in this region for which we generated county-level estimates. These effects bracket those for the Bay Area region, typically with differences of ± 1 to 3 percentage points. Across the outcomes in Table 3.2, the percentage effects for the three counties are not consistently above or below the Bay Area region average.

Capital Region (and Sacramento County)

The five counties in the Capital region are projected to have a population of nearly 39,000 4-year-olds annually over the next decade (see Table 2.3). The distribution of children by risk status and current preschool participation in this region, reported in Table 2.5, closely matches that for the entire state. Consequently, the Capital region attenuation factor (21 percent) is similar to the statewide factor (23 percent). The resulting percentage effects shown in Table 3.2 and Figures 3.1 to 3.7 are thus within about 1 percentage point of the statewide average.

Tables 3.1 and 3.2 also present results for Sacramento County, the largest county in the region, with about 23,000 4-year-olds per year projected over the next decade. Because Sacramento County has relatively lower income, the effects of a universal preschool program there are less attenuated than they are for the entire region (the attenuation factor for the county is 27 percent, compared with 21 percent for the region). Thus, the estimated percentage effects for Sacramento County are generally larger than they are for the five-county Capital region, ranging from 4 to 5 percent for the reduction in child abuse and neglect (see Figure 3.5) to 26 percent for the reduction in the number of juvenile petitions (see Figure 3.7). The estimated percentage effects for both juvenile crime measures stand out as being relatively large. Like Los Angeles County, Sacramento County has a relatively low rate of juvenile arrests, especially given the county's demographics. Again, it is not clear whether the baseline may be biased by data-quality issues.

Central Coast Region (and Ventura County)

The Central Coast region consists of five counties that together will contain 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, as shown in Table 2.3). Ventura County, the smallest of the 13 counties we analyze, is projected to have about 11,000 4-year-olds, about 40 percent of the total for the Central Coast region. Both the county group and Ventura County have relatively low proportions of highest-risk students, with an income distribution nearly equal to that in the Bay Area region. Hence, the attenuation factors of 20 percent for the county group and 15 percent for Ventura County are among the lowest levels among the counties and county groups. With the exception of the high school dropout measures (outcomes 4 and 5, plotted in Figures 3.3 and 3.4) and the measure of child maltreatment (outcome 6, shown in Figure 3.5), the percentage effects for the Central Coast region and Ventura County are below the statewide average. With the exception of these three outcomes, several of the other percentage effects for Ventura County are comparable to or even below those estimated for the Bay Area region and Bay Area counties such as Alameda.

The exceptions merit additional discussion. For both the Central Coast region and Ventura County, the percentage effects for the reduction in high school dropouts and the gap in years of education are among the highest estimated in this study (see Figures 3.3 and 3.4). The Central Coast has an estimated 28 percent reduction in high school dropouts and a 42 percent reduction in the schooling gap. These figures for Ventura County are 29 and 46 percent, respectively. As in several of the other counties discussed above, 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. The reported rate in Ventura County is 4.0 percent, and the rates in Monterey and Santa Barbara counties are nearly as low (5.7 and 5.9 percent, respectively). In contrast, Contra Costa County, with a similar income distribution, has a dropout rate of 12.7 percent. It is very likely that the differences in these rates, and hence the reported percentage effects in Table 3.2, are partly the result of anomalies in the way the dropout rates are computed at the county level; we would expect the rates to be understated in the Central Coast counties.

The other exception is the percentage effect for the child maltreatment outcome (outcome 6, shown in Figure 3.5). In this case, the percentage effect, ranging from 7 to 8 percent for the Central Coast region and 8 to 9 percent for Ventura

County, is slightly above the California average, despite the greater attenuation factor. This results from the fact that Ventura County has one of the lowest estimated rates of child abuse and neglect in the state, comparable to that for Alameda, another high-income county. It is not clear to what extent this reflects true differences in underlying rates of child maltreatment or possible reporting differences.

Central Valley Region (and Fresno, Kern, and San Joaquin Counties)

The eight-county Central Valley region is projected to have about 68,000 4-year-olds per year in the next decade (see Table 2.3). This region has the highest share of low-income children among the regions we consider, and the effects of a universal preschool program there are attenuated less than the statewide average. As shown in Table 2.5, the attenuation factor is 32 percent for the Central Valley, and it is equally low for the three counties in the region for which we generate county-level estimates: Fresno (33 percent), Kern (35 percent), and San Joaquin (26 percent). The resulting percentage effects, shown in Table 3.2, are therefore higher than those estimated for California as a whole by several percentage points, but only for the educational outcomes. For the four education outcomes plotted in Figures 3.1 to 3.4, the Central Valley region is estimated to experience an 8 to 13 percent decline in children ever using special education, a 13 percent decrease 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 (see Figures 3.5 to 3.7).

For the three individual counties for which we provide county-specific estimates, the percentage effects 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 (outcomes 4 and 5, plotted in Figures 3.3 and 3.4). In particular, San Joaquin County has a relatively low dropout rate (7 percent), which leads to large estimated percentage changes in the number of dropouts and years of education. As in the case of Orange County, there may be inconsistencies in the way dropout rates are calculated across counties that could explain these larger estimated effects. Moreover, for small counties such as San Joaquin, there is more uncertainty in our estimates, so large effects should be given less weight.

Inland Empire Region (and Riverside and San Bernardino Counties)

The Inland Empire region, which comprises Riverside and San Bernardino counties, has a projected population of nearly 68,000 4-year-olds annually over the next decade (almost evenly split between the two counties, as shown in Table 2.3). 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 (an attenuation factor of 27 percent for the region versus 23 percent for the state). The estimated percentage effects for the region are therefore 1 to 2 percentage points larger than those for the state as a whole. They range from about 6 percent for child abuse and neglect (see Figure 3.5) to 21 percent for number of juvenile petitions (see Figure 3.7).

The separate effects reported for Riverside and San Bernardino counties in Table 3.2 show that they are similar for the two measures of special education (outcomes 2 and 3, shown in Figures 3.1 and 3.2). The effect on child abuse and neglect (outcome 6, shown in Figure 3.5) is larger for San Bernardino County (8 to 9 percent) than for Riverside County (4 to 5 percent). For the dropout and juvenile crime effects (outcomes 4, 5, 7, and 9, shown in Figures 3.3, 3.4, 3.6, and 3.7), the percentage changes are largest for Riverside County. Riverside has one of the lowest baseline dropout rates, especially compared with those of other counties with similar demographics. For example, the current 4-year derived dropout rate ranges from 15 to 19 percent for Los Angeles, San Diego, and San Bernardino counties, but it is just 9 percent for Riverside County. Likewise, Riverside County has the lowest rate of juvenile arrests among the counties considered in this study. With these low baseline rates, the percentage changes are estimated to be larger than average. Again, possible errors in the data mean that such figures may not be reliable.

Discussion

Our estimates of the effects of a universal preschool program for California counties and county groups indicate that the relative changes range from quite modest to fairly substantial, although we must be cautious in placing emphasis on the differential effects across the nine outcomes we measured, for which seven percentage effects could be only approximated.

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 Tables 3.1 and 3.2 are associated with substantial dollar benefits that accumulate across

outcomes and over time. Indeed, as Karoly and Bigelow (2005) show, the cumulative dollar benefits associated with the outcomes considered here (appropriately discounted) can generate benefits for California society that more than outweigh the cost of a high-quality, universal preschool program.

As summarized in Table 3.3, based on sources cited in Karoly and Bigelow (2005), each year of special education use that is avoided is estimated to save California taxpayers $8,421.[3] A high school graduate is estimated to earn $132,000 more than a high school dropout, in present-value earnings over a lifetime (where earnings are projected through age 65). The California public sector also benefits from higher lifetime earnings by gaining more than $5,000 in additional tax revenue, in present-value dollars, for each additional high school graduate. The differentials are even higher ($303,000 in present-value earnings and $17,000 in present-value state tax revenues) when the likelihood of additional school beyond high school is taken into account. 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. These figures for child maltreatment and juvenile crime do not account for any intangible victim costs (e.g., pain and suffering), nor do they account for any subsequent lifetime savings to the criminal justice system and to victims as a result of also preventing adult crime.

We emphasize that the estimates presented in this chapter are subject to uncertainty from several sources, and this must be considered when interpreting the magnitude of the findings. The underlying effects of a high-quality preschool program in the Chicago CPC study, while estimated with considerable precision, are subject to statistical error. This means that the true effect of the Chicago program could be somewhat higher or lower than we have assumed. In addition, the effects found for the disadvantaged children in Chicago—a group of primarily African American children and a small minority of Hispanic children (10 percent)—may be larger or smaller given the race and ethnic

[3] This figure and others cited in this paragraph are all measured in 2003 present-value dollars, where future dollars are discounted at a 3 percent real discount rate to age 3. The public sector savings reported here are for California; they exclude any savings to the federal government.

Table 3.3—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 reported here are for California; they exclude any savings to the federal government.

differences in the at-risk population in California.[4] We further attenuated the estimated CPC effects to account for the differences in the expected effects of a universal preschool program versus those of a targeted program like the Chicago CPC. This introduces modeling uncertainty based on the underlying assumptions we use to derive the attenuation rates in Table 2.5.[5] This modeling

[4] To the extent that children are at risk of poor schooling outcomes on the basis of factors such as low family income, living in a single-parent family, and having a parent with less education—factors associated with race and ethnicity—the effects found for a disadvantaged population in Chicago are likely to be realized in other settings where the race and ethnic makeup of the at-risk population differs. However, the magnitude of the effects could be larger or smaller to the extent that race or ethnicity have independent effects (e.g., because of cultural differences) beyond the other risk factors they are correlated with.

[5] Karoly and Bigelow (2005) adopt a range of assumptions about the distribution of benefits across children of varying risks and by the type of preschool experience a child would have had in the absence of a universal preschool program (i.e., the weights presented in Table 2.2). Between a more-conservative set of assumptions and a less-conservative set, the attenuation

uncertainty extends to the population projections and Census data that we used to estimate key parameters for each geographic unit in the model. Finally, there is uncertainty in the estimates of baseline outcomes used to derive the percentage changes for each geographic unit. Some of the largest percentage effects occur when the baseline rates are especially low or high, levels that often seem inconsistent with rates for similar counties.

Given each of these sources of uncertainty, it is essential that any of the figures reported in this chapter be interpreted with care. In effect, each of the estimates in Tables 3.1 and 3.2 has an error band. Moreover, those error bands would be expected to widen as county size decreases (simply due to the sample-size differences in the Census). Thus, while the results provide a gauge of the potential magnitude of the effects and the relative magnitudes across geographic units, small differences in effects across outcomes for the same geographic unit or small differences in effects for the same outcome across geographic units may not represent true differences once the various sources of uncertainty are accounted for.

The estimates presented here also do not take into account the effect that migration would have on effects of a universal preschool program in California at the county or county-group level. Karoly and Bigelow (2005) conducted a sensitivity analysis for the statewide results, accounting for out-of-state migration. Such an analysis at the county or county-group level is beyond the scope of this study. Nevertheless, it is important to recognize that, just as migration patterns can affect estimated effects at the state level, they can also affect outcomes at a more-disaggregated level.

To simplify the argument, consider the case where there is no out-of-state migration in California, only in-state migration. Migration of children after they leave preschool would result in some benefits being realized in counties other than the county where the preschool education took place. For example, some of the estimated reduction in high school dropouts in county X may be realized in county Y if children move from the one county to the other before the outcome is realized. If the net effect of migration across counties is zero (i.e., the number and distribution of children in each California cohort who eventually leave a county are just balanced by the number and distribution of children from that cohort who arrive in the county), the effects we have estimated will not be

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factor for California as a whole ranged from 16 to 41 percent (versus the 23 percent baseline rate used in this analysis).

affected. However, in the coming decades, there is likely to be a redistribution of the population across counties, with some being net receiving counties and others being net sending counties. If that occurs, the effects we have estimated for California's program will be too small for the receiving counties and too large for the sending counties. Moreover, any out-of-state migration means that some of the improved outcomes we have estimated for any given county, as well as for California as a whole, would be realized in another state. (At the same time, California counties could also benefit from in-migration of individuals who participated 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 upon the balance between out-migration to any location (in or out of state) and in-migration from within California.

4. Conclusions

This study provides estimates, at a disaggregated geographic level, of the benefits from a high-quality, one-year, universal preschool program in California. Building on the methodology employed in Karoly and Bigelow (2005), we have generated estimates for the 13 largest California counties (in terms of the projected population of 4-year-olds in the next decade) and for five county groups; these large counties and groups together represent 96 percent of the projected California population of 4-year-olds. We focus on a series of nine outcomes specific to educational processes and attainment, child maltreatment, and juvenile crime. For each outcome and geographic unit, we estimate the effect of a universal preschool program for each annual cohort of 4-year-olds served by the program. Where possible, we estimate what the baseline level of the outcome would be in the absence of a universal preschool program, so that the absolute changes can be measured in percentage terms.

The statewide estimates are consistent with the findings reported in Karoly and Bigelow (2005). In particular, for each annual cohort of 4-year-olds served, a universal preschool program in California is estimated to result in 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, 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.

The estimated effects for each county and county group reflect differences in population size and in the distribution of children by risk status and current preschool participation rates. When outcomes are expressed in percentage terms, they vary around the statewide average, largely in predictable ways. For the most part, the percentage effects for the largest counties—Los Angeles, San

Diego, and Orange counties—do not deviate much from the statewide average. 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 region—are estimated to be more attenuated than the state average, so their percentage effects tend to be smaller as well. In contrast, geographic units with lower incomes (and therefore lower current preschool participation rates)—Fresno and Kern counties and the Central Valley region—are estimated to have less-attenuated effects and thus percentage effects that are generally above the statewide average. The exceptions to these patterns tend to be due to extremes in the baseline estimates, i.e., counties that have baseline rates for specific outcomes that are relatively high or low compared with those of similar counties.

While the level and percentage effects for the nine outcomes 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. Estimates from our prior study demonstrated that the cumulative effects of changes in the nine outcomes examined here would generate dollar savings to California society that exceed the cost of providing a high-quality, universal preschool program.

We emphasize that there are a number of sources of uncertainty associated with the results presented here. The specific figures presented for California as a whole or for specific counties and county groups are not intended to capture the exact effects of a universal program. Instead, these estimates provide a gauge for the approximate size of the effects and how they might differ across different geographic units in the state. Small differences in effects across outcomes for the same geographic unit or small differences in effects for the same outcome across geographic units may not represent true differences once the various sources of uncertainty are accounted for. Moreover, the effects of migration on the county and county-group estimates are not accounted for and could lead to underestimates or overestimates of likely effects, depending on the balance between out-migration to any location and in-migration within California.

Despite the uncertainty in the estimates, this disaggregated analysis provides relevant local perspective for public and private sector decisionmakers who are 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 both the public sector and private individuals.

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