



# Methodology for ‘The Cost of Inaction on Universal Preschool’

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## Summary

The memo describes the methods used to derive an estimate of the economic benefits of high-quality universal preschool over the lifespan of a cohort of students. This analysis has four steps:

1. Calculate total costs of high-quality universal preschool for a cohort of 4-year-old children, by state.
2. Calculate total benefits of high-quality universal preschool for a cohort of 4-year-old children, by state.
3. Calculate net benefits of high-quality universal preschool, by state.
4. Add together individual states’ net benefits to calculate national estimate of net benefits of preschool.

This memo also describes a preliminary analysis used to calculate the difference between potential net benefits of universal preschool—as described above—and current net benefits.

## Assumptions

- A universal public preschool program would enroll about 75 percent of all 4-year-old children.
- States would scale up enrollment while maintaining or improving quality.
- To provide high-quality preschool, states would have to spend as much per student in preschool as they do in elementary and secondary school.

The authors' assumption of 75 percent enrollment is based on current enrollment rates in states and districts that offer universal programs.<sup>1</sup> It is comparable to the enrollment rate of 5-year-old children in public kindergarten<sup>2</sup> and is more conservative than another recent report's projected 86 percent enrollment rate for universal preschool.<sup>3</sup> The authors also assume that in order to meet quality standards, costs per child would have to meet minimum benchmarks. Based on work by Ajay Chaudry, Taryn Morrissey, Christina Weiland, and Hirokazu Yoshikawa, the authors determined that states' spending per child in preschool would have to match or exceed spending per child in kindergarten through 12th grade.<sup>4</sup>

## Data sources

The authors utilize multiple sources of data from individual states:

### *Estimated enrollment of 4-year-olds in universal high-quality preschool*

Estimates of each state's 4-year-old population were taken from the 2015 U.S. Census Population Estimate, as cited in the 2016 State of Preschool Survey conducted by National Institute of Early Education Research (NIEER). This is an annual survey tracking funding, access, and policies of state-funded preschool.<sup>5</sup> This was then multiplied by 75 percent to yield the estimated enrollment of 4-year-old children in universal preschool.

### *Estimated total spending per child needed for universal high-quality preschool*

Cost per child needed for universal high-quality preschool was set equal to each state's total expenditure per pupil for public elementary and secondary schools for the 2013–14 school year, the most recent year for which data was available.<sup>6</sup> Per pupil expenditures were converted to 2016 dollars by adjusting for inflation.

### *Estimated benefit per child associated with universal high-quality preschool*

Benefit estimates were taken from Washington State Institute of Public Policy's (WSIPP) benefit-cost analysis of state and district early childhood education programs. WSIPP calculates estimates by first conducting a meta-analysis of high-quality studies from around the United States.<sup>7</sup> WSIPP's meta-analysis used 18 studies published between 1967 and 2013 representing a mix of targeted and universal programs. Most programs evaluated were one-year programs for 4-year-old children. Children in the treatment group received either district- or state-funded preschool, whereas children in the comparison group could have received other early learning and child care options available in the community, including family care, Head Start, and other preschool programs. Although studies were selected for their analytical rigor, many of the programs evaluated in these studies are regarded as high quality. Most programs for which data was available met at least 8 of 10 NIEER quality standards, a checklist of research-based benchmarks designed to capture resources needed to support high quality.

WSIPP integrates benefits from four different perspectives:

1. The benefits that accrue solely to program participants, for instance, preschool students and their parents
2. Benefits that accrue to taxpayers
3. Benefits that accrue to others
4. Indirect benefits

The categories of “others” and “indirect” capture spillover benefits of improvement in human capital outcomes as well as net changes in the deadweight costs of taxation.<sup>8</sup>

WSIPP estimates of future benefits are expressed in present value terms, after applying a discount rate.<sup>9</sup>

As the WSIPP estimate is adjusted to pertain specifically to costs of living in Washington state, the authors had to adjust the estimate prior to applying to different states. To approximate estimates for each state individually, the authors first used data on average earnings in 2015 to calculate a ratio of each state’s average person earnings, relative to Washington state’s. Data were taken from the Current Population Survey.<sup>10</sup> Next, the authors used this ratio to adjust WSIPP’s per participant benefit estimate, making it appropriate for each state.

The WSIPP benefit estimate accounts for a wider range of outcomes than other pre-school benefit cost estimates (e.g., Timothy Bartik and others’ 2012 benefit-cost analysis of Tulsa, Oklahoma, a universal preschool program).<sup>11</sup> In particular, the WSIPP estimate accounts for benefits that accrue to parents. As a result, WSIPP’s estimates are somewhat higher than estimates generated in other studies (e.g., \$41,684 vs. \$30,518–\$37,335 for Tulsa).<sup>12</sup> However, WSIPP’s estimates of benefits that accrue to children are similar to estimates from other benefit-cost studies (e.g., \$37,022 vs. \$30,518–\$37,335 for Tulsa).<sup>13</sup>

Because the WSIPP estimate uses well-designed studies evaluating both targeted and universal preschool, it represents one of the best available estimates of the benefits of preschool. However, as many studies evaluated targeted preschool programs serving lower income students—and research shows lower-income students benefit more from high-quality preschool<sup>14</sup>—it is possible the WSIPP estimate could overstate the benefits of scaling up preschool to a universal program. Nevertheless, as the WSIPP estimate is similar to benefit-cost estimates from Tulsa—a high-quality universal preschool program—this suggests the WSIPP’s estimate is reasonable.

## Calculating potential net benefits

The following formula was used to calculate the potential net benefits of high-quality universal preschool:

$$\begin{aligned} \text{Potential net benefits} &= \text{Total potential benefits} - \text{Total potential costs} \\ &= (75\% \text{ 4 yo population} \times \text{benefit per child}) - (75\% \text{ 4 yo population} \times \text{spending per child needed for quality}) \end{aligned}$$

*Step 1: Calculate total costs of high-quality universal preschool for 4-year-old children.*

To determine total costs of high-quality universal preschool in each state, the authors multiplied the number of 4-year-old children served (assuming 75 percent enrollment rate) by state-specific cost per student.

*Step 2: Calculate total benefits of high-quality universal preschool for 4-year-old children.*

To determine total benefits of high-quality universal preschool in each state, the authors multiplied the number of children served (assuming a 75 percent enrollment rate) by state-adjusted WSIPP benefits estimates.

*Step 3: Calculate net benefits of high-quality universal preschool, by state.*

Potential net benefits were calculated by subtracting total cost of high-quality universal preschool from the total benefit of high-quality universal preschool.

*Step 4: State estimates of net benefits were then summed to create a national estimate.*

## Preliminary analysis

Recognizing that some states have already made progress toward high-quality universal preschool, the authors also conducted a preliminary analysis to calculate how much more states may gain by either expanding their preschool program or improving program quality.

First, the authors calculated the current net benefits that states attain under the present system of state-sponsored preschool by subtracting total current costs from total current benefits. To determine total current costs, the authors multiplied NIEER's state-specific estimates of current preschool enrollment for 4-year-olds by total spending per child in preschool for the 2015–16 school year, as reported by NIEER.<sup>15</sup>

To determine total current benefits, the authors again multiplied the state-specific NIEER estimates of preschool enrollment for 4-year-olds by a WSIPP estimate that was adjusted for costs of living in each state (as described earlier) and program quality. That is, the state-specific WSIPP-derived estimates were adjusted for current program quality, as measured by number of NIEER quality benchmarks met.<sup>16</sup> States with programs that currently meet an average of 8.5 or more benchmarks—the average rating for studies

included in WSIPP’s meta-analysis of preschool programs—were expected to receive the full state-adjusted per student benefit. For states with average program scores of less than 8.5 benchmarks, the authors assumed a positive linear relationship between program quality and estimated monetary benefit. In light of a lack of clear data on the relationship between program quality and program benefit, the authors chose to model a linear relationship because it is easy to interpret and it captures an important intuition that higher-quality programs are better for children. It is possible that the relationship between program quality and monetary benefits is nonlinear.

$$\begin{aligned} \text{Current net benefits} &= \text{Total current benefits} - \text{Total current costs} \\ &= (\text{current \#4 yo served} \times \text{benefit per child}) - (\text{current \#4 yo served} \times \text{current spending per child}) \end{aligned}$$

Next, authors subtracted these current net benefits from the potential net benefits, described in the previous section. This number represents the additional benefits that states will miss over the lifespan of a single cohort of preschool students by *not* having investing in universal high-quality preschool.

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## Endnotes

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- 4 Ajay Chaudry, Taryn Morrissey, Christina Weiland, and Hirokazu Yoshikawa, *Cradle to Kindergarten: A New Plan to Combat Inequality* (New York, NY: Russell Sage Foundation, 2017).
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- 12 Ibid.
- 13 Ibid.
- 14 Gormley, “Universal vs. Targeted Pre-Kindergarten: Reflections for Policy-Makers”; Helen F. Ladd, “Do Some Groups of Children Benefit More Than Others from Pre-Kindergarten Programs?” In Phillips and others, “The Current State of Scientific Knowledge on Pre-Kindergarten Effects.”
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- 16 Ibid.