



Budget Model

Economic Effects from Preschool and Childcare Programs

Summary: By 2051, we find that a combination of targeted preschool and targeted childcare programs increase GDP by 0.1 percent relative to current policy, even if deficit financed. Universal versions of these programs are more costly and would instead reduce GDP by 0.2 percent by 2051.

Key Points

- Public preschool improves the eventual labor productivity of young children who are enrolled. These labor productivity effects show up much later. Preschool also provides childcare and thereby increases labor force participation for certain lower-income households that show up earlier.
- Universal public childcare produces immediate gains in aggregate labor productivity and boosts GDP 0.2 percent above the current policy baseline in 2031. But by 2051, additional public debt crowds out private investment, and GDP is 0.2 percent below baseline even at low borrowing rates.
- Means-tested targeted childcare reduces the program's cost while still increasing labor supply and productivity, such that GDP increases by 0.3 percent in 2031. By 2051, GDP is larger than baseline by 0.1 percent.

Introduction

Each person in the economy has a level of labor productivity, which along with capital, technology, and hours worked determines that individual's output and income. An individual's labor productivity is determined by factors such as innate ability, work experience, network effects and opportunities, and human capital investments such as education and job training. Although initial labor productivity is affected by influences such as family background, education, and innate ability, an individual's labor productivity evolves during their life cycle. Productivity tends to rise as a worker ages and acquires useful experience, usually peaks in late middle age, and

declines until retirement. Unforeseen positive and negative shocks also affect labor productivity and earnings-- events such as promotions, accidents, lucky opportunities, and so on.

Higher labor productivity has a direct benefit for the individual, who can earn more and accumulate more wealth over time. Improved labor productivity for a significant portion of the workforce also raises overall wages in the economy. That effect occurs because a more productive workforce increases the marginal returns to capital and thus incentives to invest. Greater investment and a larger capital stock make labor even more productive and thus raise wages. These positive feedback effects in the PWBM's model produce higher GDP than predicted from a purely static analysis of labor productivity improvements.

We analyze two programs which affect the labor productivity of different subgroups of the population. These programs are similar to those proposed by the Biden administration.

1. Preschool education. Research indicates that early childhood education improves later educational outcomes and therefore increases an individual's expected lifetime labor productivity. While many households pay for preschool education for their young children (ages three to four), a portion of households do not, due to budget constraints. By providing public preschool options, this policy attempts to increase the prevalence of preschool education in the population.
2. Childcare. Budget constraints may prevent certain households from paying for childcare and thereby force some members of the household to provide childcare rather than to engage in more economically productive work. This policy provides a public childcare option in order to relieve that constraint and allow for greater labor force participation.

For each program, we simulate two policy options: (a) a universal policy and (b) a targeted policy which serves children from households who are economically disadvantaged, defined as households with income below 185 percent of the Federal Poverty Line. Both policies are expansions of the currently served population and are assumed not to reduce existing programs. Using estimates of expected increases in a treated individual's labor productivity, the portion of the population likely affected by the treatment, and expected costs, we project long-run economic consequences in the PWBM dynamic model. We previously implemented this approach in our [analysis of long-run effects of school year extensions after COVID](#).

Both preschool and childcare programs benefit income-constrained parents and caregivers who can increase their work time and productivity. Preschool education also improves the enrolled child's future labor productivity. Additional labor supply arising from childcare services affects economic production immediately, but preschool's education benefits take much longer to appear, as treated cohorts only begin to enter the workforce after about two decades.

We find that a combined universal childcare and preschool program produces GDP which is 0.2 percent lower than the current baseline in 2051 while increasing government debt by 5.9 percent. A targeted combined childcare and preschool program increases GDP by 0.1 percent in 2051 as debt rises by 2.9 percent. Childcare programs raise GDP initially, but the effect declines in time as the cost of these programs drives debt higher. For instance, targeted childcare raises GDP by 0.3 percent in 2031, by 0.2 percent in 2041, and by 0.1 percent in 2051. Preschool programs have minimal impact on GDP during our analysis period. Although childcare and preschool policies have small effects on long-run GDP, subgroups of the population benefit from them. For example, an

average individual in the 30-39 age group in the bottom income quintile values the comprehensive effects of a targeted childcare policy at \$3,480.

Background: Preschool

As government funded preschool programs have expanded, their enrollment has also increased, reaching [enrollment rates of 47 percent for four-year-olds and 16 percent for three-year-olds](#) in 2019-2020. At that time, 37 percent of four-year-olds and 6 percent of three-year-olds were enrolled in state or locally funded preschool. Another 7 percent of three and four-year-olds were enrolled in Head Start, a federally funded preschool program targeted for low income families at or below 100 percent of the federal poverty line, and 3 percent were enrolled in special education.

The estimated annual national average cost (in 2020 dollars) of full day high quality preschool is [\\$12,500 per child](#) for a 180 day school year, about \$4,500 higher than the current average,¹ and are projected to grow at a rate of 1.7 percent above the rate of inflation due to the rising cost of educator labor.² Preschool education programs require not only educators' labor but also capital such as school buildings and facilities. For this analysis, we assume no additional capital cost, with existing public facilities and existing private buildings reassigned to public use. This assumption likely understates actual cost since serving a larger population of children requires additional facilities. Moreover, lack of expanded facilities may delay full implementation of the preschool program in the near-term.

If enrollment rates remain at current levels, in 2022, there will be 2.3 million three and four-year-olds enrolled in public preschools, with another 2 million paying for private programs and the remaining 3 million having no preschool education at all. Based on recent studies,³ we estimate that a nationwide universal expansion would result in 0.4 million three- and four-year-olds shifting from private programs to public ones and another 0.9 million, who would otherwise not have formal preschool education, enrolling in the new public option. Therefore, in 2022, 49 percent of the eligible population of three- and four-year-olds would be enrolled. Total government spending on preschool programs would be \$48 billion. The additional cost of the expansion is \$28 billion. A program targeted specifically at economically disadvantaged students would result in an increase of 0.4 million three- and four-year-old enrollees. After this targeted expansion, 38 percent of the three- and four-year-olds would have access to public preschool and total government expenditure on public preschool would be \$37 billion. The cost of the targeted expansion is \$17 billion. For both policies, we assume the federal government provides preschool nationally to expand existing public preschool programs and that existing programs are additionally funded to provide full-day, high-quality preschool.

Existing research suggests a high rate of return to early childhood education. Preschool tends to raise treated students' test scores in elementary school, probability of high school completion, skills, and productivity in work. Early childhood education also reduces future incidence of criminal activity and use of public assistance among enrolled students.⁴

The first public universal preschool program in the U.S. was implemented in Georgia in 1995. Since it takes decades before treated cohorts enter the labor market, there is little research about long term effects of universal preschool. We use an estimate from [Bailey, Sun, and Timpe \(2020\)](#) that high quality preschool education increases schooling by 0.65 years on average.⁵ We apply a five percent return for each additional year of education, based

on the returns estimated by [Kane and Rouse \(1995\)](#), to arrive at our estimate of the average increase in labor productivity for treated individuals.

Newly enrolled preschoolers joining a universal public preschool program come both from households who do not currently send these children to preschool at all and from households who switch from private to public preschool. While those young children who previously were not enrolled in any preschool receive a labor productivity boost from preschool education, children in households who switch from private to public preschool do not. These switching households effectively receive an increase to their household budget because their previous expense for private preschool is no longer necessary with the provision of the public program. We account for this implicit transfer in our modeling. For all other households, including those with children currently attending public preschool, no such implicit transfer occurs.⁶ For our targeted preschool program, such transfers are assumed not to occur since households who currently pay for private preschool are assumed ineligible for targeted public preschool.

Full-day preschool allows some children's caregivers to pursue work outside the home. Further details on these effects are provided in the section on Childcare below. In our analysis of standalone preschool policy effects, we adjust caregivers' labor productivity for estimated increases to their labor force participation from the childcare effects of sending children to preschool.

SIDEBAR: PRESCHOOL

High-quality preschool, on average, extends further educational attainment by 0.65 years for disadvantaged children ([Bailey, Sun, and Timpe \(2020\)](#)). We assume that the extension applies to post-secondary education and provides a 5 percent increase in labor productivity, according to [Kane and Rouse \(1995\)](#), so newly enrolled children gain an average 3.3 percent increase in lifetime productivity.

Background: Childcare

[Studies](#) have found the provision of childcare affects maternal labor force participation but not paternal labor force participation. Research finds labor force participation effects are strongest for women who have no younger children ineligible for childcare.⁷ The provision of childcare offers budget constrained mothers who stay at home with their children, or only work part time due to caretaking responsibilities, the opportunity to increase their labor supply and to engage in higher-paying work. We estimate that among those economically disadvantaged families with income lower than 185 percent of the Federal Poverty Line, a one percentage point increase in children's enrollment rate in childcare or preschool would result in a one percent increase in maternal labor supply based on [Malik \(2018\)](#).⁸ Childcare policies in the U.S. are new and usually small and targeted, so research in this area is limited. While middle and high-income families may also enroll their children in a public universal childcare program, we do not adjust their labor supply in the model as our literature review shows little effect on maternal labor supply of middle class households and, presumably, high-income households already acquire paid childcare if they want it.

We take our initial estimates of childcare and preschool arrangements for three- and four-year-olds from the National Institute for Early Education Research's [2020 State Preschool Yearbook](#). We assume that currently there are no significant public childcare programs and that childcare is provided in formal private programs paid for by families, or through informal arrangements provided by parents, grandparents, or other unpaid caregivers. For three- and four-year-olds, we assume a preference for preschool over childcare when both are available (since preschool provides greater future benefits to the child while also providing the same childcare benefits to the parents). When childcare is the only option (as when school is out of session or in the absence of the preschool expansion), we assume similar take-up as that which we estimate for preschool. We estimate the universal childcare policy yields an average enrollment rate of 49 percent and the targeted policy yields a 38 percent enrollment rate among the three- and four-year-olds. Since enrollment in formal preschool programs is lower for younger children,⁹ we estimate the enrollment rate in public childcare for one- and two-year-olds under a universal program to be 23 percent and enrollment under a means-tested targeted childcare program to be 13 percent.

Costs of childcare are dependent on age, with costs for younger children being higher than those for older children. We estimate the cost to provide childcare (in 2020 dollars) to be \$20,439 for a single one- or two-year-old child and \$17,152 for a single three- or four-year-old child for 247 days per year.¹⁰ The cost of government spending on the universal childcare program is \$74 billion in 2022, and \$37 billion on a targeted program. As in the case for preschool, these costs grow by an estimated education cost real growth rate of 1.7 percent per year. Again, we do not account for the capital (facilities) requirements of providing childcare in our analysis, so total costs are underestimated, and we assume no delays in policy implementation—the same assumptions we make for the preschool analysis.

Macroeconomic benefits from childcare's effect on labor supply arise when childcare can be provided for less total cost than the opportunity cost of the current caregiver. For example, if a mother can take a job earning \$10 per hour while the cost to take care of her child is \$12 per hour, then total output declines if she chooses to send her child to a childcare center and go to work herself. This mother's childcare decision benefits the macroeconomy only if the mother's human capital increases sufficiently from work experience so that future income exceeds costs (on a net present value basis). Furthermore, measurements of GDP may overestimate the macroeconomic benefit of higher labor force participation because non-market production is not counted in GDP. For instance, if Alex takes care of Bella's children and Bella takes care of Alex's children, then no real benefit occurs but measured GDP rises by the two transactions. In our analysis, we assume that the estimated labor productivity increases are not offset by any switching between market and non-market production. Thus, our positive GDP effects are likely an over-estimate.

Similarly to the case with universal preschool, some households entering a universal childcare program switch from formal private childcare to the public option. Those households effectively receive an increase to their household budget because their previous expense for childcare becomes covered by the public program. We account for this implicit transfer in our modeling. As with targeted preschool, the targeted childcare program is assumed to have no implicit transfers.

SIDEBAR: CHILDCARE

Based on [Malik \(2018\)](#), we estimate an average labor productivity increase of 48 percent for mothers of economically disadvantaged children aged one to four under a public childcare policy. This group will make up three percent of the total working age population, have a labor force participation rate of 60 percent, and earn 0.7 percent of all labor income in 2022.

Estimated Economic Effects

We analyze (a) public preschool for three- and four-year-olds, (b) public childcare for children aged one to four, and (c) the combination of both together. For each of these policies, we consider a universal and a targeted version.

Our targeted policies provide these services to only those households who are economically disadvantaged and who do not currently send these children to formal public or private programs. Universal programs are available to the whole population and include households who switch from private programs to the public option. Household switching does not increase labor productivity, while government costs increase and switching households receive an implicit transfer. Targeted versions of both programs are less expensive for the government and have no distorting transfers.

All policies increase labor supply as childcare and incidental childcare from preschool allow previously constrained workers more access to the labor market. In our modeling of universal versions of the programs, some individuals receive implicit transfers which discourage them from working and dampen the increase in labor supply. Preschool programs increase labor supply from incidental childcare benefits but to a lesser extent than full year childcare. Preschool also increases the labor productivity and labor supply of future cohorts of workers. Since childcare programs serve one- to four-year-olds while preschool serves three- and four-year-olds and for only part of the year, childcare programs are more costly for the government. Table 1 summarizes the characteristics of each of our modeled policies.

Table 1: Details of each modeled policy scenario

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Policy Type			Universal				
Children's Enrollment Status	Families' Economic Status	Age	Childcare	Preschool	Childcare & Preschool	Childcare	
Current Enrollees (no current 1-2 yo enrollees exist; current 3-4 yo enrollees are from pre-existing preschools)	Disadvantaged	3-4 year olds	67 extra days high quality care for 3-4 yo current enrollees	√	education quality improvement for 3-4 yo current enrollees	√	67 extra day: high quality care for 3-4 y current disadvantage enrollees
	Non Disadvantaged	3-4 year olds					x
New Enrollees		1-2 year olds		x			
	Disadvantaged	3-4 year olds	247 days high quality care for 1-4 yo new enrollees	√	180 days high quality preschool for 3-4 yo new enrollees	√	247 days high quality care for 1-4 yo new disadvantage enrollees
	Non Disadvantaged	3-4 year olds		√	180 days high quality preschool for 3-4 yo new enrollees		x

Table 2 shows macroeconomic projections from the PWBM dynamic model for each of the six policy scenarios. In 2051, universal childcare reduces GDP by 0.2 percent as compared to the current policy baseline, while universal preschool leaves it unchanged. GDP in 2051 increases by 0.1 percent relative to baseline for both targeted childcare and preschool. Since childcare is more costly, universal childcare increases government debt by 5.0 percent in 2051 while universal preschool raises debt by 2.1 percent.

Table 2: Macroeconomic effects of childcare and preschool programs

% deviation from baseline

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- Output
- Effective labor units supplied
- Capital
- Government debt

Output

Year	Targeted		Universal		Targeted	Universal	Universal	Universal
	Childcare	Childcare	Pre-K	Pre-K	and	and	Childcare	Pre-K -
	Childcare	Childcare	Pre-K	Pre-K	Childcare	Childcare	- No Cost	No Cost
2031	0.3	0.2	0.1	0.0	0.2	0.1	0.3	0.1
2041	0.2	0.0	0.0	0.0	0.2	0.0	0.3	0.1
2051	0.1	-0.2	0.1	0.0	0.1	-0.2	0.4	0.2

Effective labor units supplied

Year	Targeted		Universal		Targeted	Universal	Universal	Universal
	Childcare	Childcare	Pre-K	Pre-K	and	and	Childcare	Pre-K -
	Childcare	Childcare	Pre-K	Pre-K	Childcare	Childcare	- No Cost	No Cost
2031	0.3	0.3	0.1	0.1	0.4	0.3	0.3	0.1
2041	0.3	0.3	0.1	0.1	0.3	0.3	0.3	0.1
2051	0.3	0.2	0.2	0.2	0.4	0.4	0.3	0.2

Capital

Year	Capital		Capital		Targeted	Universal	Universal	Universal
	Targeted Childcare	Universal Childcare	Targeted Pre-K	Universal Pre-K	Pre-K and Childcare	Pre-K and Childcare	Childcare - No Cost	Pre-K - No Cost
2031	0.1	-0.1	0.0	-0.1	0.0	-0.2	0.2	0.1
2041	-0.1	-0.5	-0.1	-0.2	-0.2	-0.6	0.3	0.1
2051	-0.3	-1.0	-0.1	-0.4	-0.5	-1.2	0.4	0.2

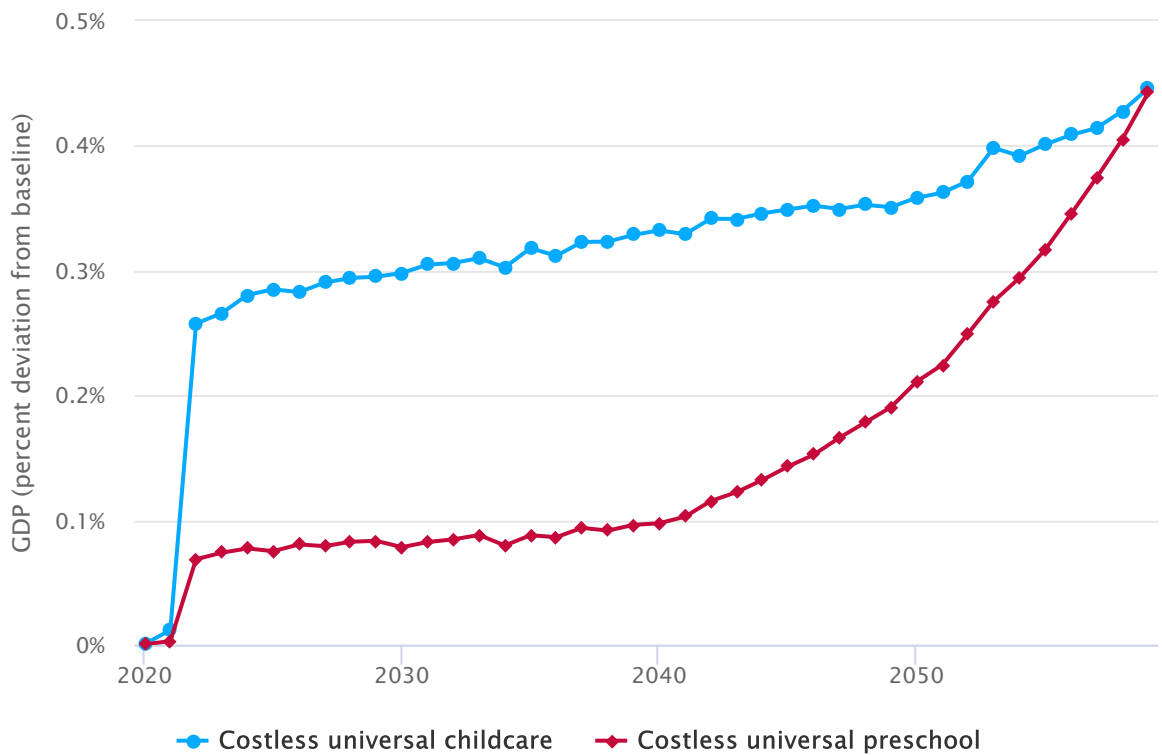
Government debt

Year	Government debt		Government debt		Targeted	Universal	Universal	Universal
	Targeted Childcare	Universal Childcare	Targeted Pre-K	Universal Pre-K	Pre-K and Childcare	Pre-K and Childcare	Childcare - No Cost	Pre-K - No Cost
2031	0.8	2.0	0.5	0.9	1.2	2.4	-0.3	-0.1
2041	1.5	3.7	0.9	1.6	2.1	4.4	-0.7	-0.2
2051	2.0	5.0	1.1	2.1	2.9	5.9	-0.9	-0.3

In addition to the policy scenarios, we look at the effects of universal preschool and childcare programs under a purely illustrative scenario in which the programs cost nothing to implement. These scenarios demonstrate the absolute upper bound of macroeconomic benefits from increased labor productivity. As shown in Figure 1, the labor productivity effects of childcare are larger than those of preschool in the earlier years because the childcare program serves more children for a longer period. Childcare provision allows a relatively small number of low-productivity caregivers to join the labor force, with GDP increasing by 0.3 percent. Preschool provision incidentally provides childcare to a smaller portion of the population than the childcare policy (and for a smaller portion of the year), so near-term labor supply and GDP effects from current workers are smaller, with GDP rising by 0.1 percent in 2031 for the costless preschool policy. However, as cohorts of workers who became more productive, because of their preschool education, begin to join the workforce, GDP increases by 0.2 percent in 2051.

Figure 1: GDP (percent deviation from baseline) for costless universal childcare and costless universal preschool programs

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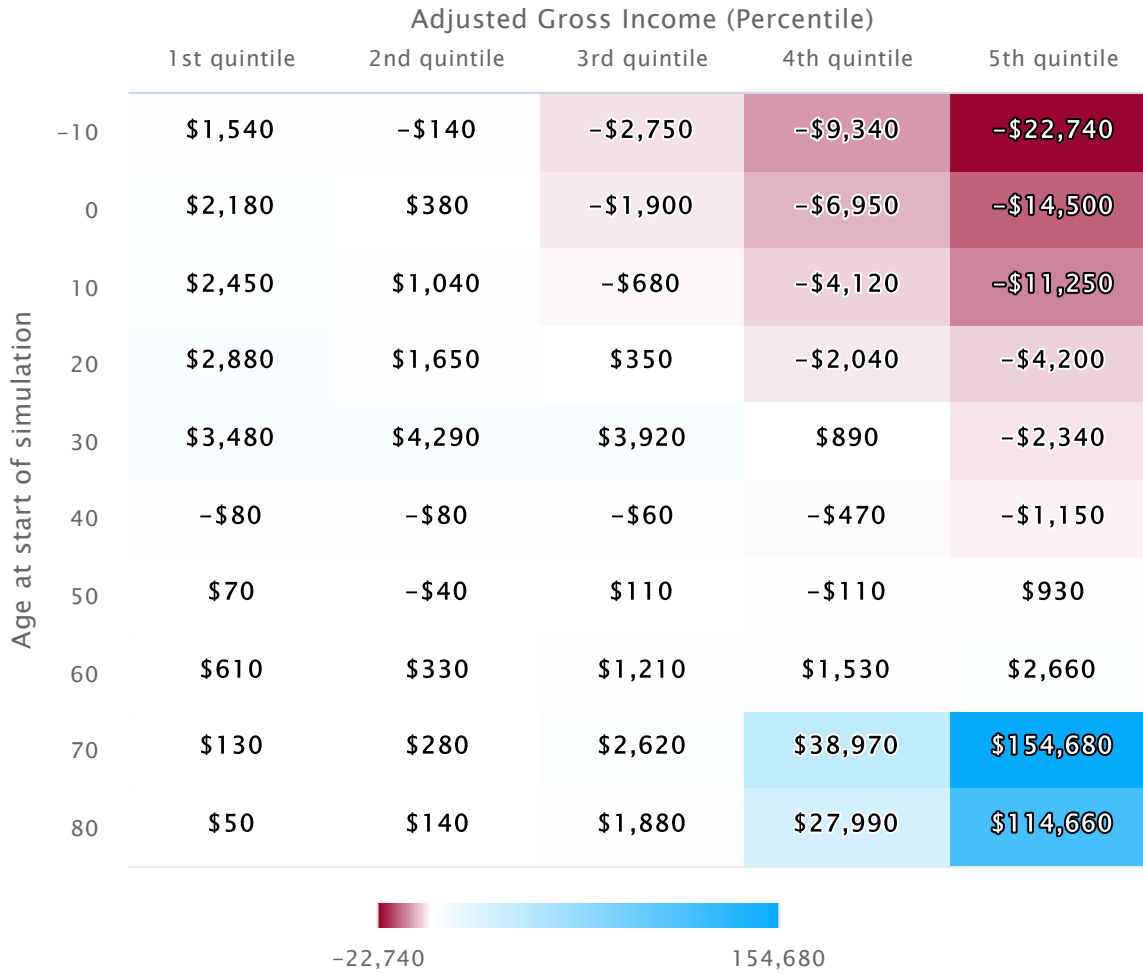
Childcare and preschool programs have large costs, financed through debt, which reduce output gains from the programs’ benefits to labor productivity. Although these policies have small long-run GDP effects, they improve welfare of specific demographic subgroups. Our equivalent variation analysis, shown in Table 3, measures the dollar amount which a person in the model requires in order to be made indifferent between living in a world with the policy versus the current policy world. We show results for targeted childcare and targeted preschool policies.

Table 3: Equivalent variation for targeted preschool and targeted childcare policies

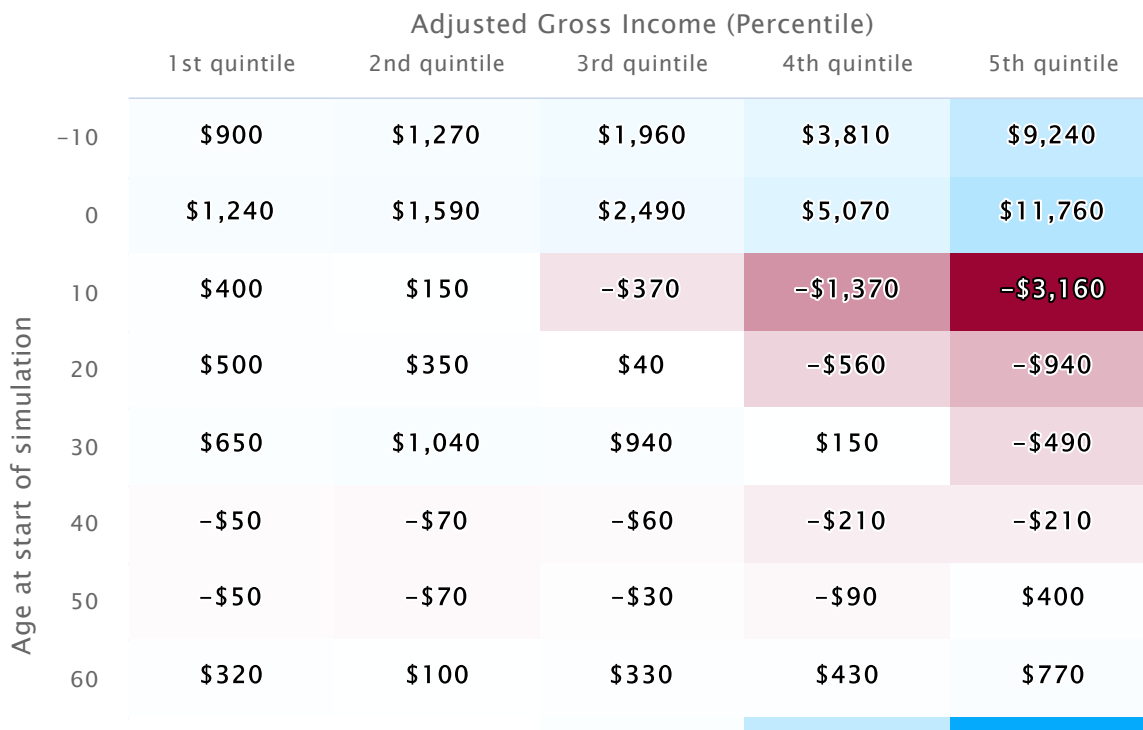
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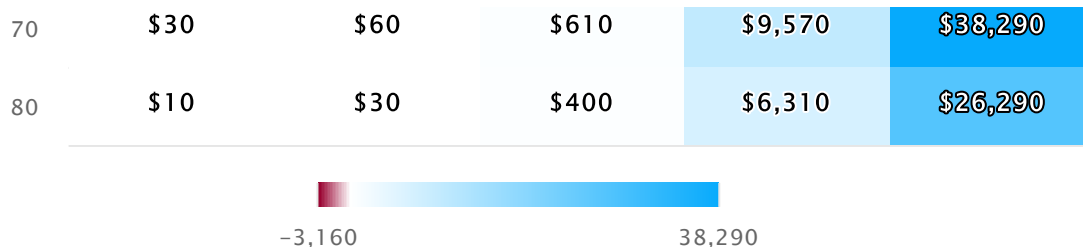
- Targeted childcare
- Targeted preschool

Targeted childcare



Targeted preschool





In general, both the childcare and the preschool policies benefit young poor workers and retirees. Some young poor workers benefit from childcare which allows them greater labor force participation and boosts their labor productivity. Middle-age workers have lower chances of having young children now or in the future so they do not receive any direct benefit from the programs. Middle-aged workers, however, live long enough to be exposed to slower growth from higher government debt. Retirees benefit from the short-run modest macroeconomic improvements and do not live long enough to bear the consequent debt increase. The richer the retiree, the larger the benefit since higher short-run capital returns increase their income from asset holdings.

The main difference between the two policies is for the very young, such as those cohorts born today and in the future. The childcare program’s growing debt is not sufficiently offset by increased productivity, so the long-run economy declines. These future generations thus enter an economy with lower wages and declining growth. In contrast, preschool program costs reduce economic growth in the medium term, but these costs and resulting debt begin to be offset by productivity improvements as the treated individuals enter the workforce. For these very young cohorts, the preschool policy benefits some directly (that is, those born into economically disadvantaged families) through higher wages. At the same time, the macroeconomic growth resulting from an overall more productive workforce benefits all individuals broadly with wages and capital returns rising.

This analysis was conducted by [Daniela Viana Costa](#), [Maddison Erbabian](#), and [Youran Wu](#) under the direction of [Efraim Berkovich](#). Prepared for the website by [Mariko Paulson](#).

1. The average per child cost of government funded preschool programs was about [\\$8,000](#) in the 2019-2020 school year. [↩](#)
2. According to [a report from the Census Bureau](#), average child care cost has increased by 40 percent over two decades in real terms. [↩](#)
3. [Fitzpatrick](#) (2010) and [Cascio and Schanzenbach](#) (2013) use enrollment data of Georgia’s and Oklahoma’s four-year-olds before and after universal preschool was implemented in those two states. While Fitzpatrick estimates that enrollment rate in any kind of preschool program increased by 6-9 percentage points, Cascio and Schanzenbach estimate that the policy led to a 15 percentage point increase in any preschool enrollment and a 25 percentage point increase in public preschool enrollment in particular, suggesting a larger effect of the universal preschool policy and a noteworthy shift from private programs to public ones among those young children. Based on these results, we estimate the increase in any preschool enrollment

and in public preschool enrollment to be 10 percentage points and 14 percentage points for four-year-olds, respectively, and 15 percentage points and 21 percentage points for three-year-olds. ↩

4. The research of [Ludwig and Phillips \(2007\)](#) into the Head Start program and the work of [Fitzpatrick \(2008\)](#), [Cascio \(2017\)](#) on the universal preschool program show early childhood education's effect on students' later academic performance. Other Head Start researchers, like [Garces, Thomas and Currie \(2000\)](#) and [Deming \(2009\)](#), estimate that preschool enrollees could have more years of education and higher future earnings. [Heckman, Moon, Pinto, Savelyev and Yavitz \(2009\)](#) find the Perry Preschool program produced crime reduction and less welfare dependency. ↩
5. Although this study's data comes from the Head Start program, which mainly serves families with income lower than the Federal Poverty Line, this targeted program is comparable with universal high quality preschools in terms of long-run productivity effects. Several studies on early stage test scores, like [Henry, Gordon and Rickman \(2005\)](#), suggest that economically disadvantaged children benefit in universal preschool programs at least as much as they do in Head Start, while non-disadvantaged universal preschool enrollees experience a smaller academic performance boost (see [Cascio \(2017\)](#)). Therefore, it is reasonable to assume that, on average, Head Start and high quality universal preschool programs lead to similar long term benefits.

We assume existing public preschool programs extend schooling by 0.40 years on average (the lower bound estimated by [Bailey, Sun, and Timpe \(2020\)](#)). Current enrollees therefore gain an average 0.25 extra years of education after the quality improvement. ↩

6. We do not give households whose children were already enrolled in public preschool an implicit transfer because they were not paying for preschool before the policy, so the expansion in the size of public programs does not directly benefit these families. However, an increase in the quality or hours of public preschool leads to an increase in future labor productivity for these children. ↩
7. Huebener, M., A. Pape, C.K. Spiess. 2020. "Parental Labour Supply Responses to the Abolition of Day Care Fees," *Journal of Economic Behavior & Organization*, 180: 510-543.
<https://www.econstor.eu/bitstream/10419/215176/1/dp12780.pdf>
Malik, R. 2018. "The Effects of Universal Preschool in Washington, D.C." Center for American Progress.
https://cdn.americanprogress.org/content/uploads/2018/09/14125635/Children-Learning-Mothers-Earning-report.pdf?_ga=2.121734536.228363175.1625670894-455886727.1621976187
Ryu, H. "The Effect of Compulsory Preschool Education on Maternal Labour Supply." *Journal of Development Studies*, 56 (7): 1384-1407.<https://doi.org/10.1080/00220388.2019.1677890> ↩
8. This cited research examines how labor supply of mothers with children younger than five changed after implementation of universal preschool in Washington, D.C.. While preschool (180 school days per year) enrollment rates among three- and four-year-olds increased by 36 percentage points, the maternal labor participation rate among families with income under the Federal Poverty Line increased 38 percent. The change among families with income above the Federal Poverty Line was minor. ↩
9. [Washington D.C.](#) and [Vermont](#)'s universal preschool programs have the highest enrollment rates among three-year-olds, yet both have lower enrollment rates for three-year-olds than four-year-olds. ↩

10. It is well documented that childcare costs for younger toddlers are higher than those for preschool aged children. We take a low estimate of the difference in center-based infant and childcare costs from [VeryWellFamily](#). They estimate that the cost of infant care was 17.1 percent higher than the cost of toddler care in 2020. ↩