Head Start Access: No Evidence of Changes to Lifetime Fertility

By Esra Kose, Siobhan O'Keefe, Maria Rosales-Rueda*

Head Start has been shown to improve long-run education, health, and labor market outcomes of participants (e.g., Garces, Thomas and Currie, 2002; Ludwig and Miller, 2007; Carneiro and Ginja, 2014; Thompson, 2018; Bailey, Sun and Timpe, 2021; Kose, 2023). These effects could influence the fertility choices of women who were exposed to the program in childhood.

The effect of Head Start on total fertility is theoretically ambiguous and therefore requires empirical investigation. While improved labor market opportunities likely increase the opportunity costs of childbearing and may reduce fertility both theoretically (Becker and Lewis, 1973) and empirically (Schaller, 2016), more resources could lead to increased total fertility for these cohorts if children are a normal good (Black et al., 2013). Previous work has shown Head Start had no statistical significant effect on teen pregnancy (Deming, 2009), but the effect of Head Start on total adult fertility has not been studied.

To examine the relationship between Head Start access and fertility, we use a robust difference-in-differences approach, leveraging variation from the rollout of Head Start across counties and over time between 1966 and 1980 for cohorts born 1955 through 1975. We find that Head Start access does not affect adult fertility on either the extensive or intensive margins: our results suggest that there is no meaningful effect in the share of the cohorts who have any children nor in the total number of children born to women before age 45.

This study contributes to the growing literature on the long-term and intergenerational effects of War on Poverty programs (e.g., Bailey et al., 2023; Bailey, Sun and Timpe, 2021; Barr and Gibbs, 2022; Kose, O'Keefe and Rosales-Rueda, 2024) by examining later-in-life fertility responses as an indicator of adult socioeconomic well-being.

I. The Head Start Program

Head Start started in 1965 as a part of the War on Poverty initiative during Lyndon Johnson's presidency. It aims to close socioeconomic gaps in school readiness by providing education, nutrition, and health services for economically disadvantaged preschool-aged children. It started as a summer program and by 1980 more than 1500 counties had launched this program.

Head Start rollout data are from Bailey, Sun and Timpe (2021). Treatment exposure is defined by the year that each county obtained any Head Start funding from 1966 to 1980 and the age of the mother when Head Start arrived in her county. Figure 1 shows the geographic and time variation in the program rollout. Counties shaded in yellow and light green were early adopters and the darkest blue represents later adopting counties. Unshaded counties did not adopt Head Start until after 1980.

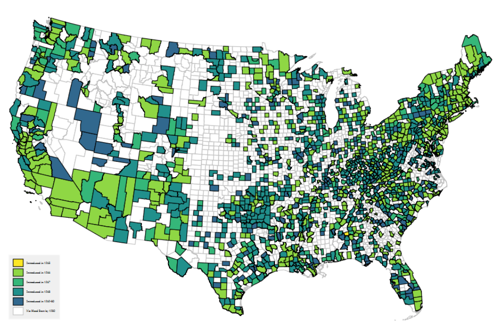

Figure 1. Timing of Head Start Adoption and Geographic Variation 1966-1980

Source: Data are compiled by Bailey, Sun and Timpe (2021) using National Archives and Records Administration, Community Action Programs and Federal Outlay System Files.

* Kose: Department of Economics, University of California, Merced (email: esrakose@ucmerced.edu); O'Keefe: Department of Economics, Davidson College (email: siokeefe@davidson.edu); Rosales-Rueda: Department of Economics, University of Delaware (email: mrosales@udel.edu). We thank Sheridan Fuller for helpful comments.

II. Data

Our primary data source is the Vital Statistics Natality data from the National Center for Health Statistics from 1970 to 2019. The estimation sample includes mothers who were born between 1955 and 1975. Importantly, mothers' state of birth, state of residence, and county of residence are reported in the Vital Statistics data, but mothers' county of birth is not reported. To improve the accuracy of treatment assignment, we restrict the sample to mothers who were born and gave birth in the same state. Conditional on this, we use county of residence when giving birth to assign maternal exposure to Head Start.

We follow the procedure of Currie and Schwandt (2014) to create two measures of fertility that capture the extensive and intensive margins. To capture the extensive margin, we calculate the number of women in the county-birth year cohort with any children by totaling all the first births observed to women. For the total fertility measure (intensive margin), we add all births observed to women in a cohort before age 45, as that is the latest age we observe all cohorts. Both of these measures are divided by the total number of women in the birth cohort to create the proportion of women with any children and the total fertility rate. Data on cohort size by county are from Bailey et al. (2016).

III. Methods

This paper leverages variation in Head Start funding availability across counties and over time from 1966 to 1980. To estimate the causal effect of maternal access to Head Start on fertility, we use a difference-in-differences design and a flexible event-study framework. For computational ease, we collapse the Vital Statistics data into county and mother's birth-year cells. Our static specification is the following:

$$Y_{ct} = \alpha + \beta HeadStart_{ct} + \\ + \theta_c + \mu_{st} + \varepsilon_{ct} \tag{1}$$

where Y_{ct} is either the proportion of women with children or the total fertility rate for a cohort of women born in county c and year t.

$HeadStart_{ct}$ captures maternal exposure to Head Start based on the mother's birth year and county of residence at child's birth. $HeadStart_{ct}$ is equal to 1 if Head Start was available in county c when the mother was six or younger. Unfortunately, we do not observe the mother's exact date of birth. Therefore, to calculate the mother's year of birth and her corresponding age at the Head Start rollout, we use the mother's age at the time of birth and the child's year of birth. This approach may misassign treatment exposure for mothers who were near the eligibility cutoff age when Head Start funding arrived in their county. Therefore, we define exposure as age six and younger so that we do not accidentally assign treated mothers to the untreated group.[1]

θ_c represents county (of residence at child's birth) fixed effects that absorb time-invariant geographic characteristics that could be correlated with the Head Start rollout. We also include state-by-year fixed effects (μ_{st}) to account for changes in state policies that could differentially affect mothers' birth cohorts (Bailey, Sun and Timpe, 2021). Regressions are weighted by the number of women in the cohort, and standard errors are clustered at the county level.

To examine dynamic treatment effects, we estimate the following event-study specification:

$$\begin{aligned} Y_{ct} &= \lambda D_c 1\left(AgeTreat_{ct} \leq -6\right) \\ &+ \sum_{a=-5}^{12} \tau_a D_c 1\left(AgeTreat_{ct} = a\right) \\ &+ \nu D_c 1\left(AgeTreat_{ct} \geq 13\right) \\ &+ \theta_c + \mu_{st} + \varepsilon_{ct} \end{aligned} \tag{2}$$

where D_c is a binary treatment variable

[1] Head Start eligibility depends on age, family income, and the state age cutoff for first grade, none of which we can observe in our data.

Table 1—The Effect of Mother's Exposure to Head Start on Fertility

	Any children		Total Fertility Rate	
	(1)	(2)	(1)	(2)
Maternal HS exposure	0.0095	0.0057	0.0396	0.0251
	(0.0177)	(0.0098)	(0.0388)	(0.0215)
Adj. R-Squared	0.833	0.858	0.853	0.876
Obs	60862	60841	60862	60841
State-by-BirthYear		Y		Y

Note: Sample includes mothers who were born between 1955 and 1975. All regressions include mother's birth year and county of residence at birth fixed effects. Standard errors are clustered at the county level.

equal to one if the county ever receives a Head Start grant. Indicator variables, $1(AgeTreat_{ct} = a)$, capture the mother's age in the year that Head Start became available in county c for observations in counties that ever received the program and are zero in all periods for counties without a Head Start program by 1980. The identifying variation for the coefficients τ_a is driven by differential exposure to Head Start's introduction within cohorts across counties and within counties across cohorts. Head Start's target age group at the time of its introduction was three to five, although children up to age six did attend some programs (Levitan, 1969). As ages older than six are not treated, the evolution of the coefficients for those ages tests the parallel trends assumption that in the absence of the program, counties with and without Head Start would have had similar trends in fertility outcomes.

To address the potential biases from treatment effect heterogeneity that may contaminate staggered designs like as ours (Goodman-Bacon, 2021), we estimate these specifications using Sun and Abraham (2021). Our control group is the set of counties that have not adopted Head Start by 1980.

As counties that introduced Head Start before 1980 may be different than those that did not, our preferred estimates use inverse propensity score weights to make control counties more comparable to treated ones. In particular, we reweight untreated counties using an estimate of the propensity of Head Start adoption in the county by 1980 ($\hat{p}$), based on a logit model of program characteristics.[2] For control counties (no Head Start by 1980), we weight the cells by the size of the cohort multiplied by $\hat{p}/(1-\hat{p})$. For treated countries, the weight is left as the size of the cohort.

IV. Effects on Fertility

Table 1 presents the static effects of Head Start exposure on the extensive margin (any children) and the intensive margin (the total number of children) of fertility. For each outcome, the first column estimates a baseline specification that includes mother's birth year and mother's county of residence at child's birth fixed effects. The second column presents our preferred specification that adds mother's birth state-by-birth year fixed effects. The results from both specifications indicate that early life exposure to Head Start does not affect later fertility for adult women.

Turning to the dynamic effects, Figure 2 plots the event study coefficients of maternal exposure to Head Start by age at rollout using our preferred specification. Given the nature of the Head Start program and the staggered implementation, mothers aged four to six were partially exposed (only a few preschool years), while mothers who were age three or younger when their county received a Head Start grant were fully exposed for all their preschool

[2]The logit model includes the share of the population under poverty, the share of the population under 5 years old and 65 and older, the share of the adult population with various levels of education, the share non-white, the share urban/rural, welfare programs transfers per capita, median family income and the number of doctors per capita in 1960.

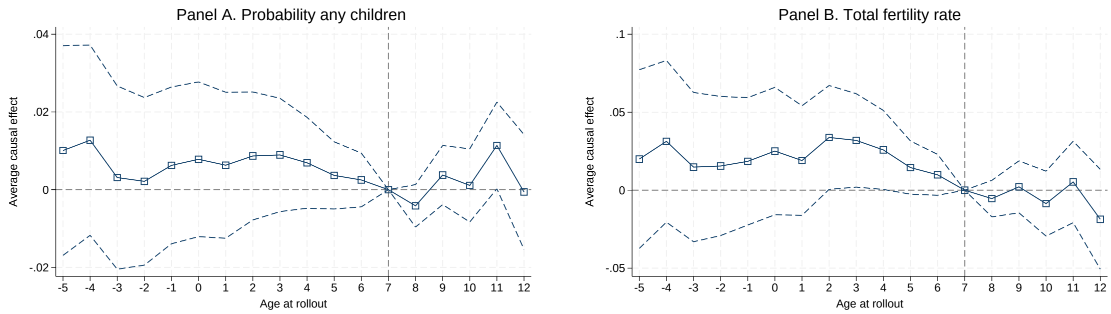

Figure 2. Dynamic effects of Head Start on Completed Fertility

Note: Sample corresponds to women born between 1955 and 1975. This figure plots the estimated coefficients and 95% confidence intervals obtained from Equation (2). The X-axis corresponds to maternal age at Head Start rollout. The omitted category is age seven. We bin distant observations including maternal ages older than 12 years, and maternal ages less than age -6 (not reported in the figure).

years. In contrast, mothers older than six at Head Start rollout would not benefit from the program as they were too old to participate. Thus, the coefficients for older cohorts can test for differential pre-trends and should be close to zero.

Figure 2 shows that women partially or fully exposed to the program did not meaningfully change their fertility choices. Panel A shows small and statistically insignificant effects on the fraction of women in a cohort who have any children. Similarly, the effect on the total fertility rate by age 44 is relatively small and generally insignificant. There is also no evidence of significant differential pre-trends in fertility.

To place our results in context, East et al. (2023) examined the intergenerational effects of access to health care through Medicaid and found no effect of early life exposure to Medicaid coverage on later fertility. Becker and Lewis (1973) discuss the trade-offs between the "quantity" and "quality" of children, a framework often used to explain the negative relationship between women's education and fertility. However, the prior literature finds mixed results. For example, Currie and Moretti (2003) show that increases in women's education through access to university openings led to a reduction in expected fertility, while McCrary and Royer (2011) find increased schooling driven by variation in school entry policies has no effect on later fertility.

V. Conclusion

This study uses the rollout of the Head Start program for cohorts of women born between 1955 and 1975 to examine the effect of maternal early childhood education on adult fertility outcomes. Using both a static estimation and a flexible event study format, we find that the introduction of the Head Start program did not change intensive or extensive margin fertility patterns for women exposed to the program.

REFERENCES

Bailey, Martha J, Hilary Hoynes, Maya Rossin-Slater, and Reed Walker. 2023. "Is the Social Safety Net a Long-Term Investment? Large-Scale Evidence from the Food Stamps Program." *The Review of Economic Studies*, 91(3): 1291–1330.

Bailey, Martha J, Shuqiao Sun, and Brenden Timpe. 2021. "Prep School for Poor Kids: The Long-Run Impacts of Head Start on Human Capital and Economic Self-Sufficiency." *American Economic Review*, 111(12): 3963–4001.

**Bailey, Martha, Karen Clay, Price Fishback, Michael Haines, Shawn Kantor, Edson Sevemini, Anna

Wentz, et al. 2016. "US County-Level Natality and Mortality Data, 1915-2007." *Ann Arbot, MI: Inter-university Consortium for Political and Social Research (ICPSR)[distributor].*

Barr, Andrew, and Chloe R. Gibbs. 2022. "Breaking the Cycle? Intergenerational Effects of an Antipoverty Program in Early Childhood." *Journal of Political Economy*, 000–000.

Becker, Gary S, and H Gregg Lewis. 1973. "On the interaction between the quantity and quality of children." *Journal of Political Economy*, 81(2, Part 2): S279–S288.

Black, Dan A, Natalia Kolesnikova, Seth G Sanders, and Lowell J Taylor. 2013. "Are children "normal"?" *The review of economics and statistics*, 95(1): 21–33.

Carneiro, Pedro, and Rita Ginja. 2014. "Long-term impacts of compensatory preschool on health and behavior: Evidence from Head Start." *American Economic Journal: Economic Policy*, 6(4): 135–173.

Currie, Janet, and Enrico Moretti. 2003. "Mother's education and the intergenerational transmission of human capital: Evidence from college openings." *The Quarterly Journal of Economics*, 118(4): 1495–1532.

Currie, Janet, and Hannes Schwandt. 2014. "Short- and long-term effects of unemployment on fertility." *PNAS*, 111(41): 14734–14739.

Deming, David. 2009. "Early Childhood Intervention and Life-Cycle Skill Development: Evidence from Head Start." *American Economic Journal: Applied Economics*, 1(3): 111–34.

East, Chloe N., Sarah Miller, Marianne Page, and Laura R. Wherry. 2023. "Multigenerational Impacts of Childhood Access to the Safety Net: Early Life Exposure to Medicaid and the Next Generation's Health." *American Economic Review*, 113(1): 98–135.

Garces, Eliana, Duncan Thomas, and Janet Currie. 2002. "Longer-term effects of Head Start." *American economic review*, 92(4): 999–1012.

Goodman-Bacon, Andrew. 2021. "Difference-in-differences with variation in treatment timing." *Journal of Econometrics.*

Kose, Esra. 2023. "Public investments in early childhood education and academic performance: Evidence from Head Start in Texas." *Journal of Human Resources*, 58(6): 2042–2069.

Kose, Esra, Siobhan O'Keefe, and Maria Rosales-Rueda. 2024. "Does the Delivery of Primary Health Care Improve Birth Outcomes?: Evidence from the Rollout of Community Health Centers." *Journal of Human Resources.*

Levitan, Sar A. 1969. "Great Society's Poor Law; a New Approach to Poverty."

Ludwig, Jens, and Douglas L. Miller. 2007. "Does Head Start Improve Children's Life Chances? Evidence from a Regression Discontinuity Design." *The Quarterly Journal of Economics*, 122(1): 159–208.

McCrary, Justin, and Heather Royer. 2011. "The effect of female education on fertility and infant health: Evidence from school entry policies using exact date of birth." *American Economic Review*, 101(1): 158–195.

Schaller, Jessamyn. 2016. "Booms, busts, and fertility: Testing the Becker model using gender-specific labor demand." *Journal of Human Resources*, 51(1): 1–29.

Sun, Liyang, and Sarah Abraham. 2021. "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects." *Journal of Econometrics*, 225(2): 175–199.

Thompson, Owen. 2018. "Head start's long-run impact: Evidence from the program's introduction." *Journal of Human Resources*, 53(4): 1100–1139.