Interactive effects of Head Start and K–12 spending

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Breaking the cycle of poverty may require early investment in disadvantaged children's skills, followed by sustained investments over time. Without these subsequent investments, the effects of early interventions may disappear. In turn, early skills development may make later interventions more successful. The study discussed in this article, conducted by myself and C. Kirabo Jackson, explored whether such complementarity between early and later childhood investment exists.[1] We looked at whether early childhood investments for disadvantaged children that were followed by increases in public school expenditures were particularly effective at improving children's long-term educational and economic outcomes.

Changes in Head Start and public education funding

In order to evaluate complementarity between early and later investment, we use two policy changes that affected investment in children. The first policy change concerned the Head Start program, which was established in 1965 to increase access to early childhood education and pediatric care for low-income children. Head Start was rolled out incrementally, so there was significant variation over time and location in the amount of spending per pupil, and in what services were available to participants. This variation makes it possible to isolate the effects of Head Start spending. Spending increases can affect: (1) who and how many children enroll in these programs; (2) the quality of pre-kindergarten instruction; and (3) spillover effects on non-Head Start participants in the community.

The second policy change is court-ordered school finance reforms. Until the early 1970s, the majority of public school spending was funded through local property taxes, which meant less affluent neighborhoods tended to have lower per-pupil K–12 spending than more affluent neighborhoods. School finance reforms changed how public school spending levels are determined, reducing inequality in school spending. Again, variation in time and location in these finance reforms makes it possible to isolate the effects of public school spending levels.

Both of these policies had a dramatic effect on funding for education in the United States. We explore the combined effects of the two policies, making use of variation over time and location in spending levels in order to isolate their effects.

We used data from the Panel Study of Income Dynamics on those born between 1950 and 1976 and followed the sample through 2013. Although test scores are often used as outcome measures in evaluating child interventions, evidence suggests that such measures may miss effects on long-run outcomes.[2] Therefore, we looked at a variety of adult outcomes including educational attainment, earnings, poverty, and incarceration.

Evidence of complementarity between early and later childhood investment

An example of our analysis can be seen in Figure 1. The left panel of this figure shows the estimated interaction effects of Head Start spending by the percentile of K–12 spending on the likelihood of graduating from high school. If there is indeed complementarity between the two types of spending, then the plots will be upward sloping. We do see such a pattern. The nearly flat line for nonpoor children indicates that additional spending on Head Start has negligible direct or indirect effects on that population, at any level of K–12 spending. For children from low-income families in public school districts below the 30th percentile of K–12 spending, additional Head Start spending has only small and statistically insignificant effects. In contrast, at the 90th percentile of K–12 spending, an additional $1,000 of Head Start spending per poor four-year-old increases the likelihood of high school graduation by about 6.5 percentage points.

The right panel of Figure 1 shows the marginal effects of increases in K–12 spending across the range of Head Start spending. As expected, for nonpoor children, increased K–12 spending increases graduation rates with no additional effect from increased Head Start spending. For poor children, however, a 10 percent increase in K–12 spending increases high school graduation rates by about 2 percentage points at the 5th percentile of the Head Start spending distribution, and by about 12 percentage points at the 90th percentile.

Similarly, we found evidence of complementarity between Head Start and public K–12 spending for adult outcomes, including years of completed education, adult wages, adult poverty, and the likelihood of incarceration. These findings suggest that increases in per-pupil spending as a result of school finance reform led to improved adult outcomes for those who were exposed to Head Start as preschoolers. These effects are restricted to children from low-income families, and are found only for changes in spending experienced during children's school-age years. Larger spending increases led to larger effects, as did more school-age years of exposure. We find that the effects of a 20 percent increase in school spending are large enough to

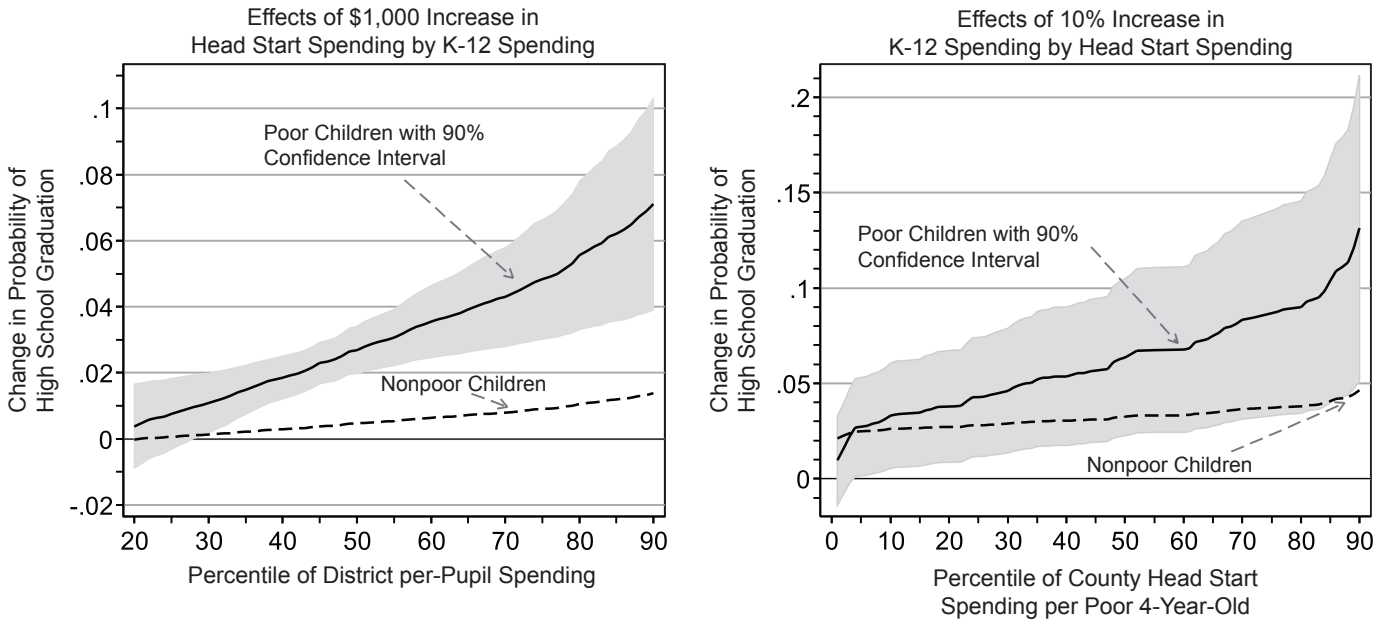

Figure 1. Interaction effects of Head Start and K–12 spending on high school graduation.

reduce outcome gaps between children from poor and non-poor families by at least two-thirds. A 1 percent increase in per-pupil spending increases adult wages for children from poor families by 1 percent. These findings suggest that sustained investment throughout disadvantaged children's development is necessary to narrow long-term disparities in well-being.■

[1]Our study is discussed in more detail at R. C. Johnson and C. K. Jackson, "Reducing Inequality Through Dynamic Complementarity: Evidence from Head Start and Public School Spending," NBER working paper No. 23489, National Bureau of Economic Research, June 2017.

[2]See, for example, J. Heckman, R. Pinto, and P. Savelyev, "Understanding the Mechanisms Through Which an Influential Early Childhood Program Boosted Adult Outcomes," *The American Economic Review* 103, No. 6 (October 2013): 2052–2086.