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**Article**

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## Understanding the Effects of Early Investments in Children

Diane Whitmore Schanzenbach

A growing economics literature is seeking to understand the effects of early childhood influences on later life outcomes. While much recent work explores the effects of health measured at birth, my work and that of others demonstrates the importance of events in early life—but after birth—on long-term outcomes.

A recent review by Douglas Almond and Janet Currie concludes that child and family characteristics measured at school entry explain as much of the variation in adult outcomes as factors such as years of education that are more typically studied by economists.<sup>1</sup> James Heckman argues that the rates of return to human capital investment in disadvantaged populations are highest in early life.<sup>2</sup>

In a series of studies, my coauthors and I have estimated the long-term impacts of interventions in early life. We find that there are promising interventions for children in school settings and through social safety net programs that impact outcomes measured in later adolescence and into adulthood.

### Early Life Interventions and Adult Economic and Health Outcomes

The food stamp program is a central part of the U.S. safety net, and provides vouchers to participants that can be used to purchase food at grocery stores. Participation in the food stamp program increases the total resources available to a family, pushing out the budget constraint and raising consumption levels among participants. When the program was introduced in the 1960s, it was rolled out slowly, over a 13-year period, on a county-by-county basis. Hilary Hoynes, Almond, and I investigate the impact of this safety net trans-

fer by exploiting this variation across geography and time of the introduction of the program.

One of our first studies found that babies who were *in utero* when food stamps were introduced in their county weighed more at birth.<sup>3</sup> But the availability of food stamps at other points during childhood may also have had an impact. In our recent work, we use the Panel Study of Income Dynamics (PSID) to test whether children born prior to the introduction of food stamps in their county also benefited from the program.<sup>4</sup> We start with the cohort of children that we initially observe in the 1968 PSID, follow them into adulthood, and observe their completed education, earnings, and detailed health outcomes such as general health status, height and weight, presence of chronic conditions, and work/activity limitations. We find that individuals with access to food stamps before age five had measurably better health in adulthood, exhibiting improved overall health and lower rates of obesity, diabetes, and high blood pressure.

For women, we also find that childhood access to the food stamp program increases economic self-sufficiency in adulthood. Those with access to food stamps as children were more likely to graduate from high school, earn more, and rely less on the social safety net as adults than those who did not. Interestingly, we find positive but diminishing impacts of food stamps by the child's age when the program was introduced in the child's county. These findings suggest that there are important long-term returns to family income from social supports during early life, and that income-support programs have benefits that have not previously been well quantified.

## Expanding Access to Preschool

Another promising intervention in early life is access to high-quality educational environments. In his 2013 State of the Union address, President Obama proposed sweeping reform to preschool education in the United States. The \$75 billion proposed “Preschool for All” initiative calls for dramatic increases in the number of four-year-olds in public preschool programs and in the quality of these programs nationwide.

The Preschool for All initiative shares many characteristics with the state universal preschool programs that have been offered in Georgia and Oklahoma since the 1990s. While high rates of return have been documented for preschool programs targeted to children of low socioeconomic status, less is known about the impacts of universal programs.<sup>5</sup> Elizabeth Cascio and I draw together data from multiple sources to estimate the impacts of these “model” state programs on preschool enrollment and a broad set of short- and longer-run family and child outcomes.<sup>6</sup>

Using data from the Current Population Survey's October supplement on school enrollment, we find that the universal state programs have increased preschool enrollment rates of children from lower and higher socioeconomic status families alike. For children from lower-SES families, preschool enrollment increased by 20 percentage points, primarily driven by children who otherwise would not have attended preschool enrolling in public programs. For children from higher-SES families, however, the enrollment impact has been more muted at 11 to 14 percentage points. Among these higher-SES children, we measure substantial crowd out due to the universal program. In particular, we estimate that of every 10 higher-SES program enrollees, four or five otherwise would have been in private preschools.

We also document the impacts of universal preschool programs on money and time investments families make in their children. Using

data from the Consumer Expenditure Survey, we find that higher-SES families—for whom private preschool enrollment falls significantly—reduce their spending on childcare. By contrast, lower-SES families—for whom there are larger impacts on the extensive margin—display larger declines in overall maternal time spent with children using data from the American Time Use Survey. This finding is counterbalanced by an increase in “quality” time spent reading, playing, talking, etc., between low-SES mothers and their children.

While the model state programs are still too young for us to estimate their long-term impacts, we are able to explore impacts on achievement as late as eighth grade. For lower-income children, we find positive impacts on math and reading scores as measured on the National Assessment of Education Progress (NAEP) in fourth grade. The impacts on this group diminish substantially by eighth grade, but sizable impacts on math scores remain. Conversely, although some children from higher-income families were more likely to have attended preschool and other families effectively received sizable income transfers from the program, their academic achievement does not appear to have improved in either grade.

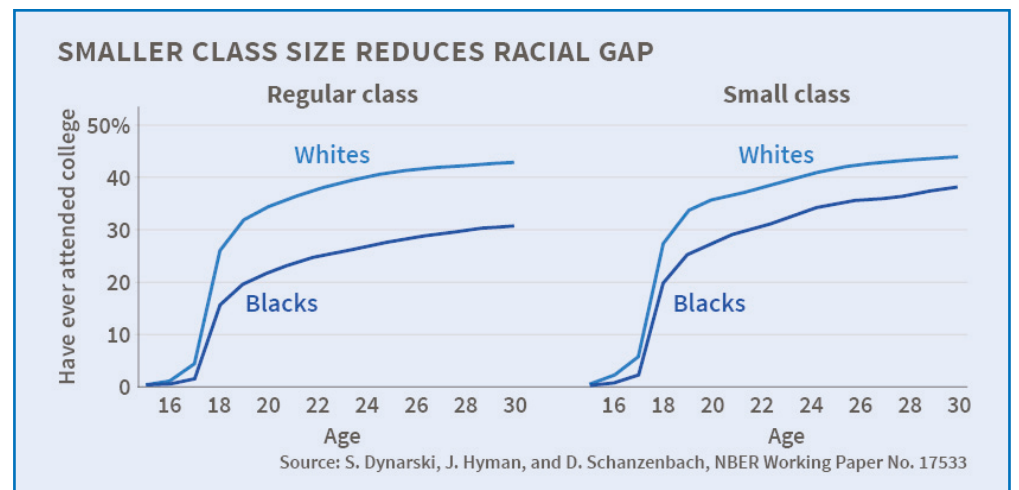
We view these results as highly consistent with the broad patterns in the preschool literature, with highest economic returns coming from programs

that are both high quality and highly targeted, and returns diminishing as the students' counter-factual experiences in the absence of a public preschool program increase.

## Long-run Impacts of Early Elementary School Experiences

Another widely-discussed early-life intervention is improvement in the quality of schooling for students in the early elementary grades. Project STAR was a randomized experiment conducted in Tennessee in which over 11,000 students and their teachers were assigned to classrooms that varied in class size and other measures of quality. The experiment included one cohort of children that started kindergarten in the 1985–86 school year. By now, the students in the original cohort have become adults, and researchers have been able to use a variety of administrative databases to follow their progress to determine whether the intervention had meaningful lasting impacts.

Susan Dynarski, Joshua Hyman, and I measure the impact on educational attainment in adulthood of being randomly assigned in grades K-3 to a small class (with on average 15 students) instead of a larger class (with on average 22 students).<sup>7</sup> Using a data match obtained from the National Student Clearinghouse, we find that assignment to a small class increases the probability of attending college by 2.7 percentage points.





The impacts are considerably higher among populations with traditionally low rates of postsecondary attainment. For example, the estimated impacts on college attendance are 5.8 percentage points among black students, and 4.4 percentage points among students who were eligible for a subsidized school lunch at the time of the original experiment. Among students attending schools with the highest concentration of poverty, small class assignment raised the rate of college attendance by 7.3 percentage points, and among students with the lowest projected probability of attending college, the impact is 11 percentage points. In addition, small classes in the early grades improve the likelihood of earning a college degree, and majoring in a more technical and high-earning field, such as science, technology, engineering, mathematics, business, or economics.

Using administrative tax return data, we are able to broaden the scope of adult outcomes studied in the Project STAR experiment. Raj Chetty, John Friedman, Nathaniel Hilger, Emmanuel Saez, Danny Yagan, and I analyzed the impacts of the experiment on outcomes ranging from earnings to retirement savings, home ownership, and marriage.<sup>8</sup> While we study long-term impacts of random assignment to a variety of observable characteristics such as class size and teacher experience, we also estimate “classroom effects”—the combined effects of teachers, peers, and other class-level shocks—on later life outcomes. An analysis of variance revealed that kindergarten classroom assignment has significant impacts on earnings and other adult outcomes, leading us to ask whether the class effects on earnings were correlated with class effects on kindergarten test scores. To address this, we proxy for classroom quality with the average test scores of an individual’s classmates, measured at the end of kindergarten. Using this proxy measure, we find that class quality impacts immediate test scores, that the boost dissipates later in elementary school, and that it reappears strongly across

a variety of adult outcomes including earnings. While the test-score impacts faded away in later grades, we were able to detect sustained impacts on non-cognitive skills, suggesting a possible mechanism for the long-term effects. The impacts of class quality are similar for students who entered the experiment later, suggesting that a better classroom environment from ages five through eight can have substantial long-term benefits.

In both Project STAR papers, we find that the actual long-run impacts were larger than what would have been predicted based on the short-run test score gains. This finding is consistent with a growing body of research on early-life interventions, and raises challenging evaluation problems. Policymakers often rely on short-term outcomes such as standardized test scores to gauge the effectiveness of educational interventions. But, as suggested in our research, if these measures systematically understate the long-run impacts of early childhood programs, over-reliance on short-run outcomes may lead to abandonment of some policies that would pass a long-term cost-benefit analysis.

<sup>1</sup> D. Almond and J. Currie, “Human Capital Development Before Age Five,” NBER Working Paper No. 15827, March 2010, and O. Ashenfelter and D. Card, eds., *Handbook of Labor Economics*, 4B, Amsterdam, The Netherlands: North Holland, 2010, Chapter 15, pp. 1315–1486.

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<sup>2</sup> J. J. Heckman and D. Masterov, “The Productivity Argument for Investing in Young Children,” NBER Working Paper No. 13016, April 2007, and Review of Agricultural Economics, 29(3), 2007, pp. 446–93.

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<sup>3</sup> D. Almond, H. W. Hoynes, and D. W. Schanzenbach, “Inside the War on Poverty: The Impact of Food Stamps on Birth Outcomes,” NBER Working Paper No. 14306, September 2008, and

Review of Economics and Statistics, 93(2), 2011, pp. 387–403.

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<sup>4</sup> H. W. Hoynes, D. W. Schanzenbach, and D. Almond, “Long Run Impacts of Childhood Access to the Safety Net,” NBER Working Paper No. 18535, November 2012.

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<sup>5</sup> J. J. Heckman, S. H. Moon, R. Pinto, P. Savelyev, and A. Yavitz, “A New Cost-Benefit and Rate of Return Analysis for the Perry Preschool Program: A Summary,” NBER Working Paper No. 16180, July 2010, and Journal of Public Economics, 94, 2010, pp. 114–28 (published as “The Rate of the Return to the HighScope Perry Preschool Program”); J. Ludwig and D. A. Phillips, “The Benefits and Costs of Head Start,” NBER Working Paper No. 12973, March 2007, and Society for Research on Child Development, Social Policy Report, 21(3), 2007.

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<sup>6</sup> E. U. Cascio and D. W. Schanzenbach, “The Impacts of Expanding Access to High-Quality Preschool Education,” NBER Working Paper No. 19735, December 2013, and Brookings Papers on Economic Activity, 47(2), 2013, pp. 127–92.

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<sup>7</sup> S. Dynarski, J. M. Hyman, and D. W. Schanzenbach, “Experimental Evidence on the Effect of Childhood Investments on Postsecondary Attainment and Degree Completion,” NBER Working Paper No. 17533, October 2011, and Journal of Policy Analysis and Management, 32(4), 2013, pp. 692–717.

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<sup>8</sup> R. Chetty, J. N. Friedman, N. Hilger, E. Saez, D. W. Schanzenbach, and D. Yagan, “How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR,” NBER Working Paper No. 16381, September 2010, and Quarterly Journal of Economics, 126(4), 2011, pp. 1593–1660.

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## How Powerful Are Fiscal Multipliers in Recessions?

Alan Auerbach and Yuriy Gorodnichenko

In policy and academic discussions of recent years, few topics have generated more interest than fiscal multipliers, which measure how much a dollar of increased government spending or reduced taxes raises output. Indeed, the magnitude of fiscal multipliers is at the core of debates about whether governments should try to stimulate their economies during a recession. Bitter disagreement in the United States and elsewhere about the course of fiscal policy during the Great Recession reflects in part how little is known about multipliers and how important this matter is for policy.

While previous research studied the effects of fiscal policy on the economy,<sup>1</sup> a key question is how powerful fiscal policy can be in recessions, during which the need to stabilize economic activity is particularly acute. With a quickly shrinking economy in late 2008 and early 2009, existing estimates of the *average* effect of fiscal stimulus were potentially misleading. For example, old-style Keynesian models emphasized that increased government spending might stimulate output and have little effect on prices in times of slack but could have an inflationary effect with low output response if the economy were close to full employment. More recent theoretical work made a similar prediction in the context of a binding zero lower bound for nominal interest rates, based on the view that a fiscal stimulus would not lead to an increase in interest rates in such a circumstance.<sup>2</sup> While reasonable to expect, cyclical variation in the size of fiscal multipliers has, until recently, been largely unexplored empirically. This glaring gap between what policymakers wanted to know and what earlier work could provide stimulated our interest in exploring state-varying fiscal multipliers.

In our initial work on this question we use a “smooth transition vector autoregression” (STVAR) that allows for transition of the economy between regimes characterized by potentially different responses to fiscal shocks.<sup>3</sup> With only a handful of post-World War II recessions, generally short in length, a key advantage of this approach is that it exploits intensive as well as extensive margins of business cycle fluctuations. What matters is not only whether the economy is in a recession but also how deep the recession is. Our approach postulates a function measuring the probability of being in a given regime (recession or expansion) that depends on the state of the economy. The higher the probability of a regime, the more the behavior of the economy will reflect conditions in that regime rather than in the alternative regime. We calibrate this function in such a way that the implied frequency of the economy being in recession matches the frequency of U.S. recessions as determined by the NBER. To measure the state of the economy, we use a coincident business cycle indicator, the deviation of the centered seven-quarter moving average of the real GDP growth rate from the average growth rate.

The same paper makes another methodological contribution by using professional forecasts to purge predictable variation from the time series of government spending in constructing measures of unexpected changes in fiscal policy. This adjustment is potentially important because many changes in fiscal variables are predictable and hence potentially anticipated by economic agents. Treating such anticipated changes in fiscal variables as fiscal shocks can attenuate estimates of fiscal multipliers.<sup>4</sup> To construct a long time series of fiscal forecasts at a quarterly frequency, we splice fore-

casts for fiscal variables using the Survey of Professional Forecasters and “Greenbook” projections made by the staff of the Federal Reserve Board.

Our STVAR estimates suggest that multipliers are considerably larger in recessions than in expansions. Although exact magnitudes depend on the horizon and specifics of how multipliers are defined, we conclude that a dollar increase in government spending raises output by about \$1.50 to \$2 in recessions and by only about \$0.50 in expansions. The figure on the next page shows a time series of multipliers over our post-war sample period based on these estimates, with the variation over time reflecting changes in the state of the economy. Controlling for real-time expectations about fiscal variables generally increases the difference in the size of the government spending multiplier across the regimes. Note that this variation in the multiplier applies broadly to recessions vs. expansions in the sense that our results are not driven by the recent U.S. experience of very low short-term interest rates and a binding zero lower bound. Our estimates suggest that fiscal policy could be a powerful tool to stabilize output and thus reduce adverse effects of business cycles.

In subsequent work, we investigate whether the government spending multiplier varies over the business cycle in other countries as well.<sup>5</sup> Introducing a multi-country dimension increases the overall number of episodes of economies which exhibit slack or which are in recession, possibly allowing us to obtain sharper estimates of fiscal multipliers. However, the international dimension poses several statistical and computational challenges for STVARs, such as correlation of error terms across countries. To address these challenges, we introduce the method of direct pro-