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The rate of return to the HighScope Perry Preschool Program

James J. Heckman [1], Seong Hyeok Moon [2], Rodrigo Pinto [2], Peter A. Savelyev [2], Adam Yavitz [3]

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Abstract

This paper estimates the rate of return to the HighScope Perry Preschool Program, an early intervention program targeted toward disadvantaged African-American youth. Estimates of the rate of return to the Perry program are widely cited to support the claim of substantial economic benefits from preschool education programs. Previous studies of the rate of return to this program ignore the compromises that occurred in the randomization protocol. They do not report standard errors. The rates of return estimated in this paper account for these factors. We conduct an extensive analysis of sensitivity to alternative plausible assumptions. Estimated annual social rates of return generally fall between 7 and 10%, with most estimates substantially lower than those previously reported in the literature. However, returns are generally statistically significantly different from zero for both males and females and are above the historical return on equity. Estimated benefit-to-cost ratios support this conclusion.

Introduction

President Barack Obama has actively promoted early childhood education as a way to foster economic efficiency and reduce inequality.[4] He has also endorsed accountability and transparency in government.[5] In an era of tight budgets and fiscal austerity, it is important to prioritize expenditure and use funds wisely. As the size of government expands, there is a renewed demand for cost–benefit analyses to weed out political pork from economically productive programs.[6]

The economic case for expanding preschool education for disadvantaged children is largely based on evidence from the HighScope Perry Preschool Program, an early intervention in the lives of disadvantaged children in the early 1960s.[7] In that program, children were randomly assigned to treatment and control group status and have been systematically followed through age 40. Information on earnings, employment, education, crime and a variety of other outcomes are collected at various ages of the study participants. In a highly cited paper, Rolnick and Grunewald (2003) report a rate of return of 16% to the Perry program.[8] Belfield et al. (2006) report a 17% rate of return.

Critics of the Perry program point to the small sample size of the evaluation study (123 treatments and controls), the lack of a substantial long-term effect of the program on IQ, and the absence of statistical significance for many estimated treatment effects.[9] Hanushek and Lindseth (2009) question the strength of the evidence on the Perry program, claiming that estimates of its impact are fragile.

The literature does little to assuage these concerns. All of the reported estimates of rates of return are presented without standard errors, leaving readers uncertain as to whether the estimates are statistically significantly different from zero.

The paper by Rolnick and Grunewald (2003) is based on the age-27 data. It does not conduct a sensitivity analysis for the effects of alternative assumptions, nor does it present a standard error for the estimated rate of return.[10] The study by Belfield et al. (2006) is based on the age-40 data we use. It does not report standard errors for its estimates. It conducts a limited sensitivity analysis.[11]

Any computation of the lifetime rate of return to the Perry program must address four major challenges: (a) the randomization protocol was compromised; (b) there are no data on participants past age 40 and it is necessary to extrapolate out-of-sample to obtain earnings profiles past that age to estimate lifetime impacts of the program; (c) some data are missing for participants prior to age 40; and (d) there is difficulty in assigning reliable values to non-market outcomes such as crime. The last point is especially relevant to any analysis of the Perry program because crime reduction is one of its major benefits. Unless these challenges are carefully addressed, the true rate of return remains uncertain as does the economic case for early intervention.

This paper presents rigorous estimates of the rate of return and the benefit-to-cost ratio for the Perry program. Our analysis improves on previous studies in seven ways. (1) We account for compromised randomization in evaluating this program. As noted in Heckman et al. (2009b), in the Perry study, the randomization actually implemented in this program is somewhat problematic because of reassignment of treatment and control status *after* random assignment. (2) We develop standard errors for all of our estimates of the rate of return and for the benefit-to-cost ratios accounting for components of the model where standard errors can be reliably determined. (3) For the remaining components of costs and benefits where meaningful standard errors cannot be determined, we examine the sensitivity of estimates of rates of return to plausible ranges of assumptions. (4) We present estimates that adjust for the deadweight costs of taxation. Previous estimates ignore the costs of raising taxes in financing programs. (5) We use a much wider variety of methods to impute within-sample missing earnings than have been used in the previous literature, and examine the sensitivity of our estimates to the application of alternative imputation procedures that draw on standard methods in the literature on panel data.[12] (6) We use state-of-the-art methods to extrapolate missing future earnings for both treatment and control group participants. We examine the sensitivity of our estimates to plausible alternative assumptions about out-of-sample earnings. We also report estimates to age 40 that do not require extrapolation. (7) We use local data on costs of education, crime, and welfare participation whenever possible, instead of following earlier studies in using national data to estimate these components of the rate of return.

Table1 summarizes the range of estimates from our preferred methodology, defended later in this paper. Estimates from a diverse set of methodologies can be found in the Appendix, Part J. All point in the same direction. Separate rates of return are reported for benefits accruing to individuals vs. those that accrue to society at large that include the impact of the program on crime, participation in welfare, and the resulting savings in social costs.

This estimate of the overall annual social rate of return to the Perry program is in the range of 7–10%. For the benefit of non-economist readers, annual rates of return of this magnitude, if compounded and reinvested annually over a 65 year life, imply that each dollar invested at age 4 yields a return of 60–300 dollars by age 65. Stated another way, the benefit-cost ratio for the Perry program, accounting for dead-weight costs of taxes and assuming a 3% discount rate, ranges from 7 to 12 dollars per person, i.e., each dollar invested returns in present value terms 7 to 12 dollars back to society.[13] We report a range of estimates because of uncertainty about some components of benefits and costs for which standard errors cannot be assigned. These estimates are above the historical return to equity.[14] However, our estimates are substantially below the estimates of the rate of return to the Perry program reported in previous studies. This difference is driven mainly by our approach to evaluating the social costs of crime. We present an extensive sensitivity analysis of the consequences of alternative assumptions about the social cost of crime for the estimated rate of return. The benefit-to-cost ratios presented in the bottom of Table 1 support the rate of return analysis. The rest of the paper justifies the estimates presented in Table 1.

This paper proceeds in the following way. Section 2 discusses the Perry program and how it was evaluated. Section 3 discusses the sampling plan used to collect the outcomes of the experiment and the empirical problems it creates, which require imputation and extrapolation to compute the rate of return. Problems of estimating non-market benefits of the program are also discussed. Section 4 presents our estimates and their sensitivity to alternative plausible assumptions. We contrast our approach with the approaches taken by other analysts. In the final section, we summarize our findings and draw conclusions.

Section snippets

Perry: experimental design and background

The HighScope Perry Preschool Program was an early childhood education program conducted at the Perry Elementary School in Ypsilanti, Michigan, during the early 1960s. Beginning at age three and lasting two years, treatment consisted of a 2.5-hour preschool program on weekdays during the school year, supplemented by weekly home visits by teachers.

The curriculum was based on supporting children's cognitive and socio-emotional development through *active learning* where both teachers and children…

Program costs and benefits

The internal rate of return (IRR) is the annualized rate of return that equates the present values of costs and benefits between treatment and control group members. Lifetime benefits and costs through age 40 are directly measured using follow-up interviews. Extrapolation can be used to extend these profiles through age 65. Alternatively, we also compute rates of return through age 40 to eliminate uncertainty due to extrapolation. The scope of our evaluation is confined to the costs and…

Internal rates of return and benefit-to-cost ratios

In this section, we calculate internal rates of return and benefit-to-cost ratios for the Perry program under various assumptions and estimation methods. The internal rate of return (IRR) compares alternative investment projects in a common metric. For each gender and treatment group, we construct average life

cycle benefit and cost profiles and then compute IRRs. We also compute standard errors for all of the estimated IRRs and benefit-to-cost ratios. The computation of standard errors is…

Conclusion

This paper estimates the rate of return and the benefit–cost ratio for the Perry Preschool Program, accounting for locally determined costs, missing data, the deadweight costs of taxation, and the value of non-market benefits and costs. It improves on previous estimates by accounting for corruption in the randomization protocol, by developing standard errors for these estimates and by exploring the sensitivity of estimates to alternative assumptions about missing data and the value of…

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1 Henry Schultz Distinguished Service Professor of Economics at the University of Chicago, Professor of Science and Society, University College Dublin, Alfred Cowles Distinguished Visiting Professor, Cowles Foundation, Yale University and Senior Fellow, American Bar Foundation.

2 Ph.D. candidate, Department of Economics, University of Chicago.

3 Research Professional at the Economic Research Center, University of Chicago.

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