

duce so that the two programs will yield identical gains per dollar? The estimated net gain produced by Upward Bound is one and one-fourth years. The cost per student to the Government of a full-year Head Start program in 1967 was \$1,050; the cost per student of Upward Bound in fiscal year 1967 was \$1,254. Using interest rates of 4, 5, and 6 percent, the Head Start costs can be brought forward 11 years and made comparable with Upward Bound costs: the adjusted costs are \$1,616, \$1,793, and \$1,993 for 4 to 6 percent respectively. Thus, for Head Start and Upward Bound to be equally "cost effective," Head Start would have to produce educational gains of 1.61, 1.79, or 1.99 years over a full school career, depending on the discount rate. The measure of cost-effective gains in this type of analysis is very sensitive to the discount rate used. The lower the discount rate the smaller the required gains from Head Start.

This leads us to the issue of the appropriate rate of discount. In general, it is our view that the opportunity cost of investing in the public sector is the foregone return in the private sector and not the cost to the Treasury of borrowing money. The rates of 4 to 7 percent used in the evaluation of our programs were chosen as representative of a safe private investment, although cogent arguments have been made by some for real rates of interest as high as 9 to 10 percent. In any case, the higher rates of many of today's safe investments include an inflation rate. That is, part of the actual interest rate reflects the real return on investments but the expectation of inflation raises the interest rate by an amount that reflects higher prices expected in the future. Since the benefits of programs are measured in real terms, the appropriate discount rate is that which measures the real returns on investments and not the nominal rate which includes a price-change factor. To the extent that similar programs can be compared to one another a uniform discount rate is appropriate.

Although differences in the discount rate can make a difference in program evaluation, differences in the measurement of benefits may still be much more critical. For example, in Professor Cain's study of the Job Corps, two methods of estimating benefits in the form of improvements in labor market earnings were used. One method consisted of comparing the post-program earnings of ex-Corpsmen with those of a group of young men who had been accepted into the Corps but did not participate. The second method estimated the gains in reading and mathematics skills by Corpsmen and translated these educational gains into expected future lifetime earnings using a careful study of the relation between earnings and education by Giora Hanoch. Using an effective discount rate of 5 percent, the benefits measured by the first method were 42 percent higher than an estimate using the second method but with the same discount rate. A comparison of the benefits calculated by the first method using two different effective discount rates showed the benefits using the 5 percent rate to be only 39 percent higher than the benefits using the 7 percent discount rate.

Note that I have been using the term "effective discount rate" when referring to the rates used in the Job Corps study. There has been some confusion about the rates used in the evaluation of our programs. The rates of 5 and 7 percent were used in the evaluation of our programs. The rates of 3 and 5 percent tabulated in the Comptroller General's report as the rates used for evaluating our programs, were used for calculation purposes only. They are not the effective discount rates.

Since the Job Corps was evaluated in terms of the improvement in labor productivity of the Corpsmen, we have argued that the rate used to discount future earnings from labor should allow for the secular growth in wage rates. This does not mean that a growth factor should be attached to every set of prices measuring the benefits of investment projects. Aside from the influences of inflation or deflation, product prices may rise or decline over time and it is difficult to judge the expected long-run trend. But, when estimating future wages on the basis of current wages, a growth factor generally should be applied to the current wage levels. A secular rise in real wages in the near future is a realistic expectation. This secular rise will be due to that technological progress and capital deepening which will be reflected in a large part in a more rapid growth in the demand for labor than in the supply of labor.

We estimate that the secular growth stemming only from the rise in the price of quality constant labor is approximately 2 percent a year. The increase in the marginal value of labor is representative of the real increase in the productivity of the labor. Thus, it is expected that the difference between what a Corpsman is expected to earn over his lifetime, as measured in present benefits, and what he would have been expected to earn without Job Corps, will increase at a rate equal to the secular growth in real wages. Our estimates of the bene-