Volume Title: Mental Ability and Higher Educational Attainment in the 20th Century

Volume Author/Editor: Paul Taubman and Terence Wales

Volume Publisher: NBER

Volume ISBN: 0-87014-243-7

Volume URL: http://www.nber.org/books/taub72-1

Publication Date: 1972

Chapter Title: Appendix C: Adjustment Procedures for Average-Ability and Loss-of-Talent Calculations

Chapter Author: Paul Taubman, Terence Wales

Chapter URL: http://www.nber.org/chapters/c5262

Chapter pages in book: (p. 43 - 44)

Appendix C: Adjustment Procedure for Average-Ability and Loss-of-Talent Calculations

As mentioned in the text, the estimates in Figures 1 and 2 have been adjusted to national levels. Such an adjustment is necessary when comparing results from a number of different samples in which the fraction of high school students continuing to college differs from the population value. We have calculated this fraction for each sample, and for the United States as a whole, for the year in which each sample was taken. Suppose that for a particular sample we denote the sample fraction continuing as E_{12}^S, and the corresponding population fraction as E_{12}^P. Consider first the adjustments needed in our loss of talent estimates. These consist of adding $E_{12}^P - E_{12}^S$ to the regression-calculated estimate of the fraction continuing at each of the selected percentiles. It is necessary to make the same correction at each ability level since no nationwide data are available on the fraction continuing by ability. The following interpretation of our adjustment method may be enlightening. If our estimated sample relationship is written as $E_{12} = e + fA$, then we are assuming that the population relationship is $E_{12} = (E_{12}^P - E_{12}^S + e) + fA$. Since our sample relation is constrained to hold at the sample means, that is, $\bar{E}_{12}^S = e + f\bar{A}^S$, and since $\bar{A}$ is the same in the sample as in the population, this adjustment allows the population relationship to pass through the means.

An alternative adjustment procedure is to multiply the sample values of E_{12} at each percentile by E_{12}^P/E_{12}^S. The choice between the ratio and the absolute adjustment factor depends on one's assumption about the reason for the discrepancy between the sample and population means. The following line of reasoning suggests that the absolute adjustment is more appropriate than the proportional one. For the Little and Talent studies, which are separated by only three years, one would expect the population relationships to be fairly similar. The coefficients on education in the sample relationship $A = h + kE_{12}$ are 1.55 and 1.17, respectively, for these samples. If the ratio adjustments are applied to convert them to population relations, then the divergence between these slope coefficients becomes much greater, since the Little sample requires a significantly larger adjustment than the other.[1] This does not seem to be a reasonable result. On the other hand, the absolute adjustment method leaves the slope coefficients unchanged.

Adjustment must also be made in $\bar{A}_c$ and $\bar{A}_{nc}$. Since we are assuming that the fraction continuing at each ability level is $E_{12}^P - E_{12}^S$ above the sample value, then the population average ability level of those continuing will be given by $(.5E_{12}^P - E_{12}^S) + \bar{A}_c\, E_{12}^S)/E_{12}^P$ and the population average ability level of those not continuing will be $\bar{A}_{nc}(1 - E_{12}^S) - .5(E_{12}^P - E_{12}^S)/(1 - E_{12}^P)$.

Most of our estimates of the fraction of high school graduates continuing to college are obtained from *The Statistical Abstract of the United States* for 1970. Unfortunately, data are not presented there for the 1920s or for 1946. For these years we have based our estimates on census data. For the O'Brien and Benson samples of 1925 and 1929, we have obtained from the 1950 census the fraction of high school graduates in the 35-44 age group who attended college (41 percent). These persons would have been 18 (and hence high school graduates) in the years 1924-1933. Since census coverage may differ from that in the *Abstract*, we have also obtained from the 1950 census the fraction continuing for the periods 1934-1938 (34 percent). The absolute difference between this value and the value for 1934-1938 from the *Abstract* (38 percent) was used to adjust the correction factor for the 1920s. We have followed exactly the same procedure for 1946.

[1] In fact, the implied slope coefficient would be equal to those in the 1920s.