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Diminishing Marginal Returns and the Production of Education: An International Analysis

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Abstract

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Notes

1. The average country in Europe spends approximately 3.6% of the Gross Domestic Product on primary and secondary education (Organization for Economic Cooperation and Development, [2003](#)). The value is 4% for a sample of 10 developing nations.
2. For example, Murnane et al. ([1995](#)), Currie and Thomas ([1999](#)), and Neal and Johnson ([1996](#)) find a positive link between academic test scores and the wages of individual workers in the United States. Psacharopoulos ([1985](#)) finds a positive relationship between years of education and income in developing countries in an extensive review of research. Hanushek and Kimko ([2000](#)) find evidence that countries with high
3. A relationship between years of education and income could not be confused with causation, which is a common mistake. For example, to years of education could lead to higher income, but higher income could also lead to more years of education. This is a classic case of correlation not implying causation.
4. See Dewey's (1900) argument that education should be a process of learning by doing. For example, Dewey's (1900) argument that education should be a process of learning by doing.
5. Harris (1997) conducted a meta-analysis of the literature on class size. He found that a reasonable estimate of the average effect of reducing class size by one student for one



grade is 0.0008–0.0020 test score standard deviations. The same study compares these results with a sample of non-experimental estimates: Akerhielm ([1995](#)), Dolan and Schmidt ([1987](#)), Eide and Showalter ([1998](#)), Ehrenberg and Brewer ([1994](#)), Ferguson ([1991](#)), Goldhaber and Brewer ([1997](#)), and Hanushek et al. ([1996](#)). Harris finds that very few of these non-experimental estimates of the class size effect are within the range identified from the experimental literature; and nearly all are below it.

6. The results in the Tennessee STAR experiment are not available by race.

7. Hanushek and Luque write that ‘it has been conventionally held, particularly following Heyneman and Loxley ([1983](#)), that schools and school resources are more important than families in developing countries’ (2003, p. 498).

8. An alternative possibility, not tested by Heyneman and Loxley, is that there may be weaker correlations between measures of socioeconomic status and actual home environment in poor countries. Heyneman and Loxley seem to highlight this possibility when they write that ‘the pressure on students to do well on examinations does not appear to vary as markedly on the basis of parental socioeconomic status’ ([1983](#), p. 1183). They provide no statistical tests of this, however.

9. One argument for testing input effects by national income level is that the latter may be a proxy for school input levels. Yet, if one is interested in DMR in school inputs, then it would seem better to interact school inputs with themselves directly, as in the analysis that follows. Income might also be seen as a measure of non-school inputs (socioeconomic status), but in this case it would seem preferable to use measures at

the individual level. Hanushek and Luque. For example, referring to those children in their analysis of educational non-achievement, they write that ‘the process, which inputs and education is place me differences in



17. The input indices were created by placing each of the input variables on a 0-1 scale, summing and dividing by the number of variables (for school and non-school categories, respectively). The national income data are taken from World Bank ([1996](#)).

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