Book Review

Hanushek, Eric A., Ludger Woessmann, The Knowledge Capital of Nations Education and the Economics of Growth. Cambridge MA (The MIT Press) 2015, pp. 280 6 × 9 in, 37 figures, 36 tables, Hardcover \$28.00 Short, £19.95, ISBN 978-0-262-02917-9; pp. 280 6 × 9 in, 37 figures, 36 tables, Ebook, \$20.00 Short, ISBN 978-0-262-32916-3

Reviewed by **Wolfgang Franz**, Zentrum für Europäische Wirtschaftsforschung GmbH (ZEW) Mannheim, L 7, 1 68161 Mannheim, Germany

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According to conventional wisdom human capital is the most important driving force of economic prosperity. This view, however, has been challenged. Empirical studies sometimes fail to establish a clear causal relationship between economic growth and human capital. Therefore, other explanations have gained importance such as legal and political institutions as is emphasized by Daron Acemoglu and others.

This book successfully contributes to resolve the issue. It is written by two internationally renowned experts in the field of the economics of education and partly draws on their previous work.

The pivotal question addressed in this book is how to measure human capital of a country or, as the authors name it, the knowledge capital, i. e. the cognitive skills of the population or of the workforce. Most empirical macro studies approximate human capital by measures such as years spent in the educational system or the like. As the authors claim, this measurement is the root for the aforementioned underestimation of the role of human capital for economic growth for the following reason. The method implies that what is learned in a typical year of schooling in, say, Japan is the same as what is learned in Peru. This problem carries over to regions within a nation. A typical year of schooling may not be the same in, say, Bavaria and Hamburg. Hence, what we need is a more adequate measure.

The central message of the book is that more direct measures of cognitive skills are available which offer a superior approach to understand the causal role of human capital for economic development. More specifically, Hanushek and Woessmann base their considerations on various data sets of international assessments of student achievement. Their data base contains information about skills in mathematics, science, and reading across seventy-seven countries covering the time period from 1964 to 2003. The empirical analysis by the authors is based on those fifty countries for which they have consistent data.

It goes without saying that the authors are fully aware of the analytical challenges of their approach. The most obvious questions are, of course, whether the different tests can be aggregated for individual countries and whether these country-specific aggregates can be compared across countries given different test designs in each country. Another problem is that these data sets rely on testing students. But what is mostly required for growth analysis is the knowledge capital of the labor force.

The authors undertake impressive efforts to handle these problems and they offer various robustness checks of their results. Without going into details, their approach is able to convince (at least the reviewer) that their measure of knowledge capital is reliable enough to outperform conventional measures of schooling. Therefore, the next step is to look at the empirical results obtained by the proposed measure.

To begin with, the growth regressions in the book suggest that a rise of one standard deviation in the cognitive skills of a nation's workforce may be associated with an approximately two percentage points higher annual growth of per-capita GDP. One standard deviation is defined as the difference between the median standard student and the student at a certain percentile, for example, the 84th percentile, of the international distribution. While the aforementioned impact is extraordinary, to say the least, it should not be overemphasized as the authors warn. Expecting the cognitive skills of the workforce to improve by one standard deviation in a reasonable time period is implausible. Rather an increase of one-quarter seems to be a much more acceptable figure as is evidenced by Germany over the past decade.

Hanushek and Woessmann, by the way, solve several puzzles. In the 1960s Latin America had schooling levels higher than those of several East Asia regions namely the "Asian tigers". From that one might have expected Latin America to develop even more rapidly than those East Asia regions. This is obviously not the case. The reason is simply that the East Asian tigers have developed a very high test performance in the second half of the past century.

The authors go one step further and elaborate on the country-specific distribution of skills. They find that improving knowledge capital at both ends of the distribution is beneficial and complementary. But there are differences between developed and developing countries, respectively. The improvement of highly skilled workers is more important for developing countries.

The final chapter of the book is devoted to policies which, in fact, are able to improve knowledge capital. One central message is that "*how* money is spent is more important than *how much* money is spent" (p. 189). Is this good news for the minister of public finances? Not necessarily, money matters, of course. The authors review different educational policies such as resource and input policies

in general, and, in addition, measures to promote the quality of teachers using teacher performance pay systems, school accountability, choice and completion on the basis of school vouchers, and, last but not least, early childhood education. Hanushek and Woessmann conclude: “The most productive reform involves aligning incentives with achievement through better educational institutions” (p. 203).

In sum, this book is essential reading for those interested in research on human capital and promising education policies. While economists will benefit anyway, researchers of other faculties will also find the book extremely useful. It is written clearly and comprehensibly with summaries at the beginning and the end of each chapter. Taken together: Well done.