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The Effects of Health and Demographic Change on Economic Growth: Integrating Micro and Macro Perspectives — Part III

III. Composition Bias in Estimating the Effect of Fertility Reduction on Economic Growth

The Brown University research program aims to increase the understanding of how investments in health and fertility decline contribute to economic growth. The project focuses on the effects of changes in health and demographic structure on the level of economic activity, the role of demographic change in the sustainable use of environmental resources, and the long-term effects of early child health and nutrition on adult productivity. This subproject seeks to assess how systematic bias may cause traditional cross-country regression in which GDP per capita or per worker is compared to some measure of demographic status to understate the economic benefit or fertility reduction.

Countries where the research will take place

Global, with a focus on India

How does the research describe the impact of population/reproductive health on poverty reduction and/or economic growth?

In this project, we assess a systematic bias that may cause traditional cross-country regression analyses to *understate* the economic benefits of fertility reduction. The bias results from the common observation that reductions in fertility do not affect all parts of the income distribution equally. Specifically, poorer parts of a society usually lag in reducing their fertility. The result of this economic differential in the speed of fertility reduction is that lower fertility at the national level produces a change in the composition of a country's population—specifically, a shift toward the children of poorer people, who themselves tend to be poorer.

At first one might think that this composition bias would lead to the conclusion that lower fertility is not such a good thing economically, since it leads to more poor people relative to rich. Our perspective is the opposite, however: the bias might lead an observer to *think* that fertility reduction was not as economically beneficial as it actually was. To see this, consider an example in which there are two countries, one of which has a reduction in fertility (biased toward high-income families) and one of which does not. Suppose that in fact fertility has no effect on family economic outcomes, so that all families in both countries experience the same rate of income growth. Because of the composition bias, the average level of income will grow more slowly in the country with rapid fertility reduction than in the country where fertility was constant.

In addition to compositional effects based on income described above, there can be similar effects among different regions, different ethnicities or castes, different education groups, and so on. These compositional changes can mean that increases in within-group income will not be fully reflected in aggregate income.

Our goal in this project is to assess the magnitude of these compositional biases. Specifically, we envision a correction that can take one of two forms. One approach is to adjust growth rates of income per capita in a country to reflect composition changes within that country. The alternative approach is to adjust the coefficients that are derived from cross-country estimates of the effect of fertility reduction on income. In this case, the adjustment would reflect the average change in composition that resulted from fertility reduction.

How will the research address a policy need, and what kind of policy lesson is expected?

This program and project will produce results that contribute to a more nuanced understanding of the mechanisms that underlie the relationship among health, fertility, and economic growth. The results from the analysis of health's effect on economic growth will have a number of policy-specific uses.

Methods used

There are several routes toward estimating the size of the composition bias. One approach is to start with data on both

the fertility differentials between different income classes (or education groups) and rates of intergenerational economic mobility. Data on fertility differentials can be derived from the World Fertility Surveys as well as vital statistics. Data on mobility is much harder to get in a standardized form. Where we do have data on both fertility differentials and intergenerational mobility, we can construct a counter-factual estimate of how the growth of average income is impacted by the fertility differential. With some auxiliary assumptions and data, we can then figure out how a decline in average fertility affects average income via the composition effect.

A second approach to estimating the magnitude of the composition bias is to use data on population *shares* corresponding to different groups. In countries where there are regional differences in average income and average fertility, we can use regional population shares to make an adjustment for composition bias. Finally, in some household data sets from developing countries, we can look at the education and/or asset levels of an individual's parents—thus one can track the fractions of the population that is made up of different economic or education groups and their descendants.

Data used

Data used in this project come from a variety of sources including World Fertility Surveys, vital statistics, and the NCAER ARIS-REDS panel. The NCAER ARIS-REDS panel has income, asset, and wealth information over a period of almost 40 years and thus provides a particularly rich perspective on compositional bias.