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Simulation Model of Fertility's Effects on Economic Growth

This research program aims to increase the understanding of how economy-wide policy interventions aimed at reducing fertility contribute to long-term economic growth. Specifically, we employ an economic-demographic simulation model to provide a quantitative assessment of the effect of exogenous reductions in fertility on output per capita. Using well-identified microeconomic estimates to build macroeconomic projections, our simulation model incorporates various channels through which a reduction in the total fertility rate affects output per capita, including changes in demographic structure, educational attainment, labor supply, the rate of capital accumulation, changes in parental resources devoted to childrearing, and crowding of fixed natural resources.

Countries where the research will take place

Global

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

This project contributes to the understanding of dynamic economic-demographic interactions by providing answers to the following set of macroeconomic questions: What are the long-term economic ramifications of policy interventions that affect fertility? What are the magnitudes of the effects operating through the channels of labor supply; investments in population, health, and education; resource congestion; physical capital accumulation; and time variation in the age structure of the population? What are the time profiles of these effects in terms of when and how they phase-in following an intervention?

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

This project produces results that contribute to a more nuanced understanding of the various mechanisms that underlie the macroeconomic relationship between fertility and economic growth. The results from this analysis will have a number of policy-specific uses, aside from generating a quantitative forecast of the economic effects of a fertility-reducing policy experiment. An understanding of the various channels through which a reduction in fertility contributes to economic growth may suggest complementary investments, for example, in education and health or in the sustainable use of natural resources, which can greatly increase the rate at which reductions in fertility are translated into improvements in the standard of living.

Methods used

The project uses microeconomic estimates to build macroeconomic predictions in an effort to link the micro and macro perspectives. Our simulation model accounts for both general equilibrium effects as well as the dynamic impact of a change in the fertility rate and the associated changes in demographic structure. Two broad classes of parameters are used: parameters involving the microeconomic effects of fertility reduction on parental labor supply and parental resources devoted to children (education and health), and parameters involving the aggregate production function.

Data used

Magnitudes on key parameters are derived from published estimates, analysis of existing microeconomic data sets, and new data from countries undergoing or that have undergone fertility transitions.

Research results

Applying our simulation model to the case of Nigeria, using current Nigerian vital rates, and for a base case set of parameter values, we find a decline in the TFR by 1.0 will raise output per capita by 13.2 percent (relative to a no-intervention scenario) at a horizon of 20 years, and by 25.4 percent at a horizon of 50 years. In the short run (the first quarter century following the intervention), a lower dependency ratio and an increase in labor supply appear to be the dominant channels through which reduced fertility increases income per capita. In the longer run (50 years after the intervention), a lower dependency ratio, higher educational attainment, capital deepening, and relaxation of congestion against fixed natural resources appear to be important outcomes.

Research products

The setup of our simulation model and the results from applying the model to the Nigerian case are discussed in a working paper, "The Effect of Interventions to Reduce Fertility on Economic Growth." This paper has been presented at the Fourth Annual PopPov Conference on "Population, Reproductive Health, and Economic Development" (Cape Town, January 2010), and at the IUSSP Seminar on "Demographics and Macroeconomic Performance" (Paris, June 2010). Work is currently underway to build a web-based user interface for our simulation model. The goal of this interface will be to provide both academics and policymakers the ability to run experiments in a user-friendly yet flexible environment that allows the application of our model to custom needs.

Notes

This project is in its fourth year of funding.