HEALTH POLICY PROJECT

A New Model for Projecting the Demographic Dividend

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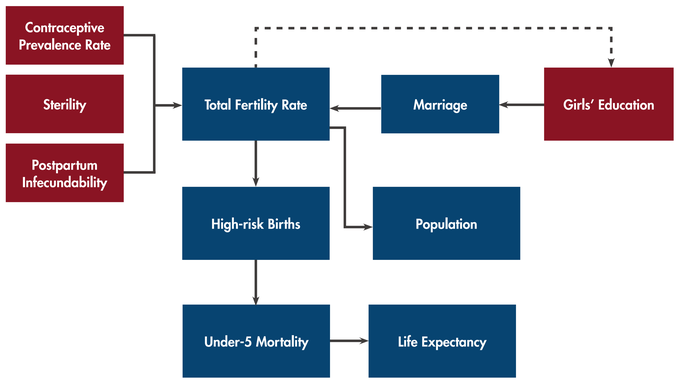
INTRODUCTION

The potential economic benefits of the demographic dividend and the policies required to achieve it are well-documented at the global level. However, no universally applicable model exists in the public domain to project the demographic dividend in individual countries. This study aimed to develop an empirically sound projection model that can be readily applied in any high-fertility country using national data on standard economic, demographic, and social indicators to estimate the effects of a future demographic dividend and specific policies required. The central hypothesis was that appropriate socioeconomic policies must be implemented to convert the demographic "opportunity" induced by changes in the age structure into a "dividend" of improved economic and development outcomes.

METHODOLOGY

A team from the USAID-funded Health Policy Project developed a two-part demographic-economic model, DemDiv, that allows for feedback between demographic changes and the economy. Multivariate linear regressions from cross-national datasets were used to quantify the demographic and economic relationships. The demographic component underlies the model structure, projecting population size and structure, child mortality, dependency ratio, fertility, and life expectancy (Figure 1). All demographic relationships were estimated using the most recent available data from the United Nations Population Division,[1] the United Nations Statistics Division,[2] the Demographic and Health Surveys,[3] and the Barro and Lee Educational Attainment Dataset.[4]

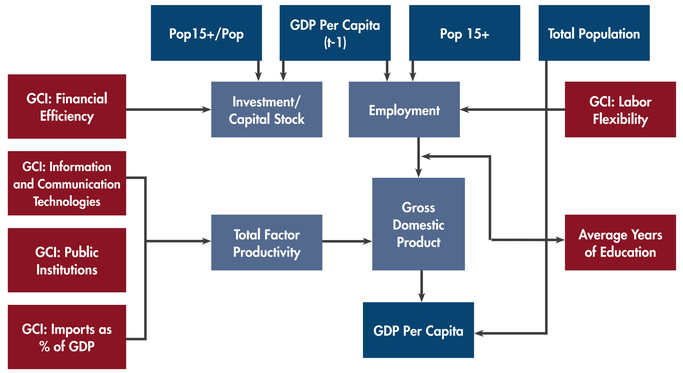
Figure 1. Demographic Sub-Model



These demographic calculations feed into the economic model. The linked demographic and economic models interact over a customizable projection period to quantify the multiplicative effects of changing age structure and economic and social policy variables on economic output, investment, and employment over time.

The economic model consists of three top-level equations describing new fixed capital formation, employment growth, and total factor productivity, the results of which are used to calculate gross domestic product (GDP) (Figure 2).

Figure 2. Economic Model



GDP was modeled using a production function of the Cobb-Douglas[5] form:

$$Y_i = \tilde{A}_i K_i^{\alpha} H_i^{1-\alpha}$$

It was assumed that

- α = 1/3 and returns to scale were constant[6]
- Y is GDP
- K is capital
- H is the human-capital augmented labor (employment) factor input

The study estimated the parameter $\tilde{A}$, known as the total factor productivity (TFP), which represents how efficiently the economy is able to use factor inputs. Calculated values of TFP were used to project GDP and the results were integrated with the demographic sub-model to produce the primary output variable of DemDiv: GDP per capita.

The three top-level economic equations were estimated using log transformed data from the World Economic Forum's "Global Competitiveness Index" (GCI),[7] the World Bank's World Development Indicators Database,[8] the International Labor Organization,[9] and the UN Population Division's World Population Prospects. GDP was estimated using calculated values of TFP and figures from approximately 100 countries with recent data on both on capital[10] and labor.[7]

CONCLUSION

This new demographic dividend modeling tool estimates the potential economic benefit of a change in age structure brought on by increased access to and use of family planning, combined with other investments and policy changes. The model clearly demonstrates how the benefits of investments in family planning programs can be enhanced by other development initiatives in employment, education, governance, macroeconomic management, and technology.

RESULTS

Table 1 and Figures 3–5 contain example model results from a March 2014 application of DemDiv in Kenya.

Table 1. Scenario Development

	Value in:	Average Years of Education	CPR	Labor Market Flexibility	ICT Use	Financial Market Efficiency	Public Institutions	Imports as % of GDP
Baseline	2010	6.27	45.5	4.65	1.94	3.87	3.49	42.62
Status Quo	2050	6.27	45.5	4.65	1.94	3.87	3.49	42.62
Economic Improvements	2050	6.27	45.5	4.89	5.00	4.9	4.71	29.83
Economic + Education Improvements	2050	11.25	45.5	4.89	5.00	4.9	4.71	29.83
Combined Econ+Ed+FP Improvements	2050	11.25	70.0	4.89	5.00	4.9	4.71	29.83

The highest levels of investment, the smallest employment gap, and the highest GDP per capita are generated by the scenario that integrates economic, educational, and family planning investments. These results are illustrative of the extent to which combined health, social, and economic policies can amplify improvements in economic and development outcomes.

Figure 3. Investment Per Capita, By Scenario

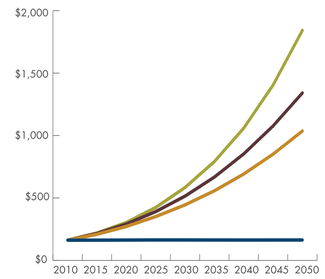


Figure 4. Employment Gap, By Scenario

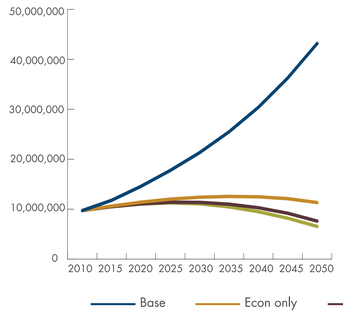
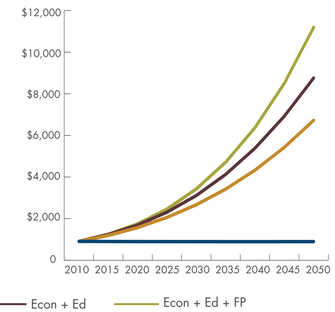


Figure 5. GDP Per Capita, By Scenario



Base
Econ only
Econ + Ed
Econ + Ed + FP

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