Demographic Trends, Economic Growth and Distribution Dynamics

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Abstract

Since the middle of the 20th century many developing countries have gone through what is generally called the second phase of the Demographic Transition, which is characterized by declining death rates and still relatively high fertility rates. The decline in death rates was the result of improved health care, prevention, sanitation and nutrition. The initial decline in mortality, which benefited infants and children proportionally more than the average individual, was much faster than the now-developed countries experienced during the 19th century when they went through their second phase of the Demographic Transition. During the last decades developing countries could benefit from the earlier experience and recent research in high-income countries. As a result of the rapid decline in mortality, while fertility rates remained relatively high, the population in the developing world has increased from 1.7 billion in 1950 to 5.2 billion in 2005 and the share of developing countries in world population has increased from 67 percent to 81 percent during the same period.

Several developing countries have now entered the third phase of the Demographic Transition, during which fertility rates gradually decline. This changes dependency rates, the size of the labor force and spending and savings behavior. For example, Birdsall, Kelley and Sinding (2001) show that changes in the demographic composition affect savings rate and educational level. This argument builds on long literature (e.g., Coale and Hoover (1958)) that shows that at the beginning of the second phase of the Demographic Transition, when youth dependency ratios increase, saving rates, investment and human capital accumulation are being reduced. Later on, this initial burden is transformed in a windfall: workers and savers become a large share of the population and per-capita income growth is boosted. Finally, when the baby-boomers reach old age the windfall can become again a burden and income growth is reduced.

A macro model is well suited to analyze these changes and their consequences for economic growth, relative price changes and real wages. However such a macro model has many limitations too. It does not include information about personal income distribution (which is influenced by the age-profile of the population) and it does not incorporate differences in household composition, which may influence the rural-urban dynamics. The literature considers three main channels through which population aging (due to a decline in fertility rates) affects the personal income distribution: first, given an upward sloping age-earnings (incomes) profile,[1] aging will increase inequality between old and young groups (Deaton and Paxson (1994)); second, different age groups are characterized by different within-group inequality, and we observe that inequality tends

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[1] A positive age-income profile can be expected when the labour market premium for experience is positive or if savings are positive within a life cycle model (Deaton and Paxson 1994).

to be higher among older age cohorts (see Deaton and Paxson (1997), Jenkins (1998) and Mookherjee and Shorroks (1982)).[2] Everything else constant, when older cohorts become more populous, as is the case with lower population growth rates, aggregate inequality increases. These two channels affect aggregate inequality without any *change* in the age premium, i.e. with a fixed age-earnings profile; however, the third channel considers the changes in inequality due to *changes* of the life-cycle income profile. As population ages, older high-wage and more experienced workers tend to become less scarce and the wage premium they initially receive will be reduced (Higgins and Williamson (1999)).[3] This third channel works through the labor market and contribute to attenuate the inequality increases brought about by the first two channels.

Micro models on the basis of household surveys can address the latter issues, but they have limitations too. Unlike macro models the micro approaches are not well suited to analyze shifts in spending and relative prices due to the interactions of aggregate demand and supply.

This paper undertakes an integrated macro-micro analysis, following the approach started in World Bank (2006) to understand how ageing affect growth and income distribution and put strains on the pension systems. The main contribution of is the development of a methodology to make the expected future changes in household composition and household behavior in the micro approach mutually consistent with the expected future changes in savings, growth, wages and prices in the macro model. The methods will include ways to impose insights from the micro approach (like migration decisions, labor participation and schooling behavior) on the macro model and, conversely, to model future changes in household composition under the restrictions imposed by the macro model.

With the resulting consistent micro-macro framework different scenarios of future ageing are analyzed. In particular the hypotheses are that (accelerated or delayed) *ageing* might cause the following effects:

- ***An increase in income inequality and hence a slow down in the poverty reduction***. The links between a delay or a quickened decline in fertility rates (and hence ageing) and income distribution are based on the three theoretical channels identified above.
- ***An enlargement in the proportion of the population living in rural areas, and, thus a slower increase of the future urbanization rate (and possibly a slower increase in the proportion of people efficiently employed in non farm activities).***[4] In developing countries, fertility rates of households whose members live in rural areas and work in the agricultural sector are generally higher than those of urban households. Holding back the decline in fertility rates, thus

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[2] Deaton and Paxson (1994 and 1995) show how the prediction that within-cohorts inequality of income or consumption should increase with the age of the cohorts can be derived from a life-cycle model of saving in the presence of uncertainty.

[3] The extent of this age-premium compression depends, among other things, on the elasticity of substitution between old and young workers in the aggregate production function.

[4] This assumes that there is a certain degree of correlation between households living in rural areas and households working in the agricultural sector. This correlation varies widely across countries.

delaying ageing, will signify an increase in the national proportion of workers in agricultural (rural) areas and likely intensify the pressure for internal migration. However, for a given growth level of the economy, the urban sector will not be able to generate enough jobs and orderly absorb all the migrants.

- *A strain in the education systems, making Millennium Development Goals (MDG) more difficult to achieve*. A delay in the reduction in fertility rates will increase the proportion of the population of primary school age. This coupled with raising average incomes may strongly increase demand for education (especially in certain regions where fertility rates are still high) and may raise the overall costs of achieving the education MDG.
- *A strain in the pension systems*. An acceleration in ageing may imply strains for the pension systems coming from decelerated growth rate, changing saving behaviors and larger number of people dependant on these transfers.

The research in the paper is based on a modeling framework recently developed at the World Bank: the Global Income Distribution Dynamics (GIDD) methodology, which consists of a global macroeconomic model interlinked with a global microsimulation model. The GIDD is a framework for ex-ante analyses of the distribution and poverty effects of changes in macroeconomic policy and/or trends in global markets. It complements a global Computable General Equilibrium model (CGE) analysis with global micro-simulations based on standardized household surveys. Data sources for the global CGE are the GTAP[5] global macro-economic data, and a global database with household surveys of 95 developing countries.

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[5] GTAP is an acronym for the Global Trade Analysis Program, a multi institutional research program whose goal is to improve the quality of quantitative analysis of global economic issues within an economy-wide framework.

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