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On the impact of demographic change on economic growth and poverty

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ABSTRACT

Changing population age structures are shaping the trajectories of development in many countries, bringing opportunities and challenges. While aging has been a matter of concern for upper-middle and high-income economies, rapid population growth is set to continue in the poorest countries over the coming decades. At the same time, these countries will see sustained increases in the working-age shares of their population, and these shifts have the potential to boost growth and reduce poverty. This paper describes the main mechanisms through which demographic change may affect economic outcomes, and estimates the association between changes in the share of working-age population with per capita growth and poverty rate. An increase in the working-age population share and a reduction in the child dependency ratio are found to be associated with an increase in gross domestic product per capita growth, with similarly positive effects on poverty reduction.

1. Introduction

This paper analyzes the effects of demographic change on economic growth and poverty. We first describe the main mechanisms of how demographic change impacts economic outcomes based on the concepts of first and second demographic dividends. We then estimate the effects of changes on the age structure of the population on per capita GDP growth and poverty rate. We use changes in the share of working age population and dependency ratios as measures of demographic change. The data cover 180 countries between 1950 and 2010, and come from different sources. Overall, we find that on average an increase in the share of working age population, and declining dependency ratios can benefit countries by boosting per capita growth and reducing poverty.

Demographic patterns are becoming increasingly diverse across economies. Many developing countries, especially in Sub-Saharan Africa and South Asia, are expected to see continued growth in the proportion of working-age people for several decades, even as the working-age population share declines in high-income countries and many middle-income countries (Lee, 2003; World Bank, 2015).[1] These demographic changes can affect economic prosperity in several ways. First, changes in the working-age share of the population impact income growth and savings, by changing the relative number of people in the economy that are able to work. Second, changes in the age-structure at the household level can disproportionally affect poorer families, that usually tend to have higher child dependency ratios.

The development impact of changes in age structure is usually decomposed as either a first or a second demographic dividend (Lee & Mason, 2006). The first dividend is a direct and immediate consequence of the rise in the working-age share of the population. The effect is straightforward, since a larger share of working age people means that the economy would have proportionally more people able to produce at the most productive stages of their lives. The second demographic dividend arises if changes in age structure create space for higher savings and lead to increasing investments in human and physical capital. Thus, the paper focuses on how changes in age structure may affect growth per capita, and poverty, as key outcomes associated with the first and second demographic dividends.

We examine the impact of the share of the working-age population and dependency ratios on per capita growth and poverty using a common framework and econometric techniques to deal with endogeneity issues. Addressing the endogeneity issue is critical since changes in income per capita are known to affect fertility, mortality, and migration, and may thus affect demographic change. The paper features a system generalized method-of-moments (GMM), in the spirit of Loayza, Schmitt-Hebel, and Servén (2000),

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[1] Throughout this paper, high-income, middle-income, lower middle-income, upper middle-income, and low-income will refer to the income per capita–based country classification used by the World Bank Group for FY 2016.

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Rajan and Subramanian (2008), and Murtin (2013), aiming to address potential endogeneity issues. While the previous literature on the effects of the dependency ratio on savings used a similar econometric approach (Loayza et al., 2000), the GMM estimation is less common in the analysis of demographic change focusing on growth and poverty. We extend the time horizon of the empirical analysis covering the period from 1950 until 2010 and test for the heterogeneous effects of changes in age structure across regions.

Our results suggest that an increase of 1 percentage point in the working-age population share is associated with an increase of 1.6 percentage points in GDP per capita growth, on average. These results are robust across different specifications and estimators, and are broadly consistent with the literature on the effects of demographic change on growth (Bloom & Canning, 2004; Bloom & Williamson, 1998; Eastwood & Lipton, 2011; Higgins & Williamson, 1997; Kelley & Schmidt, 1995, 2007). The results are also mostly driven by the reduction in the child-dependency ratio (CDR) *vis-à-vis* aged-dependency ratio, as the share of elderly tend to continuously increase. A reduction of 1 percentage point in CDR is associated with an increase of 0.5 percentage points in per capita growth. We do not find heterogeneous effects across regions, nor contemporaneous impact of demographic change on productivity, measured by product per worker.

Finally, using specifications and methods similar to those previously described to analyze growth, the results suggest that a reduction of 1 percentage point of the CDR is associated with a reduction of about 0.34 percentage points in the poverty rate. We also find that CDR is positively associated with poverty gap, although the results are less robust. To the best of our knowledge, we are the first to empirically examine the impacts of age-structure changes on poverty reduction using the most recent international poverty line of $1.90 (World Bank, 2015), based on the 2011 purchasing power parity (PPP).

The next section describes the mechanisms through which demographic change may affect economic growth and poverty. Section 3 explains the methodology used in the econometric estimations. Section 4 describes the data, trends, and descriptive statistics. Section 5 discusses the results for income per capita growth and poverty. The final section provides concluding remarks.

2. Mechanisms of how demographic change impacts growth and poverty

The development impact of changes in age structure can be classified as either a first or a second demographic dividend (Lee & Mason, 2006). The first dividend is a direct and immediate consequence of the rise in the working-age share of the population. If a larger share of the population is working, average standards of living will be higher.[2] The potential benefits for poverty reduction are twofold. First, in low-income households that reduce their fertility, standards of living will rise by increasing the number of effective producers per household member. Second, improvements in public finances resulting from an increase in the number of workers in the economy will allow more resources to be devoted to low-income households. The second dividend arises when faster growth of the working-age population leads to greater savings in the short-run and higher investment in human capital and investment per worker in the long run.

Table 1
Demographic dividends in a nutshell.

Channel	Transmission mechanisms	Demographic dividend
Labor force	Increase in the support ratio (ratio of effective labor to effective consumers) holding other factors, including saving and income per effective worker, constant	First
Savings	Changes in saving and capital per effective worker influence income, from labor and assets, per effective worker	Second
Human capital	Lower fertility and the quantity-quality trade-off lead to greater spending on health and education for children	Second

Source: Authors, based on Lee and Mason (2006).
Note: For both the first and second demographic dividends, changes in the factor given in the first column of the table, via the transmission mechanism described in the second column, results in a boost to growth.

The first demographic dividend could persist for decades but is ultimately transitory. As fertility rates decline, child dependency ratios fall both within households and within a population, while the share of the working-age population rises and remains high for a few generations. If the increasingly larger working-age population is productively employed, there is potential for an increase in economy-wide living standards. The first dividend is in large part a consequence of a given (growing) labor force supporting fewer children. For some countries, estimates suggest that the contribution of the first demographic dividend explains between 9.2 and 15.5 percent of their per capita economic growth over the 1960–2000 period (Mason & Kinugasa, 2008).

The second demographic dividend arises if changes in age structure create space for higher savings and lead to increased investment in human and physical capital. An increase in the share of workers in the economy with respect to the total population leads to higher production and more resources available in the economy, which at the same time can facilitate a rise of savings, investment, and accumulation of physical and human capital. These decisions subsequently influence the productivity of the workforce. Providing capital for a growing labor force is costly, and as labor force growth declines, a given level of investment will lead to greater capital per worker. Demographic change pushes countries toward supplying more capital, further enhancing labor productivity (Birdsall, Kelley, & Sinding, 2003). Because personal assets accumulate over the lifetime of individuals, per capita household wealth rises as a population ages. Table 1 summarizes the first and the second demographic dividends by explaining the transmission mechanisms.

In a first stage of the demographic transition, the increase in the number of children is proportionally larger than in the working age population, or the elderly people, leading to a decrease of the share of working age population driven by a rise in the share of children.[3] As income and education improves, fertility and mortality rates decline, leading to an increase of the share of working age population, concomitantly to a reduction in the total dependency ratio. This is the stage of the demographic transition that provides the condition for the first demographic dividend. The third stage of demographic transition happens when the fertility rate is very low, usually below the replacement level, and the mortality rate is also low, which leads to high life expectancy. At this stage the growth of the elderly population tends to be faster than the reduction in

[2] Assuming a constant output per worker, if the effective number of producers (workers) grows at the same rate as the number of effective consumers (total population) there would be no change in welfare in per capita terms. For example, developing countries with very high fertility rates might have a positive growth in their GDP that may not be paralleled by improvements in their welfare per capita, because the dependent population could be growing faster than the working-age population.

[3] In countries with low levels of income and education, birth rates and mortality rates are relatively high, contributing to low life expectancy.