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Demographically based global income forecasts up to the year 2050

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Abstract

Demographic projections of age structure provide the best information available on long-term future human resources and demand. Fairly robust correlations between age structure, GDP and GDP growth have been discovered in current data. In this paper we use these two facts to study the forecasting properties of demographically based models. Extending the forecasts to 2050 suggests that, due to projected fertility decreases, the poor countries of today will start to catch up with developed economies, in which the growth process will stagnate due to the growth of the elderly population. This remains the case whether or not indications of positive longevity effects are taken into account.

Keywords: Long-term forecasting; Panel data; Life expectancy; Catch-up; Age effects

1. Introduction

The question of how demographic change interacts with economic development has been discussed in the social sciences since before the 18th century. The mercantilist view was that a large population stimulates economic growth. In the 19th century, Malthus' arguments had persuaded most economists that population growth, due to decreasing returns, leads to lower per capita income. During the 20th century, opinions were more mixed. Neo-Malthusians still argued that population growth is harmful. Keynesians, on the other hand, saw population growth as a stimulus for investment demand, and thus, for income growth (Perlman, 1975). A third, neutralist, view, which gained influence during the 1970s and 1980s, was that population growth rates are not an influential factor behind variations in per capita income growth.

During the last ten years, however, a certain convergence of views has emerged. The new consensus is that population age structure, not population size, is what matters for the level of per capita income. In addition, more and more stress has been put on the fact that low mortality should not be seen only as an outcome of economic development. Increasing life expectancy also plays an important role in triggering economic growth.

At least three arguments underscore the importance of age structure for per capita income. One is the savings argument. In countries with high child-dependency rates, savings rates will be low, and this may lead to low productivity. This argument was first put forward by

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Coale and Hoover (1958). Subsequent research has largely corroborated their argument.[2] Second, a high dependency rate implies a low worker per capita ratio, and this should lead directly to a lower per capita income by a pure accounting effect. Using human capital theory, Krueger (1968) elaborated this argument. Janowitz (1973) and others have demonstrated the empirical relevance of Krueger's argument.[3] Third, as demonstrated by Lindh and Malmberg (1999), age structure within the working-age population is also of importance.

The argument for a life-expectancy effect on economic development has equally strong support, although there are somewhat different ideas regarding the mechanism. First, increasing the life-expectancy is likely to increase savings by increasing the risk of survival into old age dependency (Bloom, Canning, & Graham, 2003). Second, a higher life expectancy will increase the expected return of education, not necessarily by a longer work life–Kalemli-Özcan and Weil (2002) argue the opposite–but definitely through a healthier work life where the risk of death during active life has been substantially reduced (Boucekkine, de la Croix, & Licandro, 2003). Third, it is likely that this is further reinforced by a quantity–quality tradeoff in fertility (Kalemli-Özcan, 2002).[4] To summarize, we therefore have good reasons to think that the life expectancy would modify the impact of the age structure on economic development.

These arguments have important implications for long-term per capita income forecasting. Historically, such forecasts have been based primarily on assumptions about the rate of technological change. However, if–as suggested in this body of literature–there exists a stable statistical relationship between, on the one hand, per capita income, and on the other hand, age structure and life expectancy, then it should be possible to use conventional population projections to forecast future trends in income growth.

An important problem is the interpretation of such per capita income forecasts. Here, different views are possible. One interpretation is that the income forecast only clarifies that population projections contain implicit forecasts of future economic development. If an increase in life expectancy has historically been associated with an increase in per capita income, then a population projection that assumes a rising life expectancy implicitly assumes a rising per capita income. The second possibility is that we believe that the assumptions made in the population forecasts are based on trends in fertility and mortality, independent of income growth. In this case, the demographically based income forecasts become statements about the probable future trends in per capita income caused by such demographic trends. A third option following from a causal interpretation is to treat such income forecasts as policy models. Changes in fertility and mortality can often be influenced by explicit policies. The HIV/AIDS epidemic, for example, might be successfully contained by investing resources in health care and prevention. In this case, demographically based income forecasts are tools for evaluating the economic impact of population policies. Irrespective of what purpose demographically based income forecasts are used for, however, we need knowledge about the stability of the forecasting model. The purpose of this paper is therefore primarily to explore whether demographically based models can deliver such stability, and thus provide a valuable forecasting tool.

In the next section we first discuss some obvious problems, and explain our estimation strategy. In Section 3 we review our specification search and present out-of-sample tests. In Section 4 we discuss two alternative forecasts, one a simple homogeneous approach and one allowing for heterogeneity in effects contingent on the current level of life expectancy. Finally, in Section 5 we conclude that our forecasts imply shifts in the future economic power from currently developed economies to economies where fertility is now on its way down.

2. Forecasting problems in focus

There are a number of problems to deal with in the basic specification of a robust regression equation of GDP on demographic variables. First, it must be noted that demographic projections are, of course, uncertain.

[2] For a few examples see Leff (1969), Mason (1987), Mason (1988), Kelley and Schmidt (1996).

[3] Bloom and Freeman (1986), Brander and Dowrick (1994), Malmberg (1994), Bloom and Williamson (1998), Bloom and Sachs (1998), Bloom, Canning, and Malaney (2000).

[4] Other papers concerning this are de la Croix and Licandro (1999), Kalemli-Özcan, Ryder, and Weil (2000), Zhang, Zhang, and Lee (2001), Boucekkine, de la Croix and Licandro (2002), Kalemli-Özcan (2003), Zhang, Zhang, and Lee (2003).