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Demographic change and economic growth in Sweden: 1750–2050

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Abstract

This paper addresses two issues. To what extent can models estimated on modern data be used to account for growth patterns in the past? Can information on historical patterns help to improve long-term forecasting of economic growth? We consider a reduced-form statistical model based on the demographic dividend literature. Assuming that there is a common DGP guiding growth through the demographic transition, we use an estimate from post-war global data to backcast the Swedish historical GDP growth. The results indicate that the assumption of a common DGP can be warranted, at least back to 1870. Given the stability of the relationship between population and growth, we use the model to forecast income for the next 50 years. We compare our approach to a previous attempt to simulate the long-term Swedish growth path with an endogenous growth model. Encompassing tests show that each of the models contains independent information on the Swedish growth path, suggesting that there is a benefit from combining them for long-term forecasting.

JEL classifications: J11; O41; I20; N33

Keywords: Demographic transition; Life-expectancy; Income growth; Population

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1. Introduction

Population aging is an inescapable consequence of lower mortality and fertility. This process will affect all countries on earth, starting with the most developed ones. The consequences of aging for future income growth are of prime importance for the conduct of economic policy, but they are still largely unknown. To shed light on this issue we investigate whether demographically-based models can be used to account for past income growth and to forecast future economic growth using population projections.

Although demographic variables depend on economic development, they are still to a large extent predetermined. This demographic inertia is exploited in demographic projections to yield forecasts that are substantially more reliable than any projection of economic variables. Therefore, using demographic projections as independent variables to forecast economic growth is a promising avenue.

There are two traditions to analyze the interaction between demographic trends and long-run growth prospects. The first one consists in building theoretical models to achieve a consistent view of the mechanisms that can drive the growth process, either qualitatively (Galor and Weil, 2000; Lagerlöf, 2003) or quantitatively (Boucekkine et al., 2003). The second tradition has an agnostic view of the mechanisms actually in place; it analyzes the empirical relationships between demographic variables and growth in income per capita in recent data, and extrapolates growth rates on the basis of demographic projections (see Bloom and Williamson, 1998). Both approaches, however, share the idea that a decline in mortality may serve as a trigger for modern economic growth.

We believe that a good model for long-term forecasting should be able to shed light on the history of growth since the Malthusian stagnation to modern growth, through the industrial revolution and the demographic transition. We will therefore confront both approaches to Swedish long-term data. Looking at Sweden is particularly relevant, not only because the Swedish demographic transition is very typical, but also because excellent demographic data are available from the mid 18th century and onwards. Estimates of per capita GDP stretches back to the 18th century too.

In a previous paper (de la Croix, Lindh, Malmberg, forthcoming), we used these long-term data to calibrate a demographically-based growth model so as to reproduce the take-off process and the rise in growth rates from stagnation prior to the 18th century to 2% growth in the 20th century. The main mechanisms at work are that rises in life-expectancy increase the incentive to get education, which in turn has ever-lasting effects on growth through a human capital externality and there is a scale effect from active population on growth.

Here we consider a demographically-based statistical growth model estimated on global post-war growth data to study whether it can account for the long-term growth process that can be observed in the Swedish data. The global model estimates show a drift in the most productive activity period with life-expectancy. The peak productivity shifts from around 30 years of age when life-expectancy is low to an age around 50 for actual life-expectancies in developed and emerging economies. The model is then used to backcast Swedish economic growth back to 1750 making use of the long-term demographic data that we have available. The backcast shows that the statistical model can account not only for recent changes in per capita income but also for the long-term process of Swedish economic development since the mid 19th century.