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Demographic forecasts and fiscal policy rules

Jukka Lassila[a,*], Tarmo Valkonen[a], Juha M. Alho[b]

[a] The Research Institute of the Finnish Economy (ETLA), Lönnrotinkatu 4 B, 00120 Helsinki, Finland

[b] University of Helsinki, Department of Social Research, Helsinki, Finland

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ABSTRACT

All quantitative evaluations of fiscal sustainability that include the effects of population ageing must utilize demographic forecasts. It is well known that such forecasts are uncertain, and some studies have taken that into account by using stochastic population projections jointly with economic models. We develop this approach further by introducing regular demographic forecast revisions that are embedded in stochastic population projections. This allows us to separate, for each demographic outcome and under different policy rules, the expected and realized effects of population ageing on public finances. In our Finnish application, demographic uncertainty produces a considerable sustainability risk. We consider policies that reduce the likelihood of getting highly indebted and demonstrate that, although demographic forecasts are uncertain, they contain enough information to be useful in forward-looking policy rules.

1. Introduction

Population ageing in the coming decades will result in age structures which are vastly different from anything previously experienced. It will also put pressure on public finances, since the elderly, whose population share is increasing, are net recipients of public outlays, while persons of working age, which are a declining group at least relatively and in many countries absolutely, are the net payers.

An analysis of sustainability is therefore needed in order to provide realistic insights into the question of whether the public sector will be able, in the future, to finance the services and transfers it has explicitly or implicitly promised to citizens. This is especially important in the Nordic countries, where public welfare transfers and services are extensive, and people in general seem to count on them when pondering on how their old age will turn out economically.

A well-known definition of the sustainability of fiscal policies is the OECD view: "Sustainability is basically about good housekeeping. It is essentially about whether, based on the policy currently on the books, a government is headed towards excessive debt accumulation" (Blanchard, Chouraqui, Hagemann, & Sartor, 1990, p. 8). More precisely: "Fiscal policy can be thought of as a set of rules, as well as an inherited level of debt. And a *sustainable fiscal policy* can be defined as a policy such that the ratio of debt to GNP eventually converges back to its initial level" (p. 11).

Forward-looking approaches to sustainability, like the one we apply here, project future values for the determinants of the debt dynamics and develop measures that quantify the adjustments needed if unsustainable dynamics are detected. The approach is sensitive to the accuracy of the projections. Uncertainty in the numerical analysis of public finances is typically assessed by generating a baseline scenario and some alternatives, in order to reveal the sensitivity of the baseline to some salient variables. For example, the European Commission (EPC, 2009) uses a large number of different scenarios for the most important variables in order to describe alternative futures. It has long been known that this scenario approach has many problems (see Törnqvist, 1949). A general finding in many demographic studies has been that uncertainty is typically

* Corresponding author.
E-mail address: jla@etla.fi (J. Lassila).

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underestimated in official national demographic forecasts (Anderson, Tuljapurkar, & Li, 2001), as well as in international projections (Keilman, 2008). Studies evaluating the effects of demographic uncertainties on the economic consequences of population ageing have shown, not surprisingly, that the related economic estimates also become very uncertain (see Alho, Lassila, & Valkonen, 2005, and articles referenced by Alho, Jensen, & Lassila, 2008). As a consequence, an overly narrow range of policy alternatives is often entertained.

Studies that utilize stochastic population projections mainly use accounting models to analyze the sustainability of pension systems (e.g., Auerbach & Lee, 2006; Burdick & Manchester, 2003; Congressional Budget Office (CBO), 2001; Keilman, 2005; Lee, Anderson, & Tuljapurkar, 2003). The exceptions in this line of research are the studies by Lassila and Valkonen (2004) and Lee and Miller (2001), who study health care, and Creedy and Scopie (2002), who forecast social expenditures using an accounting model. The method of stochastic forecasting has been applied also to the unit costs of health care (see Boards of Trustees, 2003). The effects of both economic and demographic uncertainty on aggregate public finances have been studied in a similar accounting framework by Lee and Tuljapurkar (1998, 2001). Alho and Vanne (2006) and Sefton and Weale (2005) used generational accounting to perform a corresponding risk analysis.

Alho et al. (2002) and Alho, Jensen, Lassila, and Valkonen (2005) were the first to analyze ageing using a large set of OLG model simulations; their application concerned the Lithuanian economy. Alho et al. (2008) present similar results for some other countries. Lassila and Valkonen (2008) analyze the financial sustainability of the Finnish public sector using stochastic projections to describe the uncertain future demographic trends and asset yields, and also analyze policy options which are aimed at improving sustainability.

While our results support the findings in previous research utilizing stochastic demographics, our main purpose is to expand the analysis. Previous studies have not taken forecast revisions into account. The key novelty here is that, in a stochastic population projection setup, we also include revisions of demographic forecasts. This allows us to separate the expected and actual outcomes in fairly realistic situations. Also, importantly, we can study sustainability-enhancing fiscal policy rules based on expected demographics.

We believe that this will clarify the relationship between deterministic population projections and the process of policy decision making. While deterministic demographic projections have shortcomings which severely limit their usefulness, we use a stochastic approach and show that decision makers can adapt to errors in forecasts and mitigate their effects by updating the resulting decisions. This is an area of research that has not received adequate attention in policy studies to date, even though forecast updating is a fundamental aspect of the theory of forecasting. We design fiscal policy guidelines that are based on future deterministic projections, and use stochastic tools to study how one can best use deterministic forecasts as guides for policy, in order to avoid excess public indebtedness.

In Section 2 we describe our methods, first the demographic approach and then the economic model. Section 3 describes the long-term projection outcomes for the Finnish public sector finances under our base policy assumptions. The role of alternative policy rules and their implications for the sustainability of Finnish public finances are analyzed and discussed in Section 4, using conditional value-added tax (VAT) adjustment rules based on the expected size of the sustainability gap or expected future indebtedness. Section 5 concludes.

2. Methods

2.1. Demographic approach

To illustrate how long-term demographic forecasts can change substantially in a relatively short time, Fig. 1 shows four forecasts, made between 2002 and 2009, for the future population of Finland. The total population was forecasted in 2002 to be about 5 million in 2050. The view has changed gradually, and the latest forecast is for about 6.1 million in 2050. That means a 22% difference between forecasts made seven years apart.

There have also been large and systematic changes in the forecasts of the size of the working-age population and the number of elderly. These changes can be traced back to changing views on fertility, migration and longevity. They have affected empirical sustainability evaluations in various ways. There are more people working (good for tax revenues) and more retirees (costly for public finances), and people live longer (good for individual welfare but costly for public finances).

Fig. 2 shows the forecasts for the number of people aged 65 and over. Although the forecasts have changed significantly, they all show the basic feature of an ageing society: the share of the elderly is growing. The issue is quantitative—the population is ageing, but we do not know how much.

We deal with demographic uncertainty by using stochastic population projections. Statistical methods of expressing the demographic uncertainty have been developed by many researchers (see e.g. Alho & Spencer, 2005; Lee & Tuljapurkar, 1998). These methods quantify uncertainty probabilistically, based on analyses of past demographic data and the views of experts. Fertility, mortality and migration are all considered as stochastic processes. The parameters of these processes are fitted so as to match the errors of past forecasts (see Alho, Cruijsen, & Keilman, 2008). Again, judgment may be used. Then, sample paths for the future population by age-groups are simulated.

We also pry more information out of stochastic population projections than has been done previously. In essence, we add a demographic forecast to each time-point in each simulated population path. Thus, the view of future demographics is updated periodically when we move along any simulated population path. Given the uncertainty of population forecasting, it might seem that trying to forecast what future population forecasts will be like would be nearly hopeless. However, as was argued more thoroughly by Alho (2014), such forecasts are more regular than actual developments, for both theoretical and practical reasons. As one practical reason, it should be mentioned that developments in the recent past often have a heavy influence on projections of the remote future.