

Demographic uncertainty, the financing mix and the sustainability of welfare systems

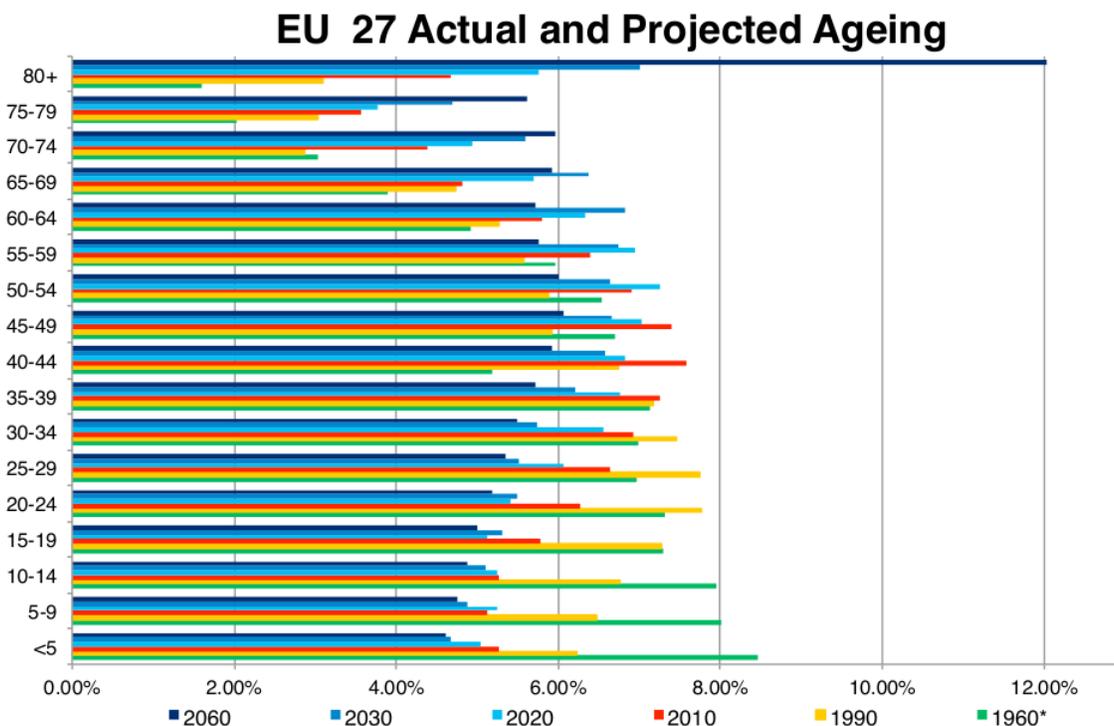
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Demographic changes are threatening the sustainability of welfare expenditure in all Western countries.

Two clear trends have characterized the last decades, and are expected to affect future population dynamics:

1. Constantly improving longevity;
2. Decreasing fertility.

The combined effect of these two phenomena have caused a fast and dramatic change in the structure of populations. Children below age 5, which constituted the larger age class in 1960, will very soon be outnumbered by people older than 80 years. Old-age dependency ratios, which measure the number of people in "retirement age" (generally aged 65 or more) relative to the number of potential workers (aged 20-64), are constantly increasing, as migration flows are not able to counterbalance the drop in the number of births observed in the last 50 years.

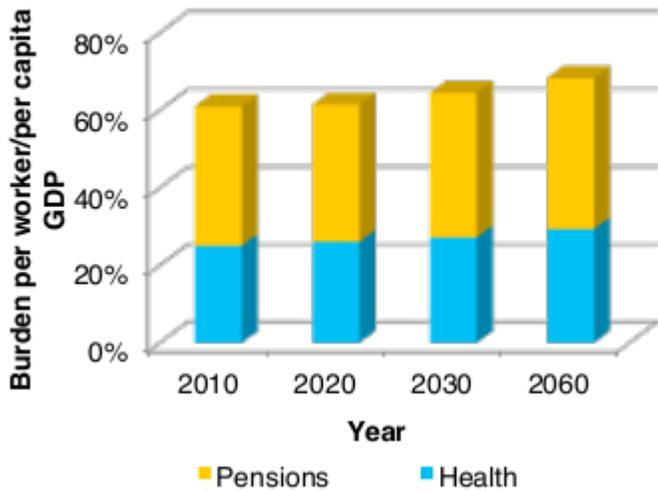


Source: Eurostat (1960 figures refer to EU 12) population data and Europop2010 projections

All in all, lower fertility (combined, in some countries, with the rise in unemployment rates especially after the crisis), is reducing the number of contributors to public welfare systems, while, due to population ageing, the size of payments for first-pillar public pensions and health is constantly increasing. Medium and long term predictions from Stability and Convergence Programs of the European Commission clarify this situation. If we analyze the 5 largest EU countries, in some of them (Italy, France) welfare expenses already account for around 60% of the GDP per capita of each worker

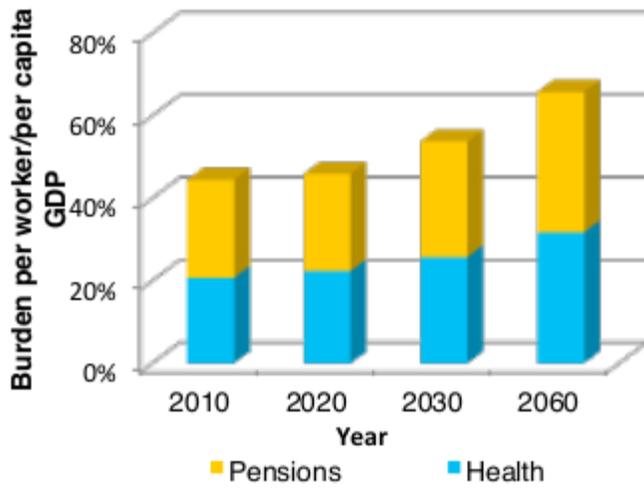
, while in the others seem to be rapidly increasing towards such level. This situation endangers Paygo systems greatly, since such a high burden is clearly unsustainable.

France



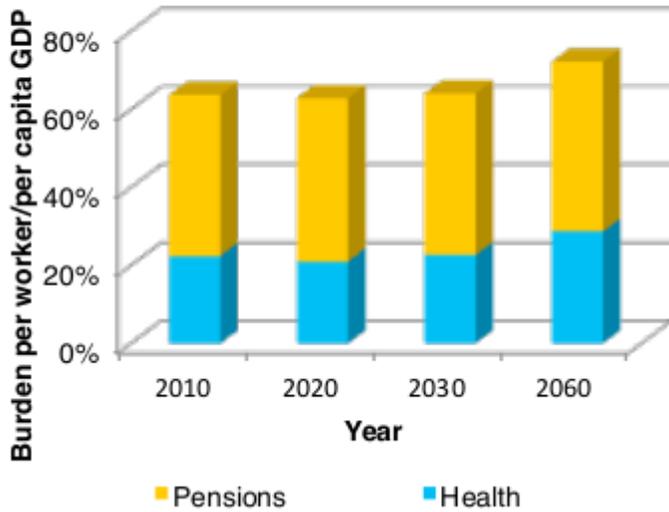
Source: elaboration from 2013 Stability and Convergence Programs

Germany



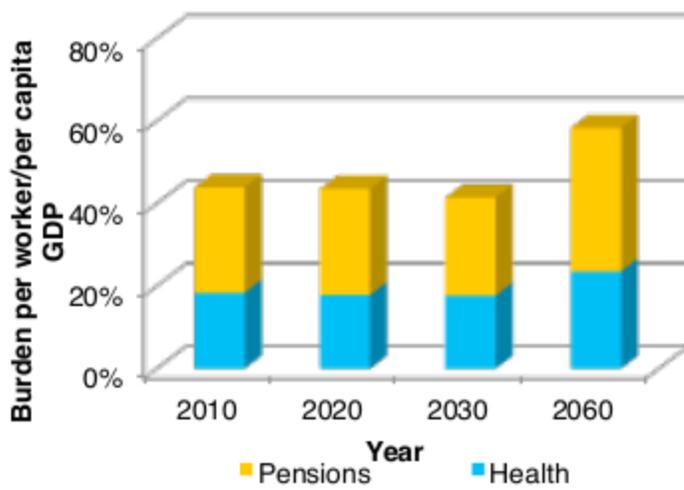
Source: elaboration from 2013 Stability and Convergence Programs

Italy



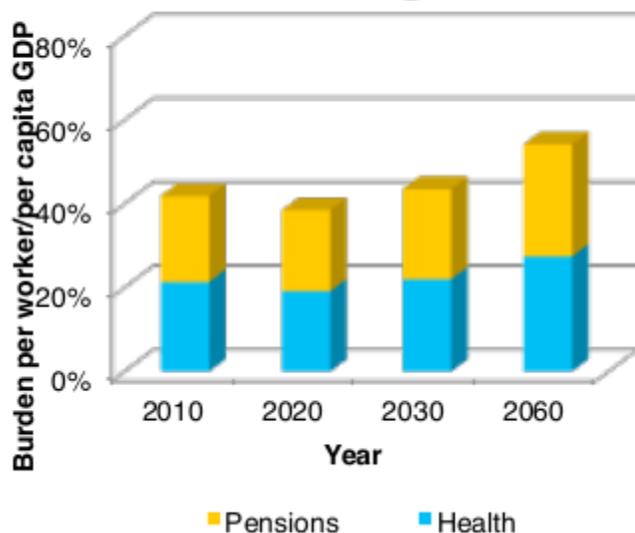
Source: elaboration from 2013 Stability and Convergence Programs

Spain



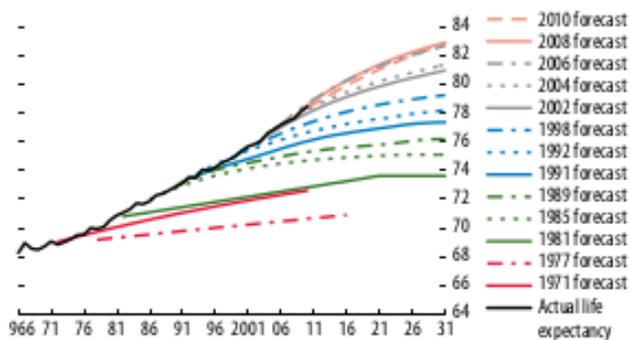
Source: elaboration from 2013 Stability and Convergence Programs

United Kingdom



Source: elaboration from 2013 Stability and Convergence Programs

Assessing whether observed demographic trends will persist in the future and which will be their intensity is particularly difficult. It has been the subject of many recent studies by demographers and actuaries. In particular, the importance of incorporating uncertainty in the estimates of mortality rates and life expectancy has become strikingly evident, as longevity improvements have been constantly underestimated in forecasts. The following figure, which compares UK realized and predicted life expectancy, clearly shows this fact.



Source: Office of National Statistics.

Source: IMF (2012)

A sound prediction of future demographic trends and taking into account measures of uncertainty is crucial in evaluating the sustainability of welfare systems. Higher-than-predicted longevity improvements cause unexpectedly high pension payments. Also, they imply that a longer individual life-time period may be spent under treatment, with consequences on health expenditure. Neglecting the uncertainty in the evolution of old-age dependency ratios can expose to the risk of unexpected future underfunding of the welfare system.

Our study considers specifically the consequences of uncertainty in future demographic trends and assesses the effects of possible measures aimed at improving the sustainability of welfare systems.

On one side, we aim at introducing stochasticity related to demography in welfare expenditure forecasts, in order to have risk assessments together with point estimates. To this end, we focus on mortality modelling by means of stochastic multi-population models, testing existing ones (Li and Lee, 2005; Jevtic et al., 2013) and exploring possible extensions to improve fit and predictions.

On the other side, we explore whether diversifying financing, introducing a funded component alongside the usual PAYGO system can improve sustainability by reducing dependence on the demographic fluctuations in the size of cohorts. We prove, in a classical setting, that the presence of a funding component can help reducing the risk of welfare system underfunding. This has consequences on both economic stability and on the individual uncertainty about future health and pension benefits, which is nowadays becoming an issue. Inter-generational welfare considerations and an investigation of the link between the welfare financing mix and economic growth are in our research agenda.

References

IMF (2012), The Financial Impact of Longevity Risk.

Jevtic, P., E. Luciano and E. Vigna, (2013), Modelling the mortality surface by means of continuous time cohort models, *Insurance: Mathematics and Economics*, 53, 122-133.

Li, N. and R. Lee (2005), Coherent mortality forecasts for a group of populations: an extension of the Lee-Carter method, *Demography*, 42, 575-594.