2nd PBSS Colloquium
21-23 May 2007
Helsinki, Finland

Topic D. Projection Methods for Pension and Social Security Financing

Stochastic Projection Methods for Social Security Systems

Kenneth G. Buffin

The objective of this paper is to explain the advantages that may be achieved for Social Security policy purposes by developing stochastic financial projections and to provide a general overview of stochastic projection methodology with particular reference to its application to the Social Security system in the United States.

Keywords: Social Security; Actuarial Uncertainty; Stochastic Projection; Monte Carlo Simulation; Time-series Analysis; R-squared; Vector Autoregression.

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Valuation of intergenerational transfers within funded collective pension schemes

R Hoenevaards and Eduard Ponds

This paper applies contingent claim analysis to value pension contracts for real-life collective pension plans with intergenerational risk sharing and offering DB-like benefits. We rewrite the balance sheet of such a pension fund as an aggregate of embedded generational options. This implies that a pension fund is a zero-sum game in value terms, so any policy change inevitably leads to value transfers between generations. We explore intergenerational value transfers that may arise from a plan redesign or from changes in funding policy and risk sharing rules. We develop a stochastic framework which accounts for time-varying investment opportunities and computes the embedded generational options. Changes in the values of the generational options enable us to evaluate the impact of policy modifications in the pension contract with respect to intergenerational transfers and redistribution. We find that a switch to a less risky asset mix is beneficial to elderly members at the expense of younger members who lose value. A reallocation of risk bearing from a plan with flexible contributions and fixed benefits to a plan with fixed contributions and flexible benefits leads to value redistribution from older plan members to younger ones.

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Fair valuation of a non-statutory participating pension contract in the presence of economic cycles

Antti Tanskanen

Market-consistent valuation (known as the fair valuation) of liabilities is an important part of analizing a non-statutory participating pension contract. Liabilities can be valued in the Black-Scholes framework, however, the Black-Scholes approach does not capture long-term behaviour of financial markets well. One way to improve the long-term behaviour is to model stochastic economic cycles in the form of an embedded Markov process, which modulates parameters of a geometric Brownian motion underlying the Black-Scholes approach. In this study, we consider the valuation of a participating pension contract in the Markov modulated Black-Scholes framework by employing the Esscher transform. Using this approach, we analyze how various parameters influence the fair value of a participating pension contract, and which sets of parameters are fair for such a contract.

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Increasing Confidence in Forecasting - an international challenge

Bertil Thorslund

Most important receiver of prognosis for the cost of social insurance is the political system. The impact of our work is heavily dependant on the confidence that politicians have in our products. We must work to earn that confidence. Our eventual success will need structured internal processes, potent hardware, excellent software, elaborated models, comprehensive data supply and (last but not least) a way of communicating that will make our products be met with the confidence they earn.

All of these challenges are common to persons and institutions doing prognosis work. So, the idea of forming an international collaboration or network for mutual professional growth is rather obvious. Following a Swedish initiative, ICF was formed a few years ago. Starting as a qualified discussions group, it is moving towards becoming a working body.

The presentation will give examples of activities carried out, documents produced and plans for the future.