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to pay the claims, then he borrows lacking money immediately at a higher rate q. The aim of the company is to find the optimal value of investment (or borrowing) y* in order to minimize expected costs. Optimal strategy is investigated in several discrete-time insurance models with the aid of dynamic programming.
Let G(x,y) be expected costs for one period, let fn(x) be expected costs for n periods provided that in each period choice of y was optimal. Hence we may derive Bellman equation fn(x)=miny[G(x,y)+Efn-1(P(x,y,η))], where P(x,y,η) is the capital of the company in the end of one period with initial capital x, value of investment (borrowing) y and claims η for this period. In case of equal rates for investment and borrowing optimal solution of this equation is found explicitly: y*(x)=F-1((q-r)/q)-x-c. Moreover, the model with different rates for investment and borrowing is also investigated.
For obtained solutions global sensitivity indices of the parameters of the model are computed using Sobol' decomposition.

Estimating child mortality from information on previous birth: data from a Portuguese birth cohort

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A whole range of techniques have been developed for estimating infant and child mortality from the information routinely recorded in maternity registers on age and reproductive history of delivering mothers. Among them, the best-known and most widely applied indirect technique was developed by William Brass. Using the baseline information from a birth cohort (Generation XXI) assembled in the period 2005-2006 in the metropolitan area of Porto, North of Portugal, we addressed in this paper the following objectives: (1) to estimate the child mortality rates based on information about previous births and their survivorship among women recruited for this birth cohort; (2) to compare these indirect estimates with direct values retrieved from Portuguese vital statistics; (3) to analyse the potential of this birth cohort to generate plausible estimates of life-table indicators. We retrieved data on mother's age, previous live births prior to the current one, and number of surviving and deceased children from a group of multiparous women (n=3521). The data was divided into seven 5-year groups by maternal age and survival and death probabilities were computed for each group. Through the Brass method,

we obtained estimates of probability of dying before attaining certain exact childhood ages, q(x), by using the multipliers k(i) as proposed by Palloni-Heligman. Then, a logit life-table system was used to derive life-table indicators. Accordingly, probabilities of dying between birth and 2, 3, 5 and 10 years were respectively: 4.0; 5.7; 7.3 and 9.6 per 1,000 children ever born, which were alocatted in time-period. These indirect estimates compared with the direct ones obtained from Portuguese vital statistics revealed that they were very similar. The life expectancy at birth was 77.6 years for both sexes, and the implied infant mortality was 4.0 per 1000 live births for Grand Porto during the period 2005-2006. The use of indirect method to analyze the potential of the Generation XXI cohort data in provide relevant information on reproductive issues, not available in the vital statistics, seems to be an important and effective tool, and promissory for analyzing the follow-up studies of this cohort held in 2009 and 2012.

Keywords: Child mortality, Brass' Method, Preceding Birth Technique.

Probabilistic Approach to Clustering in Stochastic and Agent-Based Computational Models

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A theoretical model which describes the interactions in a heterogeneous population of agents was developed and analyzed within the framework of the discussions about the gap between agent-based computational models (ABM) and stochastic analytical models. The herding and clustering of agents in complex systems is a typical problem dealt with new approaches, for example, to macroeconomic modeling, that describe macroscopic variables in terms of the behavior of a large collection of microeconomic entities. By definition, an ABM model looks at a system not at the aggregate level which could possibly be described with a few equations of motions, but at the level of its constituent units, and this microscopic level modeling includes describing the individual behavior of potentially many agents in the system. Simulating them can be extremely computation intensive and time consuming. It might not be possible to carry out exponentially increasing number of such simulations within the framework of a traditional ABM model, regardless of the computing power implied, simply because it is impossible to explore the whole set of interactions for the applied strategies. The number of possible partitions for *N* agents into *m* subsets or clusters can be easily generalized, and all values for the average payoffs, and variances are computed. Finally, we show that even a relatively simple probabilistic model can describe precisely the expected outcomes from