

Title: Solving stochastic dynamic integrated climate-economy models using Least Squares Monte Carlo methods

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Abstract

The classical dynamic integrated climate-economy (DICE) model has become the iconic typical reference point for the joint modelling of economic and climate systems, where all six model state variables (including carbon concentration, temperature, and economic capital) evolve over time deterministically and are affected by two controls (carbon emission mitigation rate and consumption). We consider the DICE model with stochastic shocks in various parts of the model and solve it under several scenarios as an optimal stochastic control problem using the Least Square Monte Carlo method (LSMC) - a popular simulation method for solving optimal stochastic control problems in quantitative finance. We consider application of various LSMC methods (including the use of neural network approximation) and discuss their pros and cons.

Bio:

Pavel Shevchenko is a Professor in the Department of Actuarial Studies and Business Analytics and Co-Director of the Centre for Risk Analytics at Macquarie Business School, Australia. Prior to joining Macquarie University in August 2016, he worked for Australian Government national science agency (CSIRO Australia) during 1999-2016, holding the position of a Senior Principal Research Scientist during 2012-2016. Since 1999, Prof Shevchenko has worked in the area of risk analytics, leading research and industry commercial projects on: modelling of operational and credit risks; longevity and mortality, retirement products; option pricing; insurance; modelling commodities and foreign exchange; and the development of relevant numerical methods and software. Prof Shevchenko has published extensively in academic journals, consulted for major financial institutions, and is a frequent presenter at industry and academic conferences. His publication records include one research monograph, two co-authored research monographs, over 80 journal papers, and over 80 technical reports.

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