

Workshop on the Economics of Social Insurance Policymaking: Theories, Models, and Methods

Maryland Population Research Center

University of Maryland, College Park

September 11th and 12th, 2003

[Sponsored by the Social Security Administration
and the Michigan Retirement Research Center]

Lecture 1: Solving Stochastic Overlapping Generations Models with Social Security

Lecture 2: Computing Stochastic Overlapping Generations Models with Social Security: Applications and Examples

Selo İmrohoroğlu

Department of Finance and Business Economics

Marshall School of Business

University of Southern California

Los Angeles, CA 90089-1427

213-740-6546

selo@marshall.usc.edu

<http://marshallinside.usc.edu/simrohoroglu>

Description

The two lectures are designed to describe a simple numerical solution method that is very useful in solving for the equilibria of large-scale overlapping generations models typically used in issues related to social security reform. The first talk introduces the overlapping generations structure, summarizes the components of the applied general equilibrium setup, and goes over the discrete-state space method. The second talk introduces a recent application, namely ‘Time Inconsistent Preferences and Social Security’.

This syllabus provides a list of resources (not meant to be exhaustive) for the theoretical and computational aspects of social security research and some recent applications.

References

1. Books:

- (a) Nancy L. Stokey and Robert E. Lucas, Jr. (1989), *Recursive Methods in Economic Dynamics*, Cambridge: Harvard University Press.
- (b) Lars Ljungqvist and Thomas J. Sargent (2000), *Recursive Macroeconomic Theory*, Cambridge: MIT Press.
- (c) Thomas F. Cooley (1995), editor, *Frontiers of Business Cycle Research*, Princeton: Princeton University Press.
- (d) Ramon Marimon and Andrew Scott (1999), editors, *Computational Methods for the Study of Dynamic Economies*, Oxford: Oxford University Press.
- (e) Timothy J. Kehoe and Edward C. Prescott (1999), editors, *The Discipline of Applied General Equilibrium*, Heidelberg: Springer-Verlag.
- (f) Alan J. Auerbach and Laurence J. Kotlikoff (1987). *Dynamic Fiscal Policy*, Cambridge: Cambridge University Press.
- (g) Kenneth L. Judd (1998). *Numerical Methods in Economics*, Cambridge: MIT Press.

2. Articles:

- (a) F. P. Ramsey (1928), “A Mathematical Theory of Saving,” *The Economic Journal*, Vol. 38, pp. 543-559.
- (b) Richard Bellman (1957), *Dynamic Programming*, Princeton, NJ: Princeton University Press.

- (c) Paul A. Samuelson (1958), “An Exact Consumption-Loan Model of Interest with or without the Social Contrivance of Money,” *Journal of Political Economy*, Vol. 66, pp. 467-482.
- (d) Robert M. Solow (1956), “A Contribution to the Theory of Economic Growth,” *Quarterly Journal of Economics*, Vol. 70, pp. 65-94.
- (e) T. C. Koopmans (1960), “Stationary Ordinal Utility and Impatience”, *Econometrica*, Vol. 28, pp. 287-309.
- (f) David Cass (1965), “Optimum Growth in an Aggregative Model of Capital Accumulation,” *Review of Economic Studies*, Vol. 32, pp. 233-240.
- (g) Peter A. Diamond (1965), “National Debt in a Neoclassical Growth Model,” *American Economic Review*, Vol. 55, pp. 1126-1150.
- (h) Truman F. Bewley (1977), “The Permanent Income Hypothesis: A Theoretical Formulation,” *Journal of Economic Theory*, Vol. 16(2), pp. 252-292.
- (i) Rao Aiyagari (1994), “Uninsured Idiosyncratic Risk and Aggregate Saving,” *Quarterly Journal of Economics*, 109 (3): 659-684.
- (j) Glenn R. Hubbard and Kenneth Judd (1987), “Social Security and Individual Welfare,” *American Economic Review*, Vol. 77(4), pp. 630-646.
- (k) Ayşe İmrohoroğlu, Selahattin İmrohoroğlu, and Douglas H. Joines (1993), “A Numerical Algorithm for Solving Models with Incomplete Markets,” *International Journal of Supercomputer Applications*, Vol. 7, pp. 212-230.
- (l) Ayşe İmrohoroğlu, Selahattin İmrohoroğlu, and Douglas H. Joines (1995), “A Life Cycle Analysis of Social Security,” *Economic Theory*, Vol. 6, pp. 83-114.
- (m) Ayşe İmrohoroğlu, Selahattin İmrohoroğlu, and Douglas H. Joines (1999). “Social Security in an Overlapping Generations Economy with Land”, *Review of Economic Dynamics*, 2 (3): 638-665.
- (n) José-Victor Ríos-Rull (1996), “Life Cycle Economies and Aggregate Fluctuations,” *Review of Economic Studies*, Vol. 63, pp. 465-489.
- (o) Mark Huggett (1996), “Wealth Distribution in Life Cycle Economies,” *Journal of Monetary Economics*, Vol. 38, pp. 469-494.
- (p) He Huang, Selahattin İmrohoroğlu, and Thomas J. Sargent (1997), “Two Computations to Fund Social Security,” *Macroeconomic Dynamics*, Vol. 1(1), pp. 7-44.
- (q) Mariacristina De Nardi, Selahattin İmrohoroğlu, and Thomas J. Sargent (1999), “Projected U.S. Demographics and Social Security”, *Review of Economic Dynamics*, Vol. 2(3), pp. 575-615.
- (r) Larry Kotlikoff, Kent Smetters and Jan Walliser (1999), “Privatizing Social Security in the United States: Comparing the Options,” *Review of Economic Dynamics*, Vol. 2(3), pp. 532-574.
- (s) Luisa Fuster (1999), “Is Altruism Important for Understanding the Long Run Effects of Social Security?” *Review of Economic Dynamics*, Vol. 2, 616-637.
- (t) Juan Carlos Conesa and Dirk Krueger (1999), “Social Security Reform with Heterogenous Agents,” *Review of Economic Dynamics*, Vol. 2, pp. 757-795.
- (u) Thomas Cooley and J. Soares (1999), “A Positive Theory of Social Security Based on Reputation,” *Journal of Political Economy*, Vol. 107, pp. 135-160.
- (v) Michele Boldrin and Aldo Rustichini (2000), “Political Equilibria with Social Security,” *Review of Economic Dynamics*, Vol. 3, pp. 41-78.
- (w) Mariacristina De Nardi, Selahattin İmrohoroğlu, and Thomas J. Sargent (2001), “Saving and Pension Reform in General Equilibrium Models”, *Oxford Review of Economic Policy*, 17 (1): 20-39.
- (x) Kjetil Storesletten, Chris Telmer, and Amir Yaron (2003), “

3. Papers for Presentation: See the web site for the course:

- (a) De Nardi, İmrohorođlu, and Sargent (2001), ‘Saving and Pension Reform in General Equilibrium Models’, *Oxford Review of Economic Policy*, Vol. 17, No 1, pp. 20-39.
- (b) İmrohorođlu, İmrohorođlu, and Joines (1999a), ‘Computing Models of Social Security’, in *Computational Methods for the Study of Dynamic Economies*, ed. by Ramon Marimon and Andrew Scott, Oxford: Oxford University Press, pp. 221-237.
- (c) İmrohorođlu, İmrohorođlu, and Joines (1999b), ‘Social Security in an Overlapping Generations Economy with Land’, *Review of Economic Dynamics*, Vol 2, pp. 638-665.
- (d) İmrohorođlu, İmrohorođlu, and Joines (2003), ‘Time Inconsistent Preferences and Social Security’, *Quarterly Journal of Economics*, Vol CXVIII, Issue 2, pp. 745-784.

Computer Code

solve1.f90 is a Fortran 90 program that reads in **psurv.dat** (survival probabilities) and **comboeff.dat** (Gary Hansen’s age-labor efficiency index) to compute a steady-state equilibrium of the setup in ‘Social Security in an Overlapping Generations Economy with Land’, *Review of Economic Dynamics*, 1999.