Incomplete Markets, Heterogeneity and Macroeconomic Dynamics*

Bruce Preston†  Mauro Roca‡
Columbia University  Columbia University

February 16, 2006

Abstract

This paper analyzes a real business cycle model with heterogeneous agents and uninsurable income risk. Because the wealth distribution matters for macroeconomic dynamics solving such models is difficult. We propose a solution algorithm based on perturbation methods. In contrast to the value function iteration-based solution of Krusell and Smith (1998), this permits an analytic characterization of an agent’s optimal decision rules that are accurate to the second order and render the implications of aggregation for macroeconomic dynamics transparent. The properties of these two solution algorithms are compared. For the benchmark model, analysis discloses that an individual’s optimal saving decisions are, to the second order, almost linear in their own capital stock giving rise to permanent income consumption behavior. This provides an explanation for the quasi-aggregation properties of this model documented by Krusell and Smith. However, comparison of Euler equation errors implied by the two solution methods reveals the perturbation approach to give a more accurate solution to the benchmark model. Furthermore, the finding of quasi aggregation is not general: models with enforced savings (such as social security) demonstrate that the dynamics of aggregate capital depend non-trivially on higher order properties of the cross-sectional wealth distribution. Perturbation methods therefore provide a flexible analytical tool for solving such models even when quasi-aggregation does not obtain.

---

*This draft is very preliminary and may contain mistakes.
†Department of Economics, Columbia University, 420 West 118th St. New York NY 10027. E-mail: bp2121@columbia.edu
‡Department of Economics, Columbia University, 420 West 118th St. New York NY 10027. E-mail: mfr2004@columbia.edu