Chapter 1: Preference Heterogeneity, Aggregate Risk and the Welfare Effects of Social Security

This paper quantitatively studies the distributional welfare implications of a pay-as-you-go social security system in a lifecycle model with ex-ante household heterogeneity in both preferences and lifecycle income streams, classified by education levels and borrowing costs. To analyze this problem, I provide an algorithm to solve a large-scale model with ex-ante heterogeneous and long-period-lived agents, borrowing constraints, and multiple assets where state aggregation methods generate large errors in optimal choices which should be avoided for quantitative welfare analysis. Through a welfare decomposition analysis, I determine the sources of welfare benefits and costs for each educational group. In the baseline calibration, I find that high-school dropouts and college educated groups are advantaged, while the high-school graduates group is disadvantaged by the welfare system. The high-school dropouts obtain a welfare gain mostly from intragenerational redistribution from the other income richer groups through the social security system. The college graduates group experiences a welfare loss from such redistribution, but old-age consumption insurance and increases in asset returns provide a substantial offsetting welfare gain to this most patient and risk-averse group. The high-school graduates receive a welfare gain from both intragenerational redistribution and consumption insurance. However, borrowing constraints strengthen the welfare cost of the social security system for this group by preventing consumption smoothing during the early stage of life which is essential especially when wages are reduced by crowding out.


This paper examines the invariant Markov distribution associated with the rational expectations equilibrium in multi-period stochastic overlapping generations models under pure exchange. We prove that a simple linear iterated function system can generate the invariant distribution in these models under small discrete aggregate shocks. We provide sufficient conditions for the linear iterated function system to generate a singular invariant measure. We also characterize the set of economies which satisfy the sufficient conditions. The attractors of the singular invariant measure in our models exhibit fractal patterns. The existence of the linear iterated function system implies that an algorithm based on its structure can allow computing equilibria in long-period stochastic overlapping generations models with heterogeneity.

Chapter 3: Income, Price Dispersion and Risk Sharing

In this paper, we study how income-dependent prices under imperfect competition affect consumption across states and ages in a life-cycle model with the incomplete market. We show that the income-dependent prices can reduce risk sharing by biasing consumption toward the rich than the perfectly competitive economy. Thus, there exists additional consumption volatility when the good markets are imperfectly competitive along with the financial market friction. In numerical analysis, we quantify the welfare loss from the additional volatility in a parametrized version of the model and find out that it takes about 50% of
the welfare loss solely from the incomplete market. We also show that the income-dependent prices over
the life-cycle can depress consumption smoothing behavior and, in fact, generate correlated
consumption/income profiles without other frictions. We conduct a policy analysis which confirms that
fiscal policy can reduce consumption variation across ages and states. In contrast, monetary policy can
mitigate consumption volatility between states, but it might generate more varying consumption profiles
over the life-cycle via an intertemporal wedge.