# Topics in Macroeconomics with Heterogeneous Households

## Project Leaders

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## Literature Overview

Heterogeneous agent models have become the norm, rather than the exception, in modern macroeconomics (see, for an excellent review, Heathcote, Storesletten, and Violante, 2009). Advances in numerical methods and significant improvements in processing power of modern computers have made it possible to solve these models within a reasonable amount of time. Besides, there is a growing consensus about the innate flaws of the representative-agent paradigm and the importance of study household heterogeneity. First, heterogeneity may affect an aggregate equilibrium. For example, Huggett (1993) shows that idiosyncratic uninsurable income risk implies a precautionary motive for saving that increases aggregate wealth and reduces the equilibrium interest rate. As an another example, changes in the timing of taxes may have large real effects in the model with heterogeneous agents whereas in the representative agent model their effect is neutral, i.e. Ricardian equivalence is observed (Heathcote, 2005). Second, heterogeneity may change the answer to normative questions. A well-known result of Lucas (1987) states that business cycles have a very small impact on the welfare of a representative household, so macroeconomic stabilization policy is not really so important. In contrast, aggregate fluctuations can have important asymmetric welfare effects across heterogeneous agents, with liquidity constrained households are particularly hard hit by aggregate shocks (see, for example, Storesletten, Telmer, and Yaron, 2001). In addition, in the multi-country model with heterogeneous consumers, financial globalization may result in adverse effects on social welfare and the distribution of wealth (Mendoza, Quadrini, and Rios-Rull, 2009). Third, there are many questions in macroeconomics which can not be addressed in a simplified representative agent model. To analyze social security policies or to study income and wealth inequality we need to assume at least some heterogeneity across households (e.g., Heathcote, Storesletten, and Violante, 2010; Krueger and Perri, 2006).

Contemporary research in macroeconomics with heterogeneous agents deals with the three large themes. The first theme centers on studying the sources of heterogeneity. What is the importance of innate or ex-ante characteristics (such as, ability, preferences, health, initial wealth endowment) relative to lifetime shocks (e.g., income shocks) in determining income and wealth inequality (Storesletten, Telmer, and Yaron, 2004)? In what extent individual income fluctuations are genuine shocks and in what extent they are endogenous decisions of agents regarding their labor supply, education or occupational choice (Huggett, Ventura, and Yaron, 2011; Quadrini, 2000)?

The second theme analyzes the main channels of insurance. The first generation of the heterogeneous agents models allowed for only one financial instrument, risk-free debt, available to smooth lifetime consumption. However, in the real world, households can invest in a range of alternative financial and real assets to hedge some of the risks, and can buy explicit insurance against others. They may also declare bankruptcy (Livshits, MacGee, and Tertilt, 2007).

Besides, recent research departs from the fiction of the 'bachelor household' and explicitly incorporates family decisions (e.g. marriage, divorces, fertility, etc.) allowing a study of many new channels of insurance, such as pooling of individual risk within households, home production, intergenerational transfers and bequests (see, for example, Greenwood and Guner, 2009). Finally, since the government offers additional risk sharing via redistributive taxation and social insurance programs, it is very important to understand the relative importance of public and private channels of insurance (Krueger and Perri, 2011).

The third theme, which is still in its infancy, is the interaction between idiosyncratic risk and aggregate dynamics. Introduction of aggregate risk into heterogeneous agent model significantly complicates its solution, since the state space of the corresponding dynamic programming problem includes an infinitely-dimensional object, e.g. wealth distribution. However, recent developments in computational methods allow to approximate this solution (Krusell and Smith, 1998; Reiter, 2009, 2010) or, under fairly mild assumptions on utility function and borrowing bounds, to present it in a tractable form (Ragot and Challe, 2011). A range of classical topics in macroeconomics, including the welfare cost of business cycles and inflation (Erosa and Ventura, 2002), the equity premium puzzle (Heaton and Lucas, 2006), and the macroeconomic stabilization policies (McKay and Reis, 2013), have been reexamined in models that feature idiosyncratic risk in addition to aggregate fluctuations.

## Potential research projects

Below there are several potential topics for research projects.

### Sources of heterogeneity

- Career choice, education and income inequality
- Alcohol use, health and income inequality in heterogeneous agent model

### Channels of insurance

- Temporary migration as an insurance
- Interactions between fertility, population ageing and social security

### Business cycles and macroeconomic policy in heterogeneous agents world

- Distributional effects of oil price changes in oil-exporting economy
- Monetary policy and its distributional effects in heterogeneous agents model
- Booms and busts in housing prices and their effects on wealth distribution
- Aggregate and idiosyncratic uncertainty in open economy

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