Topics in Macroeconomics with Heterogeneous Households and Firms

Project Leaders

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This research project is a continuation of the project 'Topics in Macroeconomics with Heterogeneous Households' started in 2013. This year we will focus on the interactions between idiosyncratic risk and aggregate macroeconomic dynamics and extend our analysis by introducing firm-level heterogeneity.

Macroeconomics with heterogeneous households

Heterogeneous agent models have become the norm, rather than the exception, in modern macroeconomics (see, for an excellent review, Heathcote, Storesletten, and Violante, 2009; Guvenen, 2011). 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; Algan, Allais, and Den Haan, 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; Gornemann, Kuester, and Nakajima, 2012), have been reexamined in models that feature idiosyncratic risk in addition to aggregate fluctuations.

Macroeconomics with heterogeneous firms

Models using heterogeneous firms became popular in international trade theory starting with Melitz (2003), who applied Hopenhayn (1992) IO model, where firms are endowed with differing marginal costs and engage in monopolistic competition in the Dixit and Stiglitz (1977) and Krugman (1979) tradition. Due largely to the work of Melitz and coauthors (e.g., Ghironi and Melitz, 2005; Bilbiie, Ghironi, and Melitz, 2007a,b, 2012) models using heterogeneous firms have also become more prevalent in open-economy macroeconomics, as scholars have sought to understand the implications of heterogeneous firms for macroeconomics and optimal stabilization policy. But while the first wave of New Trade Theory models starting with Krugman (1979) emphasized that the logic of increasing returns leads to path-dependence and sunk cost hysteresis (Avinash Dixit spent half his career on this topic – e.g., Dixit, 1989a,b, 1992), the more recent vintage of New Trade Theory models, including those applied to the international macroeconomy, often do not include sunk costs of international trade. Yet recent research (Campbell, 2014) continues to support the empirical relevance of hysteresis, as current economic relationships are the product of history (Eichengreen and Irwin, 1998).

What are the implications for optimal monetary policy of having Melitz-type heterogeneous firms and Dixit/Krugman style path-dependence and hysteresis? Does this affect the optimal policy mix, including exchange rate intervention, for oil-exporting countries such as Russia who may suffer from the effects of Dutch Disease? Might these factors affect the optimal policy response of developed countries to the Great Reserve Accumulation under Bretton Woods II

(see [Dooley, Folkerts-Landau, and Garber](), [2004](), [2007](), [2009]()), when many developed nations experienced historic appreciations in their relative prices ([Campbell and Pyun](), [2014]())? Might they change the welfare implications of the failure of developed country central banks to stabilize demand during the 'Lesser Depression' and the period of 'Secular Stagnation' experienced by many developed nations today? And what does this imply for optimal policy for countries like Russia, which typically use exchange rate intervention as a key means of stabilization policy? Do sunk costs and heterogeneous firms also have implications for the monetary policy mix e.g., are there instances when tools other than interest rates, such as quantitative targeting or exchange rate management, might be preferred, even outside of liquidity traps? Does it have implications for how to solve the Trilemma ([Obstfeld, Shambaugh, and Taylor](), [2005]())?

Firm creation and firm destruction are inherently asymmetric activities – firm creation is like turning on an oven while firm destruction is more akin to flipping off a light switch. Most dominant firms today tended to acquire their position at the birth of their industry, while new entrants in mature industries tend to struggle to compete. Would a more realistic modeling of entrepreneurship activities have implications for the optimality of having a symmetric inflation target? Should a central bank respond symmetrically to an economy operating below potential to an economy which is overheating? Now many developed-country central banks have aimed for a gradual return to full employment from the financial crisis in 2008 and the ensuing severe recession. How optimal is this policy in a world typified by hysteresis?

Potential research projects

Below there are several potential topics for research projects.

Macroeconomics with heterogeneous households

- Inequality and business cycle

- 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

Macroeconomics with heterogeneous firms

- Optimal monetary policy with heterogeneous firms

  – For an oil exporter
  – For developed countries facing the Great Reserve Accumulation
  – Optimal inflation target given prevalence of liquidity traps, nominal rigidities, and commodity price spikes

- Consequences of symmetric inflation target with heterogeneous firms

- Implications of modeling more sophisticated firm creation and dynamics including learning

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