Ideas for changing parameters:

* Standard parameters:
  + Discount factor
  + Risk aversion
  + Depreciation rate
  + Output elasticity of capital
  + productivity
* the budget constraint
  + replacement rate of unemployed
  + changing the unemployment probabilities

What does change?

* amount of taxes!

Two main reason to study heterogeneity:

* allow for studying crosssectional, or distributional phenomena
* heterogeneity could matter for aggregates
  + Imrohoroglu-Huggett-Aiyagari framework
    - Aggregates, including prices, depend on the entire wealth distribution

Comparing representative-agent and heterogeneity:

* Rios-rull (1996) and Krusell and Smith (1998)

**Summary Guevenen(2011)**

Aggregation:

* A Static Economy, Gorman (1961) - Theorem
  + for the wealth distribution to not matter, we need aggregate demand to not change for any redistribution of wealth that keeps aggregate wealth constant.
  + > key condition for aggregation is that individuals have the same marginal propensity to consume (MPC) out of wealth (or linear Engel curves).
* A Dynamic Economy (No Idiosyncratic Risk), Rubinstein (1974) - Theorem
  + Demand Aggregation:
    - Whenever a composite consumer (all other consumers besides the one consumer in question) can be constructed, in equilibrium, rates of return are insensitive to the distribution of resources among individuals. Since the aggregate demand functions (for both consumption and assets) depend only on total wealth and not on its distribution.
  + Aggregation and Heterogeneity in Relative Risk Aversion.
    - All six cases (theorem) giving rise to demand aggregation in the theorem require individuals to have the same curvature parameter. Identical curvature is a necessary condition, it is not sufficient for demand aggregation: each of the six cases adds more conditions on top of this identical curvature requirement. (notice that in some cases some sort heterogeneity is allowed and aggregation is still allowed for)
* A Dynamic Economy (With Idiosyncratic Risk)
  + Note Rubinstein (1974)’s theorem is abstracting from a key aspect of dynamic economies: uncertainty that evolves over time i.e. idiosyncratic risk
  + Constantinides (1982)
    - Shows that if **markets are complete**, under much weaker conditions, one can replace heterogeneous consumers with a planner who maximizes a weighted sum of consumer’s utilities. In turn, the central planner can be replaced by a composite consumer who maximizes a utility function of aggregate consumption.
  + see pp. 10&11 for more info
* Completing Markets by Adding Financial Assets.
  + If S(>J) states, where J are physical assets, markets are incomplete.
    - If consumers have homogenous tastes, endowments, and beliefs, then markets are (effectively) complete by simply adding enough financial assets (in zero net suplly) . There is no loss of optimality and nothing will change by thaction, since in equilibrium identical agents will not trade with each other.
    - -> hence, the more “homogeneity” we are willing to assume among consumers, the less demanding the complete markets assumption becomes.
* Section three
  + - Perfect insurance (complete markets)
      * Either a social planner who pools all individuals’ resources and maximizes a social welfare function that assigns a positive weight
      * Competitive equilibrium of a frictionless economy where individuals are able to trade in a complete set of financial securities
      * Strong assumption: every individual’s marginal utility must grow in locksteps with the aggregate and, hence, with each other.
    - Self insurance, individuals have only access to borrowing and saving
    - Partial insurance
* Incomplete Markets in General Equilibrium
  + very useful tool, since possible to jointly analyse aggregate and distributional issues
  + Three broad questions: cross-sectional distributions of consumption, earnings, and wealth
  + Aiyagari (1994)
    - Version of deterministic growth framework, with a Neoclassical production function and a large number of infinitely-lived consumers
    - Asset borrowing limit determined in various ways
    - At each point in time, consumers may differ in the history of productivities experiences, and hence in accumulated wealth.
    - There are at least two ways to embed this problem in general equilibrium
      * Aiyagari considered a production economy and viewed the single asset as the capital in the firm, which obviously has a positive net supply. In this case, aggregate production is determined by the savings of individuals, and both r and the wage rate w, must be determined in general equilibrium.
      * Huggett (1993) instead assumed that the single asset was a household bond in zero net supply. In this case, the aggregate amount of goods in the economy is exogenous (exchange economy), and the only aggregate variable to be determined is r.
    - The borrowing limit
      * Can be set to the “natural” limit, which is defined as the loosest possible constraint consistent with certain repayment of debt: Bmin =wlmin/r (note if lmin =, the limit is zero)
      * Or ad-hoc limit
    - Findings of Aiyagari (1994)
      * Aggregate capital stock is higher than it is with complete markets, difference is not quantitatively very large.
        + As a consequence r is lower that the preference rate
        + Also true in Huggett (1993)
        + -> can explain equity premium puzzle
        + however, while this environment helps, it is neither necessary nor sufficient to generate a low interest rate
      * Aiyagari also shows that model generates the right ranking between different types of inequality: wealth is more dispersed than income, which is more dispersed than consumption.
    - Limitations of the Aiyagari model see pp. 24 - 31

Aggregate uncertainty:

* Krusell and Smith (1998
  + “ One approximates the wealth distribution with a finite number of its moments (inspired by the idea that a given probability distribution can be represented by its moment generating function). In a remarkable finding, they showed that the first moment (the mean) of the wealth distribution was all individuals needed to track in this economy for predicting all future prices. This result – generally known as “approximate aggregation” – is a double-edged sword. On the one hand, it makes feasible the solution of a wide range of interesting models with incomplete markets and aggregate shocks. On the other hand, it suggests that ex post heterogeneity does not often generate aggregate implications much different from a representative-agent model. So, the hope that some aggregate phenomena that were puzzling in representative-agent models could be explained in an incomplete markets framework is weakened with this result.

Summary Chapter 17 of “Recursive Macroeconomic Theory”

Borrowing limits:

* The Inada condition makes consumption nonnegative, and this fact plays a role in justifying the natural debt limit below.
* Upper bound is restrictive