# Thesis Proposal: Heterogeneous Preferences and the Euler Equation Implied Rate

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# Questions

- How do the interest rates implied by the consumption Euler equation compare to observed historical interest rates when we add...
  - Habit formation?
  - Non-separability in consumption and labor?
  - **Heterogeneous preferences?**
- What is the distribution of the correlation between the implied and "true" interest rates?
- How do implied rates respond to monetary shocks? Is there a hump-shaped response in consumption?

# Motivation

- Consumption Euler equation expresses intertemporal consumption choice:

$$\frac{\beta E_t u'(C_{t+1})}{u'(C_t)} = \frac{1}{1 + r_t}$$

- Assumption of nearly all standard macroeconomic models
- Has been shown many times not to fit the data!

# Background

- Canzoneri et al. (2007) show a negative correlation between implied rates and money market rates, even with habit formation
- Collard and Dellas (2012) add non-separability in consumption and labor; find a positive correlation
- Gareis and Mayer (2013) compare to rate implied by Smets and Wouters (2007); find positive correlation but excess volatility

# Representative Agent Models

- Constant relative risk aversion

$$u(c_t) = \frac{c_t^{1-\gamma}}{1-\gamma}$$

- Habit formation (non-separability in time)

$$u(c_t, c_{t-1}) = \frac{(c_t/c_{t-1}^{\varphi})^{1-\gamma}}{1-\gamma}$$

- Non-separability in consumption and leisure

$$u(c_t, c_{t-1}, \ell_t) = \frac{\left[(c_t/c_{t-1}^{\varphi})^{\nu}\ell_t^{1-\nu}\right]^{1-\gamma}}{1-\gamma}$$

# Heterogeneous Preferences

- Heterogeneous optimizing behavior, e.g. Campbell and Mankiw (1989)'s "rule of thumb" consumers
- Heterogeneous time preferences $\beta$
- Heterogeneous risk aversion $\gamma$

# Data

- Macroeconomic time series from FRED, including:
  - Real personal consumption expenditures
  - Real personal disposable income
  - Real GDP
  - Average weekly hours worked (nonfarm)
  - Effective and target federal funds rates
- Journal of Commerce industrial price index

# Empirical Analysis

- Estimate VAR of consumption, leisure, inflation, etc.
- Compute implied rates...
  - With and without habit formation and consumption/leisure non-separability
  - With rule of thumb consumers
  - Assuming high and low versions of $\beta$ and $\gamma$
  - Assuming some joint distribution of $(\beta, \gamma)$
- Correlate implied rates with ex post rates; check correlation of residual and monetary policy

# Empirical Analysis

- Estimate distribution of correlations with Monte Carlo experiment
- Compute impulse responses to monetary shock (target FFR)
  - Does implied rate respond similarly to effective FFR?
  - Hump-shaped response in consumption?