Lecture 3: Old School Theories & First Attempt at Modelling Money

Adam Hal Spencer

The University of Nottingham

Advanced Monetary Economics 2018

Roadmap

Review

- Two opposing "old school" views of macroeconomics and policy.
- **Keynesian view:** just after the Great Depression.
  - John Meynard Keynes.
  - Demand-driven business cycles.
  - Supply-side more or less taken as given.
  - Government policy should act to stabilise demand.
- **Monetarist view:** around the 1960s.
  - Milton Friedman and the Chicago School.
  - Libertarianism: the private sector is inherently stable.
  - Government causes instability: should stay out of things.
  - Real variables are influenced only by real things in the long run.

Roadmap

Overview

- Lacked proper microfoundations.
- Assumes reduced-form aggregate functions for the macroeconomy.
- Assume a closed economy with monetary and fiscal authorities.

Consumer Behaviour

- Consumption function

$$C = \mathcal{C}(Y - T, r), \;\; 1 > \mathcal{C}_1 > 0, \mathcal{C}_2 < 0$$

where Y is income, T is taxes and $r = i - \pi$ is the real interest rate.

- N.B. the derivatives are by assumption here.

- Savings function

$$\begin{aligned} S &= \mathcal{S}(Y - T, r) \\ &= Y - T - C \end{aligned}$$

where $\mathcal{S}_1 > 0$ and $\mathcal{S}_2$ is ambiguous.

Firm Investment Behaviour

- Investment function

$$I = \mathcal{I}(r), \ \mathcal{I}_1 < 0$$

- Notice that the "firms" are thought of as being different from the "households" that save.

Investment-Saving (IS) Curve

- IS curve

$$\mathcal{Y}(r) = \mathcal{C}(Y - T, r) + \mathcal{I}(r) + G$$

where G is taken to be exogeneous.

- It follows then that

$$\mathcal{Y}_1 = \frac{1}{1 - \mathcal{C}_1} \{\mathcal{C}_2 + \mathcal{I}_1\}$$

which is negative.

Money Market Equilibrium

- Exogenous demand for money (where L is real balances)

$$L = \mathcal{L}(Y, i), \;\; \mathcal{L}_1 > 0, \mathcal{L}_2 < 0$$

  where i is the nominal rate of interest, (opportunity cost of holding cash).

- Exogenous and fixed supply of nominal balances, $\bar{M}$.
- Equilibrium $\mathcal{L}(Y, i) = \frac{\bar{M}}{P}$ determines nominal rate i.
- Fixed prices means equilibrium also pins-down the real rate r.

Liquidity-Money (LM) Curve

- The locus of points in $r - Y$ space where money market equilibrium holds.
- LM curve has positive slope as rises in Y mean an increase in money demand, which causes r to rise with P fixed.

Aggregate Demand

- Intersection of IS and LM curves gives equilibrium Y and r for P fixed.
- Each point along aggregate demand in $P - Y$ space corresponds to an intersection of IS-LM for given P.

Aggregate Supply

- Short-run aggregate supply (SRAS): a flat line in $P - Y$ space due to fixed prices.
- Long-run aggregate supply (LRAS): vertical line for potential output.

Fiscal Policy

- Multiplier effect coming through the dependence of C on Y itself.
- Feedback effect on IS curve.
- \$1 increase in G leads to larger than \$1 increase in Y.

Monetary Policy

- Say the central bank increases $\bar{M}$. What happens in the short-run?
- Decrease in i and r and downward shift in LM curve.
- Can lead to an increase in Y depending on the slope of the curves as AD shifts rightward.
- When prices are allowed to adjust however LRAS is unaffected. Price will be higher though as SRAS shifts upward to equilibrate.
- We just keep moving further and further up the LRAS curve!

Roadmap

Takeaways

- Of the belief that government interventions will ultimately just cause higher inflation.
- Don't waste time on business cycle stabilisation.
- Focus on improving productive capacity of the economy.

Roadmap

Overview

- What happens if we just stick money into the RBC model?
- Can potentially give us inflation and prices.
- There are problems though...why would households want to hold money?

Household Setup

- Let's forget about capital for now.
- Assume that households can hold cash m_{t+1} or discount bonds in each period b_{t+1}, (price of bonds is $q_t < 1$).
- Otherwise the setup is the same as the RBC model.

Household's Problem

- Problem:

$$\max_{\{c_t, n_t, b_{t+1}, m_{t+1}\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{c_t^{1-\sigma}}{1-\sigma} - \frac{n_t^{1+\psi}}{1+\psi} \right]$$

  subject to their budget constraints

$$p_t c_t + q_t b_{t+1} + m_{t+1} \leq w_t n_t + m_t + b_t + d_t$$
$$b_0, m_0 \text{ given}$$

- How does this differ from the infinite horizon optimisation problem from last class?

- Nominal prices: p_t denotes the price of goods in terms of money.

Household's Problem: Optimality

- Lagrangian given by

$$\mathcal{L} = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{c_t^{1-\sigma}}{1-\sigma} - \frac{n_t^{1+\psi}}{1+\psi} \right]$$
$$+ \mathbb{E}_0 \sum_{t=0}^{\infty} \lambda_t \left[w_t n_t + m_t + b_t - m_{t+1} - q_t b_{t+1} - p_t c_t \right]$$

Household Optimality: First Order Conditions

- FOCs:

$$\frac{\partial \mathcal{L}}{\partial c_t} = 0 \Rightarrow \beta^t c_t^{-\sigma} - p_t \lambda_t = 0 \tag{1}$$

$$\frac{\partial \mathcal{L}}{\partial n_t} = 0 \Rightarrow -\beta^t n_t^{\psi} + \lambda_t w_t = 0 \tag{2}$$

$$\frac{\partial \mathcal{L}}{\partial b_{t+1}} = 0 \Rightarrow -q_t \lambda_t + \mathbb{E}_t[\lambda_{t+1}] = 0 \tag{3}$$

$$\frac{\partial \mathcal{L}}{\partial m_{t+1}} = 0 \Rightarrow -\lambda_t + \mathbb{E}_t[\lambda_{t+1}] = 0 \tag{4}$$

What's the Problem with Money

- Compare equations (3) and (4)

$$q_t = 1$$

  which is a contradiction.

- Recall: the bonds trade at a discount (pay interest).
- So money is dominated in this model.
- $\nexists$ a monetary equilibrium here.

What's the Problem with Money

- We need to introduce some other motivation for holding cash!

Roadmap

Takeaways

- We want cash in a model to talk about nominal prices.
- Just sticking money into the RBC model without some other frictions won't do the trick.
- Households need some other reason for holding cash.