MONETARY POLICY IN THE INFINITE-PERIOD ECONOMY: SHORT-RUN EFFECTS

NOVEMBER 16, 2011

IS MONETARY POLICY NEUTRAL?

- **An enduring question in macroeconomics: does monetary policy have any important effects on the *real* (i.e, *real* GDP, consumption, etc) economy?**
- **Definition: Money (and hence monetary policy) is neutral if changes in the money supply (i.e., changes in monetary policy) have no effect on the real economy**
  - **Monetary policy is non-neutral if it does have effects on the real economy**
- **New Keynesian view: money is non-neutral (because prices are rigid/sticky, often for long periods of time)**
- **RBC view: money is neutral (because prices are not rigid/sticky in any important way)**
- **MIU framework allows us to consider how/why monetary policy is or is not neutral**

MONEY DEMAND

- Consumption-money optimality condition the foundation of money demand function
- Example: suppose $u\left(c_t, \frac{M_t}{P_t}\right) = \ln c_t + \ln\left(\frac{M_t}{P_t}\right)$
- Thus, $u_1\left(c_t, \frac{M_t}{P_t}\right) = \frac{1}{c_t}$ and $u_2\left(c_t, \frac{M_t}{P_t}\right) = \frac{1}{M_t / P_t}$ (no chain rule this time…)
- Consumption-money optimality condition (for this utility function…) is

$$\frac{P_t c_t}{M_t} = \frac{i_t}{1+i_t}$$

$$\Big\downarrow \text{ Isolate the } M_t / P_t \text{ term}$$

$$\frac{M_t}{P_t} = c_t \cdot \left(\frac{1+i_t}{i_t}\right)$$

REAL MONEY DEMAND FUNCTION: depends positively on c_t and negatively on i_t (i_t is the opportunity cost of money)

- Use this money demand function to analyze
  - The monetary neutrality debate
  - The long-run (aka steady-state) connection between monetary policy and inflation

MONEY DEMAND

CONSUMPTION-MONEY OPTIMALITY CONDITION

$$\underbrace{\frac{u_2(c_t, M_t / P_t)}{u_1(c_t, M_t / P_t)}}_{\text{MRS (between consumption and real money holdings)}} = \underbrace{\frac{i_t}{1+i_t}}_{\text{price ratio (between consumption and money)}}$$

NOTE: consumption-money optimality condition and money demand function are the *same thing*, just viewed from different points of view

$$\Big\downarrow \text{ Using utility function } u\left(c_t, \frac{M_t}{P_t}\right) = \ln c_t + \ln\left(\frac{M_t}{P_t}\right), \text{ generate money demand function}$$

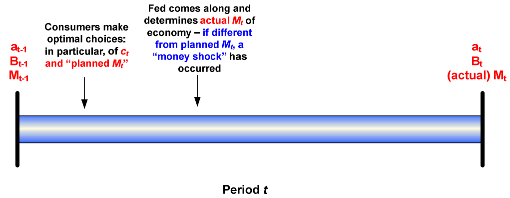
REAL MONEY DEMAND FUNCTION: depends positively on c_t and negatively on i_t (i_t is the opportunity cost of money)

$$\frac{M_t}{P_t} = c_t \cdot \left(\frac{1+i_t}{i_t}\right)$$

- Use money demand function to illustrate effects of money (monetary policy) shocks
- Gets at core of neutrality debate
- Let's be even more precise about the timing of events…

Monetary Neutrality Debate

- Precise timing of events within period t



- Fed sets "actual M_t" after consumers makes their choices of c_t and "planned M_t" (and other choices, too…)
  - If actual M_t differs from planned M_t, money shock has occurred

Monetary Neutrality Debate

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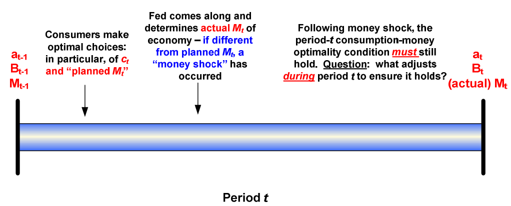

- Fed sets "actual M_t" after consumers makes their choices of c_t and "planned M_t" (and other choices, too…)
  - If actual M_t differs from planned M_t, money shock has occurred
- Question: which adjusts (P_t or c_t) to ensure consumption-money optimality condition holds? (simplify by assuming i_t doesn't adjust)

$$\frac{M_t}{P_t} = c_t \cdot \left(\frac{1+i_t}{i_t}\right)$$

MONETARY NEUTRALITY DEBATE

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$$\frac{M_t}{P_t} = c_t \cdot \left(\frac{1+i_t}{i_t} \right)$$

- **Keynesian / New Keynesian view**
  - **P_t cannot adjust because prices are sticky**
    - **(Prices will adjust *later* (i.e, in period t+1 or later), just not in period t)**
  - **A positive (negative) money shock leads to a rise (fall) in c_t**
  - **Money (and hence monetary policy) is not neutral**

Monetary Policy Analysis: Short-Run Effects

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- **RBC view**
  - **P_t can adjust because prices are not sticky**
  - **No reason for c_t to adjust (they do reflect optimal choices, after all…)**
  - **A positive (negative) money shock leads to no change (no change) in c_t**
  - **Money (and hence monetary policy) is neutral**

- **Empirical evidence for "how sticky" are prices is very mixed…**

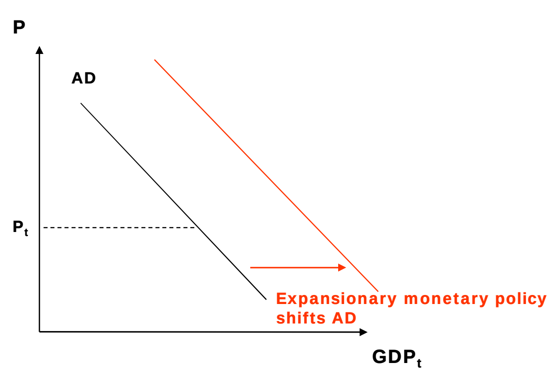
MONETARY NEUTRALITY DEBATE: EXAMPLE

- **Assume i_t = 0.125 is fixed**
- **Consumers' "planned" choices are c_t = 2 and M_t = 180**
- **This plan was made with P_t = 10 in mind**
- **Fed sets actual M_t = 270 (a positive money shock because actual M_t greater than planned M_t)**
- **Keynesian / New Keynesian view**
  - **P_t = 10 won't change (sticky prices)**
  - **c_t will rise (to c_t = 3) to make consumption-money optimality condition hold**
  - **Monetary policy is non-neutral**

$$\frac{M_t}{P_t} = c_t \cdot \left(\frac{1+i_t}{i_t} \right)$$

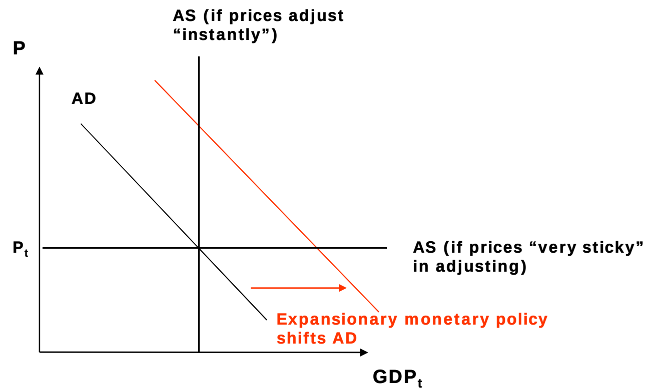
- **RBC view**
  - **Consumers' plan of c_t = 2 is what the economy really wants**
  - **P_t can fully and quickly adjust to accommodate this → P_t = 15**
  - **Monetary policy is neutral; only effect of monetary policy is on inflation**

MONETARY NEUTRALITY DEBATE



Period-t goods market

MONETARY NEUTRALITY DEBATE

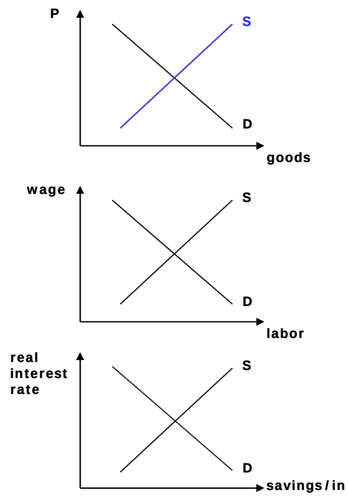


The crucial issue: how quickly do nominal prices adjust?

Period-t goods market

THE THREE MACRO (AGGREGATE) MARKETS

- **Goods Markets**
  - **Demand derived from C-L framework**
    (Shape of AS function?....depends how quickly nominal prices adjust)
- **Labor Markets**
  - **Supply derived from C-L framework**
  - **Demand derived from firm theory in C-S framework**
- **Capital/Savings/Funds/Asset Markets (aka Financial Markets)**
  - **Supply derived from C-S framework**
    Demand derived from firm theory in C-S framework



MONETARY POLICY IN THE INFINITE-PERIOD ECONOMY: LONG-RUN EFFECTS

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MONEY AND INFLATION IN THE LONG-RUN

- Question: what determines inflation in the long run (i.e., in steady-state)?
  - Use both period-(t-1) and period-t money demand functions to analyze

Money demand function in t-1

$$\frac{M_{t-1}}{P_{t-1}} = c_{t-1} \cdot \left(\frac{1+i_{t-1}}{i_{t-1}}\right)$$

Money demand function in t

$$\frac{M_t}{P_t} = c_t \cdot \left(\frac{1+i_t}{i_t}\right)$$

Divide period t money demand by period t-1 money demand

$$\frac{M_t / P_t}{M_{t-1} / P_{t-1}} = \frac{c_t}{c_{t-1}} \cdot \left(\frac{1+i_t}{i_t}\right)\left(\frac{i_{t-1}}{1+i_{t-1}}\right)$$

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Recall definition of inflation $\pi_t = \frac{P_t}{P_{t-1}} - 1$

And now define the ***money growth rate*** in an analogous way: $\mu_t = \frac{M_t}{M_{t-1}} - 1$

$$\frac{1+\mu_t}{1+\pi_t} = \frac{c_t}{c_{t-1}} \cdot \left(\frac{1+i_t}{i_t}\right)\left(\frac{i_{t-1}}{1+i_{t-1}}\right)$$

Impose steady state

i.e., $c_{t-1} = c_t = c$, $i_{t-1} = i_t = i$, $n_t = n$, and $\mu_t = \mu$

$$\frac{1+\mu}{1+\pi} = \frac{c}{c} \cdot \left(\frac{1+i}{i}\right)\left(\frac{i}{1+i}\right)$$

Monetary Policy Analysis: Long-Run Effects

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$$\boxed{\mu = \pi}$$

IN LONG RUN, RATE OF MONEY GROWTH = RATE OF INFLATION

MONETARISM

$\mu = \pi$ IN LONG RUN, RATE OF MONEY GROWTH = RATE OF INFLATION

- In steady state, inflation determined solely by how quickly central bank (Fed) expands (or shrinks) the nominal money supply

- This relationship the basis for the monetarist school of thought
  - Milton Friedman's famous dictum: "Inflation is always and everywhere a monetary phenomenon"
    - Policy translation: "A central bank should not worry about/try to control anything other than how quickly the money supply in the economy is growing. Keeping money growth under control will keep inflation under control."

Monetary Policy Analysis: Money and Inflation

MONETARISM

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  - Rose to prominence in mid- and late 1970's (during macro crises)
  - Largest policy influence in U.K., short-lived policy influence in U.S.
  - Largely died out as basis for serious policy advice by mid-1980's

- Nevertheless still viewed as fundamental "law" of macroeconomics
  - A concern today: Fed's "easy monetary policy" (read: Fed has increased money supply very rapidly) will lead to a burst of inflation

Monetary Policy

- In short-run, do changes in monetary policy have effects on consumption and real GDP?
  - Keynesian / New Keynesian view: yes because prices are sticky
  - RBC view: no because prices are not sticky
- In long-run, changes in money growth rate
  - Have effects on only inflation
  - Have no effects on consumption and real GDP
- Competing principles / theories influence policy-makers' decisions
- Basic models are guideposts for policy debates
- Actual policy-making quite messy
  - Requires lot of judgment
  - Requires hope / belief that basic models are at least *somewhat* useful guides to thinking
- Next: interactions between monetary policy and fiscal policy