

MONEY IN THE INFINITE-PERIOD ECONOMY: THE NEUTRALITY DEBATE AND THE STEADY STATE

APRIL 15, 2009

Monetary Policy Analysis: Short-Run Effects

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 money is or is not neutral**

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MONEY DEMAND

CONSUMPTION-MONEY OPTIMALITY CONDITION

$$\frac{u_2(c_t, M_t / P_t)}{u_1(c_t, M_t / P_t)} = \frac{i_t}{1+i_t}$$

MRS (between consumption and real money holdings) 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

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

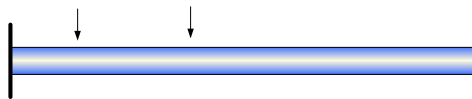
REAL MONEY DEMAND FUNCTION: depends positively on c_t and negatively on i_t (i_t is the opportunity cost of money)

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

- Use money demand function to illustrate effects of **money shocks**
- Gets at core of neutrality debate
- Let's be even more precise about the timing of events...

MONETARY NEUTRALITY DEBATE

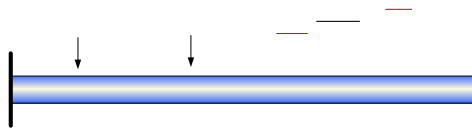
- Precise timing of events **within period t**



- 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

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 - 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)

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

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Consumers make optimal choices: in particular, of c_t and "planned M_t "

a_{t-1}
 B_{t-1}
 M_{t-1}

Fed comes along and determines **actual M_t** of economy – if different from planned M_t , a "money shock" has occurred

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- **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

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Period

MONETARY NEUTRALITY DEBATE

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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...)
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- Empirical evidence for "how sticky" are prices is very mixed...

MONETARY NEUTRALITY DEBATE: EXAMPLE

- Assume $i_t = 0.1$ is fixed
- Consumers' "planned" choices are $c_t = 2$ and $M_t = 180$
- This plan was made with $P_t = 10$ in mind

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- 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

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

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 - ❑ $P_t = 10$ 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**
- ❑ RBC view
 - ❑ Consumers' plan of $c_t = 2$ is what the economy really wants
 - ❑ P_t can fully and quickly adjust to accommodate this $\rightarrow P_t = 15$
 - ❑ **Monetary policy is neutral; only effect of monetary policy is on inflation**

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

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

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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 $\mu_t = \frac{M_t}{M_{t-1}} - 1$ in an analogous way:

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

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

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

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$\mu = \pi$ **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."

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 - ❑ 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 spawn 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
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- ❑ Actual policy-making quite messy
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- ❑ **Next: interactions between monetary policy and fiscal policy**