

Chapter 7: Money and Monetary Policy

I. Instructions:

Read quickly over this chapter. Pay attention mainly to the things that I emphasize in these notes. You can also find pieces of my lectures in subsequent chapters in the book. Look for these by topic. Note: Memorize *Summary 10* on page 290 of your text. This is good information to know.

II. Role of Money in the Macroeconomy

- A. Monetary Policy affects the supply of money, and therefore the price and quantity of money: through the following 3 tools.
 - 1. Open Market Operations (OMO)**Primary Tool
 - 2. Reserve Requirements
 - 3. Discount Window/Discount Rate
- B. The price of money (interest rates and the price level of goods and services) and the quantity of money (as measured by the monetary aggregates) has an impact on nominal GDP.
- C. In particular,
 - 1. In the Short-run: the quantity of money and interest rates may affect real output and unemployment.
 - 2. In the Long-run: monetary policy only affects inflation. But a high inflationary environment causes uncertainty and this may actually decrease GDP and increase employment.
- D. In this chapter, we will try to explain why and how monetary policy has effects on interest rates, money growth, inflation, output and unemployment.

III. The Demand for Money, Monetary Policy and Interest Rates

- A. Building the demand for Money
 - 1. Money is not like other commodities in that it does not yield benefits from consuming it. Since price is the measure we use for the benefit of a good, at the margin, the price of money is not that easy to measure.
 - 2. Likewise, the quantity of money is not that easy to measure. What is money? Anything that can be used to purchase goods and services? Any thing that acts as a financial asset?
 - 3. These questions need to be answered before we can build a demand and supply for money and talk about what happens to the price and quantity of money and how they are related to the real sector for goods and services.
 - 4. Definition of transactions money for the Macroeconomy (measure of the quantity of money)

$$M1 = \text{Currency held by the Public} + \text{Demand Deposits (non-interest bearing checking accounts)} + \text{Other Checkable Deposits (interest-bearing checking accounts)} + \text{Travelers Checks}$$

B. The Functions of Money

1. Medium of Exchange
2. Store of Value

C. The Quantity Theory of Money: Stresses Money as a Medium of Exchange

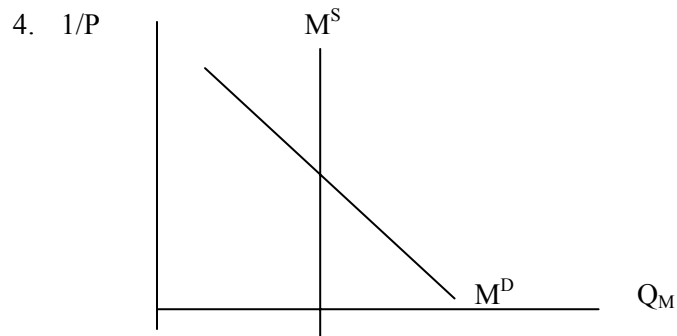
1. Equation of Exchange

$$M V = P Y$$

2. Assumptions:

- a. V is constant in the short-run (determined by institutional factors)
- b. Y is constant in the short-run (assumed to always be at full employment)

3. Implication – an increase in the money supply causes a proportionate increase in the prices of goods and services. This also causes a reduction in the value of money. Thus, $1/P$ is the price of money (i.e. as prices of goods and services rise, for a given supply of money, the price (or value) of money decreases.)



D. Modern Quantity Theory of Money: Stresses the Medium of Exchange Function of Money.

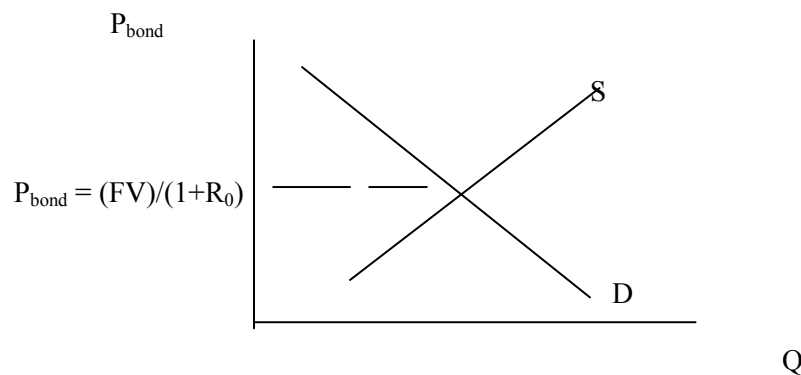
1. $\Delta M/M + \Delta V/V = \Delta P/P + \Delta Y/Y$
2. Assumptions
 - a. V grows at a constant rate in the long-run (determined by technology used in transactions – e.g., credit card use, ATM use, on-line banking)
 - b. Y grows at a constant rate in the long-run (determined by all the things we talked about in chapter 6 – e.g., technology, labor productivity and capital)
3. Implications: The growth rate in the money supply determines the inflation rate in the long-run

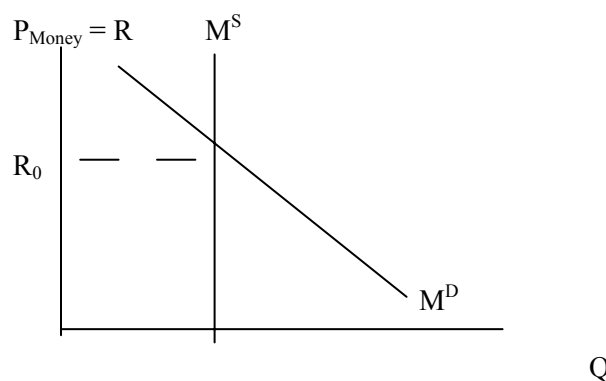
E. The Keynesian theory of Money Demand: Stresses the Store of Value Function

1. Assumptions:
 - a. Money and Bonds comprise all of financial wealth
 - b. Money is used to purchase goods and services, but does not earn interest
 - c. Bonds earn interest, but cannot be used to purchase goods and services
2. Digression on the relationship between the price of a bond and the interest rate or yield on a bond:

$$P_{\text{bond}} = PV = (FV)/(1+R)$$

3. The Effect of Monetary Policy on Real Interest Rates





- Increase in the money supply causes people to demand more bonds (as they balance their portfolio of money and bonds).
- This drives up the demand for bonds and therefore the price of bonds.
- This causes interest rates on bonds to fall (since FV is fixed).
- This causes the quantity of money demanded to rise (movement along the money demand function).

Thus, increases (decreases) in the money supply cause interest rates to decrease (increase).

Since there may be no reason to expect inflation to rise as a result of the change in the money supply, the Fed is affecting the real interest rate. This result should bother you, since this implies that the Fed can affect the real cost of capital . . . , but don't be alarmed. This is thought to occur only because the price of goods and services are not immediately affected by monetary policy. That is, monetary policy affects financial markets initially. After the money gets out into the real economy (or interest rates affect spending), AD increases and prices rise. This rise in prices of goods and services causes money demand to increase and therefore causes real interest rates to rise to their original level. Thus, monetary policy only had an effect on real interest rates because of the stickiness (or sluggishness) of prices. In the longer run the Fed has no effect on real interest rates and can only affect nominal rates through affecting the inflation rate.

F. Interest Rates

1. The Treasury Yield Curve
 - a. Expectations Hypothesis
 - b. Segmented Market Hypothesis
 - c. Liquidity Premium Theory
 - d. The Long-term rate conundrum
2. Interest Rate Risk

Assume: you have the option of buying any one of the following

1. 3 year bond
2. 1 year bond and then a 2 year bond / 2 year bond or a 1 year bond
3. 1 year bond and roll it over for 2 years.

You make a choice and purchase one of the three today so that your situation is on the following situations:

1 year Bond

Assume $\Delta R = 5\%$

$$\$900 = \$1000/(1 + R), \text{ where } R = 11\%$$

$$P_B = \$862.07 \quad \Delta R = 4.2\%$$

2 Year Bond

$$\$811.62 = \$1000/(1+R)^2, \text{ where } R = 11\%$$

$$P_B = \$743.16 \quad \Delta R = 8.43\%$$

3 Year Bond

$$\$731.19 = \$1000/(1+R)^3, \text{ where } R = 11\%$$

$$P_B = \$640.66 \quad \Delta R = 12.38\%$$

Implication:

The longer term maturity bond is riskier because changes in interest rates cause its present value to fluctuate more than for a short term bond. This is Interest Rate Risk

Application: Commercial banks have maturity mismatches as inherent part of their operations. An unanticipated increase in the market rate of interest will cause a bank's capital to fall in value. One could also see this over time as a bank acquires higher interest rate liabilities. This will decrease bank profits. A bank can mitigate this risk by more closely matching its maturities on the asset and liability sides of its balance sheet, or by using various types of derivatives.

IV. Monetary Transmission Mechanism (MTM)

A. Interest Rate Channel

$\Delta OMO \Rightarrow \Delta M^S \Rightarrow \Delta R \Rightarrow \Delta C$ (consumption) & ΔI (investment) Expend. (ΔAD)
 $\Rightarrow \Delta \text{Nominal GDP}$

B. Money Channel

$\Delta OMO \Rightarrow \Delta M^S \Rightarrow \Delta C$ & ΔI Expenditures (ΔAD) $\Rightarrow \Delta \text{Nominal GDP}$

C. Credit Channel (Borrower Net Worth Channel)

Contractionary Policy

$\Delta OMO \Rightarrow \Delta M^S \uparrow \Rightarrow \Delta R \uparrow \Rightarrow$ weakens balance sheets $\Rightarrow LN^D \downarrow \Rightarrow (\Delta C \text{ \& } \Delta I) \downarrow$
 $(\Delta AD) \downarrow \Rightarrow \Delta \text{Nominal GDP} \downarrow$

(explains why the effects of policy on nominal GDP are severe - the interest rate or money channels cannot explain this well)

Expansionary Policy

$\Delta OMO \Rightarrow \Delta M^S \uparrow \Rightarrow \Delta R \downarrow \Rightarrow \Delta LN^D = 0$ or small because of weak balance sheets \Rightarrow
 $\Delta C \text{ \& } \Delta I$ Expenditures (ΔAD) = 0 $\Rightarrow \Delta \text{Nominal GDP} = 0$

(explains why monetary policy may have weak effects in pulling an economy out of a recession)

The Borrower Net Worth Channel (a sub-channel of the Credit Channel) implies that monetary policy has asymmetric effects on nominal GDP.

Reference: Bernanke, Gertler and Gilchrist, "The Financial Accelerator and the Flight to Quality, *Review of Economics and Statistics* (technical reading), Feb. 1996 and Bernanke and Gertler, "Inside the Black Box: The Credit channel of Monetary Policy Transmission, *The Journal of Economic Perspectives*, Fall 1995, pp. 34-40 (easy reading))

V. Monetary Policy Implementation Problem

$$\begin{array}{lcl} \Delta \text{OMO} & \Rightarrow \Delta M^S & \\ & \} \Rightarrow \Delta \text{AD} \Rightarrow \Delta \text{Nominal GDP} & \\ & \Rightarrow \Delta R & \end{array}$$

In the transmission of monetary policy in the economy, there are,

Lags (6 mos. – 2 yrs. for U.S. monetary policy)

Uncertainty (of the effect of policy on the components of AD, i.e., C & I)

These problems make it difficult to conduct policy. Thus, the Fed tends to assign probabilities to recession (or inflation during an expansion in the economy) and conducts policy cautiously by changing the Federal Funds Rate in small increments over time. This approach allows the Fed to view more information shocks to the economy and their effects on the economy as more information comes available. Since lags and uncertainty make it difficult to reverse a large change in policy made in previous periods, this approach of putting small changes “in the pipeline” make for a prudent monetary policy for the Fed to follow.

Reference: “Central Banking in Theory and Practice,” Alan S. Blinder, 1998.

VI. Inflation Targeting

Approach:

1. The Fed sets a target value of inflation over the business cycle
2. The Fed communicates this target to the public
3. The Fed forecast inflation over the next 6-mos. to 1 year and conducts policy to achieve that target.
4. Short-term problems with the economy (e.g., probability of recession or economic slowdown, or negative shocks to financial markets) may warrant abandoning the inflation target for very short periods.
5. Fed would have to be more transparent and communicate target and inability to reach the target with the public.
6. This approach works best when Fiscal policy is consistent with a low-inflation environment (i.e., Fiscal policy cannot run continuous large deficits that may put pressure on the Fed to monetize them).

Reference: "Inflation Targeting: A New Framework for Monetary Policy," Bernanke and Mishkin, *Journal of Economic Perspectives*, 1997.

V. Other Topics in Monetary Policy

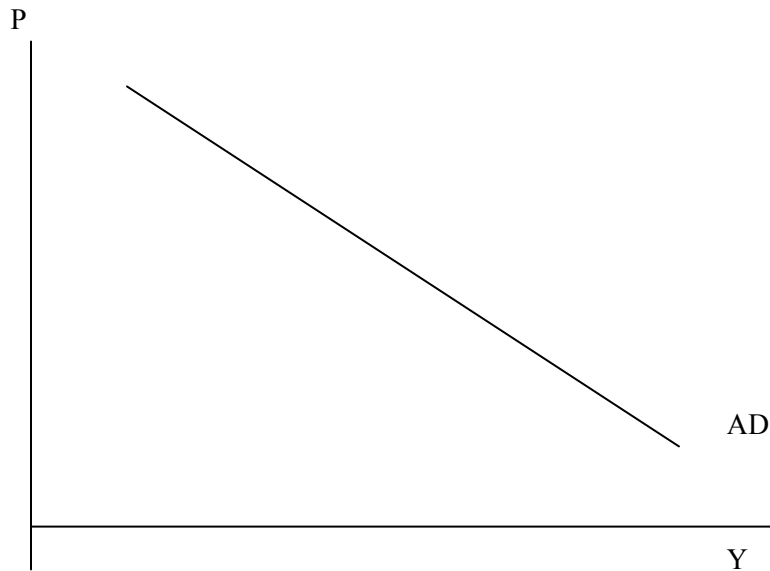
- A. Time Inconsistency
- B. Transparency
- C. Asset Markets (stock markets and housing markets) and Monetary Policy
- D. Credit Channel of Monetary Policy
- E. Targeting

VII. Effect of Fiscal and Monetary Policy on the Real Economy:
An Aggregate Demand (AD) and Aggregate Supply (AS) Framework

Aggregate Demand

Aggregate Demand and the Real Balance Effect

$\Delta P \Rightarrow \Delta M^s \Rightarrow \Delta R \Rightarrow \Delta I \Rightarrow \Delta AE \Rightarrow \Delta Y$ (explains derivation of AD)

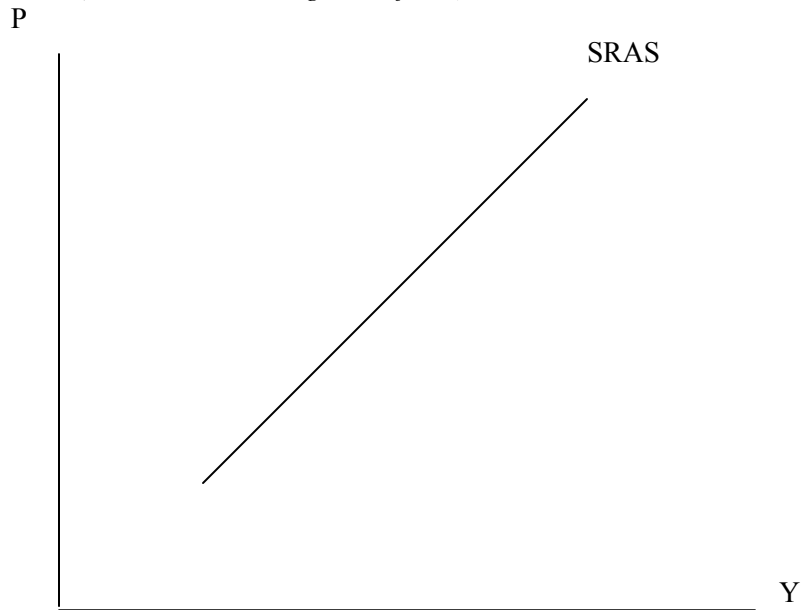


Variables that Shift AD:

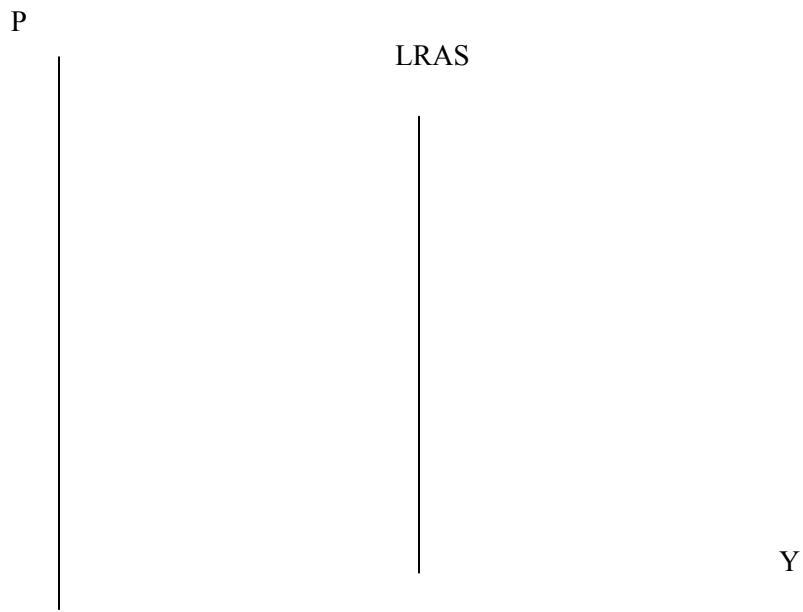
1. ΔM^s
2. ΔG_0
3. ΔT_0
4. ΔI_0
5. ΔC_0

Aggregate Supply

Short Run AS (when Nominal Wages are fixed)



Long Run AS (when Nominal Wages are flexible)



Variables that Shift:

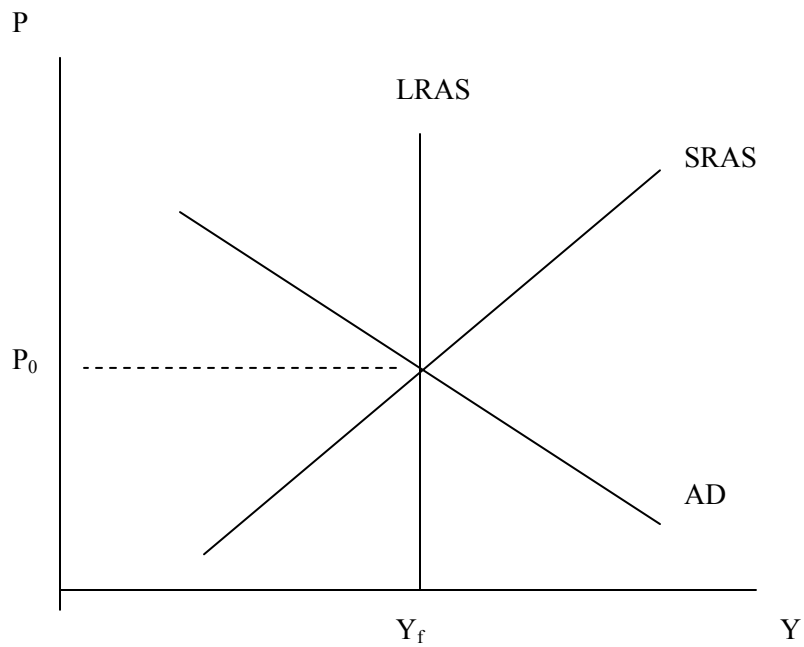
SRAS:

1. Δ wages
2. Δ Labor Productivity
3. Δ Capital
4. Δ Technology

LRAS:

1. Δ Labor Productivity
2. Δ Capital
3. Δ Technology

Equilibrium in the Macroeconomy

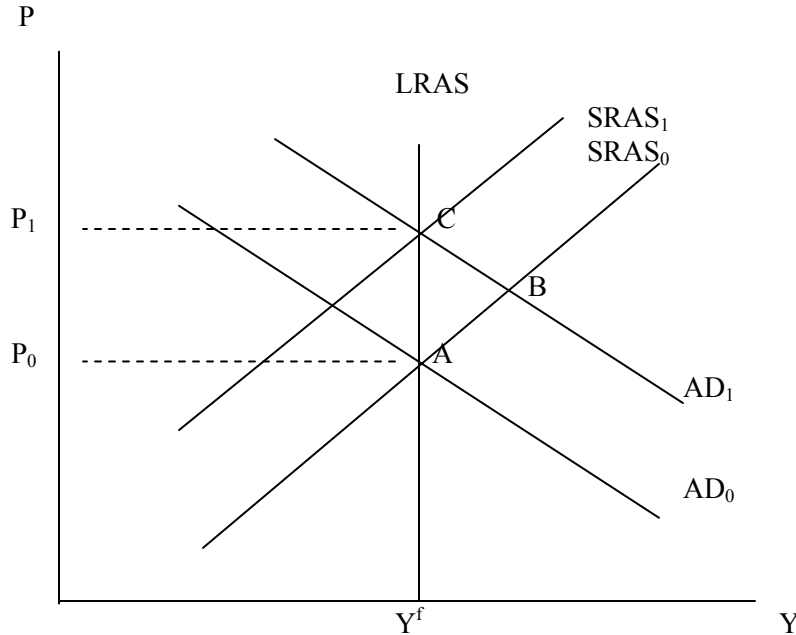


Shocks and Policy Responses

Shocks and Adjustment

1. ΔI_A
2. ΔC_A
3. Δwages
4. $\Delta \text{Labor Productivity}$
5. $\Delta \text{Capital}$
6. $\Delta \text{Technology}$

Example: ΔC_0 (e.g., due to an increase in stock market wealth)



Monetary Policy

Shifts AD. In the short run Y and P will increase. In the Long run only P will increase. Attempts by the Fed to maintain a permanent tradeoff between Y and P will result in an inflation. Monetary policy can be used to adjust our economy more rapidly towards the full employment level of output if we remain below the full employment level due to sticky nominal wages and prices.

Fiscal Policy

Shifts AD. In the short run Y and P will increase. In the Long run only P will increase. Government spending could result in crowding out of private expenditures. Fiscal policy can be used to adjust our economy more rapidly towards the full employment level of output if we remain below the full employment level due to sticky nominal wages and prices.

Financial Crises and the Macroeconomy