LECTURE NOTES

Chapter 17: Optimal Monetary Policy

1. The Monetary Policy Making Process

- Policy decisions are voted by the voting members of the FOMC
- Since 1970s, the Fed has to report to Congress, but monetary policy is subject to legislation (the Congress cannot say to the Fed what variable to target and at which value)
- The Fed has to target inflation and unemployment
    - If you believe in the short-run Phillips Curve, how can you achieve both!?

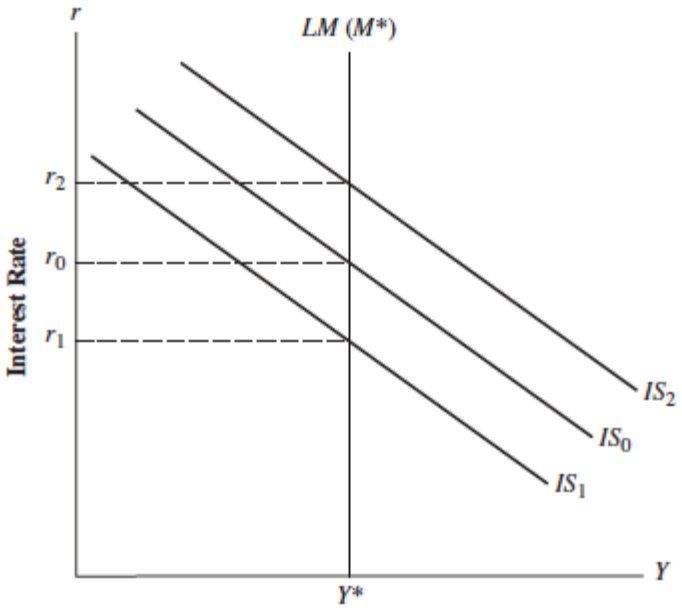
2. Competing Strategies: Targeting Monetary Aggregates or Interest Rates

- Ultimate targets: unemployment, real GDP, inflation
    - The Fed cannot control these variables directly
    - Intermediate targets: a variable that can be influenced by the Fed; it's important to the extent that allows to affect the ultimate targets.
        - Monetary aggregates
        - Interest rates
- Targeting Monetary Aggregates
    - At the beginning of each calendar year, the FOMC chooses the monetary growth rate target that it views as consistent with its *ultimate* policy goals for the next year
    - Monetary policy during the quarter proceeds with *money* as the policy target
- Targeting Interest Rate
    - The Federal Reserve sets a target for the federal funds rate
    - The FOMC conducts open market operations to increase (decrease) bank reserves until the federal funds rate decrease (increase) to the target value
- Competing targets
    - If the Fed targets the money (credit) supply, it cannot target the interest rate
    - If the Fed targets the interest rate, it cannot target the money (credit) supply

3. Money versus Interest Rate Targets in the Presence of Shocks

- Assume the Federal Reserve targets a given level of income Y^*
- Implications of Targeting a Monetary Aggregate
    - The Ideal Case for Targeting a Monetary Aggregate (Figure 17-2)
        - Demand for money is completely inelastic to the interest rate
        - This means that money demand depend only on income
        - The Federal Reserve can fix the money supply; this will yield the same level of income to any movement in the IS. The Fed does not need to predict what will happen with the IS
        - The interest rate adjusts
    - Less-Than-Ideal Cases for Targeting a Monetary Aggregate (Figure 17-3)
        - LM is upward sloping
        - Money demand is not perfectly stable (LM moves)
        - Nonvertical LM
        - The Federal Reserve will hit the income target if it correctly predicts the position of the IS

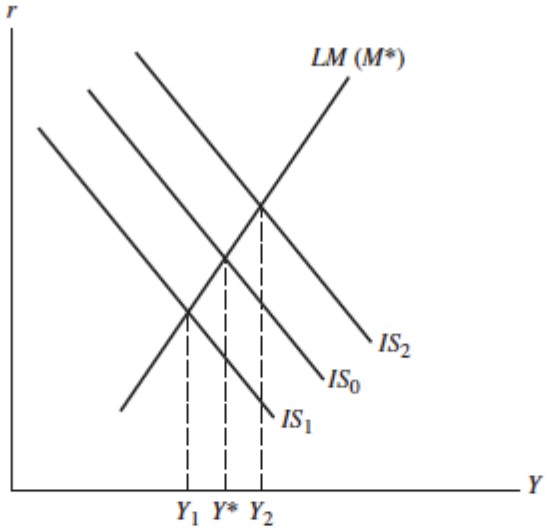
FIGURE 17-2 Ideal Case for Targeting a Monetary Aggregate



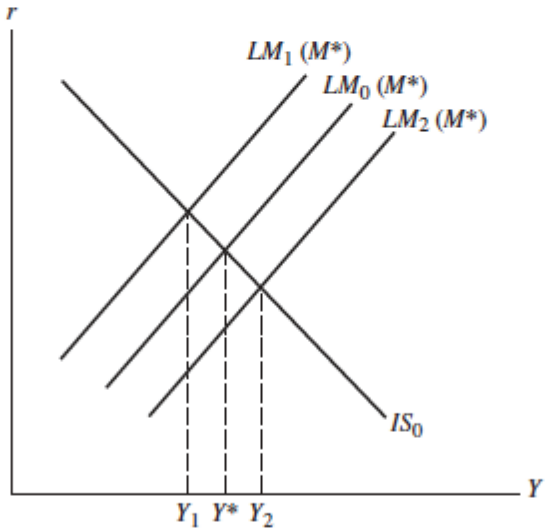
If the demand for money is totally interest inelastic and perfectly stable, then by hitting the money supply target M^*, the Federal Reserve fixes the vertical LM schedule at $LM(M^*)$. Income will be at the target level Y^* regardless of the IS schedule.

FIGURE 17-3 Less-Than-Ideal Cases for Targeting a Monetary Aggregate

a. Nonvertical *LM* Schedule



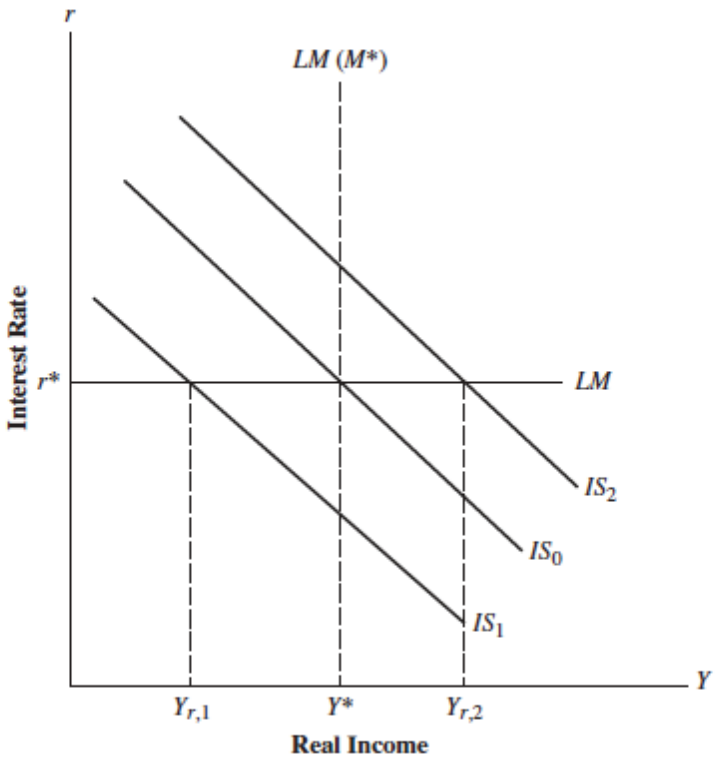
b. Unstable *LM* Schedule



Part *a* shows that if money demand is not totally interest inelastic and the *LM* schedule is upward sloping, hitting the money supply target will cause income to be at the target level Y^* only if the *IS* schedule is at the predicted position IS_0. If, because of unpredicted shocks, the *IS* schedule is instead at IS_1 or IS_2, income will be away from Y^*, at Y_1 or Y_2, even though M is at M^*. In part *b*, we assume that the Federal Reserve hits the money supply target M^*, which, on the basis of its forecast of money demand, should set the *LM* schedule at $LM_0\ (M^*)$ and hit the income target Y^*. If, because of an unpredicted shock to the money demand function, the *LM* schedule shifts to either $LM_1(M^*)$ or $LM_2(M^*)$, income will be at Y_1 or Y_2, and the income target will be missed, even if the money supply is at the target level M^*.

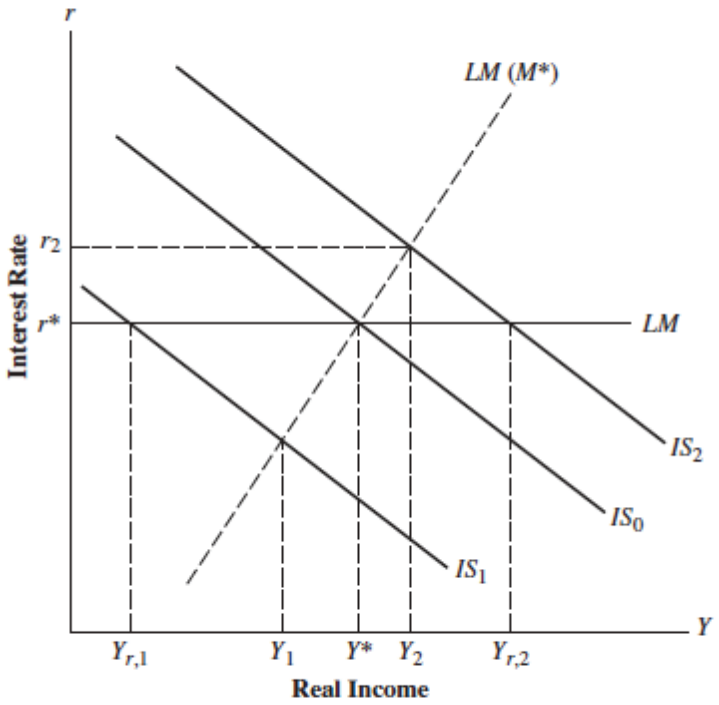
- Implications of Targeting the Interest Rate
    - If the Federal Reserve targets the interest rate, then the LM becomes horizontal
        - The Federal Reserve needs to adjust credit supply to keep the interest rate at the target level
    - Uncertainty about the IS Schedule (Figures 17-4 and 17-5)
        - With a horizontal LM the income target is achieved only of the IS Schedule is at the expected position
        - Even if the LM is upward sloping and unstable, the Fed policy makes the LM horizontal
        - Targeting money supply achieves the income target when LM is vertical and deviates less than interest rate target when LM is upward sloping
    - Uncertainty about Money Demand (Figure 17-6)
        - When LM is unstable, then to target interest rate achieves the desired level of income because the IS Schedule's position is known

FIGURE 17-4 Targeting the Interest Rate with *IS* Uncertainty: Zero Interest Elasticity of Money Demand



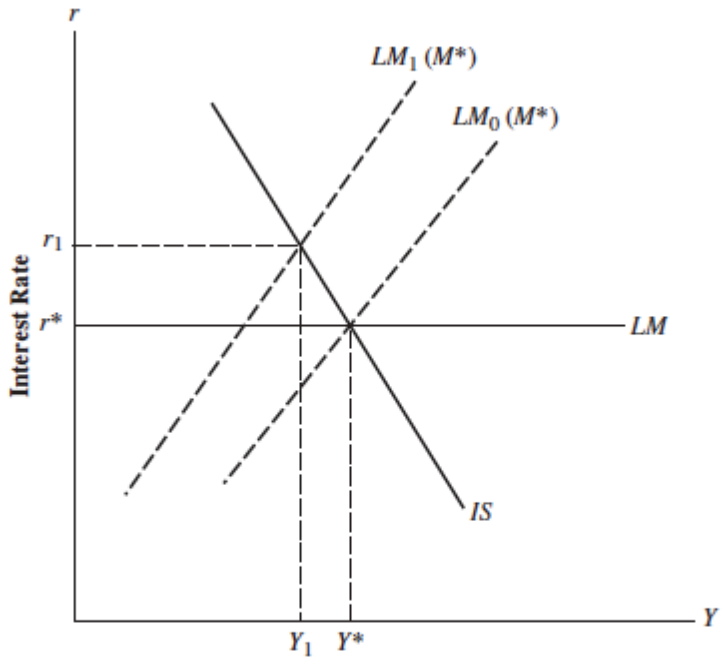
With an interest rate target, the *LM* schedule is horizontal. If the *IS* schedule is at IS_1 instead of at the predicted position IS_0, income will be at $Y_{r,1}$, below the target level. If the money supply is the target, the *LM* schedule is vertical, and the income target will be hit.

FIGURE 17-5 Targeting the Interest Rate with *IS* Uncertainty: Nonzero Interest Elasticity of Money Demand



If the interest rate is targeted and the *IS* schedule is at IS_1, income will be at $Y_{r,1}$. If the money supply is the target, with the nonvertical *LM* schedule, income will also fall below the target level, but by less, to Y_1.

FIGURE 17-6 Targeting the Interest Rate with *LM* Uncertainty



If the interest rate is targeted, the *LM* schedule is horizontal and does not shift when there is a shock to money demand. The money demand shock does not displace income from the target level. If the money supply is the target, a positive shock to money demand will shift the *LM* schedule from $LM_0(M^*)$ to $LM_1(M^*)$; income will fall below the target level to Y_1.

4. The Relative Merits of the Two Strategies

- The Sources of Uncertainty and the Choice of a Monetary Policy Strategy
    - If the source of uncertainty are unpredictable shifts to the IS (business, investment, etc.), a money supply target is superior to an interest rate target
    - If the source of uncertainty are unpredictable shifts to the LM (money demand), an interest rate target is superior to a money supply target (this stabilizes the trade-offs between bonds and money)
- Other Considerations: Credibility and Managing Expectations
    - An advantage of a strong commitment to a money supply target is that ensures control over inflation for mid-term periods (3 to 5 years)
    - If the policy is publicly announced, and its credible, then inflation expectations are low
    - Targeting the interest rate does not cover against inflation in itself
        - Low interest rates produce asset bubbles
        - Asset bubbles increase money demand
        - With an increase in money demand, the Federal Reserve needs to increase money (credit) supply to keep the interest rate target
        - The Federal Reserve needs to be able to spot a bubble early and adjust the interest rate target
            - This is difficult for two reasons:
                - Financial assets are not included in the CPI or GDP deflator
                - In a healthy economy it is expected that these prices will increase
                - Therefore, the bubble is *obvious* once it is *too big* (it is too late)
    - Investment and durable goods purchases depend on long-term interest rates, but the Federal Reserve affects short-term interest rates

5. The Evolution of Federal Reserve Strategy

- 1970-1979: Targeting the Federal Reserve Funds Rate
- 1979-1982: Targeting Monetary Aggregates (because of the high inflation of the late 1970s)
- 1982-2008: Gradual Return to Federal Funds Rate Targeting (because of the fear that interest rate target does not cover for inflation as occurred in the late 1970s)
    - 1994-2012: A move toward greater transparency
- 2008-2012: Confronting the *Zero-Bound Problem* (see "New Tools for Monetary Policy" in previous chapter)

6. Changes in Central Bank Institutions: Recent International Experience

- Since 1980 many central banks around the world have changed their institutions and mandates
    - The Federal Reserve remains mostly the same
- Most important change: Inflation Targeting
    - Target a maximum level of inflation
    - This gives place to the "Time Inconsistency Problem"
- The Time (Dynamic) Inconsistency Problem
    - An announced policy is no longer optimal at a later date even if no new information has arrived
    - Once the policy is announced, rational economic agents know that the policy maker will rather deviate from the policy than observe it
    - Intuition (see the complete model below):
        - Assume the policy maker convincingly announces an inflation target of π^*
        - Because the announcement if convincing, $E(\pi) = \pi^*$
        - Them, because of the short-run Phillips Curve relationship, the policy maker can increase output in the short run by producing $\pi^p > \pi^*$
        - However, economic agents have rational expectation and now this
        - Therefore, the policy announcement is time (dynamic) inconsistent and the result is no more output in the short-run but higher inflation than π^*
- Other Argument for Inflation Targeting
    - Policy makers care about their reputation if the policy making is a "repeated game"
    - There can (and should) be costs to miss the inflation target [i.e. loose the job]

- Time Inconsistency (Kydland and Prescott)
    - Let the unemployment-inflation Phillips Curve relationship be:
        - $u = u_N - d \cdot (\pi - E\{\pi\}); \quad u_N: natural\ rate\ of\ unemployment, d > 0$
    - Let the Social Welfare function be:
        - $W = -u_N(\pi) - c \cdot \pi^2; \quad c > 0$
    - If $E[\pi] = \pi \rightarrow W^* = -u_N$ [maximum value of *W*]
    - The (1) central bank announces an inflation rate of π^* that maximizes social welfare or (2) the central bank does not announce but the public correctly (rational expectations) predicts the value of π^* and the central bank knows (rational expectations) the public expectations
    - Replace the unemployment Phillips Curve function into the Social Welfare function
        - $W = -u_N + d \cdot (\pi - E[\pi]) - c \cdot \pi^2$
    - Maximize *W* in terms of π:
        - $\frac{\partial W}{\partial \pi} = -d - 2c \cdot \pi = 0 \rightarrow \hat{\pi} = \frac{d}{2c}$
    - Replace $\hat{\pi}$ in the Social Welfare function:
        - $\widehat{W} = -u_N + d \cdot \underbrace{\left(\frac{d}{2c} - \frac{d}{2c}\right)}_{0} - c \cdot \left(\frac{d}{2c}\right)^2 \rightarrow \widehat{W} = -u_N - \frac{d^2}{4c} < W^*$

7. Monetary Rules

- Discretion versus Rules
    - Discretion: The central bank should have autonomy to decide the best policy
    - Rules: The central bank should follow a rule
        - Which rule? All the time?
    - $M \cdot V = P \cdot Y$
    - $\dot{M} + \dot{V} = \dot{P} + \dot{Y}$
- Friedman's k% rule
    - $\dot{M} \sim \dot{Y}$
    - Money supply should grow at the same rate than the long-run real GDP growth rate
    - Intuition: Money supply should grow at a similar rate than money demand
    - Target: *M*
- Inflation Targeting
    - $\dot{P} \leq inflation\ target$
    - Intuition: Low inflation and "anchor expectations" (if there's no time inconsistency)
    - Target: *P*
- Productivity Norm
    - Let *P* move inversely with *Y* such that $\overline{PY} = constant$
    - Hayek's Rule
        - $MV = constant$
        - Target: *MV*
    - NGDP Targeting
        - $MV = grows\ at\ 5\%$
        - Target: *MV*
    - Intuition:
        - *M* is money supply and *V* is the inverse of money demand. Therefore, *MV* constant keeps monetary equilibrium
        - If *MV* is constant, then changes in output due to productivity should produce *P* to fall because there is a change in the relative quantities between money and output
        - If *Y* increase and *M* increases to keep *P* stable, then the result is a monetary disequilibrium (implied or implicit inflation)
        - Keep AD stable, let AS move freely
        - $M \cdot V = P \cdot Y \rightarrow (MB \cdot m) \cdot V = P \cdot [A \cdot F(K, N)]$
        - If there are productivity gains, either *CPI* falls or *PPI* increases. The former requires less price movements that the latter

- (Classic) Taylor Rule
  - $i = (r + \pi) + \frac{1}{2} \cdot (\pi - \pi^*) + \frac{1}{2}(y - \hat{y})$
  - r: real interest rate
  - i: nominal interest rate (i.e. Federal Funds rate)
  - π^*: inflation target (according to the GDP deflator)
  - y: log of output
  - $\hat{y}$: potential output
  - $(y - \hat{y})$: output gap
  - If in equilibrium, then:
    - $\pi = \pi^*$
    - $y = \hat{y}$
    - Then: $i = r + \pi$ (Fisher's equation!)