• Next exam Thursday Feb 23 at 8:00 p.m.
• Discussion sections next week will meet on Tuesday, Feb 21
• Discussion sections will partly review:
  – Practice Exam 2A (Practice Exam 2B also on web page)
  – Chapter 13, exercises 3 and 5, page 374
  – Chapter 14, exercise 1, page 402

• Rough grading scale for first exam:
  – A: 81-90
  – B: 72-80
  – C: 54-71
  – D: 45-53
  – F: below 45
  – average score on first exam: 75
• Final grade for course will be based on numerical score, not letter score, and will use + and – letter grades

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Outline of Chapter 13 lectures

13.1. Monetary policy rules
13.2. AD curve
13.3. AS curve
13.4. Using AS-AD
13.5. Empirical evidence
13.6. Rational expectations and inflation targeting

13.4. Using AS-AD

Aggregate demand:
\[ \dot{Y}_t = \bar{\alpha} - \beta m(\pi_t - \bar{\pi}) \]
AD passes through \( \dot{Y}_t = \bar{\alpha}, \pi_t = \bar{\pi} \)
AD shifts if \( \bar{\alpha} \) or \( \bar{\pi} \) change
AD shifts down if consumers or businesses less optimistic, taxes or imports go up, government spending, exports or Fed’s inflation target go down

AS passes through \( \dot{Y}_t = 0, \pi_t = \pi_{t-1} + \bar{\alpha} \)
AS shifts if \( \bar{\alpha} \) or \( \pi_{t-1} \) change
AS for period \( t \) shifts down if temporary shock lowers costs or if \( \pi_{t-1} < \pi_{t-2} \)

• Example 1: A temporary shock to inflation (\( \bar{\alpha} \uparrow \))
  – inflation rises and then gradually returns to Fed’s inflation target
  – output falls below potential and then gradually returns to potential
- Example 2: The Fed lowers its long-run inflation target ($\bar{\pi}$ ↓)
  - inflation gradually falls to new target
  - output initially falls below potential and then gradually returns to potential

Example 3: Aggregate demand shock

Suppose we start out in long-run equilibrium. In period 1 there is a temporary shock to demand, say $\bar{a} > 0$ for 8 periods.
However, cannot have $\bar{a} > 0$ forever because by definition in long-run equilibrium $\bar{a} = 0$.
So suppose $\bar{a}$ goes back to zero starting in period 9.
• Suppose the shock ends after period 8 and we go back to \( \bar{a} = 0 \)

• An aggregate demand shock may result in a period of boom (above-average output growth, rising inflation) followed by a contraction (below-average output growth, falling inflation)
• We sometimes see this pattern in the data

13.5. Empirical evidence

A. Monetary policy rule

B. Predicting recessions

Monetary policy rule:

\[ R_t - \bar{r} = \tilde{m}(\pi_t - \bar{\pi}) \]

\[ \bar{r} = MPK \]

\[ \bar{\pi} = \text{Fed's inflation target} \]

\[ \tilde{m} > 0 \]

\[ R_t = i_t - \pi_t^e \]

Simpler version based on ex-post rate:

\[ R_t - \bar{r} = \tilde{m}(\pi_t - \bar{\pi}) \]

\[ R_t = i_t - \pi_t^e \]

\[ i_t - \pi_t - \bar{r} = \tilde{m}(\pi_t - \bar{\pi}) \]

\[ i_t = \bar{r} + \pi_t + \tilde{m}(\pi_t - \bar{\pi}) \]
\[ i_t = \bar{r} + \pi_t + m(\pi_t - \bar{\pi}) \]
\[ \bar{r} = 2\% \]
\[ \bar{m} = 0.5 \]
\[ \bar{\pi} = 2\% \]
\[ i_t = 2 + \pi_t + 0.5(\pi_t - 2) \]
\[ i_t = 1 + 1.5\pi_t \]

Observations:
(1) Has a pretty good fit to the data
   - Simple model not a bad approximation
(2) Fed funds rate was lower in 1970s than simple policy rule predicts
   - Fed not as aggressive in responding to inflation
   - May have been one factor in producing the rise in inflation in the 1970s
(3) Actual rate is often below value predicted by rule following a recession
   - Fed is still trying to stimulate economy as output is below potential
   - Fed cares about unemployment in addition to inflation target
Simple monetary policy rule:
\[ R_t - \bar{r} = \bar{m}(\pi_t - \bar{\pi}) \]
John Taylor's proposed rule:
\[ R_t - \bar{r} = \bar{m}(\pi_t - \bar{\pi}) + \bar{n} \bar{Y}_t \]
\( \bar{n} > 0 \Rightarrow \text{Fed keeps } R_t \text{ low when } \bar{Y}_t < 0 \text{ even if } \pi_t = \bar{\pi}. \]

Observations
(1) Fed funds rate lower than Taylor Rule during 1970s may have been factor in rising inflation.
(2) Fed funds rate lower than Taylor Rule during 2003-2005 may have made small contribution to housing bubble

Cautions
These conclusions can be very sensitive to:
(1) Inflation measure used
  - Above graphs used CPI
  - Alternatives are GDP price deflator or personal consumption expenditures deflator excluding food and energy

Observations
(3) Fed would have wanted to set fed funds rate to big negative number during Great Recession if it could.
(4) The current interest rate is right about the value specified by the Taylor Rule.
Cautions

These conclusions can be very sensitive to:
(2) Potential output measure used
   - Above graphs used current CBO estimates
   - Other estimates (such as CBO estimates available at the time) give different answers

Cautions

These conclusions can be very sensitive to:
(3) Values assumed for Taylor parameters

Above graphs assumed:
\[ r = 2 \]
\[ \bar{\pi} = 2 \]
\[ m = 0.5 \]
\[ \tilde{n} = 0.5 \]

13.5. Empirical evidence

A. Monetary policy rule
B. Predicting recessions
   - How good are economists at predicting recessions before they happen?
   - Answer: not very

Case study: recession of March 2001 – Nov 2001

- If everybody knew in Jan 2000 that a recession was coming in March 2001
  - Fed would not have raised fed funds rate from 5.5% to 6.5%
  - Businesses would not have added to inventory goods that ended up not being sold
  - Firms would not have expanded capacity they ended up not using
  - Recession would never have happened!

- By forcing monetary policy to follow a rule rather than giving the Fed discretion, the outcome may actually be better
- Example: ECB’s mandate was only to keep inflation at 2% (ignore unemployment)
- Ulysses tied to mast of ship to resist song of the Sirens
13.6. Rational expectations and inflation targeting

Adaptive expectations:

\[ \pi_t^e = \pi_{t-1} \]

Expected inflation \hspace{1cm} Last year’s inflation

Rational expectations:

- People use all the information they have to make the best forecast of inflation
- If the model is right, the inflation rate people expect will be the same as the value predicted by the model

Suppose we drop the assumption of adaptive expectations and rewrite the inflation equation in terms of expected inflation:

\[ \pi_t = \pi_t^e + \bar{v} \bar{Y}_t + \bar{o} \]

• In the real world, disinflation is not costless.
• Wage and price contracts make it impossible to make changes immediately.
• Many people don’t change their expectations immediately but wait to see evidence.
• However, the more credible the central bank is, the easier it could lower inflation with minimal economic loss.

• In many countries, central banks have an explicit target rate of inflation that they seek to apply over the medium horizon.

• Explicit inflation targets
  – Anchor inflation expectations
  – May make it easier for central banks to stimulate output
• Constrained discretion

– A central bank has the flexibility to respond to shocks in the short-run.
– The bank is committed to a particular rate of inflation in the long run.