Office hours for professor and TAs for Econ 110B

<table>
<thead>
<tr>
<th>Name</th>
<th>Time</th>
<th>Place</th>
<th>Email</th>
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<tbody>
<tr>
<td>Xu Zhang</td>
<td>Monday 10:30-11:30 a.m.</td>
<td>Sequoyah 224</td>
<td><a href="mailto:xuz039@ucsd.edu">xuz039@ucsd.edu</a></td>
</tr>
<tr>
<td>Wesley Howden</td>
<td>Tuesday 2:20-3:20 p.m.</td>
<td>Sequoyah 225</td>
<td><a href="mailto:thowden@ucsd.edu">thowden@ucsd.edu</a></td>
</tr>
<tr>
<td>James Hamilton</td>
<td>Wednesday 10:30-11:30 a.m.</td>
<td>Econ 307</td>
<td><a href="mailto:jhamilton@ucsd.edu">jhamilton@ucsd.edu</a></td>
</tr>
<tr>
<td>Shihan Xie</td>
<td>Thursday 5:00-6:00 p.m.</td>
<td>Sequoyah 233</td>
<td><a href="mailto:sxie@ucsd.edu">sxie@ucsd.edu</a></td>
</tr>
<tr>
<td>Elga Denislamova</td>
<td>Friday 2:00-3:00 p.m.</td>
<td>Sequoyah 237</td>
<td><a href="mailto:edenisla@ucsd.edu">edenisla@ucsd.edu</a></td>
</tr>
</tbody>
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Answers to problem set 1 on course web page: http://econweb.ucsd.edu/~jhamilto/Econ110B.html

Chapter 11, part 2

Uses and microfoundations of the IS curve

Outline of Chapter 11 lectures

11.1. Components of aggregate demand
11.2. Putting components together
11.3. Summary of IS curve
11.4. Movement along IS curve
11.5. Shift of IS curve
11.6. Microfoundations of IS curve

IS curve: For a given ex ante real interest rate $(R_t = i_t - \pi_t)$, what is the level of short-run real output $(\tilde{Y}_t = (Y_t - \bar{Y}_t)/\bar{Y}_t)$?

$R_t \uparrow \Rightarrow I_t \downarrow \Rightarrow \tilde{Y}_t \downarrow$

$\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$

$\bar{r}$ = marginal product of capital

$= \text{value of } R_t \text{ predicted by long-run model}$

$\bar{a}$ summarizes temporary shocks to demand

$\bar{a} = \bar{a}_c + \bar{a}_i + \bar{a}_g + \bar{a}_{ct} - \bar{a}_{im} - 1$

In long-run equilibrium,

$\bar{a} = 0, \bar{R}_t = \bar{r}, \tilde{Y}_t = 0$

$\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$

IS curve passes through

$\tilde{Y}_t = \bar{a}, R_t = \bar{r}$

In long-run equilibrium, IS passes through

$\tilde{Y}_t = 0, R_t = \bar{r}$
11.5. Shift of IS curve

IS curve:
\[ \bar{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r}) \]
- If a temporary shock to spending causes \( \bar{a} > 0 \), then the value of \( \bar{Y}_t \) associated with \( R_t = \bar{r} \) would be greater than 0.
- In other words, if \( \bar{a} > 0 \), the IS curve would shift to the right.

IS curve shifts to the right if \( \bar{a} \uparrow \)

IS curve shifts to the right if \( \bar{a} \uparrow \)
\[
\bar{a} = \bar{a}_c + \bar{a}_i + \bar{a}_g + \bar{a}_{ex} - \bar{a}_{im} - 1
\]
- \( \bar{a}_c \) = ratio of consumption to \( \bar{Y}_t \)
- \( \bar{a}_i \) = ratio of investment to \( \bar{Y}_t \), when \( R_t = \bar{r} \)
- \( \bar{a}_g \) = ratio of government spending to \( \bar{Y}_t \)
- \( \bar{a}_{ex} \) = ratio of exports to \( \bar{Y}_t \)
- \( \bar{a}_{im} \) = ratio of imports to \( \bar{Y}_t \)
Summary of IS curve

• A change in \( R \) shows up as a movement along the IS curve.

• Any other change in the parameters of the short-run model causes the IS curve to shift.

Example of using IS curve

• Imagine that Europe enters into a recession.
  – The aggregate demand parameter for U.S. exports declines.
  – the IS curve shifts to the left
  – thus the European recession has an international effect.
  – We could shock any of the other aggregate demand parameters.

11.6. Microfoundations of the IS curve

Microfoundations:
The underlying microeconomic behavior that establishes the demands for \( C, I, G, EX, \) and \( IM \).

Consumption

• People prefer a smooth path for consumption compared to a path that involves large movements.

• The permanent-income hypothesis
  – People will base their consumption on an average of their income over time rather than on their current income.

• The life-cycle model of consumption
  – Suggests that consumption is based on average lifetime income rather than on income at any given age.

• The life-cycle model of consumption:
  – Young people borrow to consume more than their income.
  – As income rises over a person’s life
    • consumption rises more slowly
    • individuals save more
  – During retirement, individuals live off their accumulated savings.
The life-cycle/permanent-income (LC/PI) hypothesis
- Implies that people smooth their consumption relative to their income
- This is why we set consumption proportional to potential output rather than actual output.

Multiplier Effects
- We can modify the consumption equation to include a term that is proportional to short-run output:
\[
\frac{C_t}{Y_t} = \bar{a}_c + \bar{x} \hat{Y}_t
\]

Solving for the IS curve
- Will yield a similar result
- Now includes a multiplier on the aggregate demand shock and interest rate terms:
  - the multiplier is larger than one

\[
\hat{Y} = \frac{1}{1 - \bar{x}} \left( \bar{a} - \bar{b}(R_t - \bar{r}) \right)
\]

Multiplier
- With a multiplier:
  - Aggregate demand shocks will increase short-run output by more than one-for-one.
  - A shock will "multiply" through the economy and will result in a larger effect.
- If short-run output falls with a multiplier
  - Consumption falls
  - Which leads to short-run output falling
  - Consumption falls again
  - "Virtuous circle" or "vicious circle"

Investment
- At the firm level, investment is determined by the gap between the real interest rate and MPK.
- In a simple model
  - The return on capital is the MPK minus depreciation.
- The richer framework includes:
  - Corporate income taxes
  - Investment tax credits
  - Depreciation allowances
• **A second determinant of investment**
  – The firm's cash flow
  • the amount of internal resources the company has on hand after paying its expenses

• **Agency problems**
  – When one party in a transaction has more information than the other party
  – It is more expensive to borrow to finance investment because of this.

• **Adverse selection**
  – If a firm knows it is particularly vulnerable
  • it will want to borrow because if the firm does well it can pay back the loans.
  • if it fails, the firm cannot pay back the loan but will instead declare bankruptcy.

• **Moral hazard**
  – A firm that borrows a large sum of money may undertake riskier investments
  • if it does well, it can repay.
  • if it fails, it can declare bankruptcy.

![Image](95x435 to 244x463)

• **The potential output term in the investment equation incorporates cash flows.**

\[ I_t = \bar{a}_t \bar{Y}_t - \bar{b}(R_t - \bar{r})\bar{Y}_t \]

• Captures cash flow.
• If we wish to add short-run output, it would provide additional justification for a multiplier.

• **Government Purchases**

• **Government purchases can be**
  – A source of short-run fluctuation
  – An instrument to reduce fluctuations

• **Discretionary fiscal policy**
  – Includes purchases of additional goods in addition to the use of tax rates
  – For example, the government can use the investment tax credit to encourage investment

• **Transfer spending often increases when an economy enters into a recession.**

• **Automatic stabilizers**
  – Programs where additional spending occurs automatically to help stabilize the economy
  – Welfare programs and Medicaid are two such stabilizer programs.
  • receive additional funding when the economy weakens

• **Fiscal policy’s impact depends on two things:**
  1. The problem of timing
     • discretionary changes are often put into place with significant delay.
  2. The no-free-lunch principle
     • implies that higher spending today must be paid for today or some point in the future.
     • such taxes may offset the impact of the discretionary spending adjustment.
• What matters for consumption today?

• The permanent-income hypothesis says:
  – What matters is the present discounted value of your lifetime income, after taxes.

• Ricardian equivalence says:
  – What matters is the present value of what the government takes from the consumers rather than the specific timing of the taxes.

• An increase in government purchases financed by taxes today
  – Will have a modest positive impact on the IS curve
  – Will raise output by a small amount in the short run

• An increase in spending today financed by taxes in the future
  – Will shift the IS curve out by a moderate amount
  – Perhaps by 75 cents to $1 for each dollar

Outline of Chapter 12 lectures

12.1. The MP curve
12.2. Using the IS-MP model
12.3. Term structure of interest rates
12.4. Phillips Curve and the IS-MP model
12.5. The end of the Great Inflation
12.6. The start of the Great Inflation
12.7. Reconciling short- and long-run model
12.8. Details of implementing monetary policy

Chapter 12
Monetary policy and the Phillips Curve

12.1. The MP curve

• Monetary policy tries to influence output and inflation by controlling interest rates
• Monetary policy implemented by a nation’s central bank
• Central banks around the world:
  – U.S.: Federal Reserve (Fed)
  – Eurosystem: European Central Bank (ECB)
  – Japan: Bank of Japan

How does central bank control interest rates?

• ECB and Bank of Japan: offer to lend as much as banks want at an interest rate the central bank sets (marginal lending facility)
  – Banks would never need to pay more than this to borrow
• Offer to pay interest on any funds banks deposit with ECB (deposit facility)
  – Banks would never lend to another bank for less than this
  – Rates on loans between banks will be between these two rates
How does monetary policy influence real GDP?

- $i_t$ = nominal interest rate (controlled by central bank)
- $\pi_t^e$ = expected inflation
- $R_t = i_t - \pi_t^e$ = real interest rate (matters for investment demand in IS curve)

(1) Simple model of $\pi_t^e$

Adaptive expectations:

$$\pi_t^e = \pi_{t-1}$$

People expect inflation this year to be whatever it was last year

(2) More general model of $\pi_t^e$

Sticky inflation assumption

People take some time to change their expectations of future inflation.

Under either model of inflation expectations, when Fed raises $i_t$, result is $R_t = i_t - \pi_t^e$ goes up at least in short run.

In our short-run model, the Fed chooses the real interest rate $R_t$ through monetary policy.

Other central banks use different systems

- U.S. system right now:
  - Offers to borrow from Federal Home Loan Banks, Fannie Mae, and Freddie Mac at 0.50%
  - Offers to borrow from regular banks at 0.75%
  - Creates incentive for regular banks to borrow from FHLB between 0.50% and 0.75%
  - Regulatory costs (FDIC fees, capital requirements, leverage) limit volume
- Will say more about the historical U.S. system used by the Fed at end of chapter

ECB marginal lending rate (orange), rate paid on deposits (blue), and interest rate on loans between banks (gray).
• We will summarize monetary policy with the MP curve
• This is just a horizontal line at the real interest rate chosen by the Fed

12.2. Using the IS-MP model

Suppose we start with economy in both short-run and long-run equilibrium.
(1) IS passes through $\bar{Y}_t = 0$ (output = potential) and $R_t = \bar{r}$ (real rate = MPK).
(2) Fed sets $R_t = \bar{r}$ (MP is horizontal line at $\bar{r}$)

Example 1:
Suppose the economy starts out at both long-run and short-run equilibrium and then the Fed raises the interest rate.
Example 2:
Suppose the economy starts out at both long-run and short-run equilibrium and collapse of the housing bubble puts the economy into a recession.
How could the Fed respond?

We’re told that economy started out at short-run and long-run equilibrium.
(1) IS passed through $\tilde{Y}_t = 0, R_t = \bar{r}$.
(2) MP was horizontal line at $R_t = \bar{r}$.

(1) Fed raises nominal interest rate $i_t$ as policy decision.
(2) Inflation and inflation expectations do not respond immediately so $R_t = i_t - \pi_t$ goes up.
(3) This lowers investment demand $I_t$ which makes GDP fall below potential.
Then there was a collapse of house prices, which would mean $\bar{a}$ goes down. So IS now passes through a point to the left of $\bar{Y}_r = 0$ when $R_t = \bar{r}$. Economy may now be in recession.

Fed could respond by lowering interest rate to restore economy to full employment.

At original interest rates, consumers were spending less. But with lower interest rates, investment spending may pick up slack.