Office hours for professor and TAs for Econ 110B (beginning Jan 17)

<table>
<thead>
<tr>
<th>Name</th>
<th>Time</th>
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<tr>
<td>Xu Zhang</td>
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<td>Wednesday 10:30-11:30 a.m.</td>
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Course web page: http://econweb.ucsd.edu/~jhamilto/Econ110B.html

Chapter 9: Introduction to the Short Run

\( Y_t, \bar{Y}_t, \text{ and } \hat{Y}_t \) are all measured in real terms.

If \( Y_t, \bar{Y}_t, \text{ or } \hat{Y}_t \) go up, we are talking about a higher level of physical goods and services being produced (not a result of inflation).

How do we calculate real GDP?

- Calculate number of boxes of cornflakes produced in 2016 and multiply by the price of a box in 2015.
- Calculate number of gallons of gasoline produced in 2016 and multiply by the price of gasoline in 2015.
- Sum of these is 2016 GDP measured in 2015 prices or 2015 dollars.
- If 2016 GDP measured in 2015 prices is higher than 2015 GDP measured in 2015 prices it means real GDP went up in 2016.

\( Y_t = \) potential GDP
- level of real output predicted by long-run model
determined by population, capital stock, technology

\( Y_t = \) actual output
\( \hat{Y}_t = \) short-run output
\( \bar{Y}_t = (Y_t - \bar{Y}_t)/\bar{Y}_t \)
Or use \( 100(Y_t - \bar{Y}_t)/\bar{Y}_t \) if we wanted to report in percentage points.

Short-run output \( \hat{Y}_t \)

\( \hat{Y}_t = (Y_t - \hat{Y}_t)/\bar{Y}_t \)
\( \hat{Y}_t > 0 \) means actual GDP is above potential
\( \hat{Y}_t < 0 \) means actual GDP is below potential

Congressional Budget Office estimate of \( \hat{Y}_t \) (with recessions shown as shaded bars)
Inflation $\pi$

$\pi_t$ = inflation rate at time $t$

$\pi_{1969} = 4.6$ means $104.60$ in 1969 could buy what cost $100.00$ in 1968

$\pi_{1970} = 6.0$ means $106.00$ in 1970 could buy what cost $100.00$ in 1969

This means $110.88$ in 1970 could buy what cost $100.00$ in 1968

Inflation was $4.6\%$ in 1969

Inflation was $6.0\%$ in 1970

Change in inflation $\Delta \pi$

$\Delta \pi_t = \pi_t - \pi_{t-1} = \text{change in inflation between } t - 1 \text{ and } t$

$\pi_{1969} = 4.6$

$\pi_{1970} = 6.0$

$\Delta \pi_{1970} = 6.0 - 4.6 = 1.4$

$\Delta \pi > 0$ means inflation is higher this year than last (prices have gone up faster this year than they did the year before)

$\Delta \pi < 0$ means inflation is lower this year than last (prices have gone up slower this year than they did the year before)
Historically we often observe that when GDP is above potential, inflation tends to increase. Phillips Curve is a summary of this observation. Vertical axis: $\Delta \pi_t =$ change in inflation in year $t$

Horizontal axis: $\bar{Y}_t =$ short-run output in year $t$

Phillips Curve is far from a perfect fit

- Although the change in inflation in 1969 was exactly as predicted, in other years it was very different
- Factors other than short-run output can also cause changes in inflation
- Example: 1974: OPEC oil embargo caused price of oil to triple
- Higher gasoline prices showed up as higher U.S. inflation
The Empirical Fit of the Phillips Curve

• Empirically, the slope is approximately one-fourth.
  – Meaning: if output exceeds potential by 4 percent, the inflation rate increases one percentage point.

Since periods when output is above potential (or when “short-run output” is positive) also tend to be periods when unemployment rate is low, Phillips Curve also often described as relation between unemployment rate and change in inflation.

When unemployment is high, inflation tends to fall.

We can also talk about the level of unemployment predicted by the long-run model
• Even when the economy is working efficiently, it takes people time to find the right job
• We’d always expect there to be some houses waiting to be sold and some people waiting to find jobs

The unemployment rate predicted by the long-run model is sometimes called the “natural” rate of unemployment

Congressional Budget Office estimate of natural rate of unemployment

Currently 4.8%
Horizontal axis: difference between unemployment rate and CBO estimate of natural unemployment rate. Vertical axis: PCE inflation rate minus that for previous year.

There is also a relation between the unemployment rate and short-run output.

When output is above the natural rate of output, unemployment is below the natural rate of unemployment.

Okun’s Law

\[ u - \bar{u} = -\frac{1}{2} \times \hat{Y}_t \]

Current rate of unemployment

Natural rate of unemployment

Short-run output

Where is the U.S. economy right now?

The Congressional Budget Office estimates that output is still below potential.
However, the unemployment rate is now 4.6%, below historical average of 5.0%.

If CBO is right, inflation should remain low in 2017.

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Chapter 10
The Great Recession: A First Look

Overview of Chapter 10

- Question: what kinds of factors can push the economy below potential output?
- Approach: use the Great Recession (December 2007 to June 2009) as case study
- Today: what were some of the shocks that hit the economy?
- Tuesday: what were the results of these shocks?

Great Recession started in December 2007 and ended in June 2009

Nov 2007 unemployment = 4.7%
June 2009 unemployment = 9.5%

1. Spike in oil prices
2. Collapse of house prices
3. Financial turmoil (most important)

What caused each shock, and what were its effects?
(1) Spike in oil prices

(a) What caused oil prices to spike in 2007-2008?

Answer: surging global demand and stagnant world production

Growing income would predict growing energy use (elasticity = 0.7)

Projected demand growth based on growth of world GDP assuming constant price and Stern's income elasticity of 0.7

World GDP increased 27.7% from 2005 to 2013

Cross-section scatterplot (log scale) of energy use and GDP per capita for indicated years. Source: David Stern (http://www.sterndavidi.com/animation.gif)
(1) Spike in oil prices
(a) What caused oil prices to spike in 2007-2008?
(b) What were effects of the spike in oil price?
Lower spending by U.S. consumers, particularly U.S.-manufactured vehicles

(1) Spike in oil prices
(2) Collapse of house prices

(2) Collapse of house prices
(a) What caused house prices to collapse 2006-2009?
Answer: sharp increase in prices 2000-2005 could not be sustained

What caused run-up in house prices 2000-2005?
(i) Monetary policy
• Federal Reserve (often called “the Fed”) controls overnight interest rate (called “the fed funds rate”) as part of monetary policy
• The fed funds rate was kept low through 2004 to try to help economy recover from recession of 2001
Fed funds rate, Jan 2000 – Dec 2016

What caused run-up in house prices 2000-2005?

(ii) Global savings glut
- Trade surpluses in oil-producing countries and emerging economies led to huge increase in willingness to lend to U.S. borrowers

Source: IMF, World Economic Outlook 2014.

What caused run-up in house prices 2000-2005?

(iii) Mortgage securitization
- Increased willingness to lend to borrowers with low income, weak credit history

Historical system of mortgage finance: bank made loan directly, bank held the risk

One-bank loans (blue) was gradually replaced by securitization by govt sponsored enterprises (fuchsia) and private mortgage-backed securities (turquoise)
How private mortgage-backed securities (MBS) worked

- Loan originators would make loan, sell it off to loan aggregator
- Loan aggregator would buy pool of loans and slice into tranches
- Ratings agencies (Standard & Poor’s and Moody’s) would rate each tranche for risk (AAA, AA, etc.)
- Senior tranches sold off to investors (pension funds, hedge funds, domestic and foreign banks)

Flow chart for how mortgage securitization worked

Ashcraft and Schuermann (2007):

- Studied 4000 mortgages originated in 2006 by New Century Financial (now bankrupt)
- All subprime (poor income, credit rating, and/or collateral)
- Almost all called for borrower to increase monthly payments by 25% to 45% within 2-1/2 years
- 79% rated AAA
- 94% rated at least A

Who was willing to buy the junior tranches (“toxic waste”)?

Answer: Collect toxic waste in CDOs (Collateralized Debt Obligations) for retranching

Then collect toxic tranches from CDOs in “CDOs squared”

Household mortgage debt:
1995: $3.5 trillion
2007: $11.1 trillion

Source: Federal Reserve Flow of Funds
(2) Collapse of house prices

(a) What caused house prices to collapse 2006-2009?
(b) What were effects of house price collapse?
  • Loss of household wealth, inability to get new loans, debt overhang \(\Rightarrow\) less consumer spending
  • As banks lost money on mortgages, they could not borrow or lend themselves \(\Rightarrow\) financial turmoil

Main shocks of the Great Recession:
(1) Spike in oil prices
(2) Collapse of house prices
(3) Financial turmoil

(3) Financial turmoil

• April 2007: Bankruptcy of New Century Financial (a major subprime mortgage lender)
• Jan 2008: Countrywide Financial (a major mortgage lender) purchased by Bank of America for small fraction of its previous value
• March 2008: Failure of Bear Stearns (a major investment bank)
• Sept 2008: Failure of Lehman Brothers (a major investment bank)

(a) What caused the financial turmoil of 2007-2008?
Answer: nobody was sure which banks were safe to lend to

Rate at which banks borrowed from each other (e.g., LIBOR) spiked relative to 3-month Tbill

Result: banks could not or would not lend to consumers and businesses
(3) Financial turmoil

(a) What caused the financial turmoil of 2007-2008?
(b) What were the effects of the financial turmoil?
   - Sharp curtailment of lending meant further declines in house prices and spending by consumers and businesses
   - Lower income meant more loans went unpaid

Summary

The economy was hit by 3 big shocks:
1. Spike in oil prices
2. Collapse of house prices
3. Financial turmoil (most important)

Each had the effect of sharply lowering spending by consumers and businesses