

EC 313 Intermediate Macroeconomics

Lecture 1

Tuesday 10/1/2013

Syllabus and GTF

Go over syllabus

- Syllabus is at:
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Introduction (chs. 1 and 2)

- Why study macroeconomics?
 - Output: What makes it change over time? How can policy help to stabilize output?
 - Employment and unemployment
 - Prices and inflation, e.g. what causes inflation to go up?
 - Interest rates and why they change
 - Exchange rates and balance of trade (we won't do this)
 - Output growth, the unemployment rate, and the inflation rate are key variables for assessing the health of an economy

Introduction

- Why study macroeconomics? (continued)
 - To understand how these variables change in the short, medium, and long run we will use macroeconomic models.
 - Start with simple model, build up to more comprehensive versions
 - Point is not theory, though we want to understand it, models are useful for understanding and investigating monetary and fiscal policy
 - What if government spending goes up or down?
 - How do tax changes affect the economy?
 - What happens when the Fed changes the target interest rate?
 - Will attempts to lower the unemployment rate be inflationary?
 - What is QE and how does it work?

Introduction

- Why study macroeconomics? (continued)
 - Models are useful for understanding current events
 - What if the price of oil goes up?
 - How will the government shutdown impact the economy?
 - What causes financial meltdowns and why do they have such severe impacts?
 - Also useful for understanding important relationships that highlight policy choices
 - Models must explain Okun's Law and the Phillips Curve
 - Can also be used to understand other countries and the world economy (a different level of aggregation)

Introduction

- Which brings us to, what is macroeconomics?
 - Microeconomics is the study of individual decision making units such as individuals, households, of firms
 - Macroeconomics is the study of entire economies.
 - It's not size, it's the level of aggregation (some firms are bigger than some countries, study of firm is still micro, and study of country is macro)
 - Why model and study abstract aggregates? To see what makes prices, output, interest rates, etc. go up or down on average across the entire economy

Aggregate Output

- The measure of aggregate output is called gross domestic product, or GDP
- Can define GDP three ways
 1. GDP is the value of final goods and services produced (in organized markets in) the economy during a given period of time
 2. GDP is the sum of value added (in organized markets) during a given period of time
 3. GDP is the sum of all incomes earned (in organized markets) in a given period of time

Example from text:

- Firm 1 produces steel using workers and machines. It sells the steel to firm 2 for \$100.
- Firm 1 pays its workers \$80 leaving \$20 in profit (abstract from depreciation cost for simplicity)
- Firm 2 uses the \$100 in steel, along with workers and machines, to produce cars it sells for \$200
- Firm 2 pays its workers \$70 leaving \$30 in profit ($\$200 - \$100 \text{ steel} - \$70 \text{ wages} = \30 profit)

Example from text:

- What is aggregate output? **Use method 1, the value of final goods and services.**
 - Remember, it's final goods only, not intermediate goods, that are counted, so it's \$200 (counting intermediate goods, i.e. saying that GDP is \$300, would be double counting).
- Can see this another way. Let the two firms merge.

- After the merger:
 - Sale of final good (car) = \$200
 - Costs (wages) = \$80+\$70 = \$150
 - Steel is now transferred between units within the firm (one unit produces the steel from raw materials, gives to other unit), so no longer shows up
 - Profit = \$200-\$150 = \$50
 - Main point: GDP must be \$200

- Method 2, GDP is the sum of value added (in organized markets) during a given period of time.
 - Firm 1 goes out into the world and takes raw materials worth \$0 and transforms them into steel worth \$100. So the value added by the workers in firm 1 is \$100.
 - Firm 2 takes \$100 in raw materials and turns it into a car worth \$200, so value added is again \$100
 - $GDP = \text{sum of value added} = \$100 + \$100 = \200

- Method 3, GDP is the sum of all incomes earned (in organized markets) in a given period of time
 - We can add up the value of incomes received to calculate GDP
 - Firm 1 = \$80 wages + \$20 profit
 - Firm 2 = \$70 wages + \$30 profit

 - So $GDP = \$80 + \$20 + \$70 + \$30 = \$200$

- Method 3 (continued)
 - Why does this work? When you sell a good, revenue goes to material payments (someone else's income), to wages (worker income), etc., all left over is profit (owner's income)
 - A bit more complicated when goods go into inventory, but result is the same (treat it as though firm sells good to itself)

Nominal versus Real GDP

- Nominal GDP is the value of good and services produced valued at current prices. It is

$$\text{NGDP} = \sum_{i=1}^N p_i q_i$$

where N=number of goods, p_i =price, and q_i =quantity of goods

- It can change because prices change, or because quantity changes
- But, if we want to just measure how the amount of goods and services changes over time, need to eliminate price changes (change due to inflation)

- That is, we need to measure Real GDP
- Look at the difference with an example. Use only one good at first to make it simple.
- Will use 2005 price to calculate RGDP (base year)

Year	Quantity of cars	Price of cars	Nominal GDP	Real GDP
2004	10	\$20,000	\$200,000	\$240,000
2005	12	\$24,000	\$288,000	\$288,000
2006	13	\$26,000	\$338,000	\$312,000

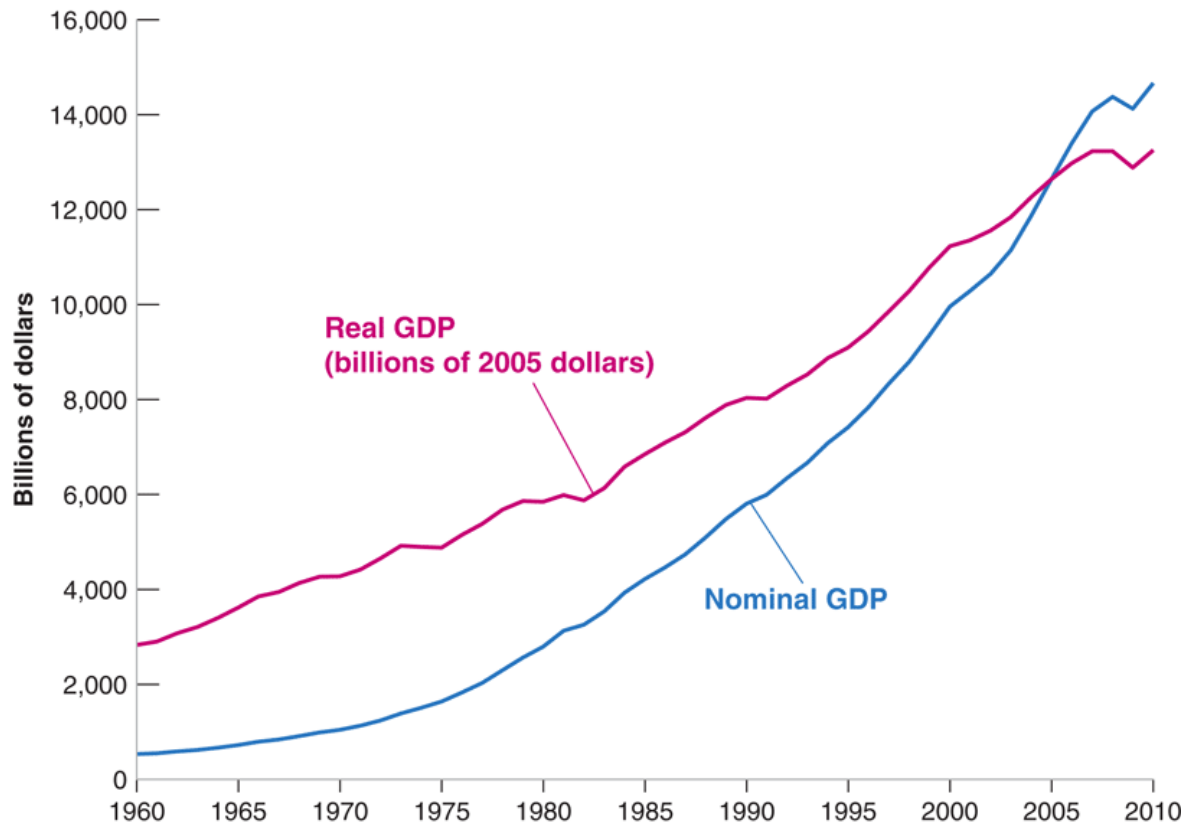
- Notice: Real GDP increased by 20% from 2004 to 2005 (from \$240,000 to \$288,000), and it increased by 8% from 2005 to 2006 (from \$288,000 to \$312,000)
- How would GDP growth change if we picked a different base year? It wouldn't, the rate of change would be the same.
- So real GDP tells how Q is changing over time
- Nominal GDP reflects both changes in P and changes in Q

- What if there is more than one good as in a real economy? How do we convert from real to nominal in that case?
- We should use relative prices. That is P_a/P_b . If good a costs twice as much as good b, it should count for twice as much in the final tally for GDP.
- Unfortunately, relative prices change over time
- This is discussed in detail in the appendix, but to solve this we use a measure called real GDP in chained 2005 dollars.
- It essentially uses the average of relative prices in consecutive years
- Prior to this, every time the base year was updated from, say, 2005 to 2010 to better reflect current relative prices, all past measures of GDP change. The chained real GDP approach solves this problem.

- Symbols: Y_t = real GDP at time t, P_t = Price level at time t (more on this in a moment), and PY_t = nominal GDP at time t.
- Terminology for nominal GDP: NGDP, dollar GDP, GDP in current dollars
- Terminology for Real GDP: RGDP, GDP in constant dollars, GDP adjusted for inflation, GDP in chained (2005) dollars, GDP in 2005 dollars.

Aggregate Output

Figure 2-1 Nominal and real U.S. GDP, 1960–2010



Source: Series GDPCA, GDPA: Federal Reserve Economic Data (FRED)
<http://research.stlouisfed.org/fred2/>

GDP Level versus growth rate

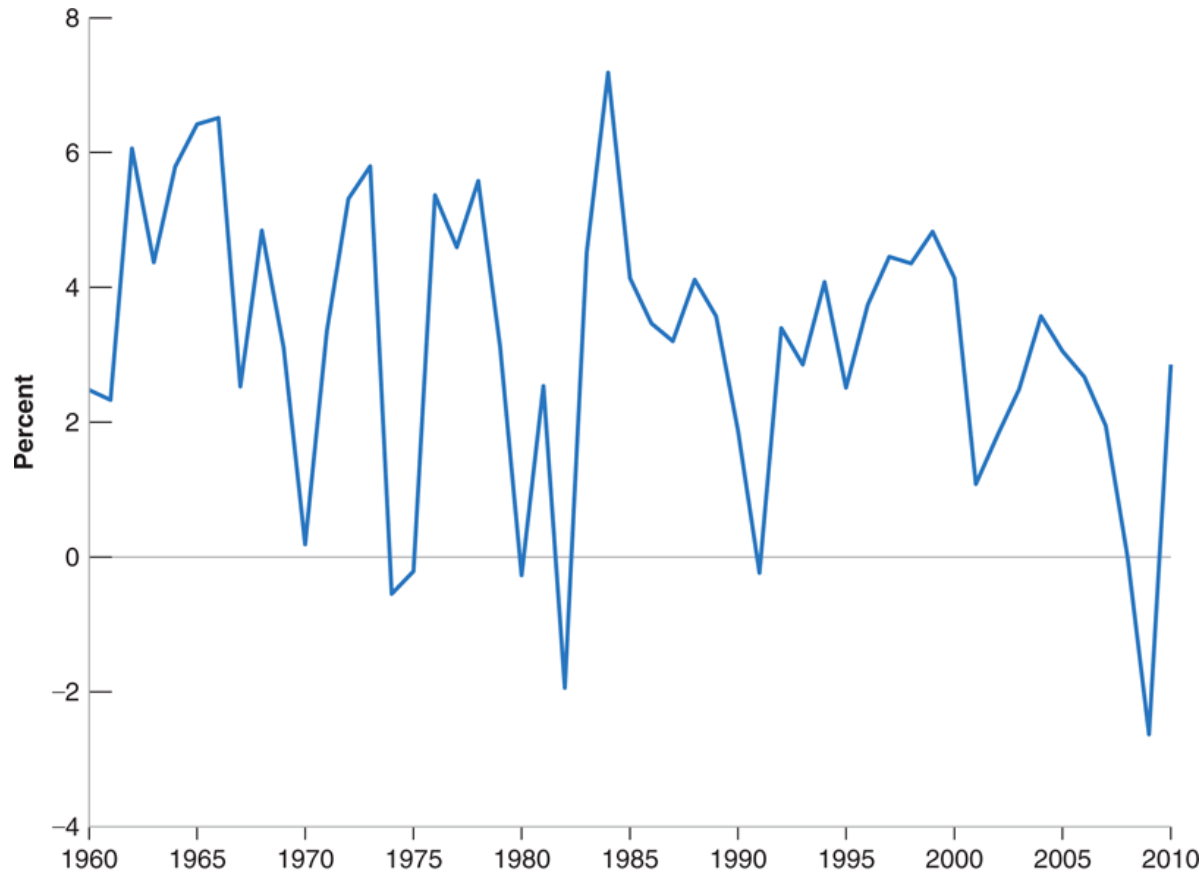
- The level of real GDP is a measure of the size of an economy
- Real GDP per capita = RGDP/population. It measures the *average* standard of living for a country.
- To measure performance of an economy from year to year, look at

$$\text{RGDP growth} = (Y_t - Y_{t-1})/Y_{t-1}$$

- Note in passing: Can also measure as $\log Y_t - \log Y_{t-1}$

Aggregate Output

Figure 2-2 Year-over-Year Growth rate of U.S. GDP, 1960–2010



Source: Calculated using series
GDPCA in Figure 2-1

The Unemployment Rate

- Another important measure of the economy's performance
- For example, presently GDP is recovering faster than employment
- Start with definitions:

$$L = N + U$$

- L = labor force, N = number employed, U = number unemployed (not the un-rate)

- Unemployment rate is calculated from a survey of 50,000 people each month done by the Current Population Survey (CPS).
 - Employed if person has a job at time of interview
 - Unemployed if not working and looked for job in last four weeks
 - Summary on next page

To summarize, employed persons are:

- All persons who did any work for pay or profit during the survey week.
- All persons who did at least 15 hours of unpaid work in a family-owned enterprise operated by someone in their household.
- All persons who were temporarily absent from their regular jobs because of illness, vacation, bad weather, industrial dispute, or various personal reasons, whether or not they were paid for the time off.

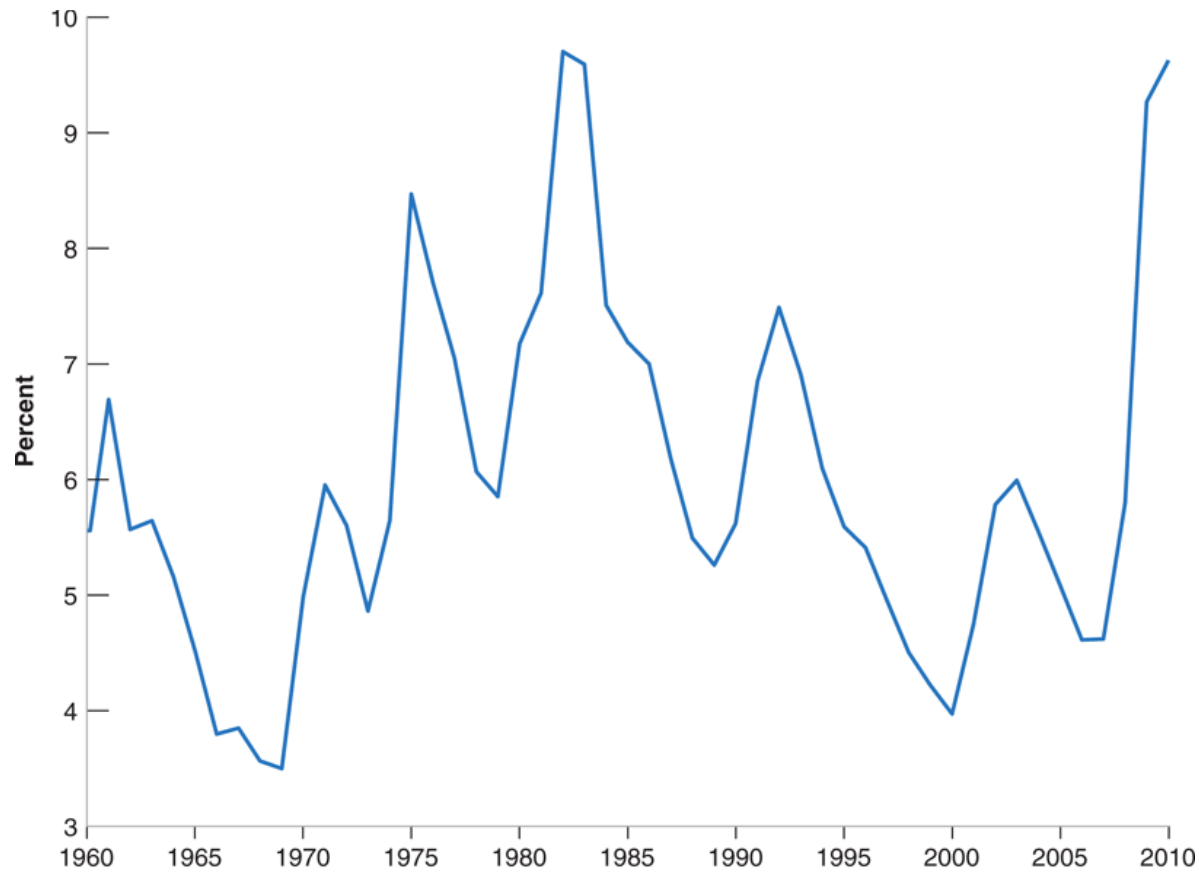
Unemployed persons are:

- All persons who did not have a job at all during the survey reference week, made at least one specific active effort to find a job during the prior 4 weeks, and were available for work (unless temporarily ill).
- All persons who were not working and were waiting to be called back to a job from which they had been laid off (they need not be looking for work to be classified as unemployed).

- Why care about unemployment? Book gives two reasons
- First, because it's an indication of how many households are struggling (both financially and psychologically)
- Second, it's a measure of how efficiently we are using our resources (for equipment, we use the capacity utilization rate – it varies closely with unemployment)

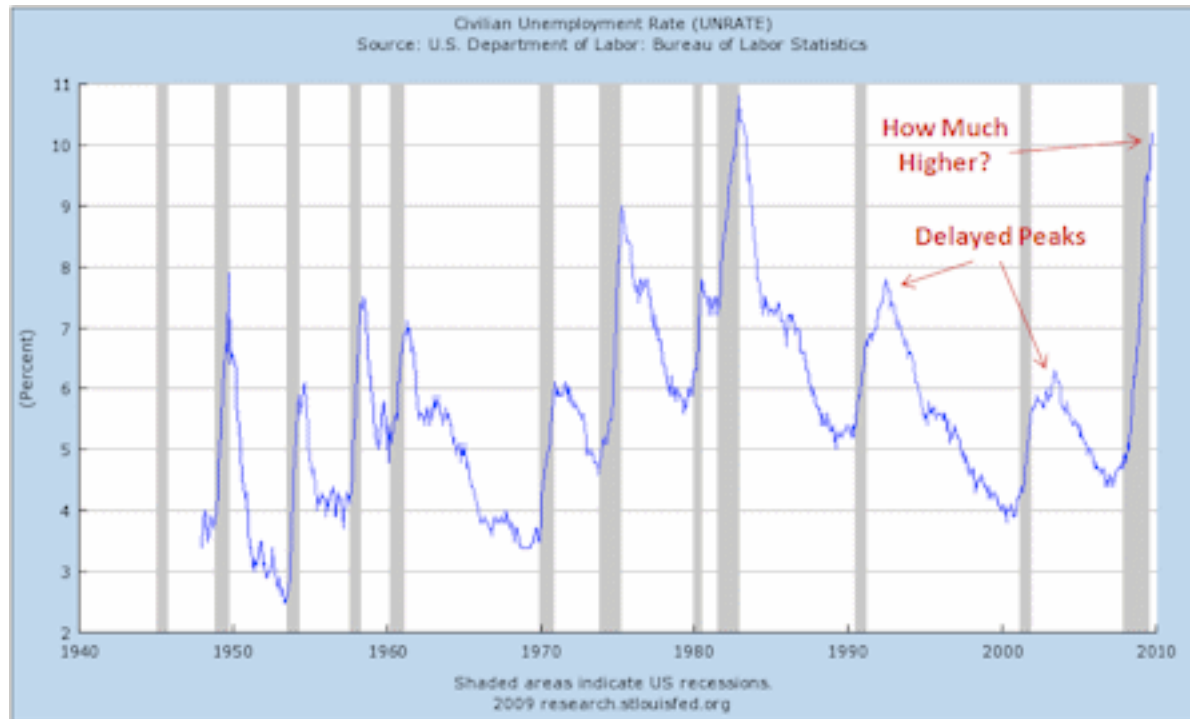
The Unemployment Rate

Figure 2-3 U.S. unemployment rate, 1960–2010

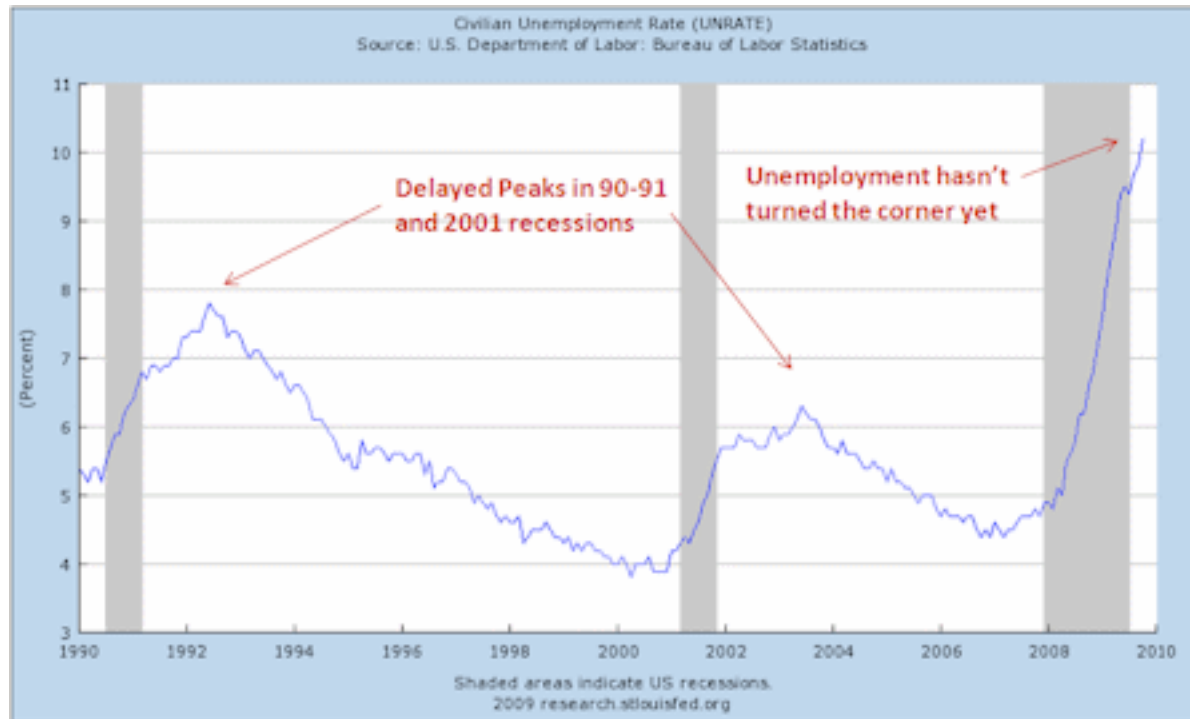


Source: Series UNRATE: Federal Reserve Economic Data (FRED) <http://research.stlouisfed.org/fred2/>

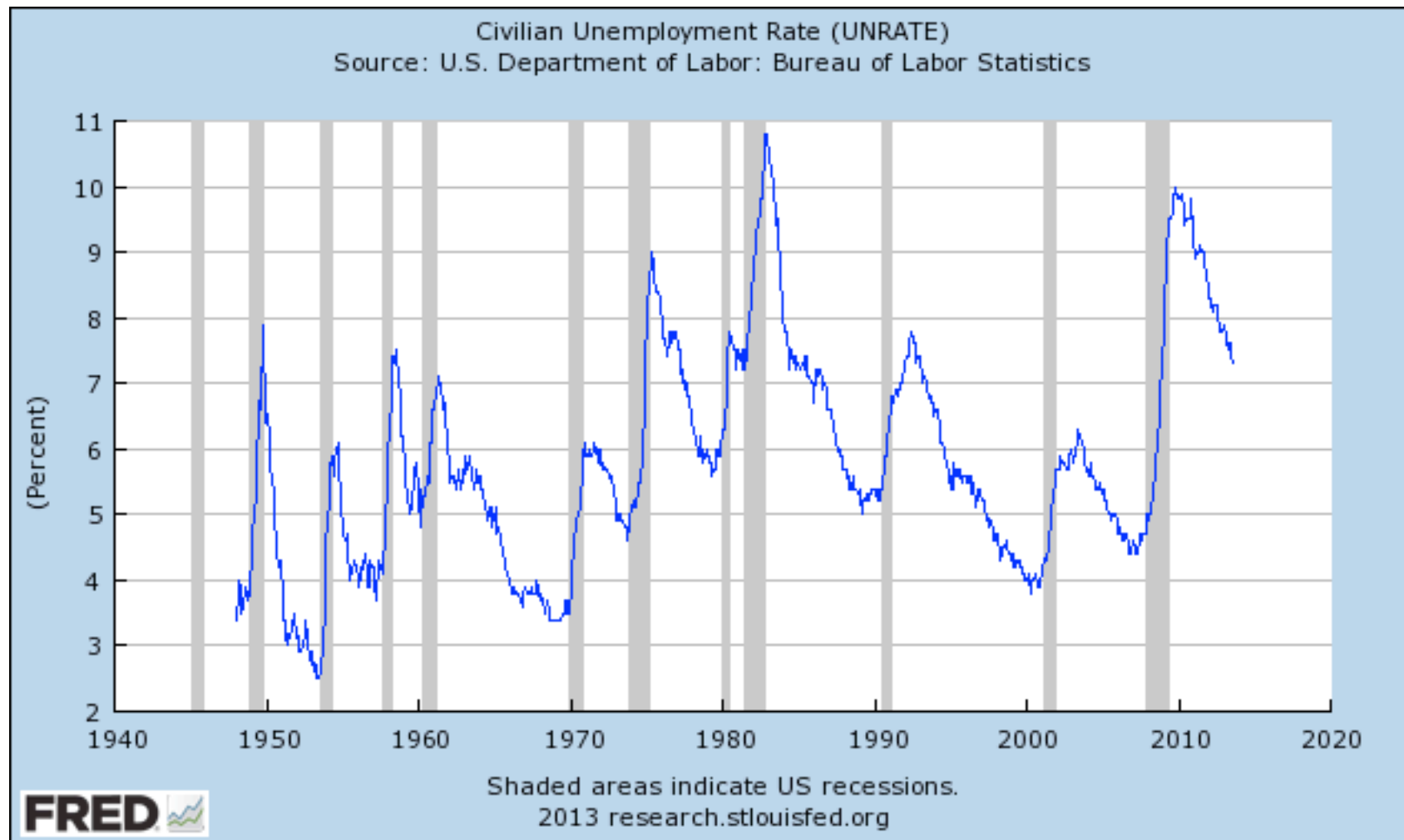
Unemployment and Recessions



Unemployment and Recessions



Unemployment and Recessions



The Price Level and the Inflation Rate

- Inflation is the rate of change in the price index or price level
- But what is the price level? There is no single measure, it depends on the question we are asking.
- One measure is the GDP deflator. It is:
- $P_t = \text{NGDP}_t / \text{RGDP}_t = \text{\$}Y_t / Y_t = P_t Y_t / Y_t$

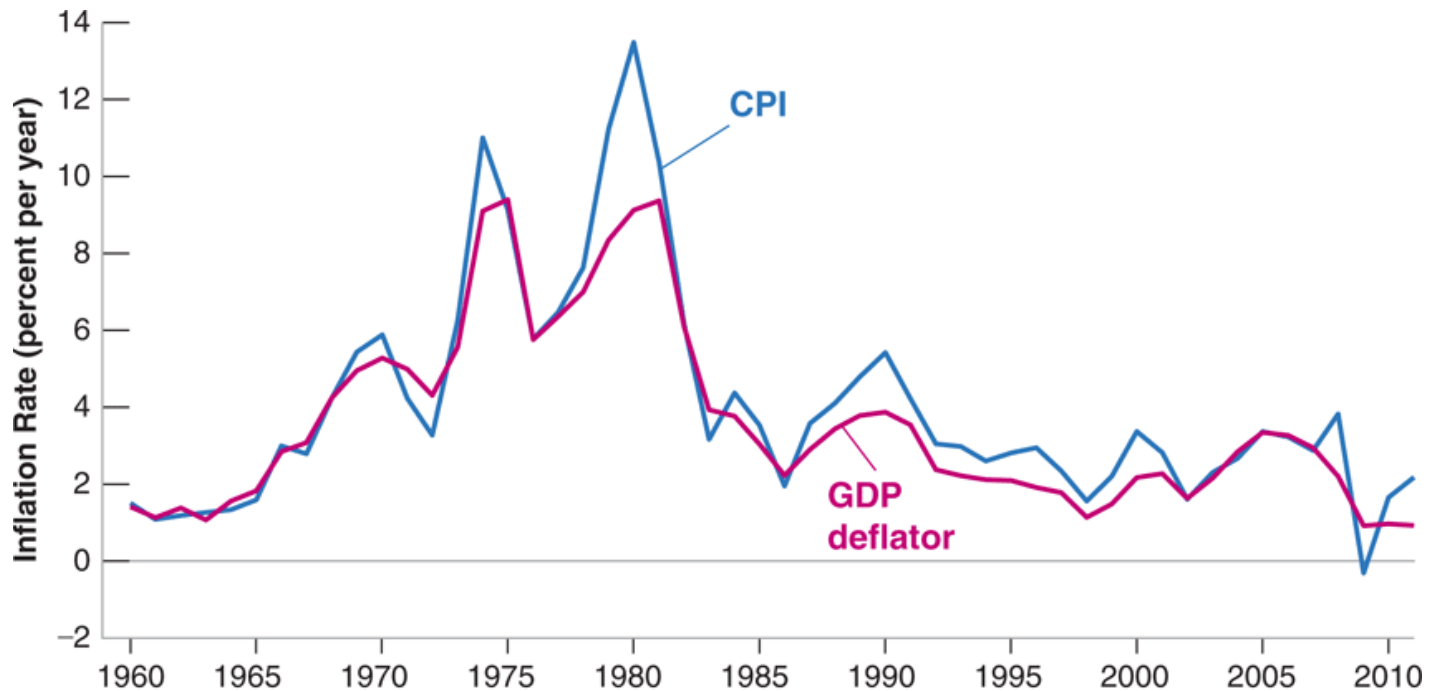
- The GDP deflator measures the average price of all goods and services produced, consumption, investment, government spending, and net exports in $Y=C+I+G+NX$
- But we are often interested in the cost of living, i.e. how the cost of what a typical household consumes changes over time. This is the CPI
- There is also the PCE or personal consumption expenditures index, the PCE is chain-weighted and also includes goods such as medical care that consumers don't necessarily purchase for themselves

- The CPI has existed since 1917, and is calculated monthly (GDP deflator is quarterly)
- Based on a specific basket of goods and services (adjusted at certain intervals, roughly every 10 years)
- Visit 23,000 stores (approx) in 87 cities, calculate the average cost for the basket of goods.
- Inflation is how that cost of the fixed basket of goods changes over time

- The CPI, like the GDP Deflator, is an index. It is set to 100 in some base year, then recalculated each year. If the price level in 2005 is 100, and if it is 200 in 2010, that means it costs twice times as much for the basket of goods (200% inflation over 5 years)
- Figure shows that CPI and GDP deflator generally move together, but not always (Fed watches PCE the closest)

The Inflation Rate

Figure 2-4 Inflation rate, using the CPI and the GDP deflator, 1960–2010



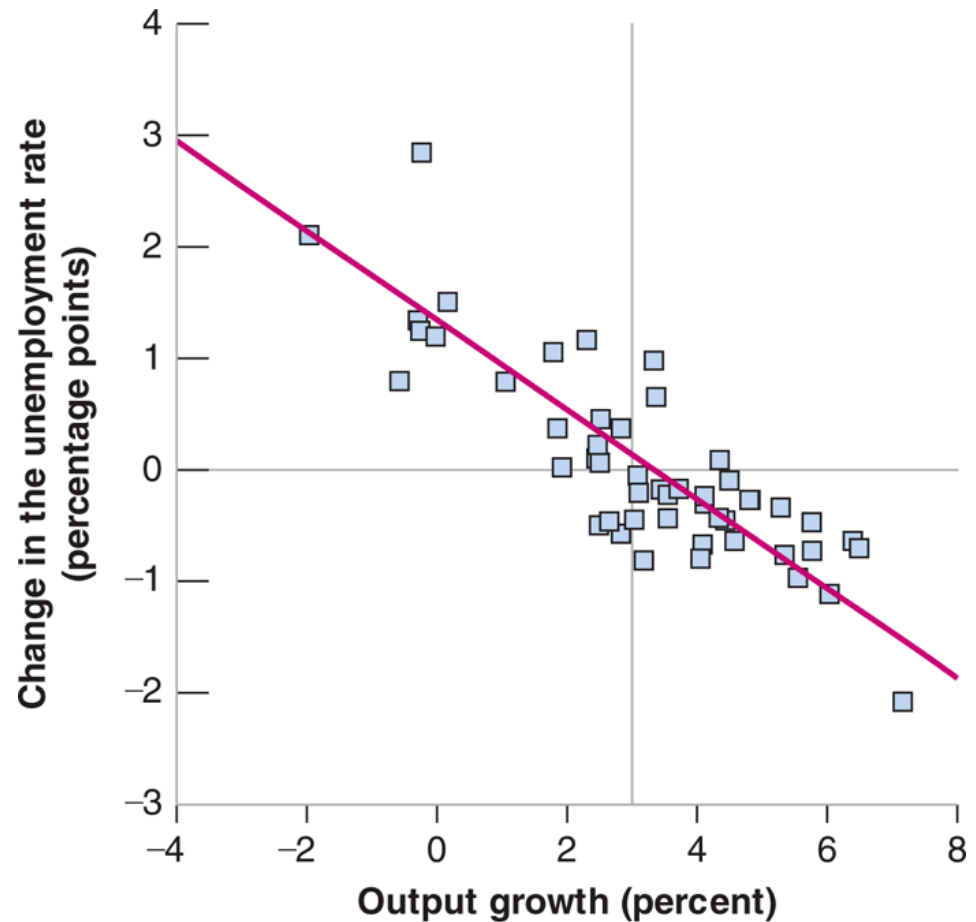
Source: Calculated using series GDPDEF, CPI-AUSCL Federal Reserve Economic Data (FRED) <http://research.stlouisfed.org/fred2/>

- Why care about inflation?
 - Transaction or menu costs: It's costly to change prices (though not as much as it used to be)
 - People on fixed incomes get hurt
 - It creates uncertainty about the future and lowers incentive to enter long-term contracts
 - It can distort tax payments if brackets are not adjusted
- We'll look at the optimal inflation rate, and the problems with deflation, later in course

- How are output, unemployment, and inflation related? (This is useful for policy, and it is something that theoretical models need to explain)
- **Okun's Law:** When output growth is high, unemployment ought to be low, and that's just what the following graph shows.
 - It plots change in unemployment rate against output growth for US since 1960

Okun's Law

Figure 2-5 Changes in the unemployment rate versus output growth in the United States, 1960–2010



Source: See Figures 2-2 and 2-3.

- Conclusions:

- First, it is downward sloping, and the fit is pretty good. Higher output growth causes is associated with lower unemployment.
- Slope = $-.4$, which means that a 1% increase in output growth lowers unemployment by .4% (2.5% increase in output growth leads to a 1% decrease in unemployment)
- Second, vertical line crosses zero – stable unemployment – when output growth is around 3%. This is the natural rate.

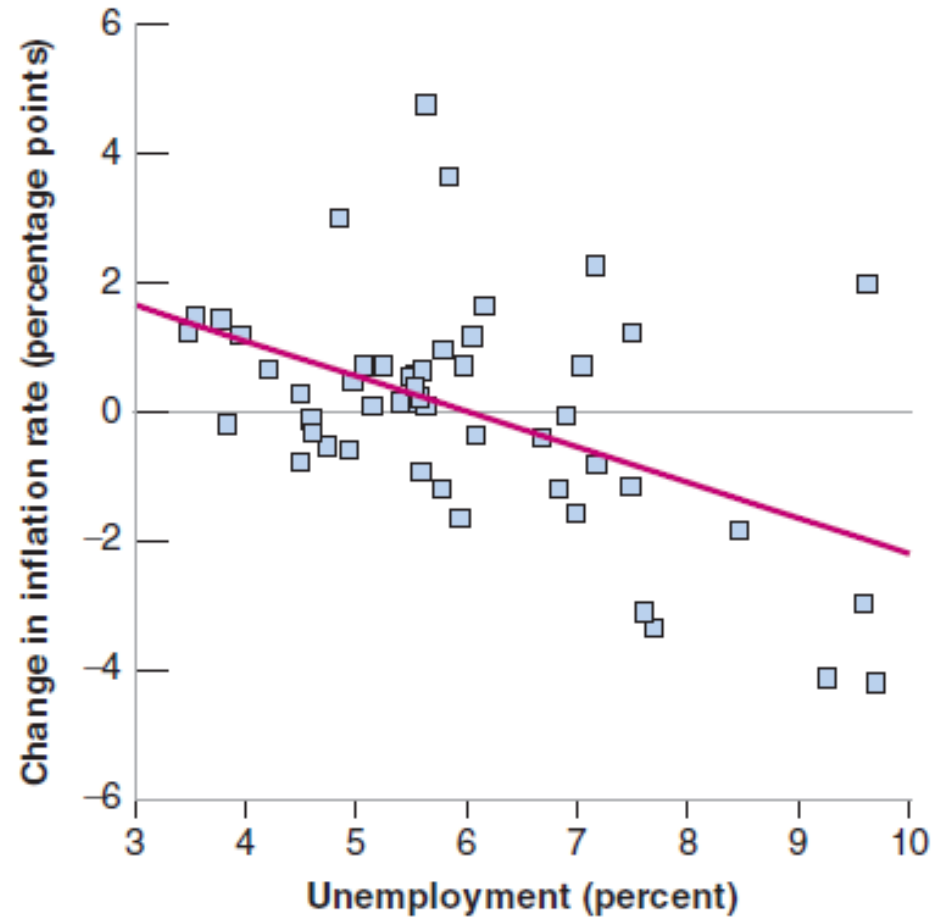
- The 3% growth rate comes about for two reasons.
 - First, population is growing so output must also grow to keep everyone employed
 - Second, if productivity is increasing (need less workers to produce the same output), need output growth to keep employment constant
 - That is, suppose population growth is 1% and productivity growth is 2%. Then need output to grow at $1\% + 2\% = 3\%$ to keep unemployment constant

- The Phillips Curve

- Okun's law says that if output growth is high enough, unemployment can be very low
- But what happens to prices in such a case? Wouldn't we need to worry about inflation?
- Yes, and that's what the Phillips curve shows us
- The original Phillips curve (1959, A.W. Phillips) looked at the relationship between inflation (actually wage inflation, then price inflation) and unemployment (or)output.
- It is now generally redefined as a relationship between the change in inflation and the unemployment rate. See the figure

The Phillips Curve

Figure 2-6 Changes in the inflation rate versus the unemployment rate in the United States, 1960–2010



- Two conclusions from the Phillips Curve
 - First, the line is downward sloping. As unemployment falls, inflation tends to rise (though the fit is far from perfect)
 - Inflation is zero when unemployment is around 6% (though sometimes the estimate is a bit lower, 4% to 5%, when more controls are added to the equation explaining inflation)
- Book is partly about how we can use policy, if needed, to achieve high employment and output growth with stable prices.