Lecture 1: Introduction and Data

1) Data Trends

Three variables are of special interest in measuring the performance of the macroeconomy:
real gross domestic product,
GDP
Inflation rate, and the
unemployment rate.
Lets take a look at how these three macroeconomic variables have behaved historically, and where these stand at the current point in time.

a) GDP:
Definition: Total value of all goods and services produced in a nation.

Two big observations from plot of GDP data:
1) it grows over time. Is double what was in 1960 - Do parents tell stories about how much harder it was when they growing up? If so, partly reflects this fact that GDP tends to grow over time. GDP is 5 times what was in 1900.
2) growth is not steady. There are periods when real GDP is falling, especially in early 1930s. Small ones called recessions. Large called depressions.

Note that the short-run recessions not seem to affect long-run growth path. Big drop in output in Great Depressions, but recovery made up for it with output that grew unusually fast.
Looks like can draw a line of nearly constant slope, then superimpose wavy line over it.
Decompose long-run trend from short-term fluctuations.

Currently: See dip in 1991 for recession. Has recovered since then.
Over previous year total GDP has grown at 6.0%. (5.2% in recent quarter)
(comparison: Japan only 0.8 and Germany 3.3)

b) unemployment.
Ask for observations:
1) Never zero. Are always some people unemployed.
2) But is worse during recessions, especially Great Depression, up to 25%. Has generally been higher in decades after 1970 than was in decades prior.

Ask if know current rate: 4.3%. (Aug)
Compare with Germany at 10.5%, Japan 4.8%, Spain 15.5%.

Questions: Why unemployment exist, why worse some times than others, why worse in Europe than U.S.?
c) **inflation rate** - percent change in price level.

Observation: **Can be negative, but not lately**

Notice that in first half of century inflation averaged zero: was negative as often as positive.

Negative inflation is deflation, prices were falling.

In second half of century, inflation always positive. Inflation was especially a problem in the late 1970s, when prices persistently rose about 10% a year.

Current: Inflation is currently fairly low. The overall price level rose 3.7% over the last year.

Surprising, since usually get inflation when output is at high level and unemployment is low.

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2) **Approach and plan** in course.

**Models**

Goal of class is to trace out how these variables and a few others are linked to each other. Mathematical models will do this for us.

Then can see how government can use monetary as well as fiscal policy to influence this system of interrelated variables.

**Questions:**

Why would Federal reserve look at high output growth and fear it would give rise inflation?

What does Fed do to prevent inflation?

Now that we have a federal budget surplus, does it make sense to cut taxes?

**Long run / short run distinction:**

Part one of the course will trace the interconnections between variables in the long run.

Part two will look at the interrelationships in the short run.

This is a logical distinction because we often think that in the short run, some price levels are sticky – they do not adjust to clear a market. But if given time, these prices adjust.

One set of theories applies to markets when prices have adjusted to clear markets, and another applies when prices are sticky and markets do not clear.
3) Measuring GDP

Data released by Bureau of economic analysis 4 times a year.

a) Can be measured in two ways:
   1) total expenditures - to buy the goods and services
   2) total income - earned for producing the goods and services

   Can count up either way, because every transaction has two sides: buyer and seller.
   Certain number of goods and services produced. Value determined by dollars paid for each of them. Can add this up as measure of total value.
   Suppose economy is a bakery, produce 100 cookies, 1$ each.

   GDP = 1 $/cookie * 100 cookies = 100$.

   But the dollars paid to seller are in turn used to pay the workers that produced the goods or services.
   Every dollar earned goes into someone’s pocket: wages for labor, or profits of owners of equipment.
   Add up all forms of wages and profits involved in producing the 100 cookies, will also get $100 total.

   So sometimes call GDP domestic income, as well as domestic product.

b) Use market prices as measure of value

   Account for fact are different types of goods being produced.
   Ask for two favorite types of cookies:
   Suppose produced 3 chocolate chip cookies and 4 biscotti. Could say GDP is 7 cookies? What if different types of cookies have different values?

   Suppose chocolate chip is 1$ and biscotti is 50 cents.

   Then GDP = 1 $/choc chip * 3 choc chip + 0.5 $/biscotti * 4 biscotti = 5$

(c) Only count final goods:

   When make 1 cookie, baker uses 20 cents of flour. Include these 20 cents for the intermediate good? No. Said in definition, only count final goods and services.

   Value of the intermediate good is already included as part of the price of the final good.
   To say GDP was $1.20 would be double-counting the flour.

   One way to count the value of final goods and services is to add up value added at each stage.

   Def: value added: value of the firm output less the value of the intermediate goods that the firm purchases.
d) **Imputed values:**

Want to value goods and services at their market prices, but some goods not ever sold in a market, so not know price. Use estimate of value: imputed value.

**Housing** is an example: If rent home, rent is included in GDP as expenditure of tenant or as income of landlord.

But what if own home. Are getting services from housing just like renter, want to included in GDP. Include this by imputing a value on these serves, estimated at what a renter would pay.

Count this imputed rent as both expenditure and income of home owner.

Also use put value of government services.

Protection of police not bought in market at a market value.

Estimate value of their service at cost - wages they are paid to provide the service.

GDP misses some things: services of car two years after you buy it not counted.

Home-cooked meals.

**Underground economy** - activity hidden from government to avoid taxation or because is illegal.

Means GDP is an imperfect measure.

Makes hard to compare across countries, especially if size of underground economy can be very different in different countries.

e) **Real GDP v. Nominal**

What computed last time was actually nominal GDP:

Recall: \(1999 \text{ nominal GDP} = 1 \text{$/cookie} \times 100 \text{ cookies} = 100\$\).

nominal GDP: measure at current market prices

Need be careful with this if want to compare GDP across time. Suppose price level doubled from 1998 to 1999:

\[
1998 \text{ nominal GDP} = 1998 \text{ price of cookie} \times 1998 \text{ quantity of cookies} = 0.5 \text{$/cookie} \times 100 \text{ cookies} = 50\$.
\]

Producing same amount, but value of a dollar has changed. If want to compare to across time, better to use a common price from a base year, such as 1992.

\[
1998 \text{ real GDP} = 1992 \text{ price of cookie} \times 1998 \text{ quantity of cookies} = 0.20 \text{$/cookie} \times 100 \text{ cookies} = 20 \text{$(1992)}
\]

\[
1999 \text{ real GDP} = 1992 \text{ price of cookie} \times 1999 \text{ quantity of cookies} = 0.20 \text{$/cookie} \times 100 \text{ cookies} = 20 \text{$(1992)}
\]

Choose some common base year to get prices from, here 1992.

Real GDP: gives value at constant prices, ie. in 1992 dollars.

What is reported usually is a growth rate of real GDP over the last year:

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\% \text{ Growth rate} = (1999 \text{ real GDP} / 1998 \text{ real GDP}) - 1
\]
f) Define a third statistic from these two:  
\[
\text{GDP deflator} = \frac{\text{nominal GDP}}{\text{Real GDP}}
\]
In case of cookie example is easy:  \(1999\) GDP deflator = \(100 / 20 = 5\)

But consider case of multiple goods with different prices, choc chip v. biscotti:  
\[
\text{GDP deflator} = \frac{(P_{cc}^92 * Q_{cc}) + (P_{bis}^92 * Q_{bis})}{(P_{cc}^92 * Q_{cc}) + (P_{bis}^92 * Q_{bis})}
\]

numerator is nominal GDP, and can be viewed as the price of a basket of goods (combination of apples and oranges) valued at current prices. Denominator is real GDP, and measures value of the same basket of goods at base-year prices. Can rewrite equation: nominal GDP = real GDP \(\times\) GDP deflator.

g) Notes: Chain weighting:
There is a problem with using constant price level in computing real GDP: prices become outdated with time. So update base year every five years.

Example: computers have gotten cheaper over time, and people buying more of them. Say a decent desktop computer is a quarter the price of what was in 1992. As a result more people are buying computers. But if use old high price of computers, makes it look like 4 times as much expenditure on computers than in reality.

Another solution: way to continuously update the base year: chain weighting: In 1995, BEA began reporting an alternative measure of GDP growth that updates base year each year: chain-weighted index.

Recall to compute growth rate, need to compare real GDPs in two years: say 1999 and 1998. Need to decide on a base year. Chain weighting does it two ways: one way using 1999 as base year, and then also using 1998 as a base year. The two ways do not give exactly the same answer. To get the final answer, take an average of these two versions in a particular way (multiply the two together and then take a square root). In essence, what it does is to use base prices that are an average of the prices in the two years being compared.

h) GNP v. GDP
Add one more refinement to definition of GDP

GDP counts goods and services produced within borders of a nation.
Contrast with GNP: goods and services produced by members of a nation or by factors of production owned by them, regardless of where the production takes place.
GDP includes income earned domestically by foreigners, but not include income earned by domestic residents on foreign ground.
Example: Suppose Mexican resident comes temporarily to the US to work. Income earns in the US is part of US GDP because earned domestically, but not part of US GNP because worker is not a US national.

i) Seasonal adjustment:
If look at GDP over the course of a year, see a pattern. Highest in last 3 months of the year, and lowest in first 3 months of year. A seasonal cycle. First part of year partly because construction harder when cold. End of year partly because Christmas spending.