

ECON 421: Business Fluctuations

Spring 2015
Tu 6:00PM–9:00PM
Section 102

Created by
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Based on
Macroeconomics, Blanchard and Johnson [2011]

Suppose your employer, an IT analytics firm, wants to open an office in another country. The proprietor thinks that offering alternative offices around the world will attract more talented employees.

What are the 3 appealing destinations?
What about three unappealing destinations?

Three Ways to Measure GDP

► Production

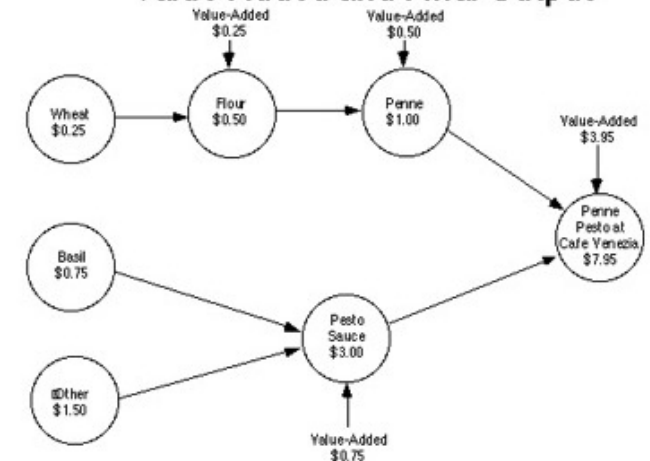
- 1. GDP equals the value of the final goods and services produced in the economy during a given period.

$$GDP = Y = C + I + G + NX$$

- 2. GDP is the sum of value added in the economy during a given period.
- Income
- 3. GDP is the sum of incomes in the economy during a given period.

Value Added

Value-Added and Final Output



Definitions

Notes 02

Aggregate
OutputGDP:
Production and
IncomeNominal and
Real GDPGDP
TerminologyUnemployment
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- **Nominal GDP** is the sum of the quantities of final goods produced times their current price.
- **Real GDP** the sum of final goods times *constant* prices.

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1. $t = \text{year}$
2. $i = \text{goods index (up to } N \text{ goods)}$
3. $q_{i,t} = \text{quantity of good } i \text{ produced in year } t$
4. $p_{i,t} = \text{price of good } i \text{ produced in year } t$
5. $NGDP_t = \sum_{i=1}^N q_{i,t} p_{i,t}$
6. $RGDP_t = \sum_{i=1}^N q_{i,t} p_{i, \text{base year}}$

Nominal GDP

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Nominal GDP in Year 0 and in Year 1.

	Year 0		
	Quantity	\$ Price	\$ Value
Potatoes (pounds)	10	1	10
Wine (bottles),	5	2	10
Nominal GDP			20

	Year 1		
	Quantity	\$ Price	\$ Value
Potatoes (pounds)	15	1	15
Wine (bottles)	5	3	15
Nominal GDP			30

- $NGDP_t = \sum_{i=1}^N q_{i,t} p_{i,t}$
- $RGDP_t = \sum_{i=1}^N q_{i,t} p_{i, \text{base year}}$

The rate of growth of **nominal GDP** from year 0 to year 1 is equal to 1

$$\frac{\$30 - \$20}{\$20} = 50\%$$

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	Quantity	\$ Price	\$ Value
Potatoes (pounds)	15	1	15
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Nominal GDP			30

- What is real GDP in each year using Year 0 as the base year?
- And using Year 1 as the base year?
- What growth rate is implied?

Chain Weighting

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		Year 1		
	Quantity	\$ Price	\$ Value	
Potatoes (pounds)	15	1	15	
Wine (bottles)	5	3	15	
Nominal GDP			30	

Using year 0 as the base year

- ▶ Real GDP in year 0 is the sum of the quantity in year 0 times the price in year 0 for both goods:
 $10 * \$1 + 5 * \$2 = \$20$.
- ▶ Real GDP in year 1 is the sum of the quantity in year 1 times the price in year 0 for both goods:
 $15 * \$1 + 5 * \$2 = \$25$.
- ▶ The rate of growth of real GDP from year 0 to year 1 is then

$$\frac{\$25 - \$20}{\$20} = 25\%.$$

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Wine (bottles),	5	2	10	
Nominal GDP			20	

		Year 1		
	Quantity	\$ Price	\$ Value	
Potatoes (pounds)	15	1	15	
Wine (bottles)	5	3	15	
Nominal GDP			30	

Using year 1 as the base year

- ▶ Real GDP in year 0 would be equal to $10 * \$1 + 5 * \$3 = \$25$.
- ▶ Real GDP in year 1 would be equal to $15 * \$1 + 5 * \$3 = \$30$.
- ▶ Implying a growth rate of $\frac{\$30 - \$25}{\$25} = 20\%$ which is less than the growth rate calculated when year 0 is the base year (25%).

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- ▶ Growth based on Year 0 as the base year is different from growth based on Year 1 as the base year.
- ▶ This problem extends over time.
- ▶ Suppose real GDP is calculated using a new base year, say using 2010 instead of 2005, then the growth rate for 1980 to 1981 may change!
- ▶ The solution is simple:
 - ▶ Define real GDP based on growth, rather than calculating growth from real GDP.
 - ▶ This is achieved by measuring growth between any two years as the average growth rate using each as a base year.
 - ▶ In our example, growth is simply $\frac{20\% + 25\%}{2} = 22.5\%$
 - ▶ Growths are calculated in this way across all years, then real GDP is simply nominal GDP in the base year times the growth factor.

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	2008	2009	2010	2011	2012	2013	2014
Growth Rate (g)	2.880%	0.000%	2.532%	1.602%	2.321%	2.219%	2.862%
Growth Factor (1+g)	1.029	1.000	1.025	1.016	1.023	1.022	1.029
Relative to 2009	1.029	1.000	1.025	1.042	1.066	1.090	1.121
Real GDP (Billions)		14419					

Calculate Real GDP for the missing years.

Note: Growth in 2009 was actually negative. Since it's the base year, I have fixed its growth to zero and calculated the growth of 2008 relative to 2009 (as opposed to 2007) for convenience.

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Relative to 2009	1.029	1.000	1.025	1.042	1.066	1.090	1.121
Real GDP (Billions)	14830	14419	14784	15021	15369	15710	16160

Terminology

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- **Per Capita GDP**, i.e. real GDP per person, is the ratio of real GDP to the population of the country.
- Periods of negative GDP growth are called **recessions**.
- Periods of positive GDP growth are called **expansions**.

Unemployment

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- An **unemployed person** is someone who does not have a job, but is looking for one.
- The **labor force** is the sum of those who have jobs, (*the employed*, and the unemployed).
- The **unemployment rate** is the ratio of unemployed persons to the labor force.
- Those persons of working age who do not have a job and are not looking for one are classified as **out of the labor force**.
- The **participation rate** is the ratio of the labor force to the size of the working age population.

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Suppose a country has an adult population of 25 million, labor-force participation rate of 60 percent, and unemployment rate of 6 percent.
What are the number of people employed and the number of people in the labor force?

Inflation Rate

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Two primary measures of the aggregate price level:

- ▶ The **GDP deflator**, is the ratio of nominal to real GDP.
- ▶ The **consumer price index (CPI)** measures the price level by weighting the prices of various goods according to average consumer expenditure shares.

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GDP Deflator

- ▶ Measures with arbitrary levels but well-defined rates of change are called **index numbers**.
- ▶ The GDP deflator is an index number.

$$GDP\ Deflator = \frac{nominal\ GDP}{real\ GDP} * 100$$

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Year	Nominal GDP	Real GDP	GDP Deflator	Growth Rate
2011	\$6000	\$6000		
2012	\$8250	\$7200		
2013	\$10,800	\$8400		

$$GDP\ Deflator = \frac{nominal\ GDP}{real\ GDP} * 100$$

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Year	Nominal GDP	Real GDP	GDP Deflator	Growth Rate
2011	\$6000	\$6000	100	-
2012	\$8250	\$7200	114.6	14.6%
2013	\$10,800	\$8400	128.6	12.2%

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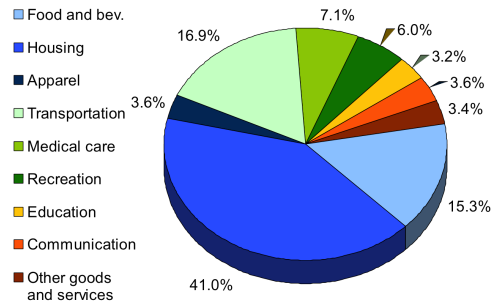
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- ▶ CPI measures the price of a representative basket of private consumption.
- ▶ In the United States, the CPI is based on price surveys across U.S. cities.
- ▶ The prices of various goods are weighted according to average consumer expenditure shares.
- ▶ The construction of the CPI and the construction of real GDP involve similar problems.



So what?

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- ▶ If inflation means all prices are rising (including wages), then why do we care?
- ▶ This question makes incorrect assumptions. Although it is correct that if all prices moved together, economists would be unconcerned.
- ▶ Inflation only tells us that average prices are rising.

So what?

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- ▶ Inflation distorts relative prices because some nominal variables do not adjust immediately to the rise in the aggregate price level.
- ▶ Inflation redistributes income because some transactions involve fixed nominal payments.
- ▶ For example, *some* retirees receive fixed nominal incomes.
- ▶ Nevertheless, most economists favor a stable inflation rate somewhere between 0 and 3%.

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- ▶ **Okun's law** says that if output growth is high, unemployment will decrease
- ▶ The **Phillips Curve** suggests that low unemployment rates lead to increases in the inflation rate, while a high unemployment rates decrease inflation rates.

Macroeconomists view the economy in terms of three time frames.

- ▶ In the short run (a few years or so) demand for goods and services determines output. And prices are modeled as stable. (IS-LM Model)
- ▶ In the medium run (a decade or so) the level of technology and the size of the capital stock determine output. Since these variables change slowly, it is a useful simplification to assume that they are fixed in the medium run. Here prices fluctuate. (AS-AD Model)
- ▶ Finally, in the long run, technological progress and capital accumulation are the primary determinants of output growth.

All of the models in the first 13 chapters of the book assume the economy is closed ($NX = 0$). In lieu of focusing on the long run, we relax that assumption and devote our attention to open economy macroeconomics.

Practice Problem (part i)

An economy produces three goods: cars, computers, and oranges. Quantities and prices per unit for years 2005 and 2006 are as follows:

	2005		2006	
	Quantity	Price	Quantity	Price
Cars	10	\$2000	12	\$3000
Computers	4	\$1000	6	\$500
Oranges	1000	\$1	1000	\$1

1. What is nominal GDP in 2005 and in 2006? By what percentage does nominal GDP change from 2005 to 2006?
2. Using the prices for 2005 as the set of common prices, what is real GDP in 2005 and in 2006? By what percentage does real GDP change from 2005 to 2006?

Practice Problem (part ii)

An economy produces three goods: cars, computers, and oranges. Quantities and prices per unit for years 2005 and 2006 are as follows:

	2005		2006	
	Quantity	Price	Quantity	Price
Cars	10	\$2000	12	\$3000
Computers	4	\$1000	6	\$500
Oranges	1000	\$1	1000	\$1

3. Using the prices for 2006 as the set of common prices, what is real GDP in 2005 and in 2006? By what percentage does real GDP change from 2005 to 2006?
4. Why are the two output growth rates constructed in 2. and 3. different? Which one is correct? Explain your answer.

GDP Forecasting Contest

First place wins a box of cookies.

1. The BEA releases its Gross Domestic Product, 4th quarter and annual 2014 (second estimate) on February 27 at 8:30 am
2. It also releases its third estimate of Gross Domestic Product, 4th quarter and annual 2014 on March 27 8:30 am
3. I will give prizes to the three students with the closest forecasts
4. You will be allowed to update your forecasts until Thursday before the data are released

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Comments, questions, or concerns?

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Olivier Jean Blanchard and David Johnson. *Macroeconomics*. Prentice Hall, 6th edition, 2011. ISBN 9780133061635.

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