Measuring a Nation’s Income
GDP and Other Measures

Principles of Macroeconomics
Module 2.1

Gross Domestic Product

The market value of all final goods and services produced within a country in a given period of time.

- GDP measures how well an economy is doing over time
- GDP measures how well an economy is doing compared to other economies
- GDP measures fluctuations in the economy

Breakdown of GDP

- Market Value: the amount of money needed to buy all goods and services produced in the economy at market prices

- Final goods and services: Products that are for final sale – not intermediate goods used in the production of other goods

- In a country: Counts only goods produced within the legal geographical boundaries of a country regardless of who makes them

- In a given period: Counts only goods produced within that current year or quarter (not goods produced in the past)

Components of GDP

Output Equation:
Y = C + I + G + NX

- Y = Output or GDP
  Amount of goods and services produced by an economy
- C = Consumption
  Spending on goods and services by households
- I = Investment
  Spending on capital goods by firms
- G = Government Spending
  Spending on goods and services by the government
- NX = Net Exports
  Exports - Imports

Nominal GDP vs. Real GDP

Nominal GDP: The value of output at current prices – takes into account price change and quantity change

$$NGDP = P_1 * Q_1 + P_2 * Q_2 + P_3 * Q_3 + ... + P_n * Q_n$$

Real GDP: The value of output at constant prices – takes into account only quantity change

$$RGDP = P_b * Q_1 + P_b * Q_2 + P_b * Q_3 + ... + P_b * Q_n$$

Pb = prices at base year

Test your Understanding

Consider an economy that produces calculators, and pens. Using the following table determine:

- Nominal GDP each year
- Real GDP if the base year is 2011.

	Calculators		Pens	
	Price	**Quantity**	**Price**	**Quantity**
2011	$20	100	$5	300
2012	$20.50	105	$5.25	350
2013	$21.75	107	$5.80	425

Test your Understanding

Nominal GDP = P x Q

	Calculators			Pens			Nominal GDP
	P	**Q**	**PxQ**	**P**	**Q**	**PxQ**	
2011	$20	100	$2,000	$5	300	$1,500	$3,500
2012	$20.50	105	$2,153	$5.25	350	$1,838	$3,990
2013	$21.75	107	$2,327	$5.80	425	$2,465	$4,792

Test your Understanding

Real GDP = P(2011) x Q

	Calculators			Pens			Real GDP
	P	**Q**	**PxQ**	**P**	**Q**	**PxQ**	
2011	$20	100	$2,000	$5	300	$1,500	$3,500
2012	$20.50	105	$2,100	$5.25	350	$1,750	$3,850
2013	$21.75	107	$2,140	$5.80	425	$2,125	$4,265

Change in GDP

- Change in nominal GDP – reflects changes in both prices and quantities produced
- Change in real GDP – reflects only changes in quantities produced

Real GDP is "corrected" for inflation

Growth in production – growth in real GDP!

Income and economic well being is rising!

Growth in GDP

$$Growth\ in\ GDP = \frac{GDP\ 2 - GDP\ 1}{GDP1} x\ 100\%$$

	Nominal GDP	Growth	Real GDP	
2011	$3,500		$3,500	
2012	$3,990		$3,850	
2013	$4,792		$4,265	

Growth in GDP

$$Growth\ in\ GDP = \frac{GDP\ 2 - GDP\ 1}{GDP1} x\ 100\%$$

	Nominal GDP	Growth	Real GDP	Growth
2011	\$3,500	-	\$3,500	-
2012	\$3,990	14.0%	\$3,850	10.0%
2013	\$4,792	20.1%	\$4,265	10.8%

Using GDP to understand prices

- Price level in an economy – a statement of what is happening with prices overall in an economy.

- **GDP Deflator** – index of prices based on nominal and real GDP

$$GDP\ Deflator = \frac{Nominal\ GDP}{Real\ GDP}\ x\ 100$$

Calculating Inflation with GDP

	NOMINAL GDP	REAL GDP	GDP Deflator	Inflation
2011	$9,500	$9,500		
2012	$11,030	$10,250		
2013	$12,532	$10,715		

Inflation:

Percentage change in price levels from last year to this year.

Calculating Inflation with GDP

	NOMINAL GDP	REAL GDP	GDP Deflator	Inflation
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<u>Inflation:</u>

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Calculating Inflation with GDP

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Inflation:

Percentage change in price levels from last year to this year.

Calculating Inflation with GDP

	NOMINAL GDP	REAL GDP	GDP Deflator	Inflation
2011	\$9,500	\$9,500	100	-
2012	\$11,030	\$10,250	107	7.6%
2013	\$12,532	\$10,715	117	8.2%

Inflation:

Percentage change in price levels from last year to this year.

Key Takeaways

- GDP is one of the most important measures used by economists to gauge what is happening with the economy
- It accounts for consumption, investment, government spending and net exports
- Real GDP controls for changing prices while nominal GDP is calculated using actual prices observed in the economy in that year

Measuring the Cost of Living
Inflation, CPI, and Prices

Principles of Macroeconomics
Module 2.2

Cost of Living

- Another measure of what is happening in the economy is the cost of living
- Prices of many goods and services change in different directions – some increase, some decrease, some stay the same
- When the majority of prices increase – inflation!

Use a price index to measure overall prices in an economy

The Consumer Price Index (CPI)

- Measures the typical consumer’s cost of living
- CPI is made up of a fixed basket of goods whose prices change year over year
- The change in prices for the basket of goods indicates inflation

How the CPI Is Calculated

1. ***Fix the "basket."***

   Determine what goods make it into the basket

   Quantity of goods remains constant

2. ***Find the prices.***

   Determine the prices of each good

   Prices change

3. ***Compute the basket's cost.***

   Cost of each good = quantity of each good in basket x price of each good

   Cost of the basket = sum of each cost

How the CPI Is Calculated

4. Choose a base year and compute the index.

$$\text{CPI} = \frac{\text{Cost of basket in current year}}{\text{Cost of basket in base year}} \text{ X } 100$$

5. Compute the inflation rate.

$$\text{Inflation rate} = \frac{\text{CPI this year} - \text{CPI last year}}{\text{CPI last year}} \times 100\%$$

Test your Understanding

Consider an economy where the typical consumer consumes 10 lbs. of beef and 20 lbs. of chicken. These are the two goods in the CPI basket.

	price of beef	*price of chicken*
2011	\$4	\$4
2012	\$5	\$5
2013	\$9	\$6

- What is the CPI each year if the base year is 2010?
- What is the inflation rate in 2011 and 2012?

Test your Understanding

Q of Beef: 10lbs

Q of Chicken: 20lbs

	PxQ Beef	PxQ Chicken	Cost of the Basket	CPI
2011	$40	$80		
2012	$50	$100		
2013	$90	$120		

Test your Understanding

Add up cost Beef and Chicken together

	PxQ Beef	PxQ Chicken	Cost of the Basket	CPI
2011	$40	$80	$120	
2012	$50	$100	$150	
2013	$90	$120	$210	

Test your Understanding

$$\frac{\text{Cost of Basket}}{\text{Cost of Basket in base}}$$

	PxQ Beef	PxQ Chicken	Cost of the Basket	CPI
2011	\$40	\$80	\$120	100
2012	\$50	\$100	\$150	125
2013	\$90	\$120	\$210	175

Test your Understanding

	PxQ Beef	PxQ Chicken	Cost of the Basket	CPI
2011	$40	$80	$120	100
2012	$50	$100	$150	125
2013	$90	$120	$210	175

Inflation: Percentage Change in CPI

2010 - 2011: (125 – 100)/100 = 25%

2011 – 2012: (175 – 125)/100 = 40%

Real vs. Nominal Values

- **Nominal Value of Goods:** The value of the good at the current price
- **Real Value of Goods:** The value of the good controlling for price changes
  - Value of the good is corrected for inflation
- **Real Interest Rates = Nominal Interest Rates – Inflation Rate**

Real vs. Nominal Values

If you have $10,000 in student debt at an interest rate of 5%

In 1 year: you will owe $10,000 + $500 = $10,500

<u>This is the nominal value of your debt</u>

But what if inflation is 2%?

What if inflation is 10%?

Real vs. Nominal Values

If you have \$10,000 in student debt at an interest rate of 5%

– The inflation rate = 2% and the nominal interest rate = 5%

– Real interest rate = 5% - 2% = 3%

– **Real value of debt = \$10,000 + \$300 = \$10,300**

– ***With inflation: the real value of your debt is lower***

Real vs. Nominal Values

If you have $10,000 in student debt at an interest rate of 5%

- The inflation rate = 10% and the nominal interest rate = 5%
- Real interest rate = 5% - 10% = - 5%
- **Real value of debt = $10,000 + (-$500) = $950**

- ***The higher the inflation: the more it eats away at the value of your debt***

Real vs. Nominal Value

	Real vs. Nominal Value	Good for:	Bad for:
High Inflation	Real Value less than Nominal Value	Debtors	Savers Consumers Creditors
Zero Inflation	Real Value Equal to Nominal Value		
Negative Inflation (Deflation)	Real Value Greater than Nominal Value	Savers Creditors	Debtors

Types of Inflation

Demand Pull Inflation: Inflation is driven by the demand-side of the economy

- Rapid increases in consumption or investment spending
- Sudden increase in exports
- Large increase in government spending
- Excessive money growth fueling investment/spending bubble

Types of Inflation

<u>Cost Push Inflation:</u> Inflation is driven by the supply-side of the economy

- Increase in cost of important goods used in production
- Factors of production/resource prices increase
- Production becomes more expensive – final goods become more expensive

Costs of Inflation

- Menu costs:
  - Cost to businesses of actually changing their prices
- Shoe-leather costs
  - **Cost** of time and effort that people spend trying to counter-act the effects of inflation, such as holding less cash and having to make additional trips to the bank.
- Drop in purchasing power
  - As prices rise, value of money falls, so what you can buy with the same amount of money declines

Key Takeaways

- The CPI shows the cost of a basket of goods and services that most consumers purchase.
- Though imperfect, it provides a decent reflection on the cost of living in a country and how it changes
- With the price index (CPI or GDP deflator) we can calculate inflation and adjust for the value of goods overtime

Principles of Macroeconomics Module 2.3

Unemployment

Understanding the Labor Market

- The labor market reflects the number of jobs and number of workers in an economy
- If there is a mismatch, shortfall, or difference between workers and jobs available, the economy experiences unemployment
- Two types of unemployment – cyclical (what is actually reported) and natural (estimated)

Labor Force Statistics

Labor force:

% of the labor force that is unemployed

$$LF = \# \text{ of unemployed} + \# \text{ of employed}$$

Labor Force Statistics

Unemployment rate (μ):

% of the labor force that is unemployed

$$\mu = 100 \times \frac{\text{\# of unemployed}}{\text{labor force}}$$

Labor force participation rate (LFPR):

% of the adult population that is in the labor force

$$\text{LFPR} = 100 \times \frac{\text{labor force}}{\text{adult population}}$$

Test your Understanding

Country	Adult Population	Labor Force	Employed People	Unemployed People	Unemployment Rate	Labor-Force Participation Rate
Country A	74,938	53,930		5,130		
Country B	38,530			2,429	8.80%	71.60%

Test your Understanding

Country	Adult Population	Labor Force	Employed People	Unemployed People	Unemployment Rate	Labor-Force Participation Rate
Country A	74,938	53,930	48,800	5,130	9.51%	72.00%
Country B	38,530	27,600	25,171	2,429	8.80%	71.60%

Find Unemployment Rate:
5,130 / 53,930= 9.51%

Test your Understanding

Country	Adult Population	Labor Force	Employed People	Unemployed People	Unemployment Rate	Labor-Force Participation Rate
Country A	74,938	53,930	48,800	5,130	9.51%	72.00%
Country B	38,530	27,600	25,171	2,429	8.80%	71.60%

Find Labor Force Participation Rate:
53,930/74,938= 72%

Test your Understanding

Country	Adult Population	Labor Force	Employed People	Unemployed People	Unemployment Rate	Labor-Force Participation Rate
Country A	74,938	53,930	48,800	5,130	9.51%	72.00%
Country B	38,530	27,600	25,171	2,429	8.80%	71.60%

Find "Employment Rate":
100% - 9.51% = 90.49%

Multiply by Labor Force:
53,930*90.49% = 48,800

Test your Understanding

Country	Adult Population	Labor Force	Employed People	Unemployed People	Unemployment Rate	Labor-Force Participation Rate
Country A	74,938	53,930	48,800	5,130	9.51%	72.00%
Country B	38,530	27,600	25,171	2,429	8.80%	71.60%

Find Labor Force:
38,530 * 71.6% = 27,600

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Find "Employment Rate":
100% - 8.8% = 91.2%

Multiply by Labor Force:
27,600*91.2% = 25,171

Limitations of the Unemployment Rate

- It excludes discouraged workers.
- It does not distinguish between full-time and part-time work, or people working part time because full-time jobs not available.
- Some people misreport their work status in the BLS survey
- Cannot account for the difficulty in finding a job after a long break in employment

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Cyclical Unemployment vs. the Natural Rate

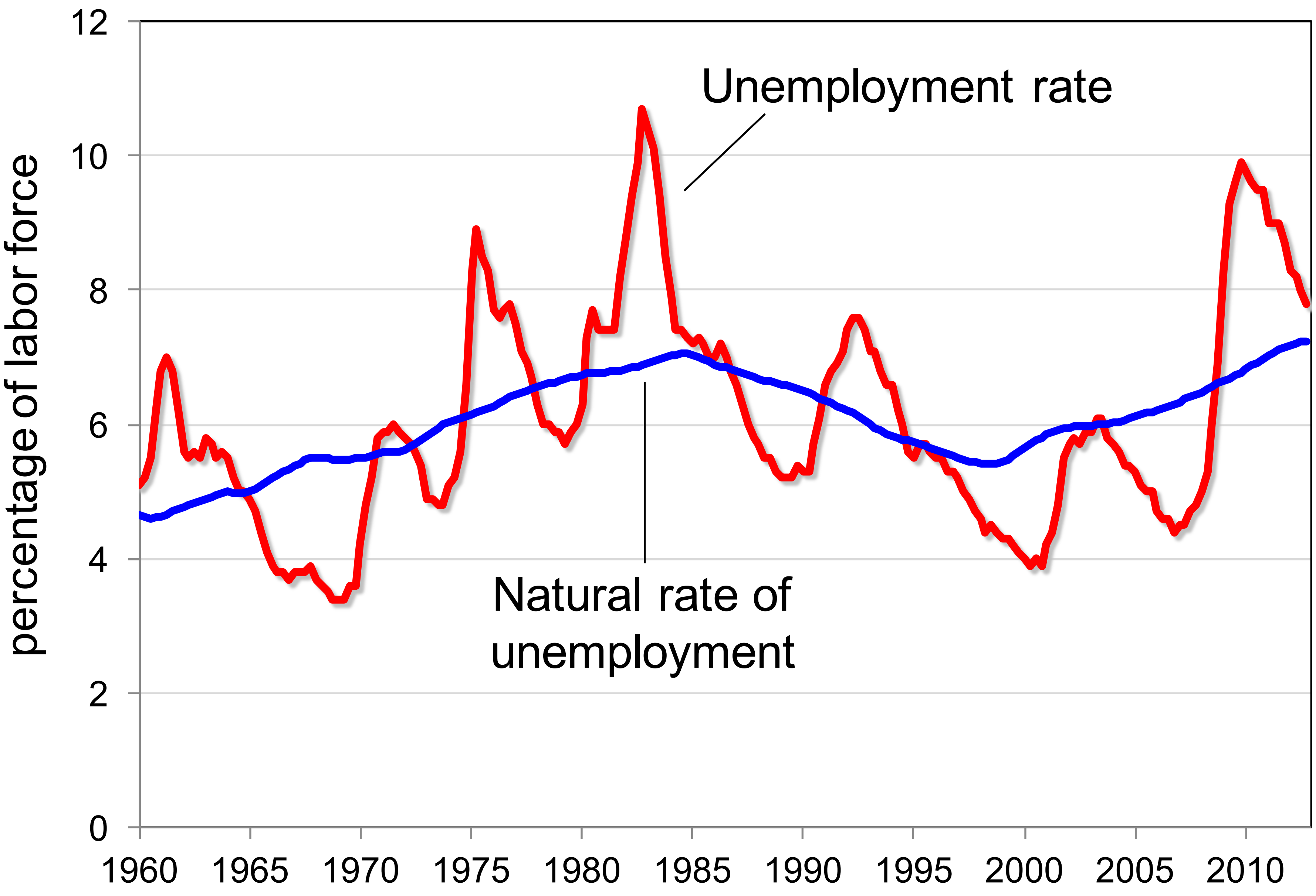
Natural rate of unemployment

- The normal rate of unemployment around which the actual unemployment rate fluctuates

Cyclical unemployment

- The deviation of unemployment from its natural rate
- Associated with business cycles

U.S. Unemployment, 1960–2012



Why a Natural Rate of Unemployment?

Even when the economy is doing well, there is always some unemployment:

Frictional factors

- Occurs when workers spend time searching for the jobs that best suit their skills and tastes
- Short-term for most workers

Structural factors

- Occurs when there is a mismatch between skills of workers and skills required for jobs
- Industries expand or contract with new technology creating new employment opportunities that make some products and jobs obsolete
- Barriers exist in the labor market that create unemployment

Structural vs. Frictional Unemployment

- Jeremy graduated from his MBA in December. He is looking for a job in Boston.

- Minimum wage laws increase in NYC to $15 per hour. McDonald's replaces its service staff with electronic terminals where customers can place their order.

- Sarah was laid off from her position in a publishing house. She is applying to different positions to make a career change.

Structural vs. Frictional Unemployment

- FRICTIONAL: Jeremy graduated from his MBA in December. He is looking for a job in Boston.

- STRUCTURAL: Minimum wage laws increase in NYC to $15 per hour. McDonald's replaces its service staff with electronic terminals where customers can place their order.

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- The employment situation for US workers whose manufacturing firm has moved operations to Mexico.

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Some Causes of Structural Unemployment

- **Technological Advancements --** *Automation of jobs eliminates the demand for labor to fill those positions*
- **Unemployment Insurance** – *Government provides temporary payment transfers to alleviate the hardship of unemployment*
- **Minimum Wage Laws** – *Mandates on wages create a mismatch between workers that want jobs and jobs available at the minimum wages*

Some Causes of Structural Unemployment

- **Unions** – *Collective bargaining and union representation makes it difficult for employers to adjust their demand for labor in response to market conditions*

Some Causes of Structural Unemployment

- **Efficiency Wages** - *Employers sometimes choose to pay workers more than the equilibrium wage*
  - Promotes worker effort
  - Attracts higher quality applicants for the position
  - Minimizes worker turnover

Key Takeaways

- Unemployment in the economy is inevitable – there is always someone in between jobs or looking for the next job
- The level of natural unemployment varies between countries because of *structural unemployment* or certain barriers that exist in the labor market
- The unemployment rate differs from the natural rate due to short term fluctuations in the economy (business cycles) which also reflect fluctuations in output