

Introduction to Macroeconomics

Cheng Sun

Guanghua School of Management

Fall 2016

Today's Class

- ▶ Practical information about the class
 - ▶ Contact Information
 - ▶ Class Requirements
- ▶ Overview of the class
 - ▶ The science of Macroeconomics (Chapter 1)
 - ▶ The data of Macroeconomics (Chapter 2)
 - ▶ National income: where it comes from and goes (Chapter 3)

My Experience

- ▶ 2004-2006 School of Physics, Peking University
- ▶ 2006-2009 University of Rochester, B.A. with Honors in Math and Economics (Summa Cum Laude)
- ▶ 2009-2015 Princeton University, Ph.D. in Economics
- ▶ 2015-now Guanghua School of Management
- ▶ Research Interest: Microeconomics, Political Economy, Public Finance and Corporate Finance.

Contact Information

- ▶ Email: csun@gsm.pku.edu.cn
- ▶ Office: Room 458 of New Guanghua Building
- ▶ Office Hour: 4-5pm on Wednesdays or by appointment
- ▶ Preceptors: contact information listed on Syllabus

Readings

- ▶ Lecture notes
- ▶ N. Gregory Mankiw "Macroeconomics", 8th edition
 - ▶ 6th and 7th editions are ok.
- ▶ Related books
 - ▶ Abel A.B. and B.S. Bernanke "Macroeconomics"
- ▶ Academic papers
 - ▶ Related papers will be sent out as reading materials.
- ▶ Newspapers/magazines (part of each assignment)
 - ▶ Find an article related to a recent lecture, send it to your preceptor with your homework and explain how it is related in 100 words.

Problem Sets

- ▶ Solving problems is crucial to learning
- ▶ Weekly assignment: problem set and article review in English
 - ▶ The preceptors will collect problem sets in the classroom
 - ▶ Group discussion is encouraged
 - ▶ Turn in your own solution
 - ▶ Show how you get your result
 - ▶ Late homework sets are not accepted
 - ▶ Cheating is not allowed.

Outline of This Course

- ▶ Introduction to Macroeconomics and related data
- ▶ Classical Theory: the economy in the long run
 - ▶ The key assumption is that the prices are flexible.
 - ▶ It accurately describes the economy only in the long run.
- ▶ Growth Theory: the economy in the very long run.
 - ▶ The assumptions of price flexibility and market clearing.
 - ▶ New emphasis on growth in the capital stock, the labor force, and technological knowledge.
- ▶ Business Cycle Theory: the economy in the short run
 - ▶ The behavior of economy when the prices are sticky.
 - ▶ The non-market-clearing model for short-run issues.
 - ▶ The reason for economic fluctuations and the influence of the government policy on those fluctuations.

Today's Class

- ▶ Overview of the class
 - ▶ What Macroeconomists study?
 - ▶ How economists think?
 - ▶ Measuring the value of economic activity: GDP.
 - ▶ Measuring the cost of living: the Consumer Price Index.
 - ▶ Measuring the joblessness: the Unemployment rate.
 - ▶ What determines the total production of goods and services?
 - ▶ How is national income distributed to factors of production?
 - ▶ What determines the demand for goods and services?
 - ▶ What brings the supply and demand for goods and services into equilibrium?

What Macroeconomics Studies

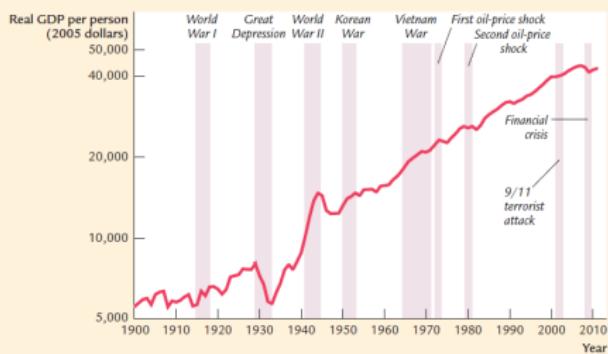
- ▶ Macroeconomics studies the structure and performance of national economies and the policies that government use to try to affect economic performance.
 - ▶ What determines a nation's long-run economic growth?
 - ▶ What causes a nation's economic activity to fluctuate?
 - ▶ What causes unemployment?
 - ▶ What causes prices to rise?
 - ▶ How does being part of a global economic system affect nations' economies?
 - ▶ Can government policies be used to improve a nation's economic performance?

The Historical Performance of the U.S. Economy

- ▶ Macroeconomic variables
 - ▶ Real GDP (real gross domestic product) measures the total income of everyone in the economy (adjusted for the level of price)
 - ▶ The inflation rate measures how fast prices are rising.
 - ▶ The unemployment rate measures the fraction of the labor force that is out of work.
- ▶ GDP falls: Recessions and Depression.
 - ▶ Recessions: mild, and your friends lost their jobs.
 - ▶ Depressions: severe, and you lose your own job.
- ▶ Inflation and Deflation.

The Historical Performance of the U.S. Economy

FIGURE 1-1



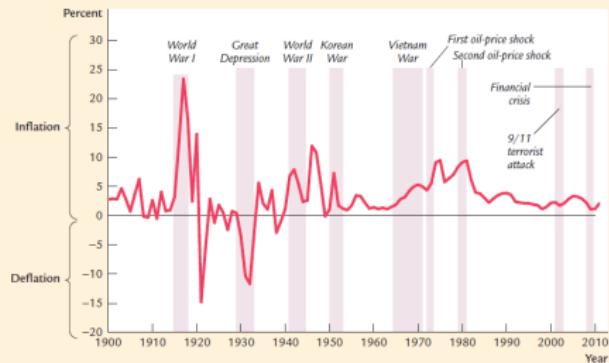
Real GDP per Person in the U.S. Economy Real GDP measures the total income of everyone in the economy, and real GDP per person measures the income of the average person in the economy. This figure shows that real GDP per person tends to grow over time and that this normal growth is sometimes interrupted by periods of declining income, called recessions or depressions.

Note: Real GDP is plotted here on a logarithmic scale. On such a scale, equal distances on the vertical axis represent equal percentage changes. Thus, the distance between \$5,000 and \$10,000 (a 100 percent change) is the same as the distance between \$10,000 and \$20,000 (a 100 percent change).

Source: U.S. Department of Commerce and Economic History Services.

The Historical Performance of the U.S. Economy

FIGURE 1-2



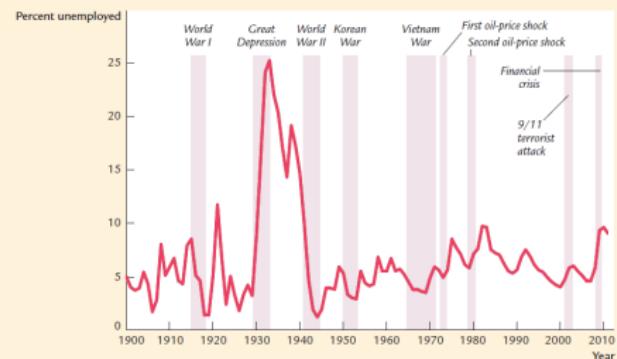
The Inflation Rate in the U.S. Economy The inflation rate measures the percentage change in the average level of prices from the year before. When the inflation rate is above zero, prices are rising. When it is below zero, prices are falling. If the inflation rate declines but remains positive, prices are rising but at a slower rate.

Note: The inflation rate is measured here using the GDP deflator.

Source: U.S. Department of Commerce and Economic History Services.

The Historical Performance of the U.S. Economy

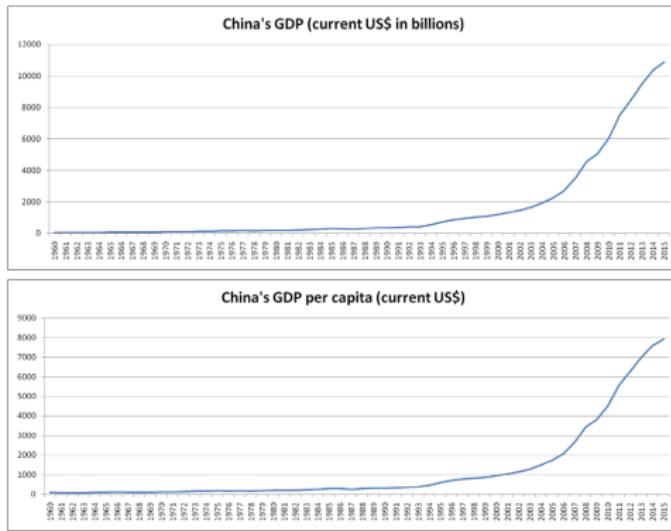
FIGURE 1-3



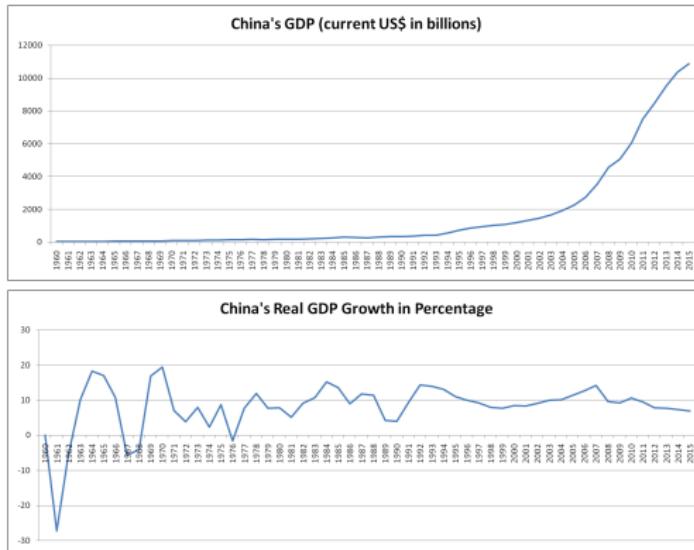
The Unemployment Rate in the U.S. Economy The unemployment rate measures the percentage of people in the labor force who do not have jobs. This figure shows that the economy always has some unemployment and that the amount fluctuates from year to year.

Source: U.S. Department of Labor and U.S. Bureau of the Census (*Historical Statistics of the United States: Colonial Times to 1970*).

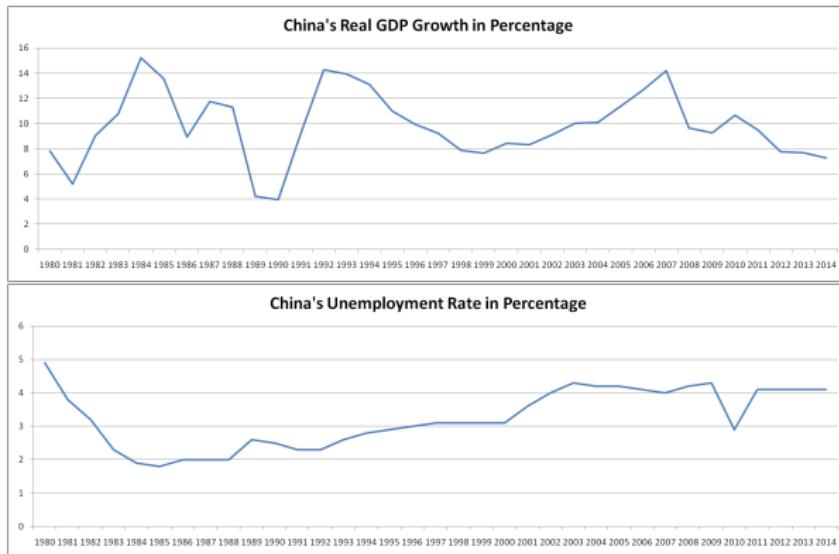
The Historical Performance of China's Economy



The Historical Performance of China's Economy



The Historical Performance of China's Economy



What Macroeconomics Studies

- ▶ What Macroeconomists do?
 - ▶ Macroeconomic forecasting: the GDP growth rate, the unemployment rate, the inflation rate and interest rate.
 - ▶ Macroeconomic analysis: implications of current economic events, such as the Fed board meeting and the investment to Northeast China.
 - ▶ Macroeconomic research: from abstract mathematical analysis to psychological experimentation to simulation projects.
 - ▶ Economic theory: a set of ideas about economics that has been organized in a logical framework.
 - ▶ Data development: macroeconomists use economic data to assess the current state of the economy, make forecasts, analyze policy alternatives and test macroeconomic theories.

What Macroeconomics Studies

- ▶ Interesting stories related to Macroeconomics
 - ▶ The economics behind the ugly divorce of Wang Baoqiang.
 - ▶ The lawsuits between Prof Lang Xianping and his mistress.
 - ▶ China's skyrocketing housing prices.
 - ▶ Chinese tourists spent \$183 billion shopping overseas last year, bought up nearly half of the world's luxury goods.
 - ▶ Fighting a hostile takeover is taking its toll on China Vanke.

Today's Class

- ▶ Overview of the class
 - ▶ How economists think?
 - ▶ Measuring the value of economic activity: GDP.
 - ▶ Measuring the cost of living: the Consumer Price Index.
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Theory as Model Building

- ▶ Developing and testing an economic theory
 - ▶ State the research question.
 - ▶ Make provisional assumptions that describe the economic setting and the behavior of the economic actors.
 - ▶ Work out the implications of the theory.
 - ▶ Conduct an empirical analysis to compare the implications of the theory with data.
 - ▶ Evaluate the results of your comparisons.

Theory as Model Building

- ▶ Models have two kinds of variables
 - ▶ Endogenous variables serve as outputs: a model tries to explain.
 - ▶ Exogenous variables serve as inputs: a model takes as given.
- ▶ Example: The model of the pizza market.
 - ▶ Step 1: the quantity of pizza demanded by consumers depends on the price of pizza and on aggregate income.

$$Q^d = D(P, Y) \quad (1)$$

- ▶ Step 2: the quantity of pizza supplied by pizzaarias depends on the price of pizza and the price of materials.

$$Q^s = S(P, P_m) \quad (2)$$

- ▶ Step 3:

$$Q^s = Q^d \quad (3)$$

Theory as Model Building

FIGURE 1-4



How Models Work Models are simplified theories that show the key relationships among economic variables. The exogenous variables are those that come from outside the model. The endogenous variables are those that the model explains. The model shows how changes in the exogenous variables affect the endogenous variables.

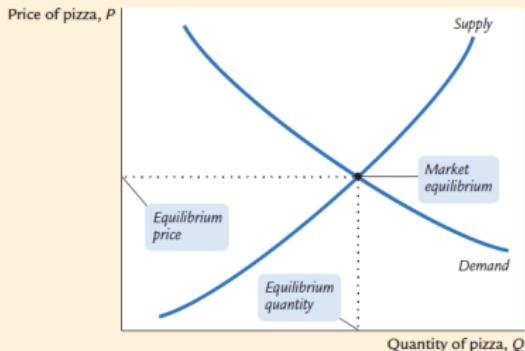
The Pizza Market Example

- ▶ Four variables in the model
 - ▶ Exogenous variables: aggregate income and the price of materials
 - ▶ Endogenous variables: the price of pizza and the quantity of pizza exchanged
- ▶ A change in one of the exogenous variables affects both endogenous variables
- ▶ This model makes simplifying assumptions
- ▶ Using functions to express relationships

$$Q^d = 60 - 10p + 2Y \quad (4)$$

The Pizza Market Example

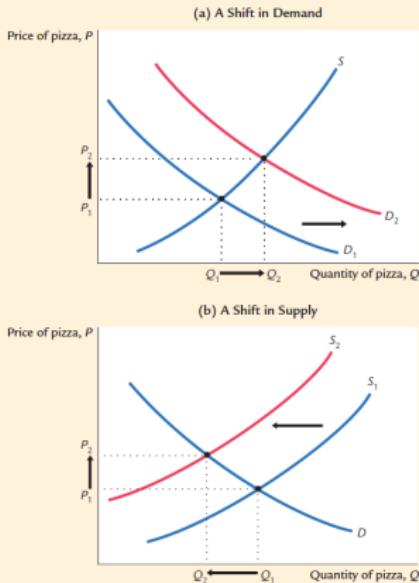
FIGURE 1-5



The Model of Supply and Demand The most famous economic model is that of supply and demand for a good or service—in this case, pizza. The demand curve is a downward-sloping curve relating the price of pizza to the quantity of pizza that consumers demand. The supply curve is an upward-sloping curve relating the price of pizza to the quantity of pizza that pizzerias supply. The price of pizza adjusts until the quantity supplied equals the quantity demanded. The point where the two curves cross is the market equilibrium, which shows the equilibrium price of pizza and the equilibrium quantity of pizza.

The Pizza Market Example

FIGURE 1-6



Changes in Equilibrium In panel (a), a rise in aggregate income causes the demand for pizza to increase: at any given price, consumers now want to buy more pizza. This is represented by a rightward shift in the demand curve from D_1 to D_2 . The market moves to the new intersection of supply and demand. The equilibrium price rises from P_1 to P_2 , and the equilibrium quantity of pizza rises from Q_1 to Q_2 . In panel (b), a rise in the price of materials decreases the supply of pizza at any given price, pizzerias find that the sale of pizza is less profitable and therefore choose to produce less pizza. This is represented by a leftward shift in the supply curve from S_1 to S_2 . The market moves to the new intersection of supply and demand. The equilibrium price rises from P_1 to P_2 , and the equilibrium quantity falls from Q_1 to Q_2 .

The Pizza Market Example

- ▶ Developing and testing an economic theory in the pizza market example
 - ▶ The research question: how does the equilibrium price move with the supply and the demand?
 - ▶ The assumption: the demand and the supply function
 - ▶ Implication: See Figure 1-6.
 - ▶ Conduct an empirical analysis: an exogenous shock changes the supply or the demand.
 - ▶ Evaluate the results of your comparisons.

The Use of Models

- ▶ Not a single model can answer every question.
 - ▶ This class presents different models that address different questions and make different assumptions.
- ▶ Price: Flexible versus Sticky
 - ▶ Market clearing: the price moves quickly to bring quantity supplied and demanded into balance.
 - ▶ In the real world, some wages and prices are sticky.
- ▶ Microeconomic thinking
 - ▶ The households and firms optimize.
 - ▶ Macroeconomic theory rests on a microeconomic foundation.

Today's Class

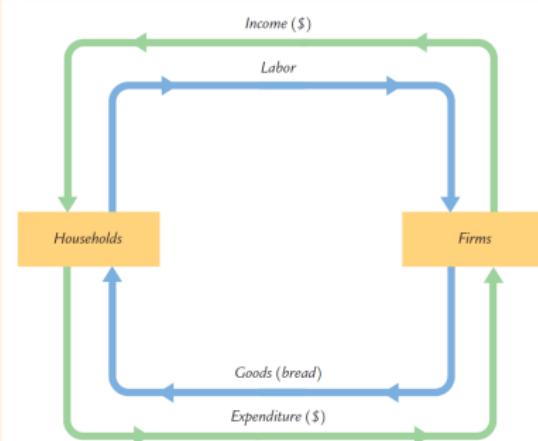
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Measuring the Value of Economic Activity: GDP

- ▶ The dollar value of economic activity in a given period.
 - ▶ The total income of everyone in the economy.
 - ▶ The total expenditure on the economy's output of goods/services.
- ▶ National income accounting.
- ▶ Definition:
 - ▶ GDP is the market value of all final goods and services produced within an economy in a given period of time.

The Circular Flow

FIGURE 2-1



The Circular Flow This figure illustrates the flows between firms and households in an economy that produces one good, bread, from one input, labor. The inner loop represents the flows of labor and bread: households sell their labor to firms, and the firms sell the bread they produce to households. The outer loop represents the corresponding flows of dollars: households pay the firms for the bread, and the firms pay wages and profit to the households. In this economy, GDP is both the total expenditure on bread and the total income from the production of bread.

Example: Adding Apples and Oranges

- ▶ The economy produces four apples and three oranges.
 - ▶ $GDP = Price_{Apples} * Quantity_{Apples} + Price_{oranges} * Quantity_{oranges}$
- ▶ Used good: the sale of used is not included as part of GDP.
- ▶ Inventory: production for inventory increases GDP.
- ▶ Intermediate Goods and value added
 - ▶ GDP includes only the value of final goods (apple source).
 - ▶ Sum of the value added at each stage of production.
- ▶ Housing service and other imputations.
 - ▶ Estimate the value of goods and services without market values.
 - ▶ Housing services, government services, and household services.
 - ▶ Example: The imputed rent is included both in the homeowner's expenditure and income.

Real GDP Versus Nominal GDP

- ▶ Nominal GDP: measured at current prices.
- ▶ Real GDP: measured at a constant set of prices.
- ▶ The GDP deflator: The ratio of nominal to real GDP.
 - ▶ $\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}}$
 - ▶ The GDP deflator measures the price of output relative to its price in the base year.
 - ▶ $\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP Deflator}}$
- ▶ Chain-Weighted Measures of Real GDP
 - ▶ The price used to compute real GDP is updated periodically.

The Components of Expenditure

- ▶ Four categories of spending
 - ▶ Consumption (C): goods and services bought by households.
 - ▶ Investment (I): good bought for future use.
 - ▶ Government purchase (G): goods and services bought by federal, state, and local government.
 - ▶ Net export (NX): trade with other countries.
- ▶ National income accounts identity: $Y = C + I + G + NX$.
 - ▶ Y stands for GDP.

The Components of Expenditure

TABLE 2-1

GDP and the Components of Expenditure: 2010

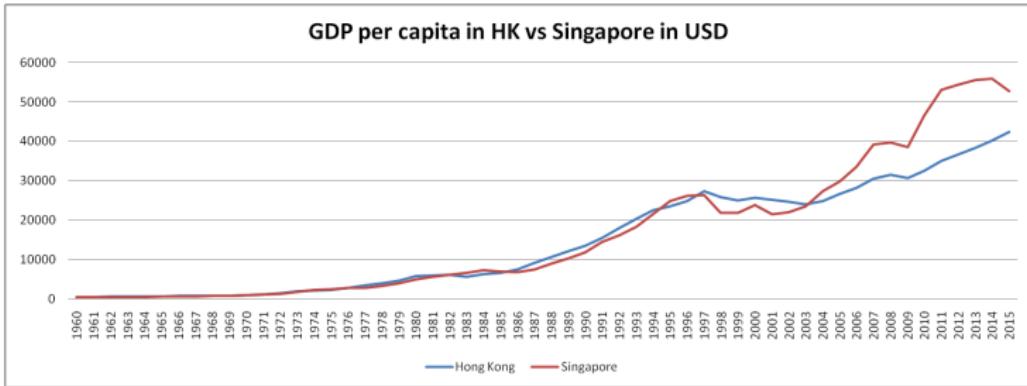
	Total (billions of dollars)	Per Person (dollars)
Gross Domestic Product	14,527	47,050
Consumption	10,246	33,184
Non durable goods	2,302	7,454
Durable goods	1,086	3,516
Services	6,859	22,214
Investment	1,795	5,814
Nonresidential fixed investment	1,390	4,502
Residential fixed investment	338	1,095
Inventory investment	67	217
Government Purchases	3,003	9,726
Federal	1,223	3,961
Defense	819	2,653
Nondefense	404	1,307
State and Local	1,780	5,765
Net Exports	-517	-1,674
Exports	1,840	5,959
Imports	2,357	7,633

Source: U.S. Department of Commerce.

Other Measures of Income

- ▶ GNP: Gross National Product
 - ▶ $GNP = GDP + \text{Factor Payment from Abroad} - \text{Factor payment to Abroad}$
 - ▶ GDP: total income produced domestically.
 - ▶ GNP: total income earned by nationals (residents of a nation).
 - ▶ Example: Chinese resident owns an apartment in NYC. Rental income is part of U.S. GDP not GNP.
- ▶ NNP: Net National Product.
 - ▶ $NNP = GNP - \text{Depreciation}$
 - ▶ Depreciation is the consumption of fixed capital.
 - ▶ NNP is approximately equal to national income, and two differs by the statistical discrepancy.
 - ▶ NNP includes: compensation of employees (63%), proprietor's income (8%), rental income (3%), corporate profits(14%), net interest (14%), and indirect business taxes(8%).

Hong Kong Vs Singapore



Hong Kong GDP by Sector

Economic Activity	2010	2011	2012	2013	2014 [1]
Agriculture, fishing, mining and quarrying	0.1	0.0	0.1	0.1	0.1
Manufacturing	1.8	1.6	1.5	1.4	1.3
Electricity, gas and water supply, and waste management	2.0	1.8	1.8	1.7	1.6
Construction	3.3	3.4	3.6	4.0	4.4
Services	93.0	93.1	93.0	92.9	92.7
Import/export, wholesale and retail trades	23.8	25.9	25.4	25.0	24.1
Import and export trade	19.7	21.1	20.4	19.7	19.1
Wholesale and retail trades	4.1	4.8	5.0	5.3	5.0
Accommodation and food services ^	3.2	3.5	3.6	3.6	3.6
Transportation, storage, postal and courier services	7.9	6.3	6.0	6.0	6.2
Transportation and storage	7.6	6.0	5.7	5.7	5.9
Postal and courier services	0.3	0.3	0.3	0.3	0.3
Information and communications	3.2	3.3	3.5	3.6	3.5
Financing and insurance	16.3	16.1	15.9	16.5	16.6
Real estate, professional and business services	10.8	11.3	11.5	10.8	10.9
Real estate	5.1	5.6	5.8	5.0	5.0
Professional and business services	5.7	5.7	5.7	5.7	5.9
Public administration, social and personal services	17.0	16.5	16.8	17.0	17.2
Ownership of premises	10.6	10.3	10.3	10.4	10.5
GDP at basic prices	100.0	100.0	100.0	100.0	100.0

Today's Class

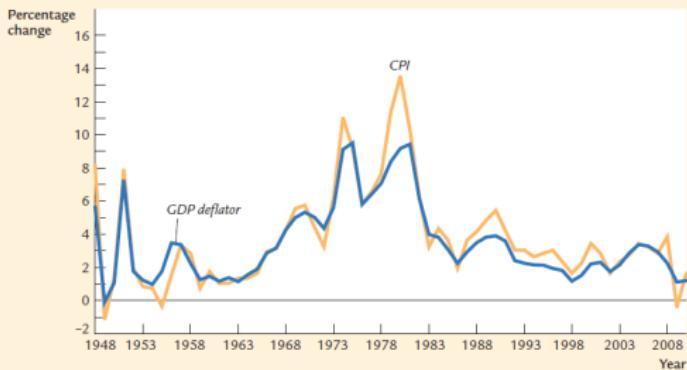
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The Cost of Living

- ▶ CPI: the consumer price index
 - ▶ The price of a basket of goods and services purchased by a typical consumer.
 - ▶ CPI is the price of this basket at a certain time relative to the price of the same basket in some base year.
 - ▶ PPI (producer price index) for firms rather than consumers.
- ▶ CPI versus the GDP deflator
 - ▶ GDP deflator measures the price of all goods and services produced.
 - ▶ GDP deflator includes only those goods produced domestically.
 - ▶ CPI assigns fixed weights to the price of different goods, whereas the GDP deflator assigns changing weights.

The Cost of Living

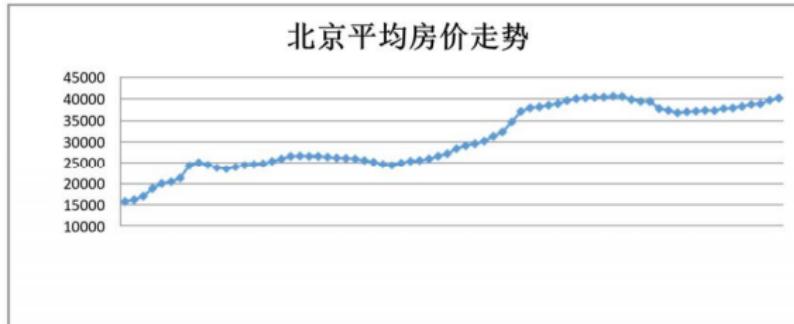
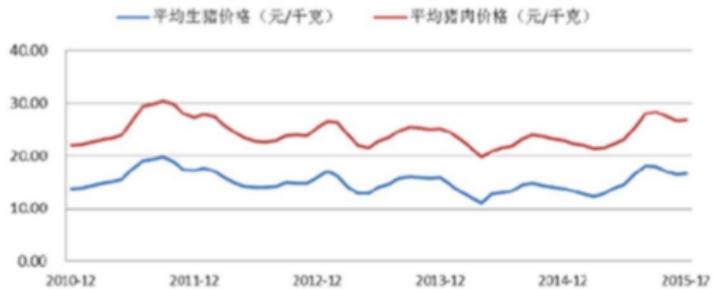
FIGURE 2-3



The GDP Deflator and the CPI This figure shows the percentage change in the GDP deflator and in the CPI for every year from 1948 to 2010. Although these two measures of prices diverge at times, they usually tell the same story about how quickly prices are rising. Both the CPI and the GDP deflator show that prices rose slowly in most of the 1950s and 1960s, that they rose much more quickly in the 1970s, and that they have risen slowly again since the mid-1980s.

Source: U.S. Department of Commerce, U.S. Department of Labor.

The Cost of Living



Today's Class

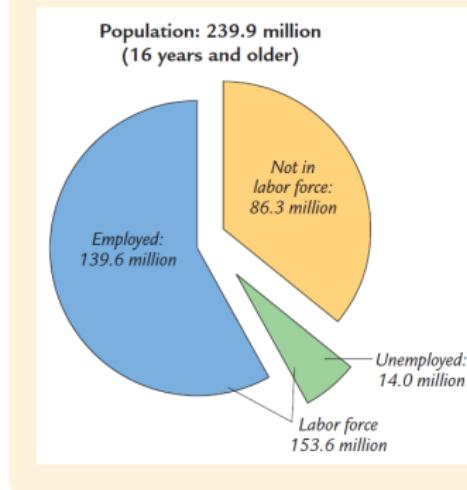
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Measuring Joblessness

- ▶ Unemployment rate: the percentage of those people wanting to work who do not have jobs.
- ▶ The household survey
 - ▶ Employed: worked as paid employees, worked in their own business, or worked as unpaid workers in a family member's business.
 - ▶ Unemployed: not employed but available for work and tried to find employment.
 - ▶ Not in the labor force: fit neither of the first two categories (full-time students, homemaker, retiree)
- ▶ Labor Force = Employed + Unemployed
- ▶ Unemployment Rate = $\frac{\text{Unemployed}}{\text{Labor Force}}$
- ▶ Labor-Force Participation Rate = $\frac{\text{Labor Force}}{\text{Adult Population}}$

Measuring Joblessness

FIGURE 2-4

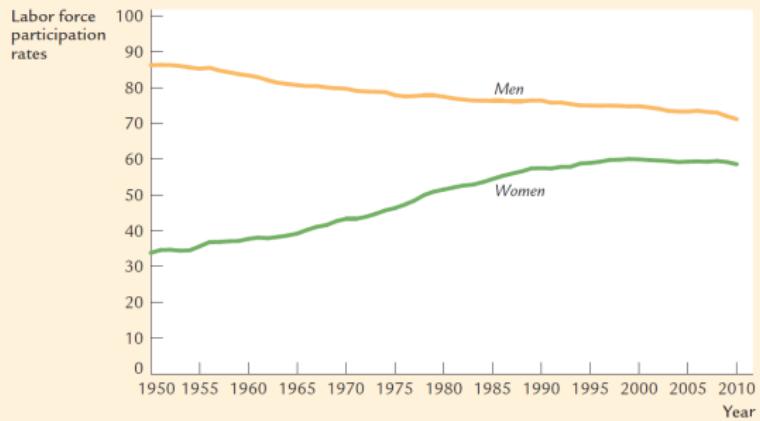


The Three Groups of the Population When the Bureau of Labor Statistics surveys the population, it places all adults into one of three categories: employed, unemployed, or not in the labor force. This figure shows the number of people in each category in August 2011.

Source: U.S. Department of Labor.

Measuring Joblessness

FIGURE 2-5



Labor-Force Participation Over the past several decades, the labor-force participation rate for women has risen, while the rate for men has declined.

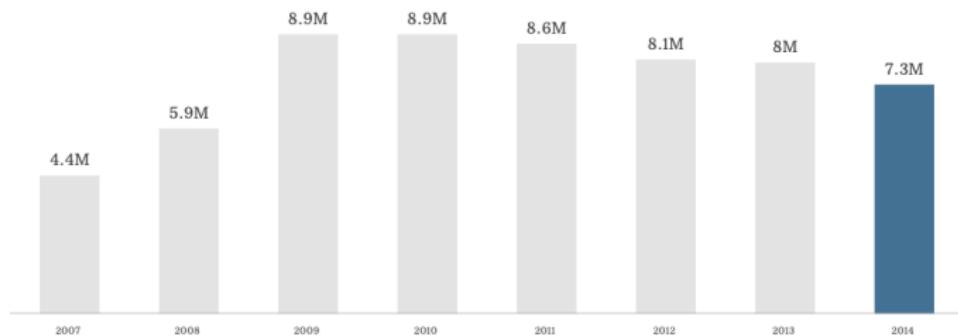
Source: U.S. Department of Labor.

Measuring Joblessness

- ▶ America's part-time worker problem
 - ▶ By June 2015, over 6.6 million Americans work part-time jobs but want full-time jobs.
 - ▶ That's much higher than the roughly 4.5 million part-timers before the Great Recession began.
 - ▶ They do not have health care or other benefit.
 - ▶ Some economists describe involuntary part-time work as "hidden unemployment."
 - ▶ While the number of involuntary part-time workers is still high, their ranks peaked in 2010 and have declined since.

Measuring Joblessness

Involuntary part-time



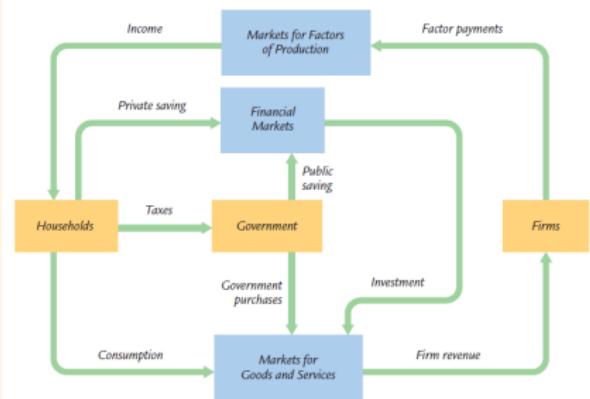
* NUMBERS ARE ANNUAL AVERAGES; SOURCE: BUREAU OF LABOR STATISTICS

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The Total Production of Goods and Services

FIGURE 3-1



The Circular Flow of Dollars Through the Economy This figure is a more realistic version of the circular flow diagram found in Chapter 2. Each yellow box represents an economic actor—households, firms, and the government. Each blue box represents a type of market—the markets for goods and services, the markets for the factors of production, and financial markets. The green arrows show the flow of dollars among the economic actors through the three types of markets.

The Total Production of Goods and Services

- ▶ The factors of production
 - ▶ Inputs used to produce goods and services, includes capital and labor.
 - ▶ Capital K : the set of tools that workers use.
 - ▶ Labor L : the time people spend working.
 - ▶ Assumption in this chapter: $K = \bar{K}$ and $L = \bar{L}$ for the nation.
- ▶ Production function
 - ▶ Output is a function of capital and labor: $Y = F(K, L)$
 - ▶ Constant return to scale: $zY = F(zK, zL)$
- ▶ The supply of goods and services
 - ▶ Determined by the factors of production and the production function.
 - ▶ $Y = F(\bar{K}, \bar{L}) = \bar{Y}$.

Today's Class

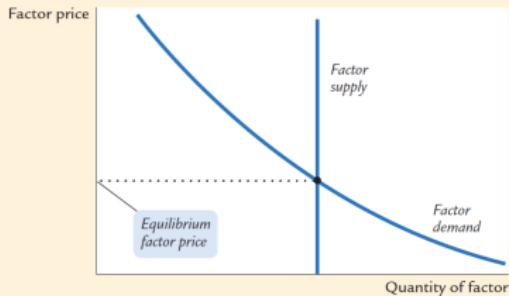
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How Is National Income Distributed

- ▶ Factor prices
 - ▶ The wage workers earn and the rent the owners of capital collect.
 - ▶ Determined by the supply and demand for that factor.
- ▶ Competitive Firm
 - ▶ Price taker of inputs and outputs, including P , W , R .
 - ▶ Firm's production: $Y = F(K, L)$
 - ▶ Firm's profit: Profit = $PY - WL - RK = PF(K, L) - WL - RK$

How Is National Income Distributed

FIGURE 3-2



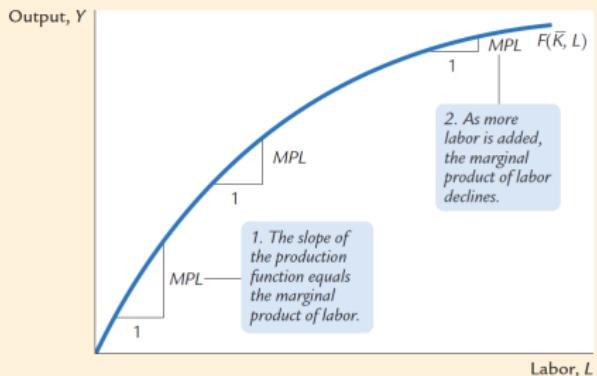
How a Factor of Production Is Compensated The price paid to any factor of production depends on the supply and demand for that factor's services. Because we have assumed that supply is fixed, the supply curve is vertical. The demand curve is downward sloping. The intersection of supply and demand determines the equilibrium factor price.

The Firm's Demand for Factors

- ▶ The Marginal Product of Labor
 - ▶ The extra output the firms gets from one extra unit of labor.
 - ▶ $MPL = \frac{F(K,L+\delta L) - F(K,L)}{\delta L}$
 - ▶ Diminishing marginal product (mostly).
- ▶ The change in profit
 - ▶ $\frac{\delta \text{Profit}}{\delta L} = P * MPL - W.$
 - ▶ Profit maximization: $P * MPL = W.$
 - ▶ $MPL = \frac{W}{P}$, the real wage rate.

The Firm's Demand for Factors

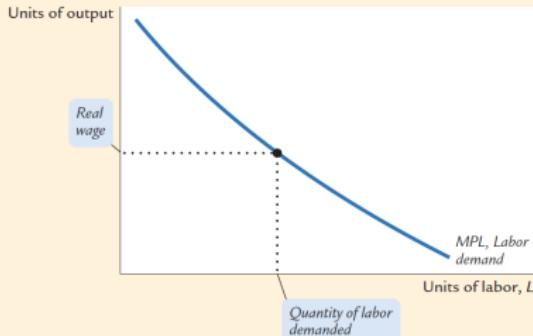
FIGURE 3-3



The Production Function This curve shows how output depends on labor input, holding the amount of capital constant. The marginal product of labor MPL is the change in output when the labor input is increased by 1 unit. As the amount of labor increases, the production function becomes flatter, indicating diminishing marginal product.

The Firm's Demand for Factors

FIGURE 3-4



The Marginal Product of Labor Schedule The marginal product of labor MPL depends on the amount of labor. The MPL curve slopes downward because the MPL declines as L increases. The firm hires labor up to the point where the real wage W/P equals the MPL . Hence, this schedule is also the firm's labor demand curve.

The Firm's Demand for Factors

- ▶ The Marginal Product of capital
 - ▶ The extra output the firms gets from one extra unit of capital.
 - ▶ $MPK = \frac{F(K+\delta K, L) - F(K, L)}{\delta K}$
 - ▶ Diminishing marginal product (mostly).
- ▶ The change in profit
 - ▶ $\frac{\delta \text{Profit}}{\delta K} = P * MPK - R.$
 - ▶ Profit maximization: $P * MPK = R.$
 - ▶ $MPK = \frac{R}{P}$, the real rental price of capital.
- ▶ Remark
 - ▶ The firm demands each factor of production until the factor's marginal product falls to equal its real factor price.

The Division of National Income

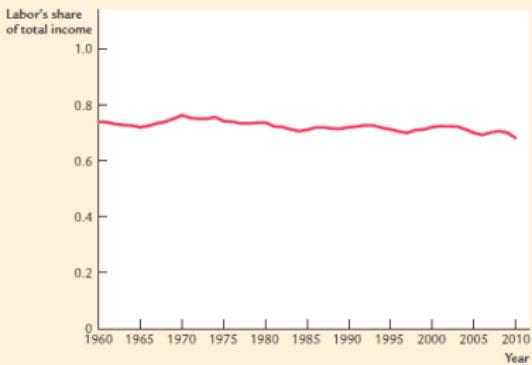
- ▶ The economic profit of the firms in real term (divided by P).
 - ▶ Economic Profit = $Y - MPL * L - MPK * K$.
 - ▶ $Y = MPL * L + MPK * K + \text{Economic Profit}$
- ▶ Assumption: constant return to scale
 - ▶ $F(K, L) = MPL * L + MPK * K$
 - ▶ The economic profit is zero.
 - ▶ Accounting Profit = Economic Profit + $MPK * K$
- ▶ Remark
 - ▶ Total output is divided between the payments to capital and the payments to labor, depending on their marginal productivities.

Cobb-Douglas Production Function

- ▶ Cobb-Douglas production function: $F(K, L) = AK^\alpha L^{1-\alpha}$
- ▶ α is between 0 and 1.
 - ▶ Constant return to scale: $F(zK, zL) = AzK^\alpha L^{1-\alpha} = zF(K, L)$
- ▶ Marginal products
 - ▶ $MPL = (1 - \alpha)Y/L$
 - ▶ $MPK = \alpha Y/K$
- ▶ The distribution of national income
 - ▶ The amount paid to labor: $MPL * L = (1 - \alpha)Y$.
 - ▶ The amount paid to capital: $MPK * K = \alpha Y$

Cobb-Douglas Production Function

FIGURE 3-5



The Ratio of Labor Income to Total Income Labor income has remained about 0.7 of total income over a long period of time. This approximate constancy of factor shares is consistent with the Cobb-Douglas production function.

Source: U.S. Department of Commerce. This figure is produced from U.S. national income accounts data. Labor income is compensation of employees. Total income is the sum of labor income, corporate profits, net interest, rental income, and depreciation. Proprietors' income is excluded from these calculations, because it is a combination of labor income and capital income.

Cobb-Douglas Production Function

- ▶ Developing and testing an economic theory
 - ▶ The research question: how is the total output divided between the payment to capital and the payment to labor?
 - ▶ The assumption: Cobb-Douglas production function
 - ▶ Implication: the constancy of factor shares
 - ▶ Conduct an empirical analysis: See figure 3-5
 - ▶ Evaluate the results of your comparisons.
 - ▶ Method: guess and verify.

Labor Productivity

TABLE 3-1

Growth in Labor Productivity and Real Wages: The U.S. Experience

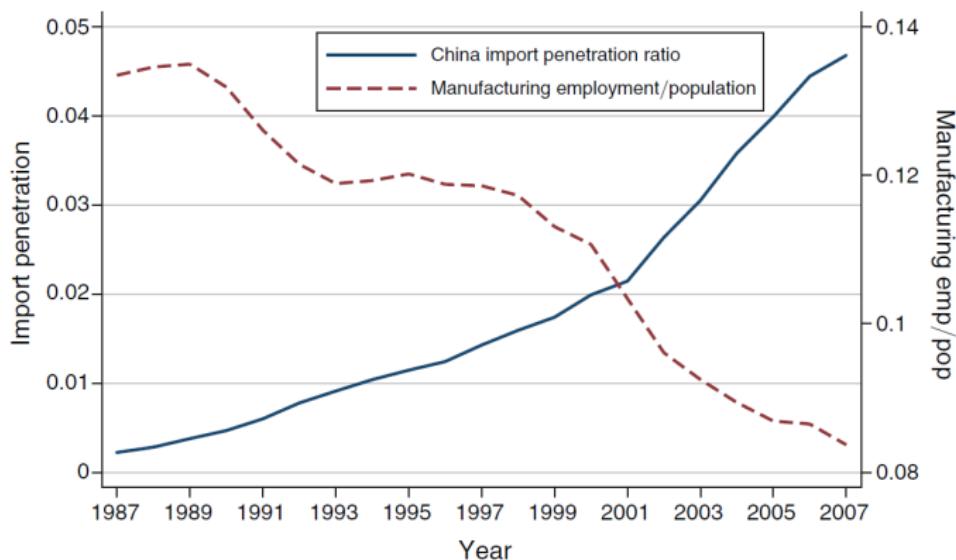
Time Period	Growth Rate of Labor Productivity (Percent)	Growth Rate of Real Wages (Percent)
1960–2010	2.2	1.9
1960–1973	2.9	2.8
1973–1995	1.4	1.2
1995–2010	2.7	2.2

Source: *Economic Report of the President 2011*, Table B-49, and updates from the U.S. Department of Commerce Web site. Growth in labor productivity is measured here as the annualized rate of change in output per hour in the nonfarm business sector. Growth in real wages is measured as the annualized change in compensation per hour in the nonfarm business sector divided by the implicit price deflator for that sector.

The China Syndrome (2013)

- ▶ The China Syndrome: Local Labor Market Effects of Import Competition in the United States
 - ▶ By David H. Autor, David Dorn and Gordon H. Hanson
 - ▶ They analyze the effect of rising Chinese import competition between 1990 and 2007 on US local labor markets.
 - ▶ Rising imports cause higher unemployment, lower labor force participation, and reduced wages in local labor markets that house import competing manufacturing industries.
 - ▶ Import competition explains one-quarter of the contemporaneous aggregate decline in US manufacturing employment.
 - ▶ Transfer benefits payments for unemployment, disability, retirement, and healthcare also rise sharply in more trade-exposed labor markets.

The China Syndrome (2013)



Today's Class

- ▶ Overview of the class
 - ▶ What determines the demand for goods and services?
 - ▶ What brings the supply and demand for goods and services into equilibrium?

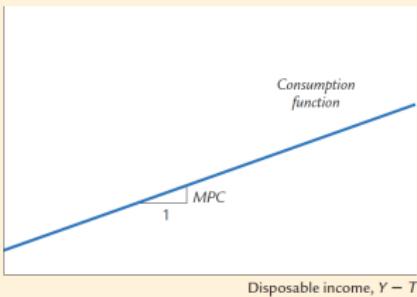
What Determines the Demand

- ▶ Assumption: a closed economy and $Y = C + I + G$.
- ▶ Consumption
 - ▶ Disposable income $Y - T$.
 - ▶ Consumption function: $C = C(Y - T)$
 - ▶ The slope of consumption function is marginal propensity to consume (MPC).
- ▶ Investment
 - ▶ The quantity of investment depends on the interest rate, $I = I(r)$.
 - ▶ The nominal interest rate: the one that investors pay to borrow.
 - ▶ The real interest rate: the one corrected for the effects of inflation.
- ▶ Government purchase
 - ▶ Balanced budget, budget deficit, budget surplus.
 - ▶ Assumption: fixed fiscal policy with $G = \bar{G}$ and $T = \bar{T}$.

What Determines the Demand

FIGURE 3-6

Consumption, C



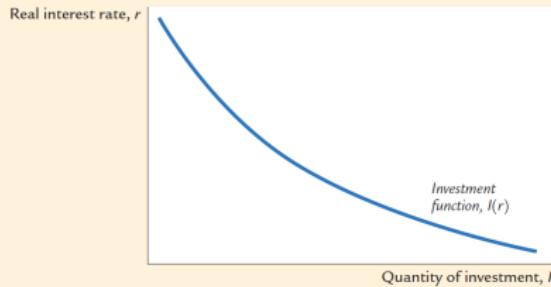
Disposable income, $Y - T$

The Consumption Function

The consumption function relates consumption C to disposable income $Y - T$. The marginal propensity to consume MPC is the amount by which consumption increases when disposable income increases by one dollar.

What Determines the Demand

FIGURE 3-7



The Investment Function The investment function relates the quantity of investment I to the real interest rate r . Investment depends on the real interest rate because the interest rate is the cost of borrowing. The investment function slopes downward: when the interest rate rises, fewer investment projects are profitable.

The Demand and Supply

- ▶ Summarize the demand and supply
 - ▶ Supply: $Y = C(Y - T) + I(r) + G$
 - ▶ Fixed policy $G = \bar{G}$ and $T = \bar{T}$
 - ▶ Fixed supply $Y = F(\bar{K}, \bar{L}) = \bar{Y}$
- ▶ The interest rate is determined in the equilibrium.
 - ▶ At the euqilibrium interest rate, the demand for goods and services equals the supply.
 - ▶ $\bar{Y} = C(\bar{Y} - \bar{T}) + I(r) + \bar{G}$

Today's Class

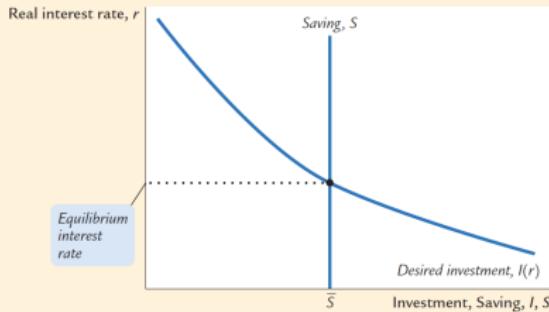
- ▶ Overview of the class
 - ▶ What brings the supply and demand for goods and services into equilibrium?

Equilibrium in The Financial Market

- ▶ Savings
 - ▶ National saving: $S = Y - C - G$
 - ▶ Private saving: $Y - T - C$
 - ▶ Public saving: $T - G$
- ▶ National saving S is fixed.
 - ▶ G and T are fixed by policy.
 - ▶ Y is fixed by the factors of production function.
- ▶ Interpretation of the equilibrium
 - ▶ The good is loanable funds and the price is the interest rate.
- ▶ At the equilibrium interest rate
 - ▶ Households' desire to save balances firms' desire to invest.
 - ▶ The quantity of loanable funds supplied equals the one demanded.

Equilibrium in The Financial Market

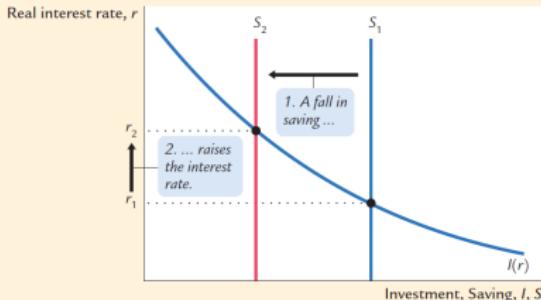
FIGURE 3-8



Saving, Investment, and the Interest Rate The interest rate adjusts to bring saving and investment into balance. The vertical line represents saving—the supply of loanable funds. The downward-sloping line represents investment—the demand for loanable funds. The intersection of these two curves determines the equilibrium interest rate.

Equilibrium in The Financial Market

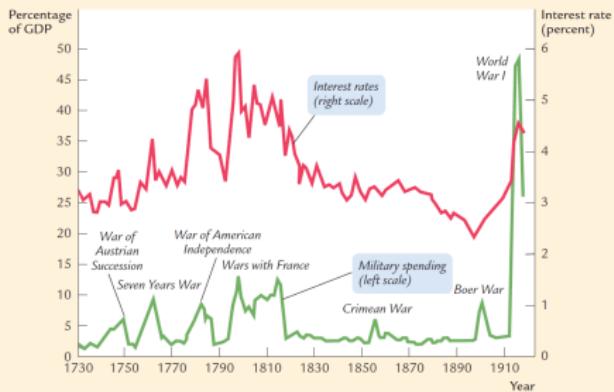
FIGURE 3-9



A Reduction in Saving A reduction in saving, possibly the result of a change in fiscal policy, shifts the saving schedule to the left. The new equilibrium is the point at which the new saving schedule crosses the investment schedule. A reduction in saving lowers the amount of investment and raises the interest rate. Fiscal-policy actions that reduce saving are said to crowd out investment.

Equilibrium in The Financial Market

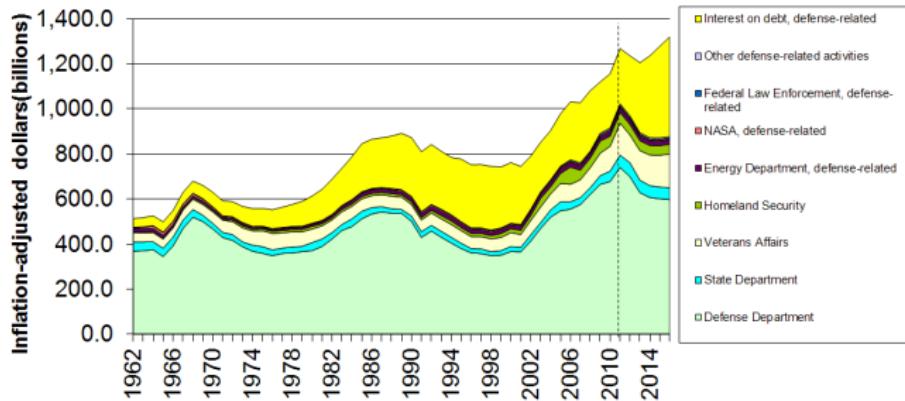
FIGURE 3-10



Military Spending and the Interest Rate in the United Kingdom This figure shows military spending as a percentage of GDP in the United Kingdom from 1730 to 1910. Not surprisingly, military spending rose substantially during each of the eight wars of this period. This figure also shows that the interest rate tended to rise when military spending rose.

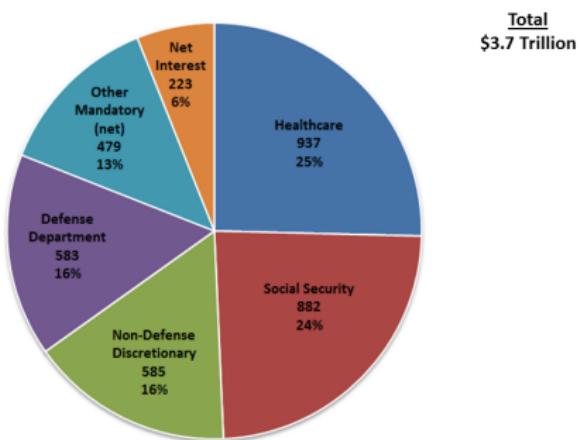
Source: Series constructed from various sources described in Robert J. Barro, "Government Spending, Interest Rates, Prices, and Budget Deficits in the United Kingdom, 1701–1918," *Journal of Monetary Economics* 20 (September 1987): 221–248.

Equilibrium in The Financial Market



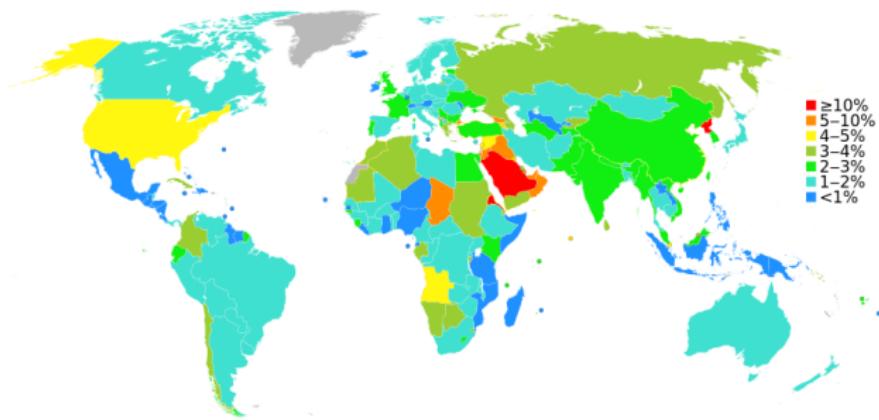
Equilibrium in The Financial Market

U.S. Federal Spending – Fiscal Year 2015 (\$ Billions)



Source Data: CBO Historical Tables, March 2016

Equilibrium in The Financial Market

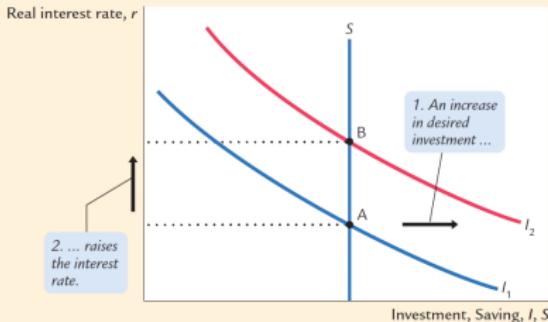


The Effect of Fiscal Policy

- ▶ An increase in government policy
 - ▶ Government purchase crowds out investment.
 - ▶ It causes the interest rate to rise.
- ▶ A decrease δT in taxes
 - ▶ The consumption increases by $MPC * \delta T$.
 - ▶ National saving S falls by the same amount.
 - ▶ It increases the interest rate and crowds out investment.
- ▶ Changes in investment demand
 - ▶ Fixed saving: only interest rate raises.
 - ▶ Saving positive related to the interest rate: both raise.

Equilibrium in The Financial Market

FIGURE 3-11

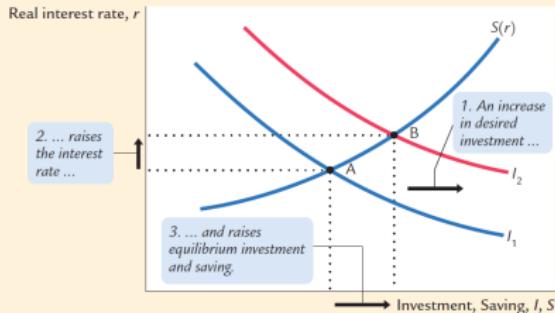


An Increase in the Demand for Investment

An increase in the demand for investment goods shifts the investment schedule to the right. At any given interest rate, the amount of investment is greater. The equilibrium moves from point A to point B. Because the amount of saving is fixed, the increase in investment demand raises the interest rate while leaving the equilibrium amount of investment unchanged.

Equilibrium in The Financial Market

FIGURE 3-12



An Increase in Investment Demand When Saving Depends on the Interest Rate

When saving is positively related to the interest rate, a rightward shift in the investment schedule increases the interest rate and the amount of investment. The higher interest rate induces people to increase saving, which in turn allows investment to increase.