GDP and short-run economic fluctuations

GRADUATE MACRO – LAB SESSION 2

ETTORE GALLO

Class Outline

1. GDP – Exercises
2. The composition of GDP
3. Introduction to economic fluctuations (short run)
   - The goods market
   - The Keynesian cross diagram

Definition

Gross domestic product (GDP)
is the market value of the final goods and services produced within the borders of a country during a particular period of time.

Let's break down this definition:

1. **Final** goods and services: counting coffee beans and cups would be double-counting. These are implicitly included when we take into account the final value of the cup of coffee.
   What happens with the unsold goods? Kept as inventory. Should it still be included in the measure of GDP?
2. **Within** borders of a country: US GDP concerns goods and services produced in the US independently of who owns factors.
3. A particular **period** of time: either a year or a quarter. GDP in 2015 or GDP in 2015Q1.

Income-expenditure-production identity

Key identity:

$$Production \equiv Expenditure \equiv Income$$

$$\text{GDP} = \sum \text{VA}$$

$$\text{GDP} = \text{C} + \text{I} + \text{G} + \text{NX}$$

$$\text{GDP} = \text{W} + \text{P} + \text{R}$$

Expenditures → GDP = C + I + G + Xn

Consumption (C)	Investment (I)	Government purchases (G)	Net exports (Xn)
• Consumer durables • Consumer nondurables • Services	• Business investment • Residential investment • Inventory investment	• Federal • State • Local • *NOT transfer payments*	• Exports • *MINUS* Imports

Real vs. Nominal GDP

Nominal GDP is the sum of the quantities of final goods produced times their current price.

Nominal GDP increases for two reasons:

- The production of most goods increases
- The price of most goods increases

Our goal is to measure production and its change over time.

Real GDP is the sum of quantities of final goods times *constant* (not *current*) prices.

Real versus Nominal GDP

Real GDP

- Production of goods and services
- Valued at constant prices
- Designate one year as base year
- Not affected by changes in prices

For the base year

- Nominal GDP = Real GDP

Real versus Nominal GDP

The GDP deflator

- Ratio of nominal GDP to real GDP times 100
- Is 100 for the base year
- Measures the current level of prices relative to the level of prices in the base year
- Can be used to take inflation out of nominal GDP ("deflate" nominal GDP)

Real versus Nominal GDP

Inflation

- Economy's overall price level is rising

Inflation rate

- Percentage change in some measure of the price level from one period to the next

$$\text{Inflation in year 2} = \frac{\text{GDP deflator in year 2} - \text{GDP deflator in year 1}}{\text{GDP deflator in year 1}} \times 100$$

Is it part of GDP?

1. A parent that stays home to care for a baby
2. Dinner at a restaurant
3. Dinner at home
4. A social security check
5. A haircut
6. The construction of an office building
7. The sale of a ten-year-old house
8. An oil change
9. Interest on a CD at your bank
10. A new car
11. Tires purchased by Ford to put on a new car

Is it part of GDP?

1. A parent that stays home to care for a baby – **No**
2. Dinner at a restaurant – **Yes**
3. Dinner at home – **No, but yes on the groceries**
4. A social security check – **No**
5. A haircut – **Yes, unless you did it yourself**
6. The construction of an office building – **Yes**
7. The sale of a ten-year-old house – **No**
8. An oil change – **Yes, unless you did it yourself**
9. Interest on a CD at your bank – **No**
10. A new car – **Yes**
11. Tires purchased by Ford to put on a new car – **No**

Exercise 2.2, pag. 39

Suppose you are measuring annual U.S. GDP by adding up the final value of all goods and services produced in the economy. Determine the effect on GDP of each of the following transactions.

a) A seafood restaurant buys \$100 worth of fish from a fisherman.

b) A family spends \$100 on a fish dinner at a seafood restaurant.

c) Delta Air Lines buys a new jet from Boeing for \$200 million.

d) The Greek national airline buys a new jet from Boeing for \$200 million.

e) Delta Air Lines sells one of its jets to Jennifer Lawrence for \$100 million.

Exercise 2, pag. 39

a) No change. This transaction is a purchase of intermediate goods.

b) +$100: personal consumption expenditures

c) +$200 million: gross private domestic fixed investment

d) +$200 million: net exports

e) No change. The jet was already counted when it was produced, i.e., presumably when Delta (or some other airline) bought it new as an investment.

Exercise 4, pag. 39

An economy produces three goods: cars, computers, and oranges. Quantities and prices per unit for years 2009 and 2010 are as follows:

	2009		2010	
	Quantity	Price	Quantity	Price
Cars	10	$2000	12	$3000
Computers	4	$1000	6	$500
Oranges	1000	$1	1000	$1

Exercise 4, pag. 39

	2009		2010	
	Quantity	Price	Quantity	Price
Cars	10	$2000	12	$3000
Computers	4	$1000	6	$500
Oranges	1000	$1	1000	$1

a) What is nominal GDP in 2009 and in 2010? By what percentage does nominal GDP change from 2009 to 2010?

b) Using the prices for 2009 as the set of common prices, what is real GDP in 2009 and in 2010? By what percentage does real GDP change from 2009 to 2010?

c) Using the prices for 2010 as the set of common prices, what is real GDP in 2009 and in 2010? By what percentage does real GDP change from 2009 to 2010?

d) Why are the two output growth rates constructed in (b) and (c) different? Which one is correct? Explain your answer.

Exercise 4, pag. 39

a) 2009 GDP: 10($2,000)+4($1,000)+1000($1)=$25,000
2010 GDP: 12($3,000)+6($500)+1000($1)=$40,000
Nominal GDP has increased by 60%. ($40,000-$25,000)/$25,000

b) 2009 real (2009) GDP: $25,000
2010 real (2009) GDP: 12($2,000)+6($1,000)+1000($1)=$31,000
Real (2009) GDP has increased by 24%.

c) 2009 real (2010) GDP: 10($3,000)+4($500)+1,000($1)=$33,000
2010 real (2010) GDP: $40,000.
Real (2010) GDP has increased by 21.2%.

d) The answers measure real GDP growth in different units. Neither answer is incorrect, just as measurement in inches is not more or less correct than measurement in centimeters.

Other Macroeconomic Measurements

HOW TO MEASURE **UNEMPLOYMENT** AND **PRICES**

2-2 The Unemployment Rate

- **Employment** is the number of people who have a job.
- **Unemployment** is the number of people who do not have a job but are looking for one.
- The **labor force** is the sum of employment and unemployment.

$$\begin{array}{ccccc} L & = & N & + & U \\ \text{labor force} & = & \text{employment} & + & \text{unemployment} \end{array}$$

2-2 The Unemployment Rate

- The **unemployment rate** is the ratio of the number of people who are unemployed to the number of people in the labor force.

$$u = \frac{U}{L}$$

$$\text{unemployment rate} = \text{unemployment} / \text{labor force}$$

2-2 The Unemployment Rate

- Most rich countries rely on large surveys of households to compute the unemployment rate.
- The U.S. **Current Population Survey (CPS)** relies on interviews of 60,000 households every month.
- A person is unemployed if he or she does not have a job *and has been looking for a job in the last four weeks*.
- Those who do not have a job and are not looking for one are counted as **not in the labor force**.

2-2 The Unemployment Rate

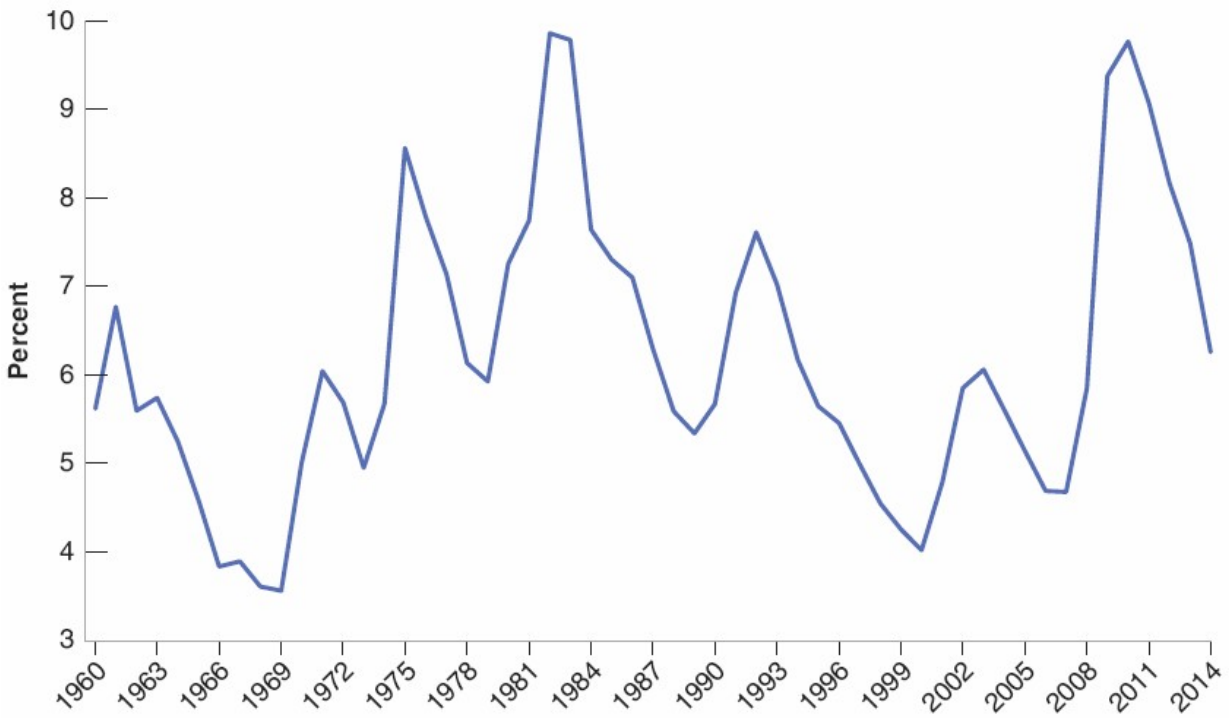
- **Discourage workers** are those who give up looking for a job and so no longer counted as unemployed.
- The **participation rate** is the ratio of the labor force to the total population of working age.
- Because of discourage workers, a higher unemployment rate is typically associated with a lower participation rate.

2-2 The Unemployment Rate

- Why Do Economists Care about Unemployment?
  1. Direct effect on the welfare of the unemployed, especially those remaining unemployed for long periods of time.
  2. A signal that the economy is not using its human resources efficiently.
- Very low unemployment can also be a problem as the economy runs into labor shortages.

2-2 The Unemployment Rate

Figure 2-3 U.S. Unemployment Rate, 1960–2014



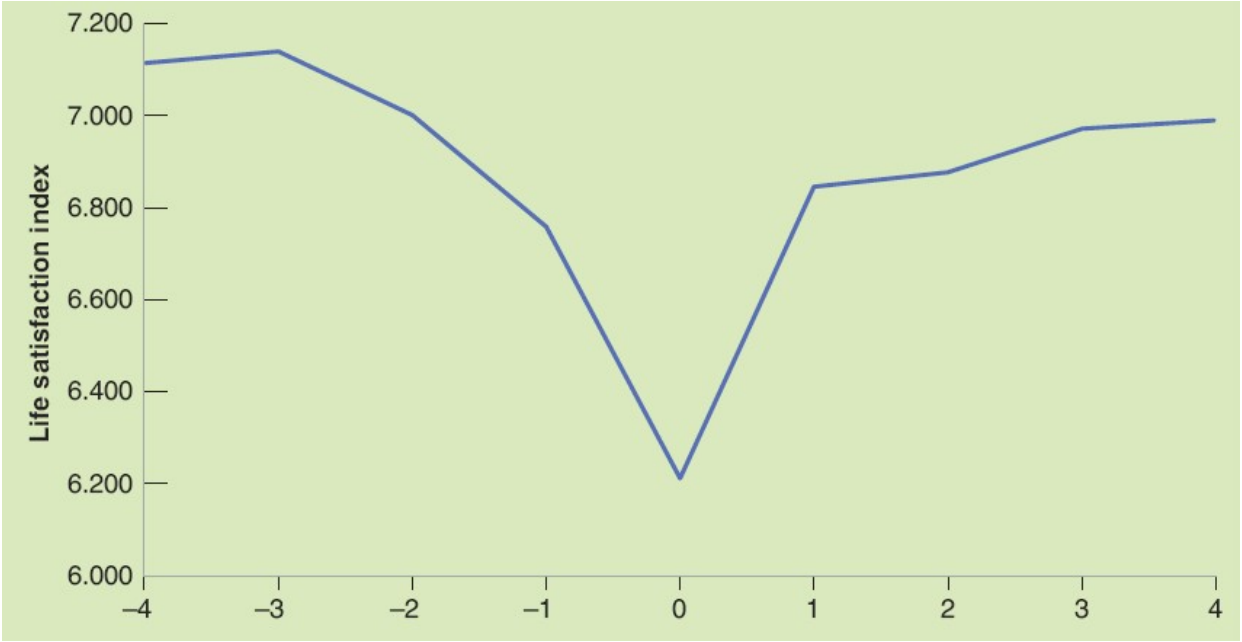
Source: Series LRUN64TTUSA156N: Federal-Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/.

- Since 1960, the U.S. unemployment rate has fluctuated between 3 and 10%, going down during expansions and going up during recessions.
- The effect of the recent crisis is highly visible, with the unemployment rate reaching close to 10% in 2010, the highest such rate since the early 1980s.

FOCUS: Unemployment and Happiness

- Results of the German Socio-Economic Panel survey suggest that (1) becoming unemployed leads to a large decrease in happiness, (2) happiness declines before the actual unemployment spell, and (3) happiness does not fully recover even four years later.

Figure 1 Effects of Unemployment on Happiness



Source: Winkelmann 2014.

2-3 The Inflation Rate

- **Inflation** is a sustained rise in the general level of prices—the **price level**.
- The **inflation rate** is the rate at which the price level increases.
- **Deflation** is a sustained decline in the price level (negative inflation rate).

2-3 The Inflation Rate

- The **GDP deflator** in year t (P_t) is the ratio of nominal GDP to real GDP in year t:

$$P_t = \frac{\text{Nominal GDP}_t}{\text{Real GDP}_t} = \frac{\$Y_t}{Y_t}$$

- It is called an **index number** (1 in 2009), which has no economic interpretation.
- The rate of change has a clear interpretation: the rate of inflation.

$$\pi_t = (P_t - P_{t\text{-}1})/P_{t\text{-}1}$$

2-3 The Inflation Rate

- Defining the price level as the GDP deflator implies a simple relation between nominal GP, real GDP, and the GDP deflator:

$$\$Y_t = P_t Y_t$$

- *Nominal GDP is equal to the GDP deflator times real GDP*.
- The rate of growth of nominal GDP is equal to the rate of inflation plus the rate of growth of real GDP.

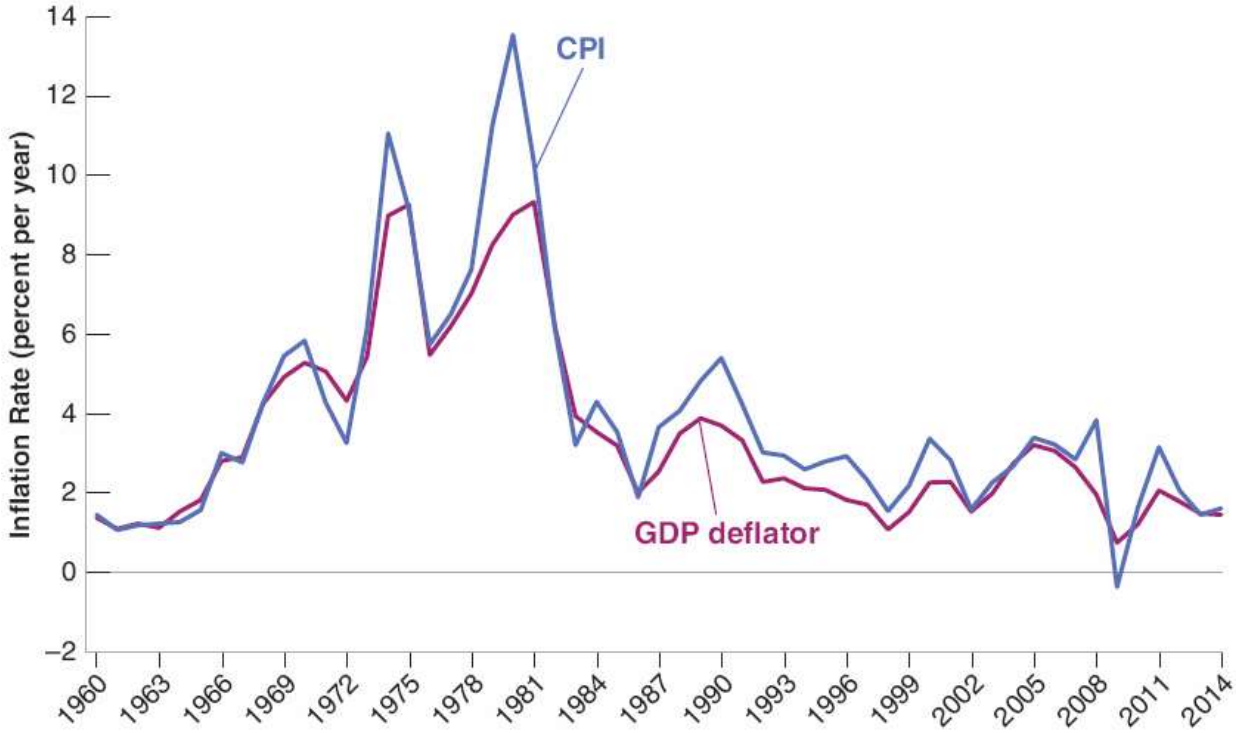
2-3 The Inflation Rate

- The set of goods produced in the economy is not the same as the set of goods purchased by consumers because:
  - Some of the goods in GDP are sold not to consumers but to firms, to the government, or to foreigners.
  - Some of the goods bought by consumers are not produced domestically but are imported from abroad.
- The **Consumer Price Index** (**CPI**) is a measure of the **cost of living**.
- The CPI is published monthly by the Bureau of Labor Statistics (BLS), which collects price data for 211 items in 38 cities.
- The CPI gives the cost in dollars of a specific list of goods and services over time.

2-3 The Inflation Rate

Figure 2-4 Inflation Rate, Using the CPI and the GDP Deflator, 1960–2014

The inflation rates, computed using either the CPI or the GDP deflator, are largely similar.



Source: Calculated using series USAGDPDEFAISMEI, CPALTT01USA659N Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/.

2-3 The Inflation Rate

- The CPI and GDP deflator moved together most of the time.
- Exception: In 1979 and 1980, the increase in the CPI was significantly larger than the increase in the GDP deflator due to the price of imported goods increasing relative to the price of domestically produced goods.

2-3 The Inflation Rate

- *Pure inflation* is proportional increase in all prices and wages.
  - This type of inflation causes only a minor inconvenience as relative prices are unaffected.
  - Real wage (wage measured by goods rather than dollars) would be unaffected.
  - There is no such thing as pure inflation.

2-3 The Inflation Rate

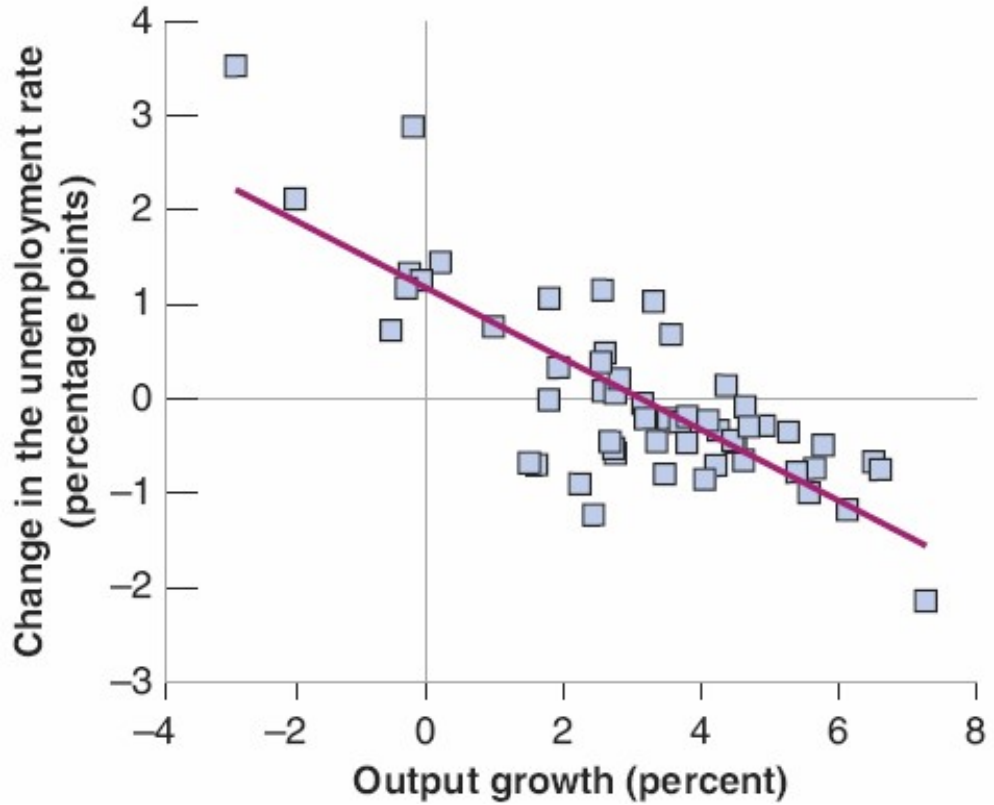
- Why Do Economists Care about Inflation?
  - Inflation affects income distribution when not all prices and wages rise proportionally.
  - Inflation leads to distortions due to uncertainty, some prices that are fixed by law or by regulation, and its interaction with taxation (*bracket creep* in taxes).
- Most economists believe the "best" rate of inflation to be a low and stable rate of inflation between 1 and 4%.

2-4 Output, Unemployment, and the Inflation Rate: Okun's Law and the Phillips Curve

Figure 2-5 Changes in the Unemployment Rate versus Growth in the United States, 1960–2014

Output growth that is higher than usual is associated with a reduction in the unemployment rate.

Output growth that is lower than usual is associated with an increase in the unemployment rate.



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

2-4 Output, Unemployment, and the Inflation Rate: Okun's Law and the Phillips Curve

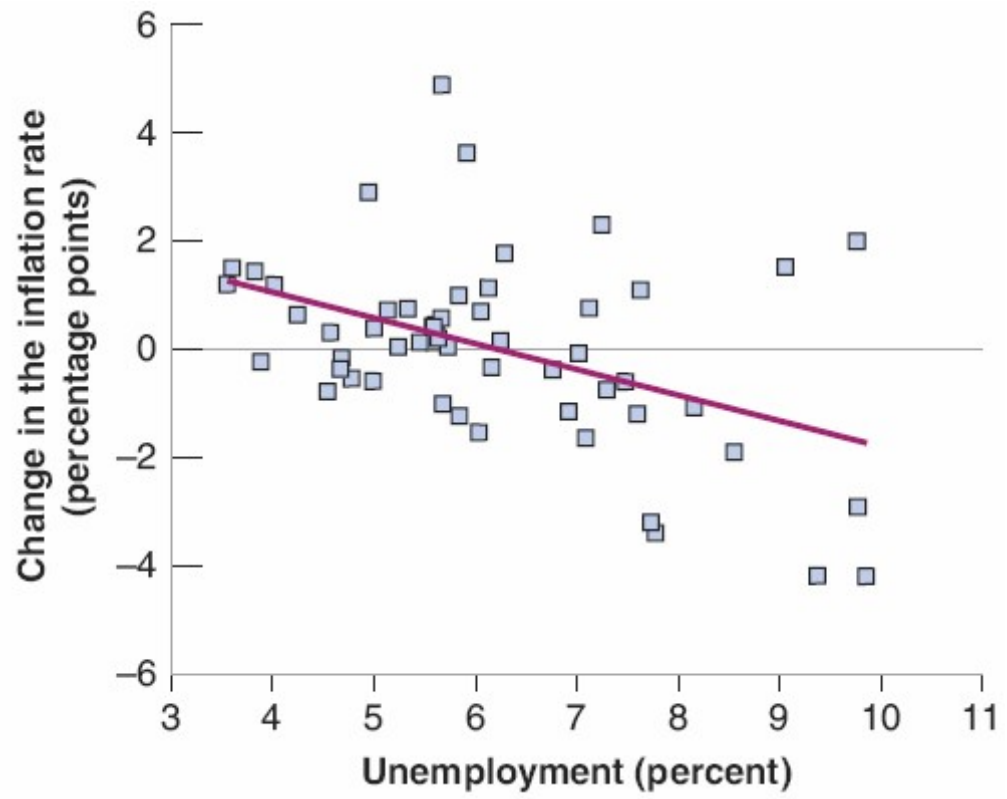
- **Okun's law** is a relation first examined by U.S. economist Arthur Okun.
- In Figure 2-5, the line that best fits the points is downward sloping.
- The slope of the line is –0.4, which imples that, on average, an increase in the growth rate of 1% decreases the unemployment rate by –0.4%.
- The line crosses the horizontal axis where output growth is 3%, meaning that it takes a growth rate of 3% to keep unemployment constant.

2-4 Output, Unemployment, and the Inflation Rate: Okun's Law and the Phillips Curve

Figure 2-6 Changes in the Inflation Rate versus the Unemployment Rate in the United States, 1960–2014

A low unemployment rate leads to an increase in the inflation rate.

A high unemployment rate leads to a decrease in the inflation rate.



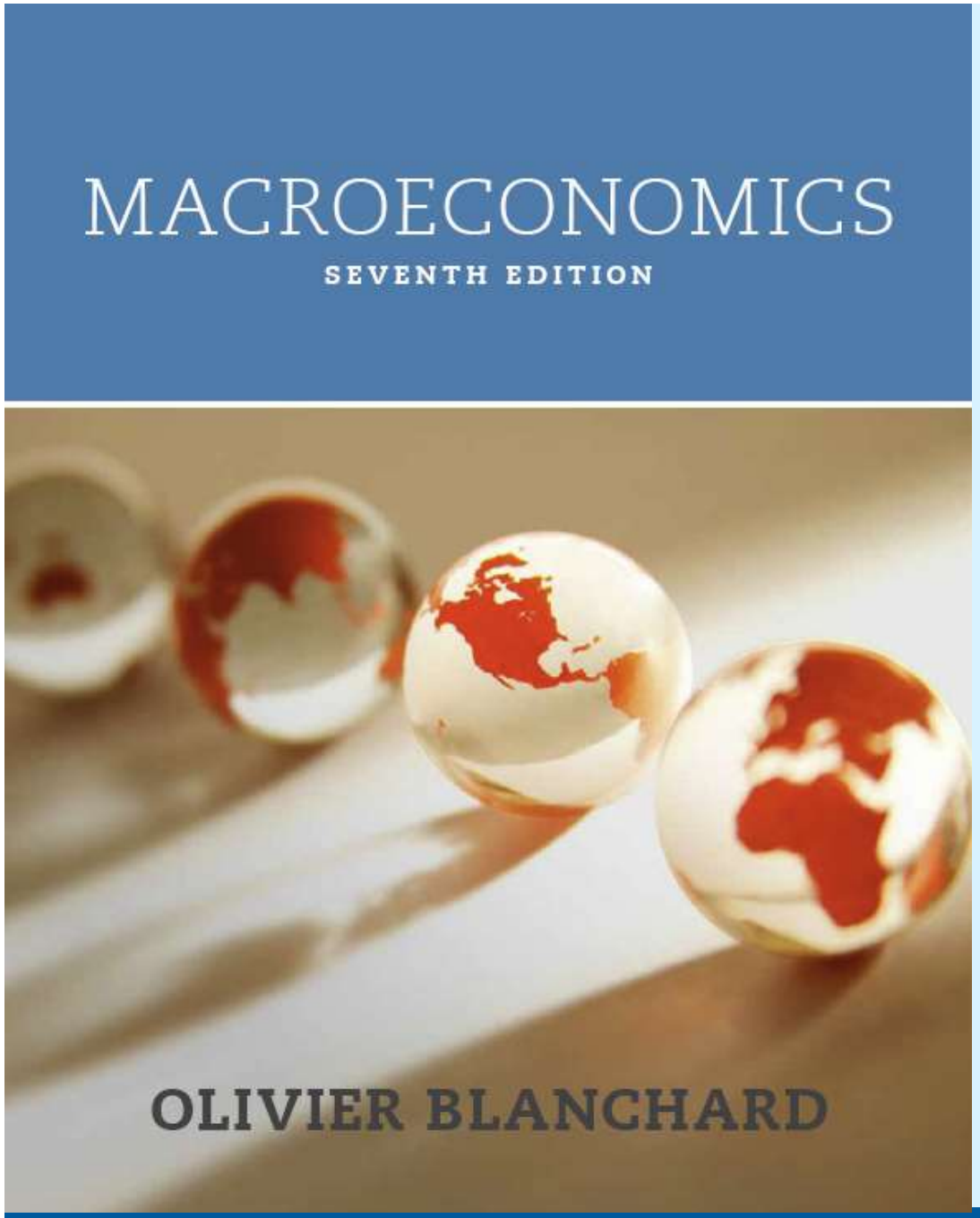
Source: See Figures 2-3 and 2-4.

2-4 Output, Unemployment, and the Inflation Rate: Okun's Law and the Phillips Curve

- The Phillips curve is a relation first explored in 1958 by New Zealand economist A.W. Phillips.
- Figure 2-6 plots the change in the inflation rate against the unemployment rate, along with the line that best fits the points.
- The line is downward sloping, meaning that higher unemployment leads, on average, to a decrease in inflation, and vice versa.
- The line crosses the horizontal axis where the unemployment rate is equal to about 6%, meaning that inflation typically increased when unemployment was below 6%.

2-5 The Short Run, the Medium Run, and the Long Run

- In the **short run** (e.g., a few years), year-to-year movements in output are primarily driven by movements in demand.
- In the **medium run** (e.g., a decade), the economy tends to return to the level of output determined by supply factors, such as the capital stock, the level of technology, and the size of the labor force.
- In the **long run** (e.g., a few decades or more), the economy depends on its ability to innovate and introduce new technologies, and how much people save, the quality of the county's education system, the quality of the government, and so on.



The Goods Market

Chapter 3

ALWAYS LEARNING
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Chapter 3 Outline

The Goods Market

3-1	The Composition of GDP
3-2	The Demand for Goods
3-3	The Determination of Equilibrium Output
3-4	Investment Equals Saving: An Alternative Way of Thinking about Goods—Market Equilibrium
3-5	Is the Government Omnipotent? A Warning

The Goods Market

- When economists think about year-to-year movements in economic activity, they focus on the interactions among *production*, *income*, and *demand*:
  - Changes in the demand for goods lead to changes in production
  - Changes in production lead to changes in income
  - Changes in income lead to changes in the demand for goods

3-1 The Composition of GDP

- **Consumption** (*C*): goods and services purchased by consumers
- **Investment** (*I*) or *fixed investment*: the sum of nonresidential investment and residential investment
- **Government spending** (*G*): purchases of goods and services by the federal, state, and local governments; excluding **government transfers**

3-1 The Composition of GDP

- **Exports** (X): purchases of U.S. goods and services by foreigners
- **Imports** (IM): purchases of foreign goods and services by U.S. consumers, U.S. firms and the U.S. government
- **Net exports** or **trade balance**: $X - IM$
- Exports > Imports $\Leftrightarrow$ trade surplus
- Imports > Exports $\Leftrightarrow$ trade deficit
- Inventory investment: difference between production and sales

3-1 The Composition of GDP

Table 3-1 The Composition of U.S. GDP, 2014

		Billions of Dollars	Percent of GDP
	GDP (*Y*)	17,348	100.0
1	Consumption (*C*)	11,865	68.3
2	Investment (*I*)	2,782	16.0
	Nonresidential	2,233	12.9
	Residential	549	3.1
3	Government spending (*G*)	3,152	18.1
4	Net exports	−530	−3.1
	Exports (*X*)	2,341	13.5
	Imports (*IM*)	−2,871	−16.6
5	Inventory investment	77	0.4

Source: Survey of Current Business, July 2015, Table 1-1-5

3-2 The Demand for Goods

$$Z \equiv C + I + G + X - IM$$

- The above identity defines the total demand for goods (Z) as consumption, plus investment, plus government, plus export, minus imports.
- In a closed economy ($X = IM = 0$):

$$Z \equiv C + I + G$$

3-2 The Demand for Goods

- Consumption (C) is a function of disposable income (Y_D), which is the income that remains once consumers have received government transfers and paid their taxes.

$$C = C(Y_D) \qquad (3.1)$$
$$(+)$$

- $C(Y_D)$ is called the **consumption function**.
- This is a **behavioral equation** that captures the behavior of consumers.

3-2 The Demand for Goods

- Assume that the consumption function is a **linear relation** with two **parameters**, c_0 and c_1:

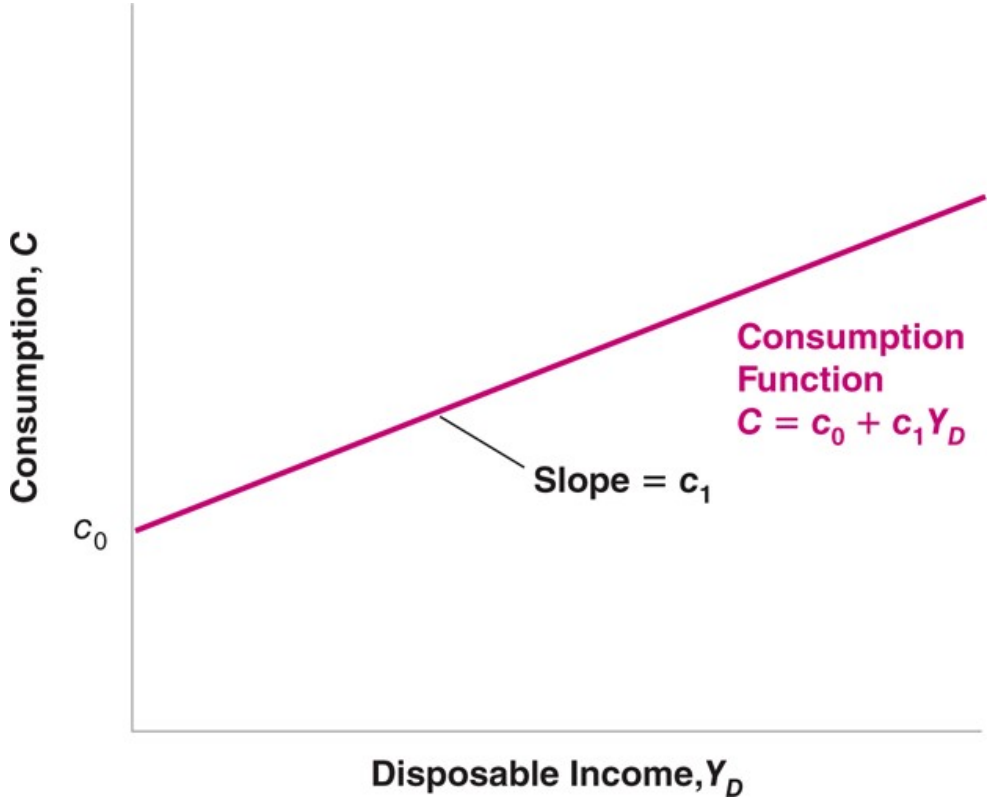
$$C = c_0 + c_1 Y_D \tag{3.2}$$

- c_1 is the **propensity to consume**.
- c_0 is what people would consume if their disposable income equals zero.
- Changes in c_0 reflect changes in consumption for a given level of disposable income.

3-2 The Demand for Goods

Figure 3-1 Consumption and Disposable Income

Consumption increases with disposable income but less than one for one.
A lower value of c_0 will shift the entire line down.



3-2 The Demand for Goods

- Disposable income is:

$$Y_D \equiv Y - T$$

where Y is income and T is taxes minus government transfers.

- Replacing Y_D in equation (3.2) gives:

$$C = c_0 + c_1(Y - T) \tag{3.3}$$

3-2 The Demand for Goods

- **Endogenous variables**: variables depend on other variables in the model
- **Exogenous variables**: variables not explained within the model but are instead taken as given

$$I = \bar{I} \tag{3.4}$$

- A bar on investment means investment is taken as given.

3-2 The Demand for Goods

- *T* and *G* describe **fiscal policy**—the choice of taxes and spending by the government.
- *G* and *T* are exogenous because:
  - Governments do not behave with the same regularity as consumer or firms.
  - This book will typically treat *G* and *T* as variables chosen by the government and will not try to explain them within the model.

3-3 The Determination of Equilibrium Output

- Assume $X=IM=0$, so

$$Z \equiv C + I + G$$

- Replacing C and I from equations (3.3) and (3.4):

$$Z = c_0 + c_1(Y - T) + \bar{I} + G \qquad (3.5)$$

- **Equilibrium in the goods markets** requires

$$Y = Z \qquad (3.6)$$

- This is an **equilibrium condition**.

3-3 The Determination of Equilibrium Output

- Replacing Z in (3.6) by equation (3.5) gives

$$Y = c_0 + c_1(Y - T) + \bar{I} + G \qquad (3.7)$$

- *In equilibrium, production (Y) is equal to demand, which in turn depends on income (Y), which is itself equal to production.*

3-3 The Determination of Equilibrium Output

- Macroeconomists always use three tools:
  1. Algebra to make sure that the logic is correct
  2. Graphs to build the tuition
  3. Words to explain the results

3-3 The Determination of Equilibrium Output

- Rewrite equation (3.7):

$$Y = c_0 + c_1 Y - c_1 T + \bar{I} + G$$

- Reorganize the equation:

$$(1 - c_1)Y = c_0 + \bar{I} + G - c_1 T$$

- Divide both sides by $(1 - c_1)$:

$$Y = \frac{1}{1 - c_1}[c_0 + \bar{I} + G - c_1 T] \qquad (3.8)$$

which characterizes equilibrium output in algebra.

3-3 The Determination of Equilibrium Output

- **Autonomous spending**: $[c_0 + \overline{I} + G - c_1 T]$
- Autonomous spending is positive because if $T = G$ (**balanced budget**) and $c_1$is between 0 and 1, then $(G - c_1 T)$ is positive, and so is autonomous spending.
- The term 1/(1-c_1) is the **multiplier**, which is larger when c_1 is closer to 1.
- If c_1 equals 0.6, the multiplier equals 1/(1 – 0.6) = 2.5, meaning that an increase of consumption by $1 billion will increase output by 2.5 x $1 billion = $2.5 billion.

3-3 The Determination of Equilibrium Output

- Steps to characterize the equilibrium graphically:

  1. Plot production as a function of income. Because production equals income, their relation is the 45-degree line.
  2. Plot demand as a function of income.

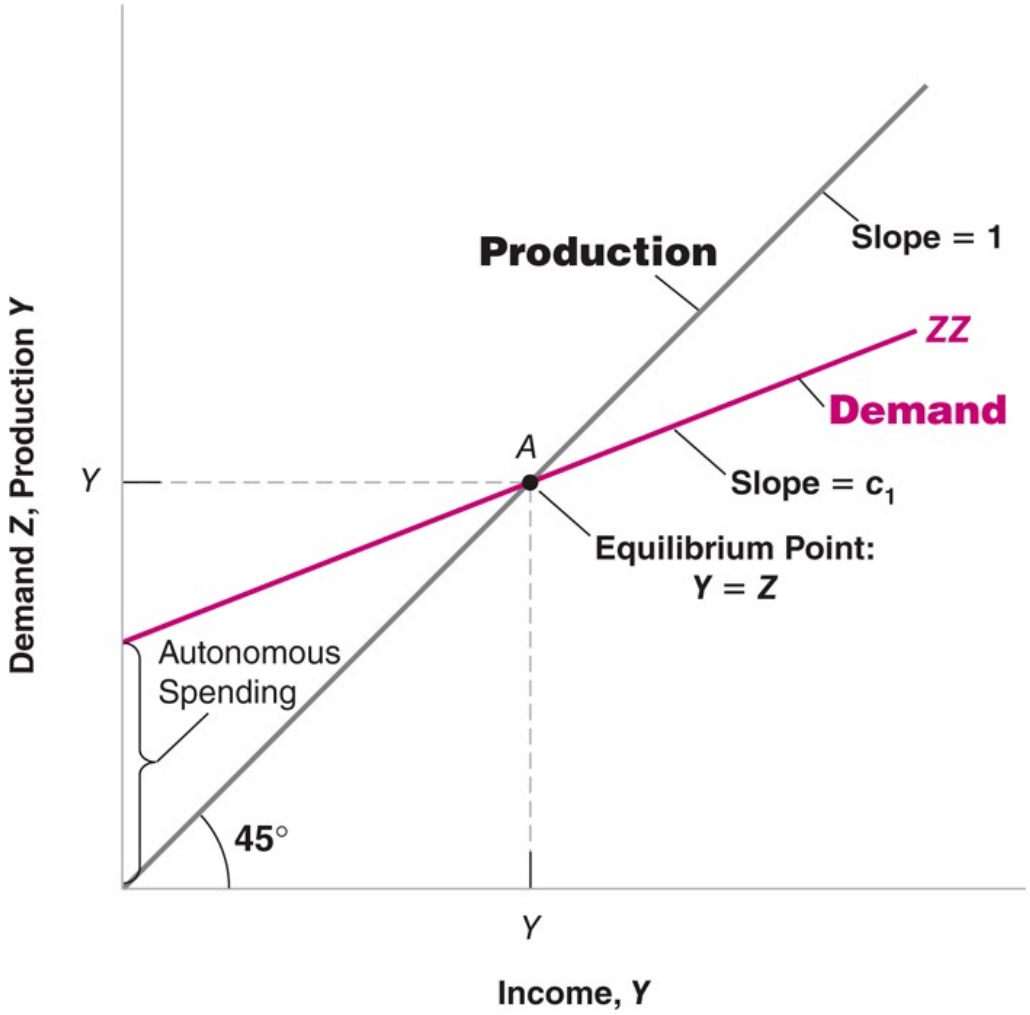
$$Z = (c_0 + \bar{I} + G - c_1 T) + c_1 Y \qquad (3.9)$$

  3. In equilibrium, production equals demand.

3-3 The Determination of Equilibrium Output

Figure 3-2
Equilibrium in the Goods Market

Equilibrium output is determined by the condition that production is equal to demand.

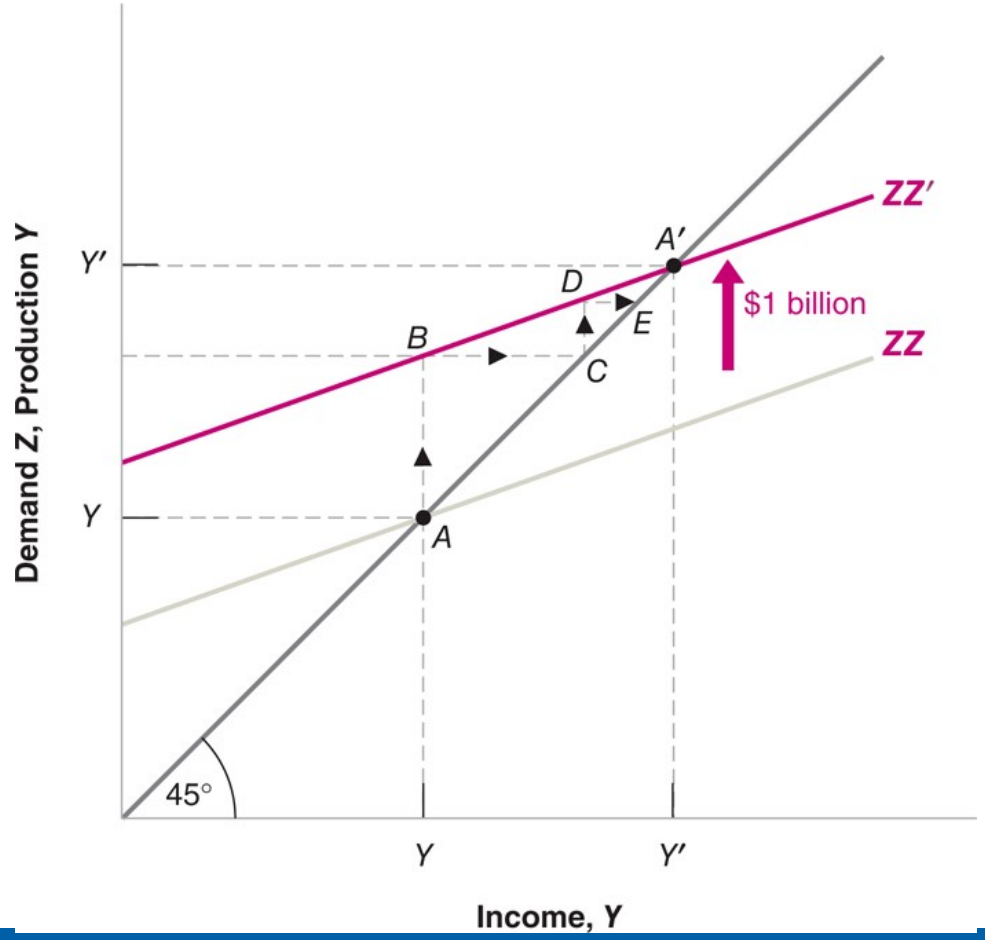


3-3 The Determination of Equilibrium Output

- Suppose c_0 increases by \$1 billion.

Figure 3-3 The effects of an increase in autonomous spending on output

An increase in autonomous spending has a more than one-for-one effect on equilibrium output.



3-3 The Determination of Equilibrium Output

- *AB*: first-round increase in production
- *BC*: first-round increase in income
- *CD*: second-round increase in demand
- *DE*: second-round increase in production and income
- The total increase in production after n+1 rounds:

$$1 + c_1 + c_1^2 + \ldots + c_1^n$$

which is a **geometric series** with a limit of $1/(1-c_1)$.

3-3 The Determination of Equilibrium Output

- To summarize our findings using words:
  - Production depends on demand, which depends on income, which is itself equal to production.
  - An increase in demand leads to an increase in production and income, which in turn leads to a future increase in demand.
  - The increase in output that is larger than the initial shift in demand, by a factor equal to the multiplier.
  - The multiplier depends on the propensity to consume, which can be estimated using **econometrics**—the set of statistical methods used in economics.

3-3 The Determination of Equilibrium Output

- The adjustment of output over time is called the **dynamics** of adjustment.
- How long the adjustment takes depends on how and when firms revise their production schedule.

Assumptions

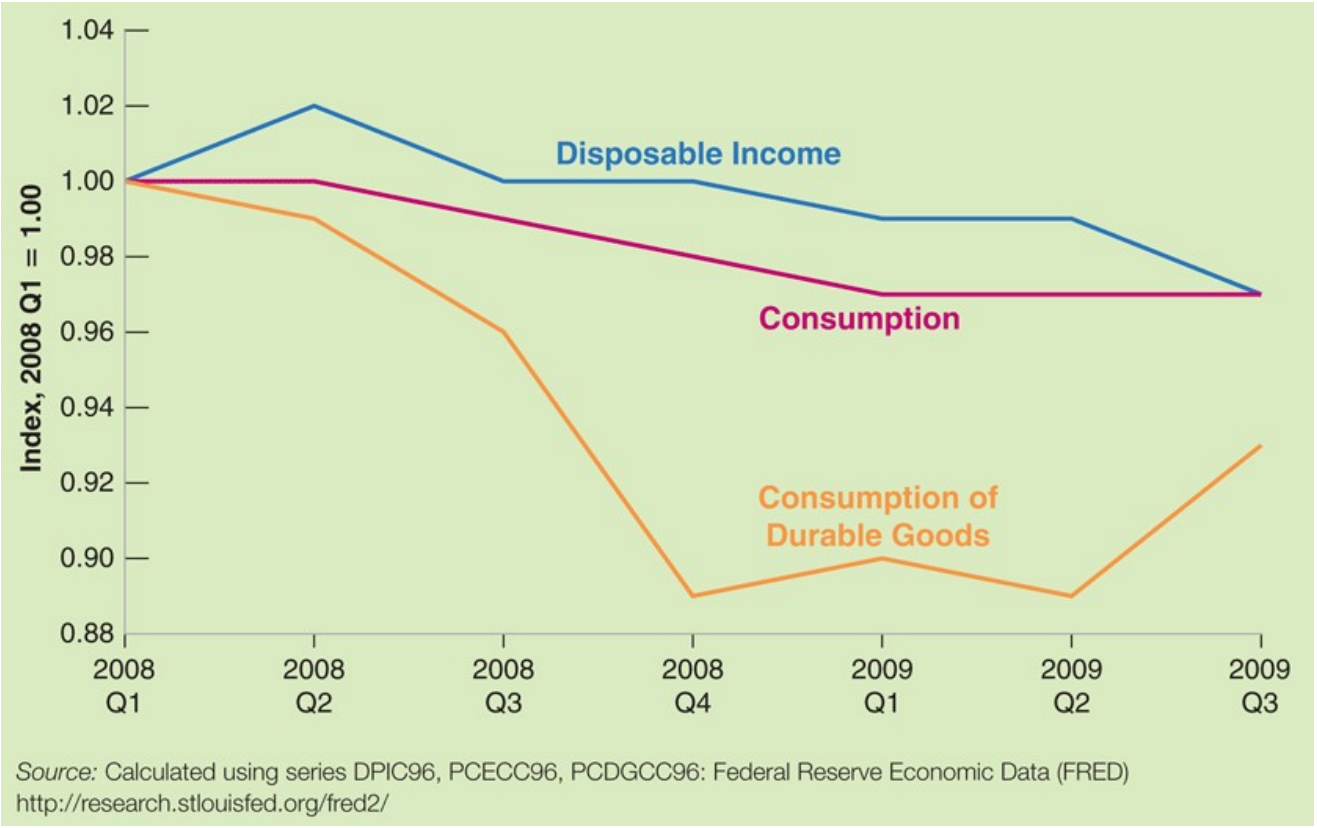
- *i*. We assume that the economy produces a **single good.**
- *ii*. We assume a **closed economy**.
- *iii*. For short-run analysis, we assume that production adjusts automatically to output without changes in price. This assumption implies that the **price level is fixed.**
- *iv*. Within the short-run context, the critical assumption is that **investment does not respond to the interest rate.** This isolates the goods market from the financial market.
- *v*. We assume that **investment is exogenous**. It does not depend on output, nor is there inventory investment, either planned or unplanned.

FOCUS: The Lehman Bankruptcy, Fears of Another Great Depression, and Shifts in the Consumption Function

- When people start worrying about the future, they decide to save more even if their current income has not changed.
- News about Lehman Brothers going bankrupt in September 2008 reminded people of the Great Depression, as confirmed by the number of searches for "Great Depression" in Google.
- Consumption fell even if disposable income had not yet changed.

FOCUS: The Lehman Bankruptcy, Fears of Another Great Depression, and Shifts in the Consumption Function

Figure 1 Disposable Income, Consumption, and Consumption Of Durables In the United States, 2008:1 to 2009:3



Source: Calculated using series DPIC96, PCECC96, PCDGCC96: Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/

FOCUS: The Lehman Bankruptcy, Fears of Another Great Depression, and Shifts in the Consumption Function

Figure 2 Google Search Volume for "Great Depression," January 2008 to September 2009

Source: Google Trends, "Great Depression."

3-4 Investment Equals Saving: An Alternative Way of Thinking about Goods—Market Equilibrium

- John Maynard Keynes articulated an alternative model that focuses instead on investment and saving in the General Theory of Employment, Interest and Money in 1936.
- **Private saving** (S) is

$$S \equiv Y_D - C$$

$$S \equiv Y - T - C$$

- By definition, **public saving** = $T - G$.
- Public saving > 0 ⇔ **Budget surplus**
- Public saving < 0 ⇔ **Budget deficit**

3-4 Investment Equals Saving: An Alternative Way of Thinking about Goods—Market Equilibrium

- In equilibrium:

$$Y = C + I + G$$

- Subtract T from both sides and move C to the left side:

$$Y - T - C = I + G - T$$

- The left side of the equation is simply S, so

$$S = I + G - T$$

- Or equivalently

$$I = S + (T - G) \qquad (3.10)$$

- This is the ***IS relation***, which stands for "**I**nvestment equals **S**aving".

3-4 Investment Equals Saving: An Alternative Way of Thinking about Goods—Market Equilibrium

- Two equivalent ways of stating the condition for equilibrium in the goods market:

Production = Demand

Investment = Saving

3-4 Investment Equals Saving: An Alternative Way of Thinking about Goods—Market Equilibrium

- We can also derive equation (3.8) using equation (3.10).
- Because consumption behavior implies that:

$$S = Y - T - C$$

$$= Y - T - c_0 - c_1(Y - T)$$

Rearranging terms, so

$$S = -c_0 + (1 - c_1)(Y - T) \qquad (3.11)$$

- $(1-c_1)$ is called the **propensity to save**, which is between zero and one.

3-4 Investment Equals Saving: An Alternative Way of Thinking about Goods—Market Equilibrium

- In equilibrium, $I = S$, so that equation (3.10) becomes:

$$I = -c_0 + (1 - c_1)(Y - T) + (T - G)$$

- Solve for output:

$$Y = \frac{1}{1 - c_1}[c_0 + \bar{I} + G - c_1 T] \qquad (3.12)$$

which is the same as equation (3.8).

FOCUS: The Paradox of Saving

- We are told about the virtues of thrift as we grow up, but the model in this chapter tells a different story.
- Suppose that consumers decide to save more, so c_0 decreases.
- Equation (3.12) implies that output decreases.
- Saving cannot change either, because equation (3.10) implies that at equilibrium:

$$I = S + (T - G)$$

- S cannot change because I, T or G does not change by assumption.

3-5 Is the Government Omnipotent? A Warning

- Equation (3.8) implies that the government can choose the level of *G* or *T* to affect the level of output it wants.
- However, there are many aspects of reality that we have not incorporated in our model:
  - Changing *G* or *T* is not easy.
  - Investment and imports may change, making it hard for governments to assess the effects of their policies (Chapters 5, 9, and 18 to 20).
  - Expectations are likely to matter (Chapters 14 to 16).
  - The effects on output may be unsustainable in the medium run (Chapter 9).
  - Cutting *T* or increasing *G* can lead to large budget deficits and public debt in the long run (Chapters 9, 11, 16 and 22).