The multiplier model

Th. Warin

Keynes stirred the stale economic frog pond to its depth.

— Gottfried Haberler

Chapter Goals

- Explain the difference between induced and autonomous expenditures

- Demonstrate how the level of income is graphically determined in the multiplier model

- Use the multiplier equation to determine equilibrium income

Chapter Goals

- Explain how the multiplier process amplifies shifts in autonomous expenditures

- Demonstrate how fiscal policy can eliminate recessionary and inflationary gaps

- Discuss six reasons why the multiplier model might be misleading

The Multiplier Model

- The **multiplier model** is a model that emphasizes the effect of fluctuations in aggregate demand, rather than the price level, on output

- For small and moderate fluctuations in AD, most economists believe that the AS/AD model provides a better sense of how the macroeconomy operates

- For large fluctuations in AD, the multiplier model gives a better sense of what is happening

The Aggregate Production Curve

Production = Income
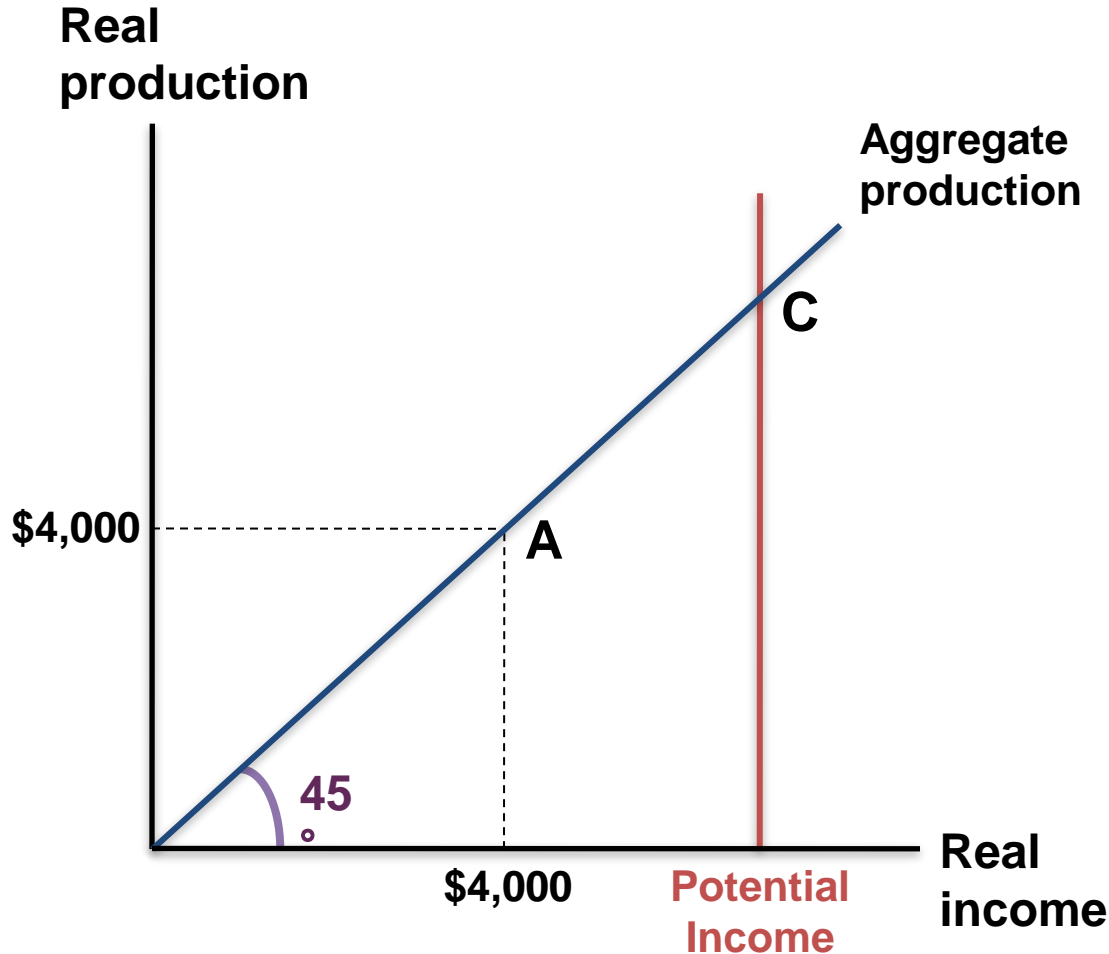
- Aggregate production is the total amount of goods and services produced in every industry in an economy

- **Production creates an equal amount of income**

- The 45° line shows that real production = real income

Aggregate Expenditures

- **Aggregate expenditures** are the total amount of spending on final goods and services

- This amount consists of four main expenditure classifications

  1. Consumption
  2. Investment
  3. Government spending
  4. Net foreign spending

Autonomous and Induced Expenditures

- **Autonomous expenditures** are expenditures that do not systematically vary with income

    - They are unrelated to income
    - They remain constant at all levels of income

- **Induced expenditures** are expenditures that change as income changes

    - They are directly related to income
    - When income changes, they change by less than income

Aggregate Expenditures Curve

Real production

Aggregate expenditures are the sum of autonomous and induced expenditures

Aggregate expenditures

Slope = mpe = y/x = 0.5

$6,500

$5,500

Induced expenditures

y

$3,000

x

Autonomous expenditures

$5,000 $7,000   **Real income**
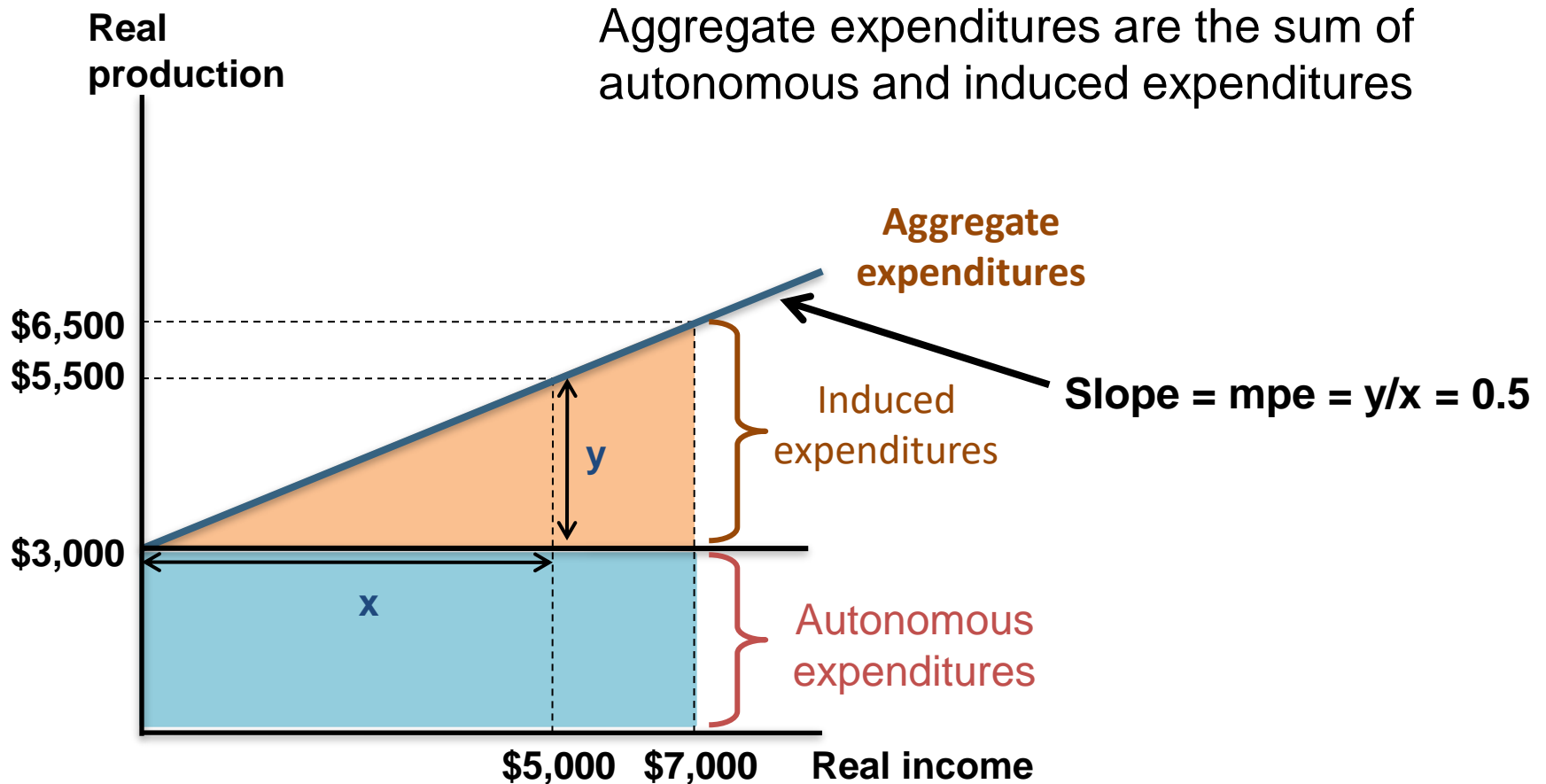
The Marginal Propensity to Expend

- **Marginal propensity to expend (mpe)** is the ratio of the change in aggregate expenditures to a change in income

- The mpe is an aggregation of the change in each of the components of aggregate expenditures to changes in income

- The mpe, always between 0 and 1, is the slope of the aggregate expenditures curve

$$mpe = \frac{\text{Changes in expenditures}}{\text{Changes in income}}$$

The Marginal Propensity to Expend

- The **marginal propensity to consume (mpc)** is the change in consumption that occurs with a change in income
  - The **mpc** is the most important component of the **mpe**
  - The mpc is less than one because individuals consume only a portion of an increase in income

- Marginal propensity to import is the change in imports that occurs with a change in income

- Income taxes reduce people's income which lowers their expenditures
  - Taxes reduce the mpe

The Aggregate Expenditures Function

The relationship between aggregate expenditures and income can be expressed mathematically as:

$$AE = AE_0 + mpeY$$

$\underbrace{}$ autonomous $\quad$ $\underbrace{}$ induced

$$AE_0 = C_0 + I_0 + G_0 + (X_0 - M_0)$$

Application: Graphing the Expenditures Function

$C_0 = 100$

$I_0 = 40$
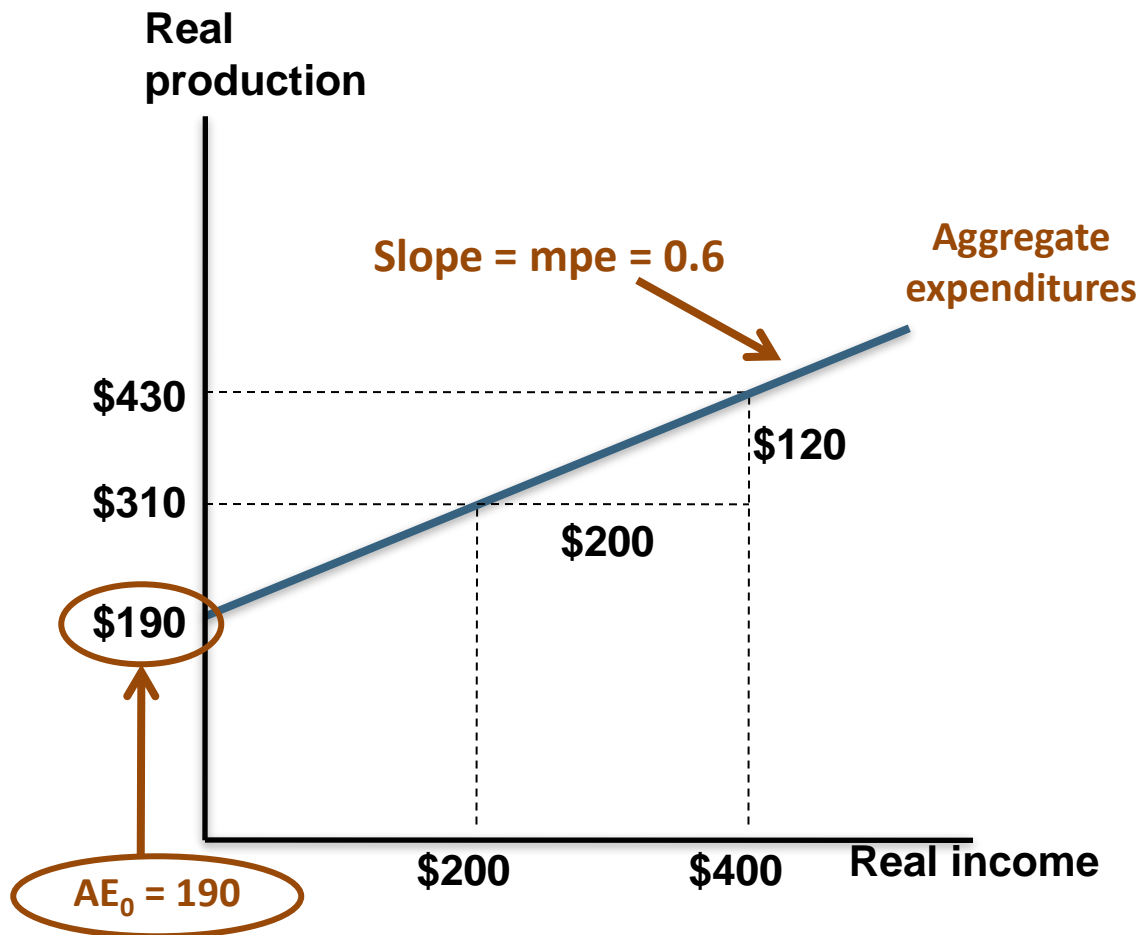
$G_0 = 20$

$(X_0 - M_0) = 30$

$mpe = 0.6$

**AE = 190 + 0.6Y**

Real production

Slope = mpe = 0.6

Aggregate expenditures

$430

$120

$310

$200

$190

$AE_0 = 190$

$200 $400   **Real income**

Autonomous Shifts in the Expenditures Function

- Changes are usually classified by which of the four subcomponents of autonomous expenditures changed

  - Autonomous consumption
  - Autonomous investment
  - Autonomous government spending
  - Autonomous net exports

- All of these can change suddenly, and, when one or more do, the AE curve shifts up or down

- Economists look at autonomous components as they develop their forecasts of the economy

Equilibrium Aggregate Income
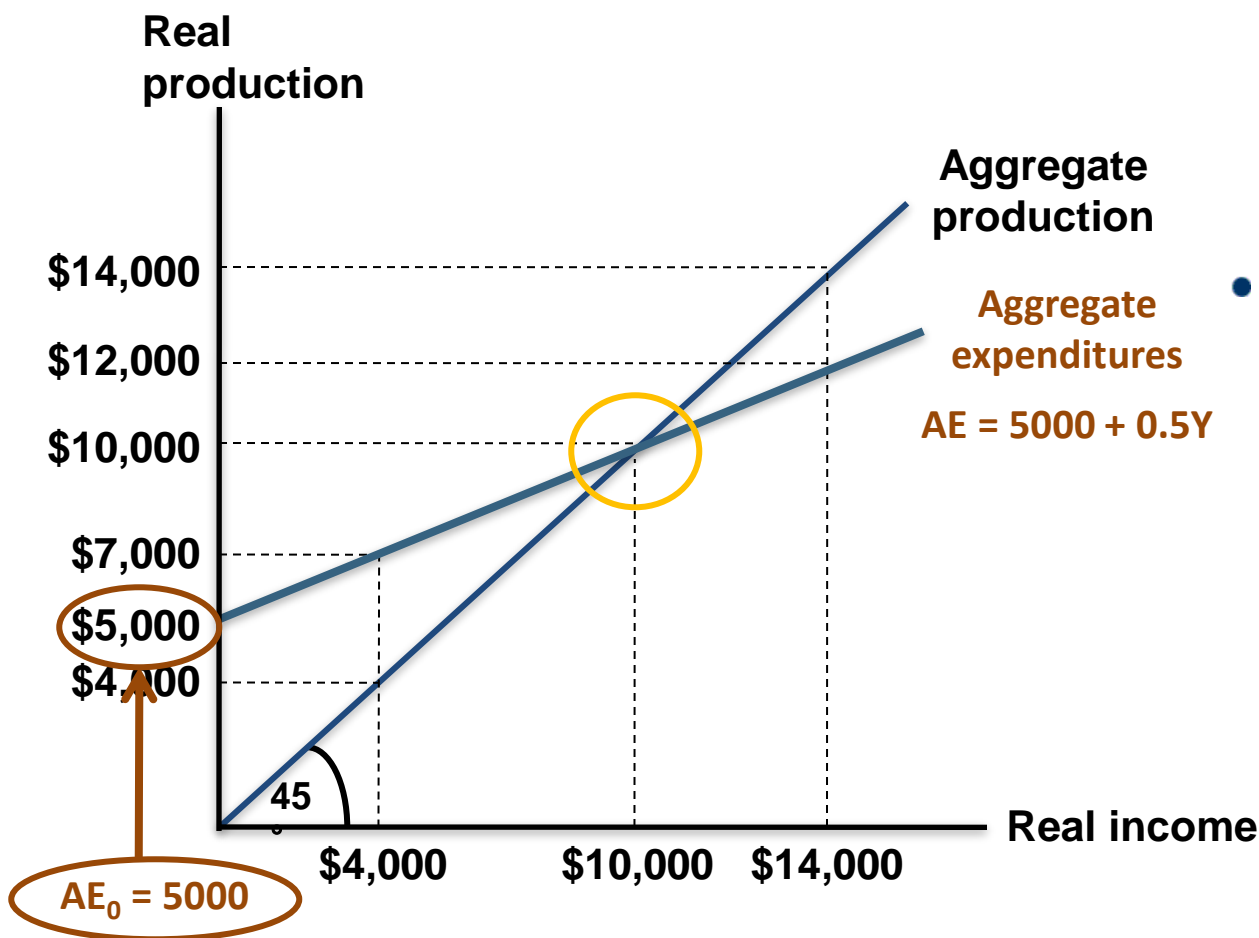
- Equilibrium in the multiplier model is determined where the AE and AP curves intersect

- At income levels higher or lower than that, planned production will not equal planned expenditures
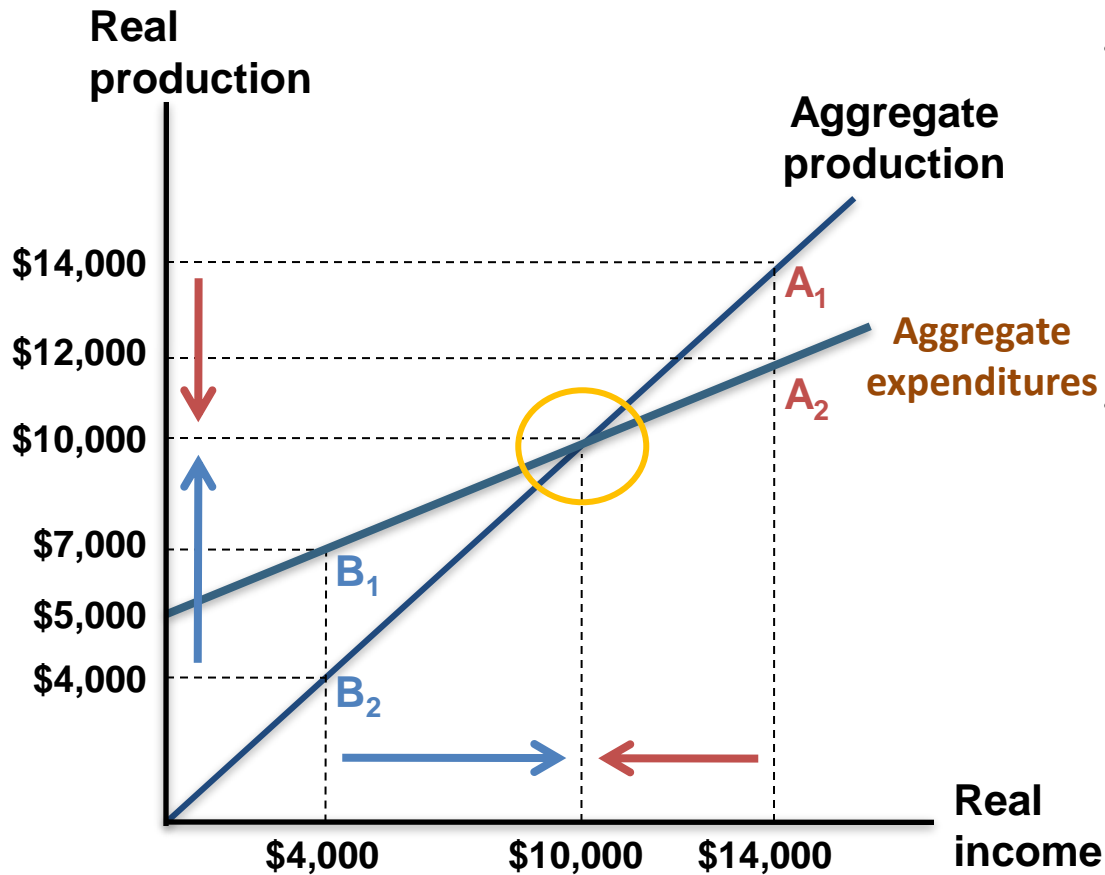
Real production

Aggregate production

Aggregate expenditures

AE = 5000 + 0.5Y

$14,000
$12,000
$10,000
$7,000
$5,000
$4,000

45

$AE_0 = 5000$

$4,000 $10,000 $14,000

Real income

The Multiplier Equation

- **Multiplier equation** is an equation that tells us that income equals the multiplier times autonomous expenditures

$$Y = \text{Multiplier} \times \text{Autonomous expenditures}$$

- **Expenditures multiplier** is a number that tells us how much income will change in response to a change in autonomous expenditures

$$\text{Multiplier} = \frac{1}{(1 - mpe)}$$
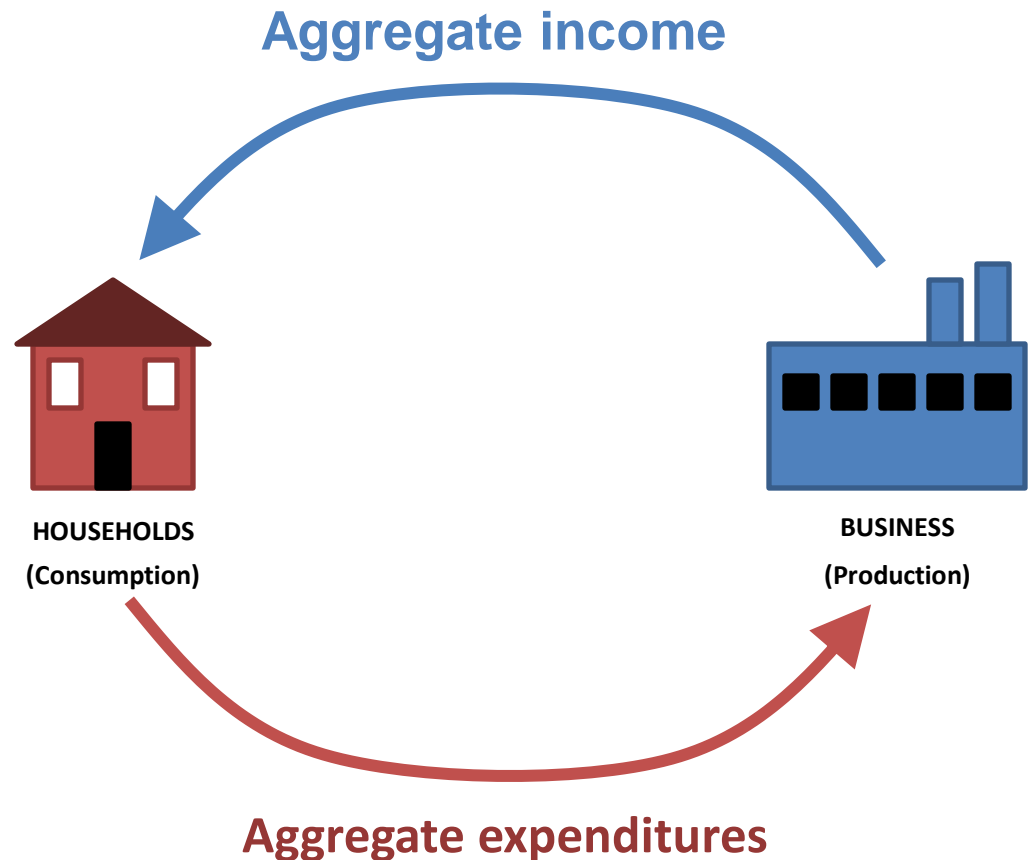
The Multiplier Process

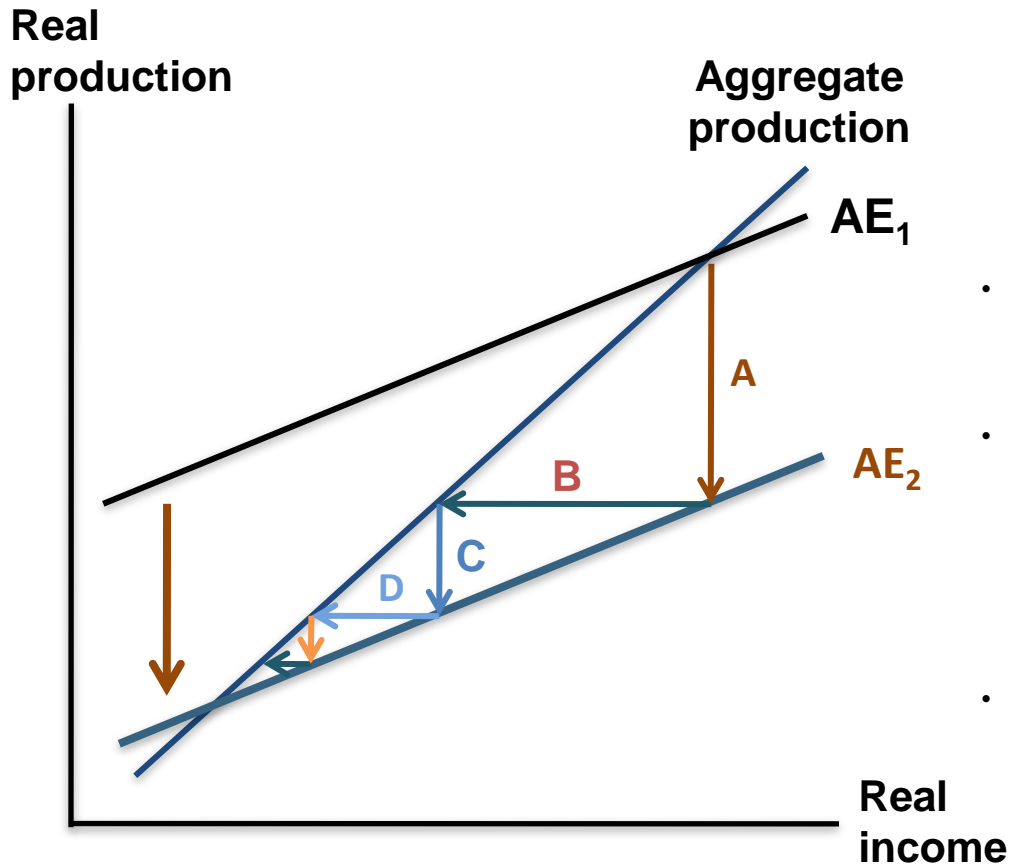At income levels **A** and **B**, the economy is in disequilibrium

- At **A**, firms *decrease* planned production leading to lower income and decreased expenditures until the economy reaches equilibrium

- At **B**, production *increases*, income and expenditures increase until the economy reaches equilibrium

- Equilibrium in the economy requires the withdrawals from the spending stream to equal injections into the spending stream

- If they don't, the economy will be either expanding or contracting

Aggregate income

HOUSEHOLDS
(Consumption)

BUSINESS
(Production)

Aggregate expenditures

The Multiplier Model in Action

Real production

Aggregate production

AE₁

A

B

C

D

AE₂

Real income

The multiplier process under a microscope when **AE** shifts by **A**

- Income falls by **B** and expenditures fall by **C**

- In response to that fall of expenditures, producers reduce output by **C**, which decreases income by **D**

- The lower income causes expenditures to fall further and the process continues
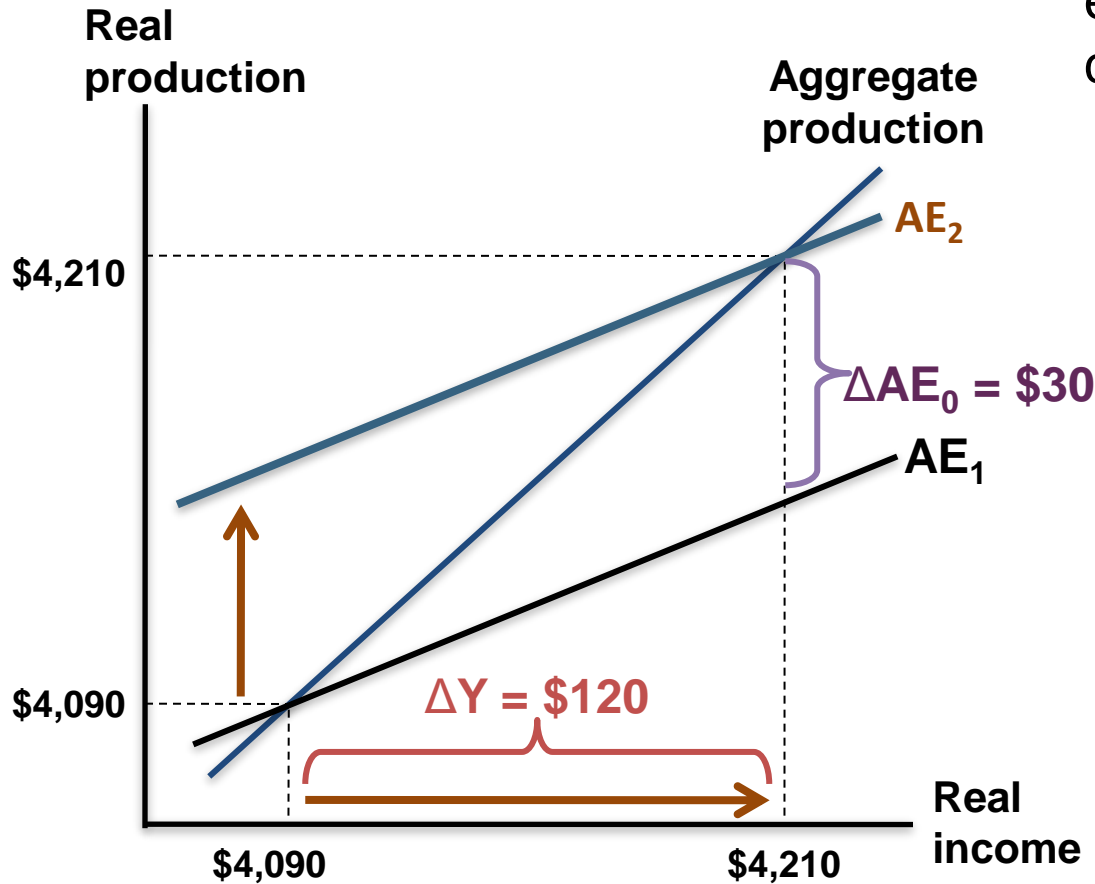
The First Steps of Two Multipliers

mpe = 0.5

100
50
25
12.5
6.5
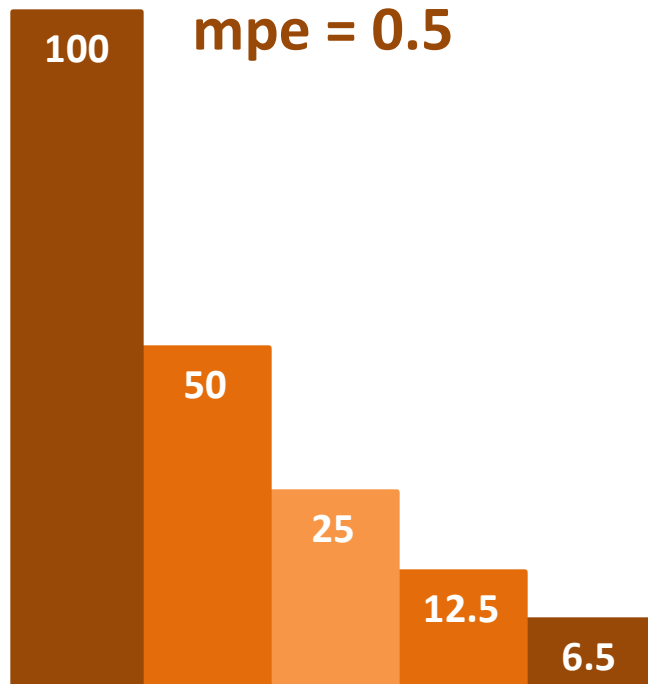
Multiplier = 1/(1-0.5) = 2

mpe = 0.8

100
80
64
51.2
41
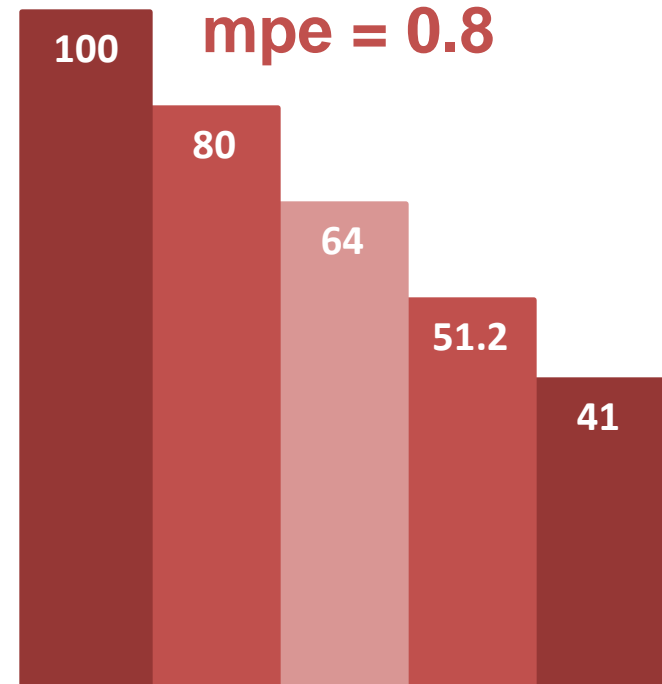
Multiplier = 1/(1-0.8) = 5

The larger the marginal propensity to expend, the more steps are required before the shifts become small

Application:
# An Increase in Autonomous Expenditures

The steeper the slope of the AE curve, the greater the effect of a shift in the AE curve on equilibrium income

Real production

Aggregate production

AE$_2$

$4,210

Δ**AE$_0$ = $30**

AE$_1$

$4,090

Δ**Y = $120**

Real income

$4,090 $4,210

$$\Delta Y = [1/(1-0.75)]\Delta AE_0$$

$$= 4(\Delta AE_0) = \$120$$

- A dramatic appreciation of the Japanese exchange rate in 1995 cut Japanese exports, decreasing aggregate expenditures
  - Aggregate production was greater than planned aggregate expenditures

- The Worldwide Recession of 2008
  - The housing market in the United States collapsed, the financial market almost collapsed, and the stock market dropped precipitously
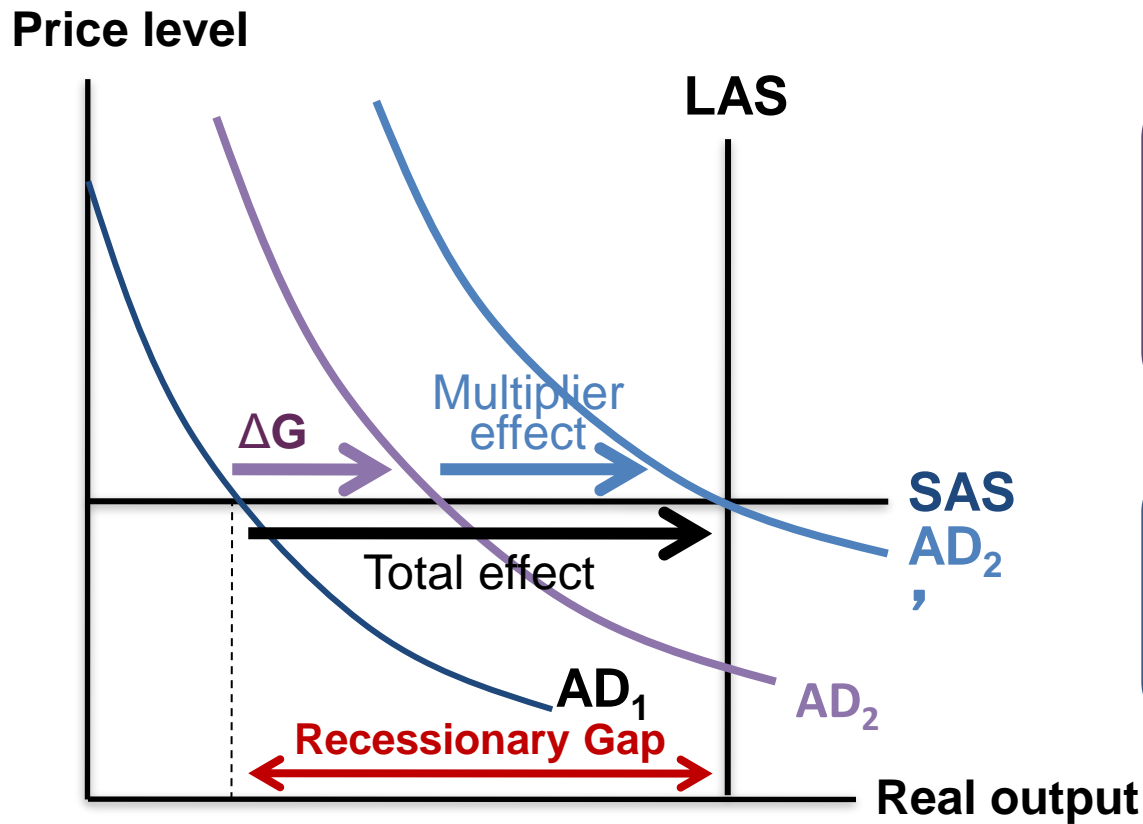 - The result was a sudden large shift down in the AE curve
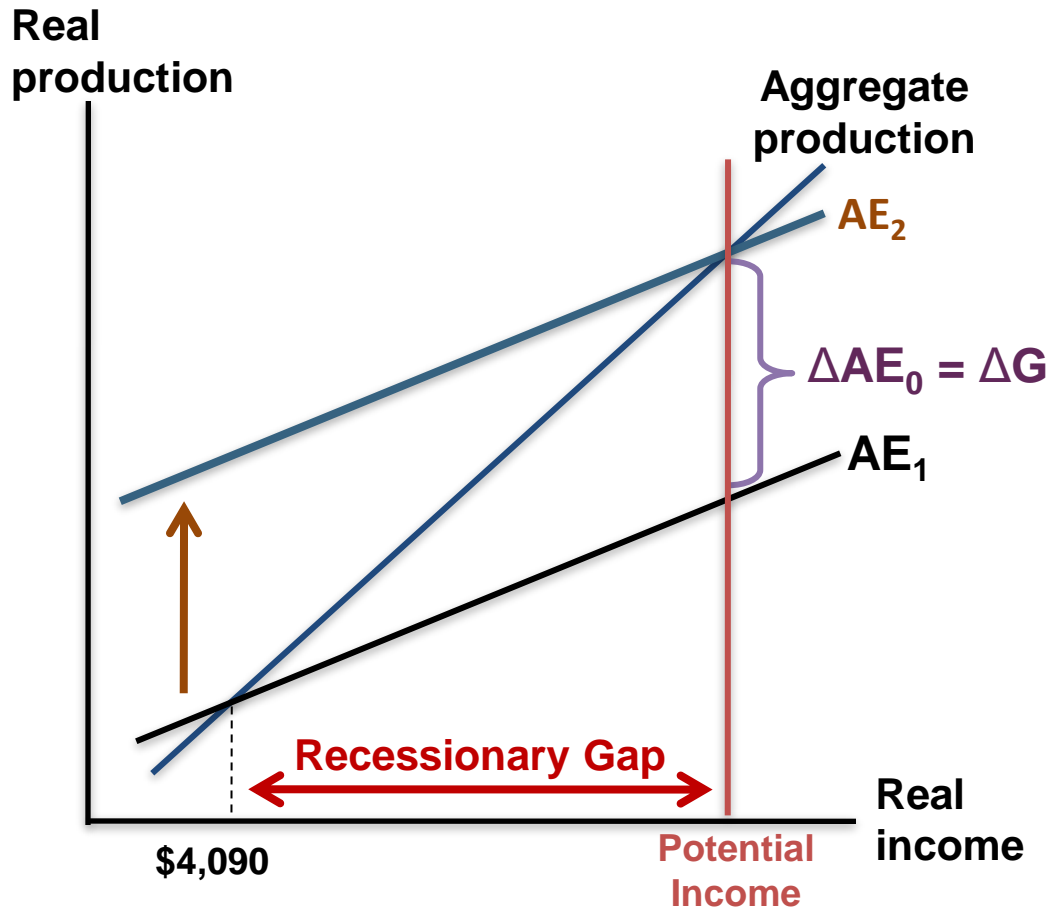
If the economy is below its potential income level, the government can increase government spending to stimulate the economy

Real production

Aggregate production

AE_2

$\Delta AE_0 = \Delta G$

AE_1

Recessionary Gap

$4,090

Potential Income

Real income

An increase in government spending **(ΔG)** shifts **AE** up

An increase in government spending (ΔG) shifts AD to the right

Multiplier effects further shifts AD to the right

Limitations of the Multiplier Model

- It is not a complete model of the economy
- Shifts are sometimes not as great as the model suggests
- Fluctuations can sometimes be greater than the model suggests
- The price level will often change in response to shifts in demand
- People's forward-looking expectations make the adjustment process much more complicated
- Shifts in expenditures might reflect desired shifts in S or D
- Expenditures depend on much more than current income