GLOBAL EDITION

Economics

ELEVENTH EDITION

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28 EXPENDITURE MULTIPLIERS

After studying this chapter, you will be able to:

- Explain how expenditure plans are determined when the price level is fixed
- Explain how real GDP is determined when the price level is fixed
- Explain the expenditure multiplier
- Explain the relationship between aggregate expenditure and aggregate demand

Exports and investment fluctuate like the volume of a rock singer's voice and the uneven surface of a New York City street.

How does the economy react to those fluctuations?

Does it behave like an amplifier, blowing up the fluctuations and spreading them out to affect the many millions of participants in an economic rock concert?

Or does it react like a limousine, absorbing the shocks and providing a smooth ride for the economy's passengers?

Fixed Prices and Expenditure Plans

The Keynesian model describes the economy in the very short run when prices are fixed.

Because each firm's price is fixed, for the economy as a whole:

1. The *price level* is fixed.

2. A*ggregate demand* determines real GDP.

What determines aggregate expenditure plans?

Fixed Prices and Expenditure Plans

Expenditure Plans

The components of aggregate expenditure sum to real GDP.

That is,

$$Y = C + I + G + X - M.$$

Two of the components of aggregate expenditure, consumption and imports, are influenced by real GDP.

So there is a two-way link between aggregate expenditure and real GDP.

Fixed Prices and Expenditure Plans

Two-Way Link Between Aggregate Expenditure and Real GDP

Other things remaining the same,

- An increase in real GDP increases aggregate expenditure.
- An increase in aggregate expenditure increases real GDP.

Fixed Prices and Expenditure Plans

Consumption and Saving Plans

Consumption expenditure is influenced by many factors but the most direct one is disposable income.

Disposable income is aggregate income or real GDP, *Y*, minus net taxes, *T*.

Call disposable income *YD.*

The equation for disposable income is

$$YD = Y - T$$

Fixed Prices and Expenditure Plans

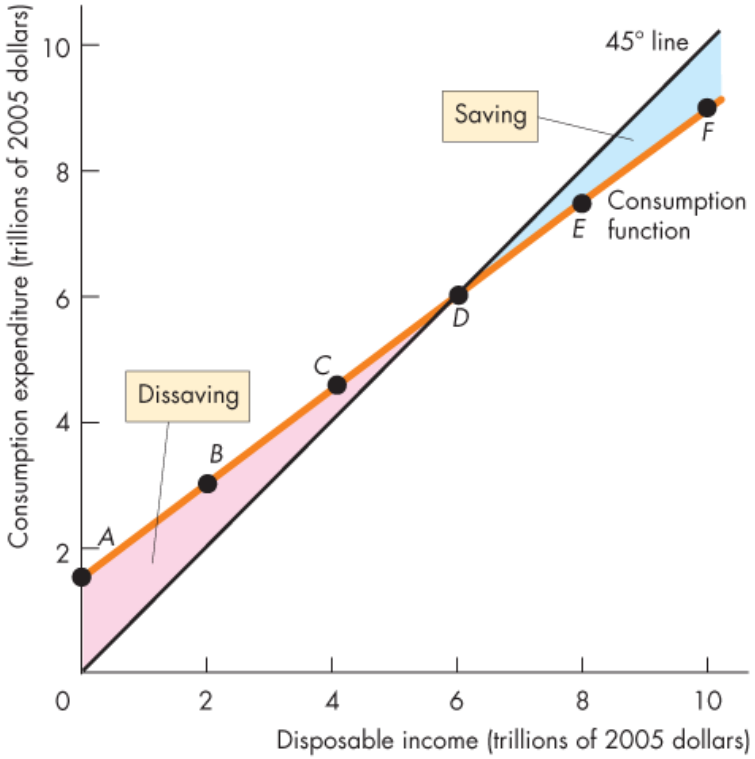
Disposable income, *YD*, is either spent on consumption goods and services, *C*, or saved, *S*.

That is, $YD = C + S$.

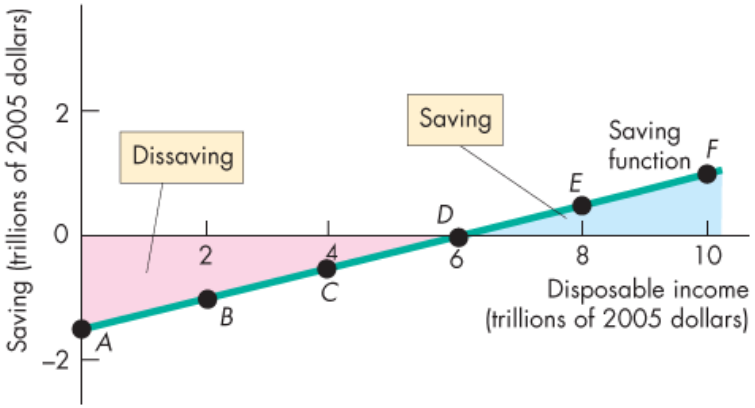
The relationship between consumption expenditure and disposable income, other things remaining the same, is the **consumption function**.

The relationship between saving and disposable income, other things remaining the same, is the **saving function**.

Figure 28.1 illustrates the consumption function and the saving function.



(a) Consumption function



(b) Saving function

	Disposable income	Planned consumption expenditure	Planned saving
	(trillions of 2005 dollars)		
A	0	1.5	−1.5
B	2	3.0	−1.0
C	4	4.5	−0.5
D	6	6.0	0
E	8	7.5	0.5
F	10	9.0	1.0

When consumption expenditure *exceeds* disposable income, saving is negative (dissaving).

When consumption expenditure is *less than* disposable income, there is saving.

Fixed Prices and Expenditure Plans

Marginal Propensities to Consume and Save

The **marginal propensity to consume** (*MPC*) is the fraction of a change in disposable income spent on consumption.

It is calculated as the change in consumption expenditure, ΔC, divided by the change in disposable income, ΔYD, that brought it about.

That is, $MPC = \Delta C \div \Delta YD$

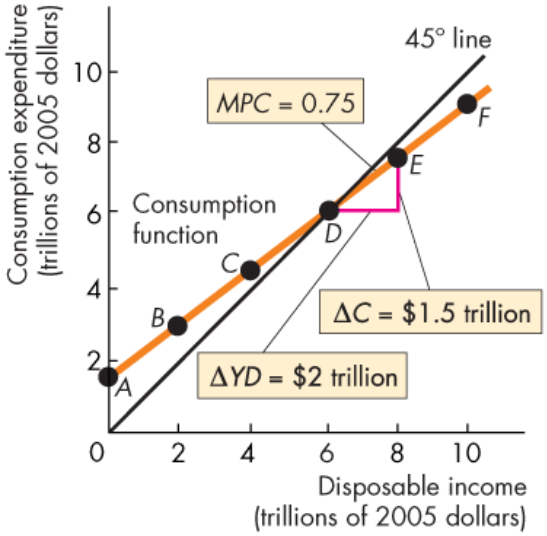
Fixed Prices and Expenditure Plans

Figure 28.2(a) shows that the *MPC* is the slope of the consumption function.

When disposable income increases by $2 trillion, …

consumption expenditure increases by $1.5 trillion.

The *MPC* is 0.75.



(a) Consumption function

Fixed Prices and Expenditure Plans

The **marginal propensity to save** (*MPS*) is the fraction of a change in disposable income that is saved.

It is calculated as the change in saving, ΔS, divided by the change in disposable income, ΔYD, that brought it about.

That is,

$$MPS = \Delta S \div \Delta YD.$$

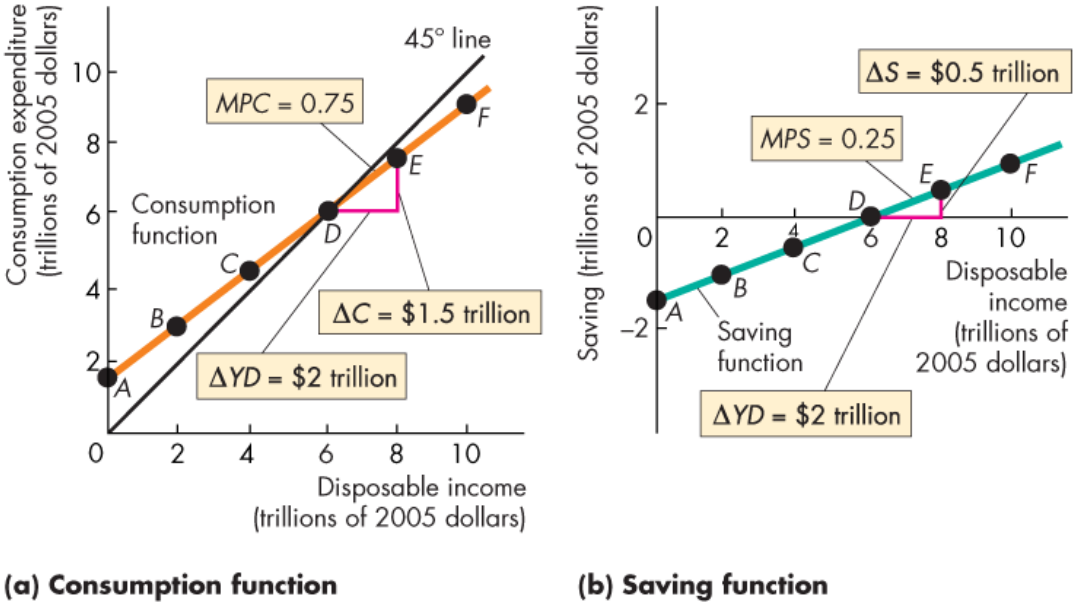
Fixed Prices and Expenditure Plans

Figure 28.2(b) shows that the *MPS* is the slope of the saving function.

When disposable income increases by $2 trillion,

saving increases by $0.5 trillion.

The *MPS* is 0.25.



(a) Consumption function (b) Saving function

Fixed Prices and Expenditure Plans

The *MPC* plus the *MPS* equals 1.

To see why, note that,

$$\Delta C + \Delta S = \Delta YD.$$

Divide this equation by ΔYD to obtain,

$$\Delta C/\Delta YD + \Delta S/\Delta YD = \Delta YD/\Delta YD$$

or

$$MPC + MPS = 1.$$

Fixed Prices and Expenditure Plans

Consumption as a Function of Real GDP

Disposable income changes when either real GDP changes or net taxes change.

If tax rates don't change, real GDP is the only influence on disposable income, so consumption expenditure is a function of real GDP.

We use this relationship to determine real GDP when the price level is fixed.

Fixed Prices and Expenditure Plans

Import Function

In the short run, U.S. imports are influenced primarily by U.S. real GDP.

The **marginal propensity to import** is the fraction of an increase in real GDP spent on imports.

If an increase in real GDP of $1 trillion increases imports by $0.25 trillion, the marginal propensity to import is 0.25.

Real GDP with a Fixed Price Level

When the price level is fixed, aggregate demand is determined by aggregate expenditure plans.

Aggregate planned expenditure is *planned* consumption expenditure plus *planned* investment plus *planned* government expenditure plus *planned* exports minus *planned* imports.

Real GDP with a Fixed Price Level

Planned consumption expenditure and planned imports are influenced by real GDP.

When real GDP increases, planned consumption expenditure and planned imports increase.

Planned investment plus planned government expenditure plus planned exports are not influenced by real GDP.

Real GDP with a Fixed Price Level

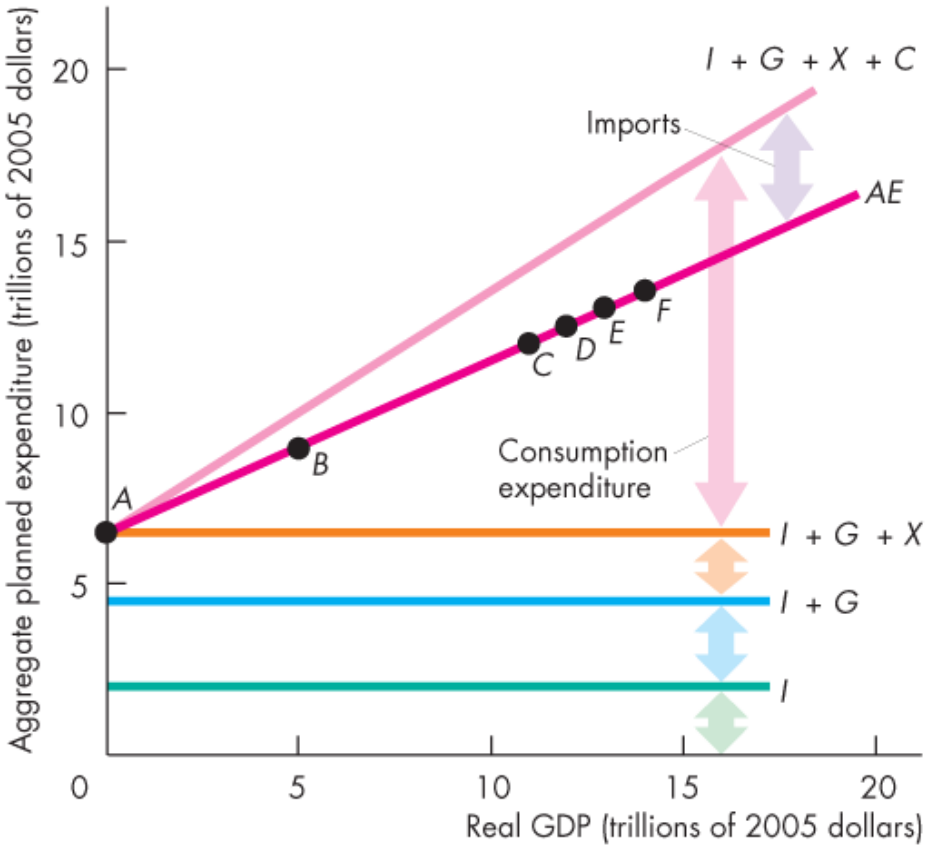
Aggregate Planned Expenditure

The relationship between aggregate planned expenditure and real GDP can be described by an *aggregate expenditure schedule*, which lists the level of aggregate expenditure planned at each level of real GDP.

The relationship can also be described by an *aggregate expenditure curve*, which is a graph of the aggregate expenditure schedule.

Real GDP with a Fixed Price Level

Figure 28.3 shows how the aggregate expenditure curve (*AE*) is built from its components.



Real GDP with a Fixed Price Level

Consumption expenditure minus imports, which varies with real GDP, is **induced expenditure**.

The sum of investment, government expenditure, and exports, which does not vary with GDP, is **autonomous expenditure**.

(Consumption expenditure and imports can have an autonomous component.)

Real GDP with a Fixed Price Level

Actual Expenditure, Planned Expenditure, and Real GDP

Actual aggregate expenditure is always equal to real GDP.

Aggregate planned expenditure may differ from actual aggregate expenditure because firms can have unplanned changes in inventories.

Equilibrium Expenditure

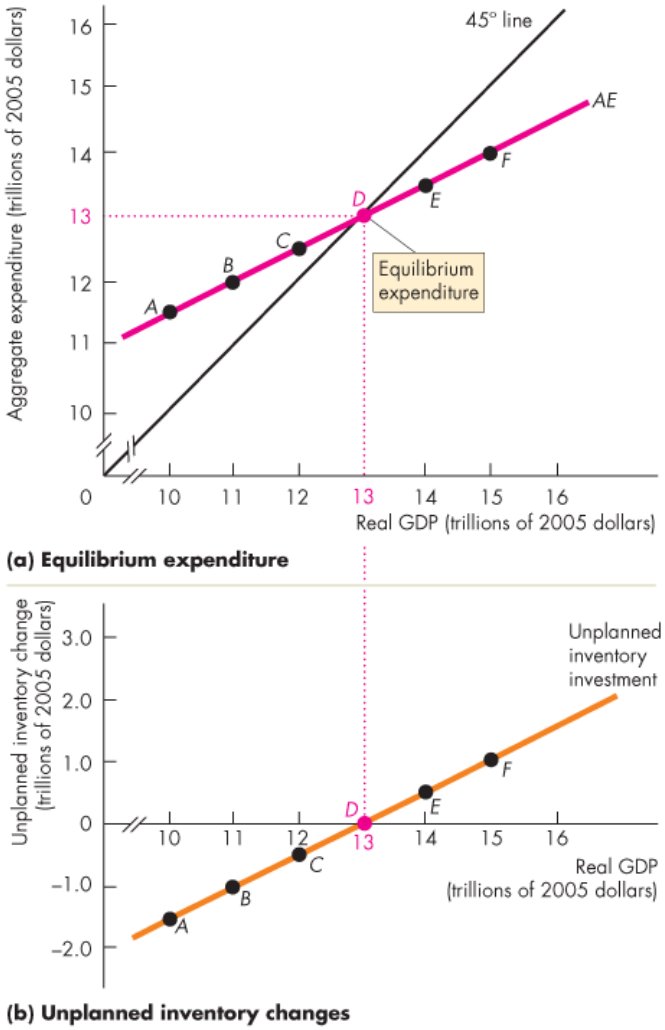
Equilibrium expenditure is the level of aggregate expenditure that occurs when aggregate *planned* expenditure equals real GDP.

Real GDP with a Fixed Price Level

Figure 28.4 illustrates equilibrium expenditure.

Equilibrium occurs at the point at which the *AE* curve crosses the 45° line in part (a).

Equilibrium occurs when there are no unplanned changes in business inventories in part (b).



Real GDP with a Fixed Price Level

Convergence to Equilibrium

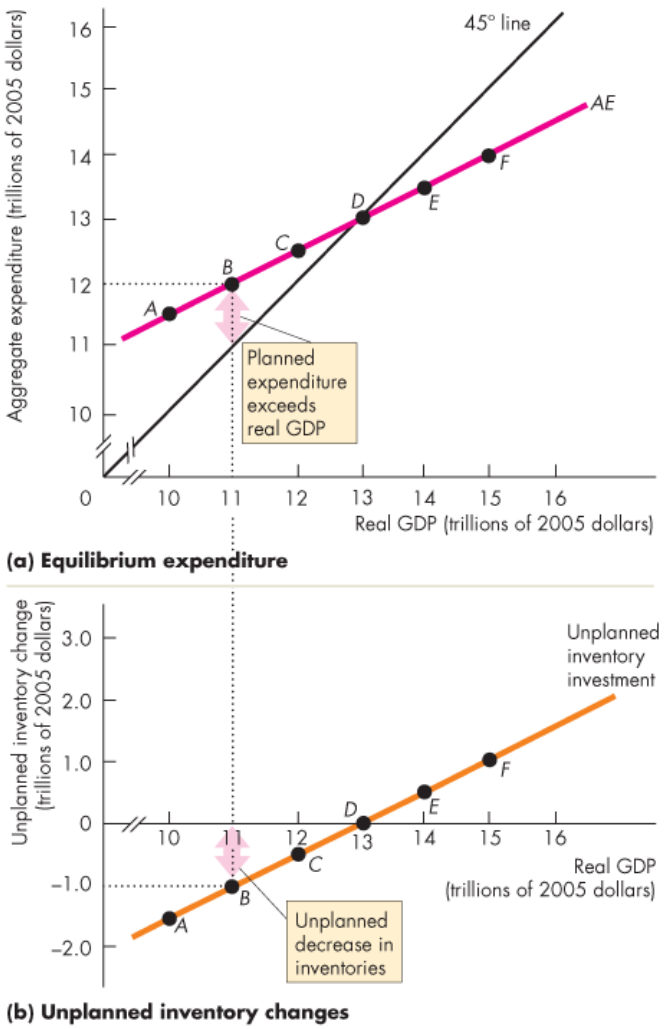
From Below Equilibrium

If aggregate planned expenditure exceeds real GDP,

there is an unplanned decrease in inventories.

To restore inventories, firms hire workers and increase production.

Real GDP increases.



Real GDP with a Fixed Price Level

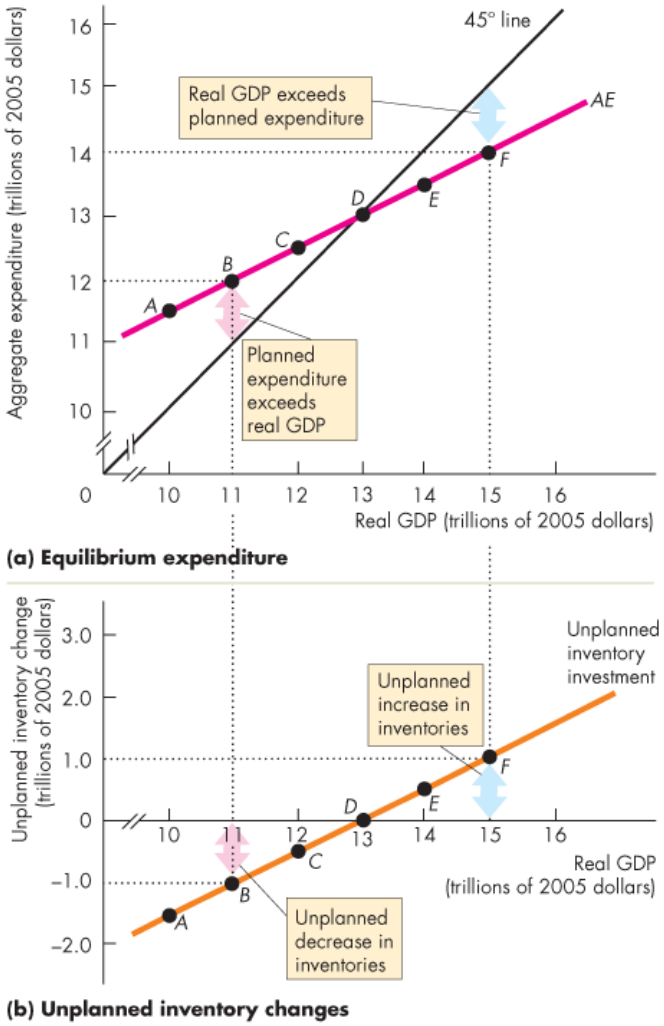
From Above Equilibrium

If real GDP exceeds aggregate planned expenditure, …

there is an unplanned increase in inventories.

To reduce inventories, firms fire workers and decrease production.

Real GDP decreases.



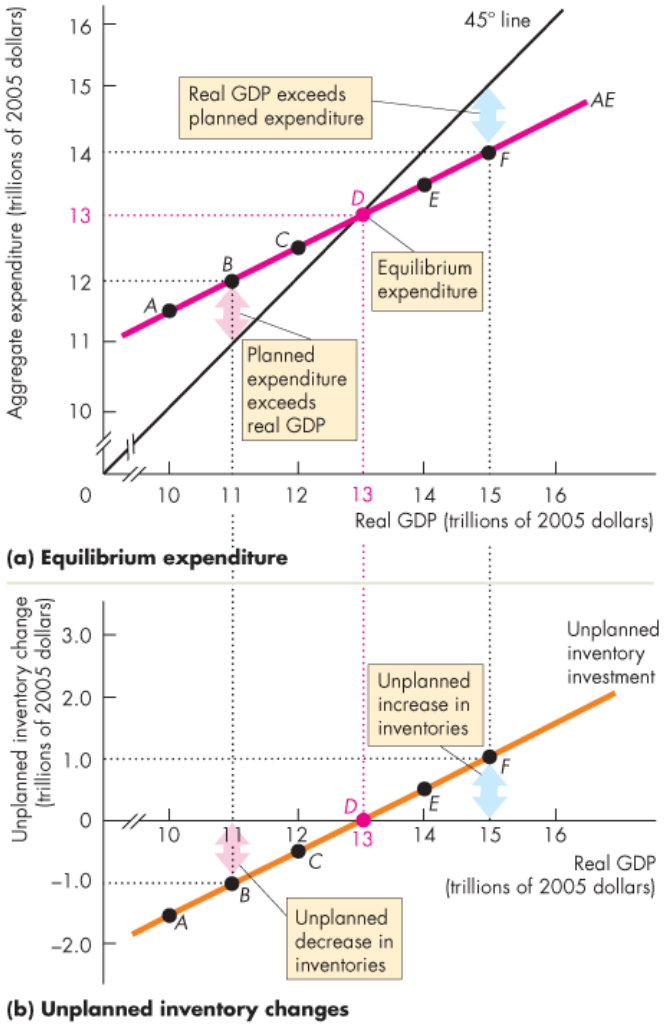
Real GDP with a Fixed Price Level

If aggregate planned expenditure equals real GDP (the *AE* curve intersects the 45° line), …

there is no unplanned change in inventories.

And firms maintain their current production.

Real GDP remains constant.



The Multiplier

When autonomous expenditure changes, so does equilibrium expenditure and real GDP.

But the change in equilibrium expenditure is *larger* than the change in autonomous expenditure.

The **multiplier** is the amount by which a change in autonomous expenditure is magnified or multiplied to determine the change in equilibrium expenditure and real GDP.

The Multiplier

The Basic Idea of the Multiplier

An increase in investment (or any other component of autonomous expenditure) increases aggregate expenditure and real GDP.

The increase in real GDP leads to an increase in induced expenditure.

The increase in induced expenditure leads to a further increase in aggregate expenditure and real GDP.

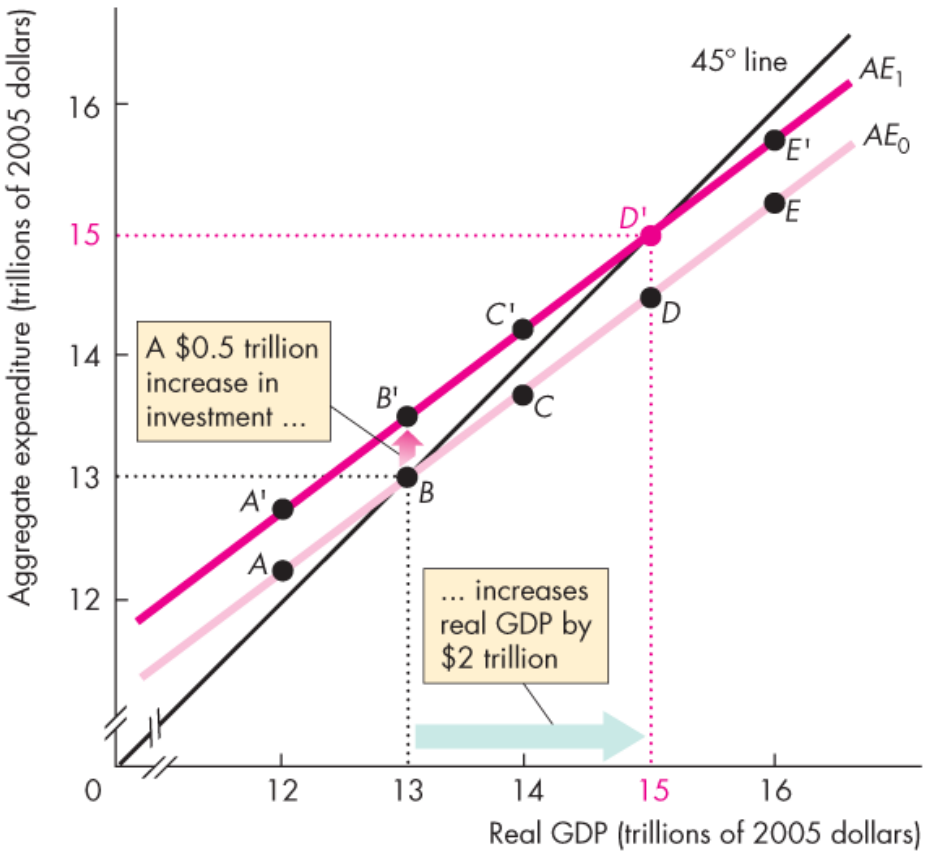
So real GDP increases by more than the initial increase in autonomous expenditure.

The Multiplier

Figure 28.5 illustrates the multiplier.

An increase in autonomous expenditure brings an unplanned decrease in inventories.

So firms increase production and real GDP increases to a new equilibrium.



The Multiplier

Why Is the Multiplier Greater than 1?

The multiplier is greater than 1 because an increase in autonomous expenditure induces further increases in aggregate expenditure.

The Size of the Multiplier

The size of the multiplier is the change in equilibrium expenditure divided by the change in autonomous expenditure.

The Multiplier

The Multiplier and the Slope of the *AE* Curve

The slope of the *AE* curve determines the magnitude of the multiplier:

$$\text{Multiplier} = 1 \div (1 - \text{Slope of } AE \text{ curve})$$

If the change in real GDP is ΔY, the change in autonomous expenditure is ΔA, and the change in induced expenditure is ΔN, then

$$\text{Multiplier} = \Delta Y \div \Delta A$$

The Multiplier

To see why the multiplier = 1 ÷ (1 – Slope of *AE* curve), begin with the fact that:

$$\Delta Y = \Delta N + \Delta A.$$

But

$$\text{Slope of } AE \text{ curve} = \Delta N \div \Delta Y$$

so,

$$\Delta N = (\text{Slope of } AE \text{ curve} \times \Delta Y).$$

Now replace ΔN in the first equation

$$\Delta Y = (\text{Slope of } AE \text{ curve} \times \Delta Y) + \Delta A.$$

The Multiplier

$$\Delta Y = (\text{Slope of } AE \text{ curve} \times \Delta Y) + \Delta A$$

Re-arrange as

$$(1 - \text{Slope of } AE \text{ curve}) \times \Delta Y = \Delta A$$

and

$$\Delta Y = \Delta A \div (1 - \text{Slope of } AE \text{ curve})$$

$$\text{Multiplier} = \Delta Y \div \Delta A$$

So Multiplier = $1 \div (1 - \text{Slope of } AE \text{ curve})$

The Multiplier

With the numbers in Figure 28.5, the slope of the *AE* curve is 0.75, so the multiplier is

$$\Delta Y \div \Delta A = 1 \div (1 - 0.75) = 1 \div (0.25) = 4.$$

When there are no income taxes and no imports, the slope of the *AE* curve equals the marginal propensity to consume, so the multiplier is

$$\text{Multiplier} = 1 \div (1 - MPC).$$

But $1 - MPC = MPS$, so the multiplier is also

$$\text{Multiplier} = 1 \div MPS.$$

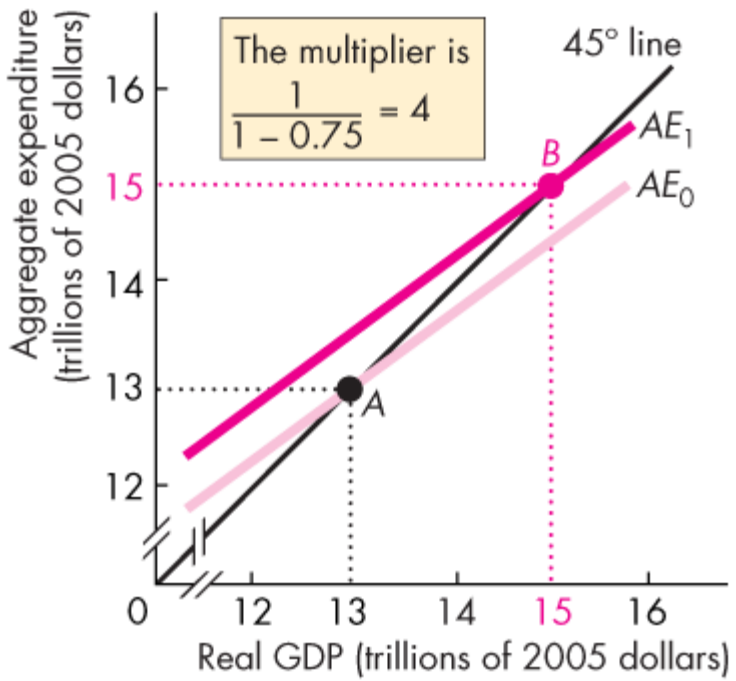
The Multiplier

Imports and Income Taxes

Both imports and income taxes reduce the size of the multiplier.

Figure 28.6 shows how.

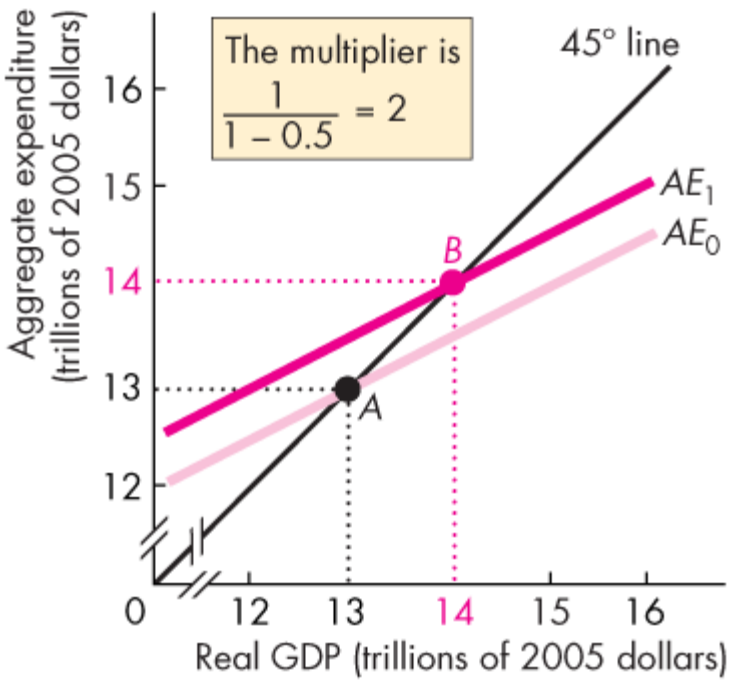
In part (a) with no taxes or imports, the slope of the *AE* curve is 0.75 and the multiplier is 4.



(a) Multiplier is 4

The Multiplier

In part (b), with taxes and imports, the slope of the *AE* curve is 0.5 and the multiplier is 2.



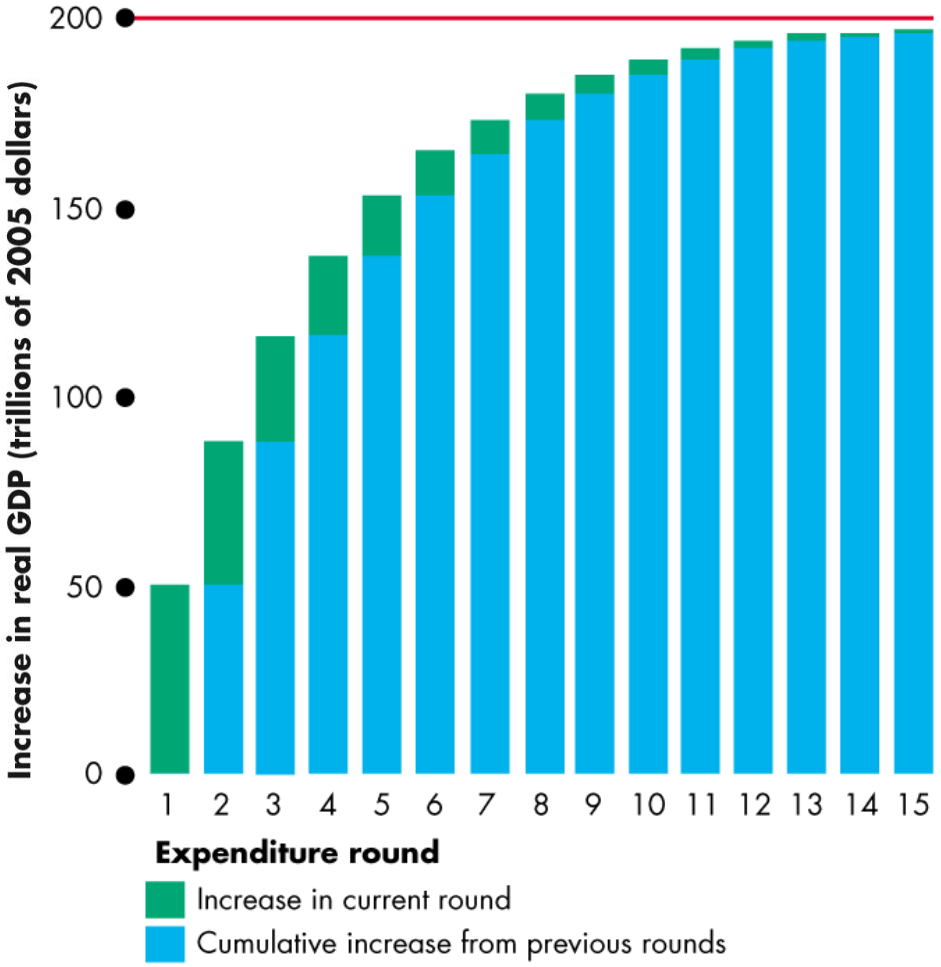
(b) Multiplier is 2

The Multiplier

The Multiplier Process

Figure 28.7 illustrates the multiplier process.

The *MPC* determines the magnitude of the amount of induced expenditure at each round as aggregate expenditure moves toward equilibrium expenditure.



The Multiplier

Business Cycle Turning Points

Turning points in the business cycle—peaks and troughs—occur when autonomous expenditure changes.

An increase in autonomous expenditure brings an unplanned decrease in inventories, which triggers an expansion.

A decrease in autonomous expenditure brings an unplanned increase in inventories, which triggers a recession.

The Multiplier and the Price Level

Adjusting Quantities and Prices

Real firms don't hold their prices constant for long.

When firms have an unplanned change in inventories, they change production *and prices*.

And the price level changes when firms change prices.

The *AS-AD* model explains the simultaneous determination of real GDP and the price level.

The two models are related.

The Multiplier and the Price Level

Aggregate Expenditure and Aggregate Demand

The **aggregate expenditure curve** is the relationship between aggregate planned expenditure and real GDP, with all other influences on aggregate planned expenditure remaining the same.

The **aggregate demand curve** is the relationship between the quantity of real GDP demanded and the price level, with all other influences on aggregate demand remaining the same.

The Multiplier and the Price Level

Deriving the Aggregate Demand Curve

When the price level changes, a wealth effect and substitution effects change aggregate planned expenditure and change the quantity of real GDP demanded.

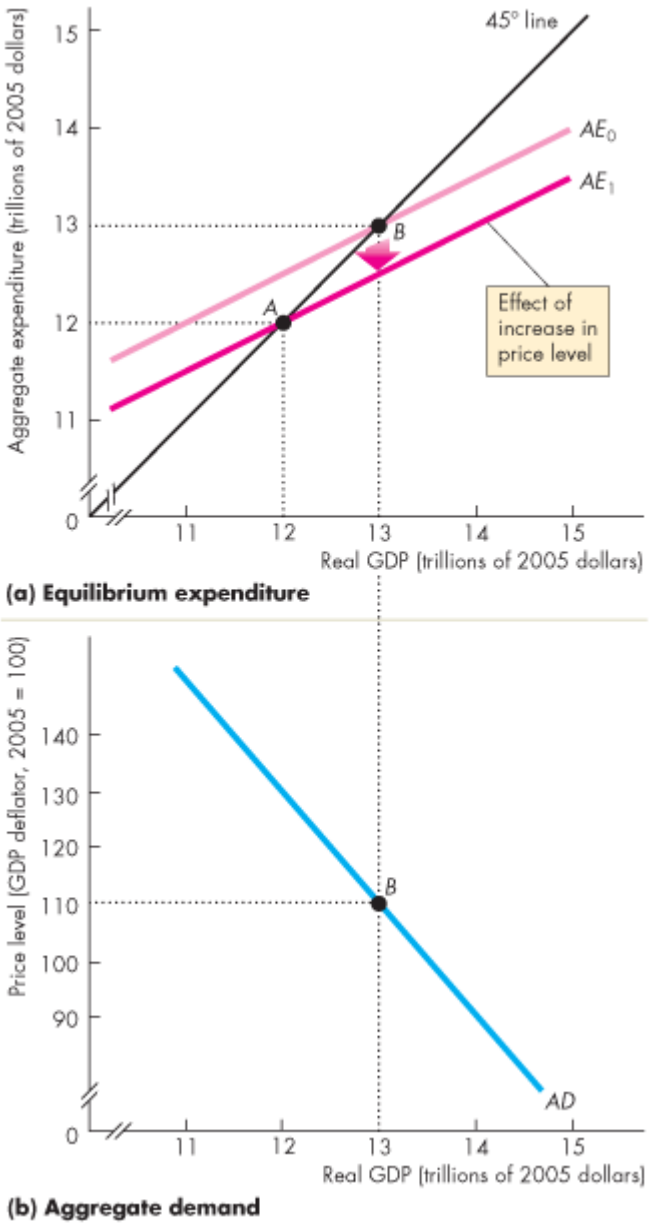
Figure 28.8 on the next slide illustrates the effects of a change in the price level on the *AE* curve, equilibrium expenditure, and the quantity of real GDP demanded.

The Multiplier and the Price Level

In Figure 28.8(a), a rise in price level from 110 to 130 …

shifts the *AE* curve from AE_0 downward to AE_1 and …

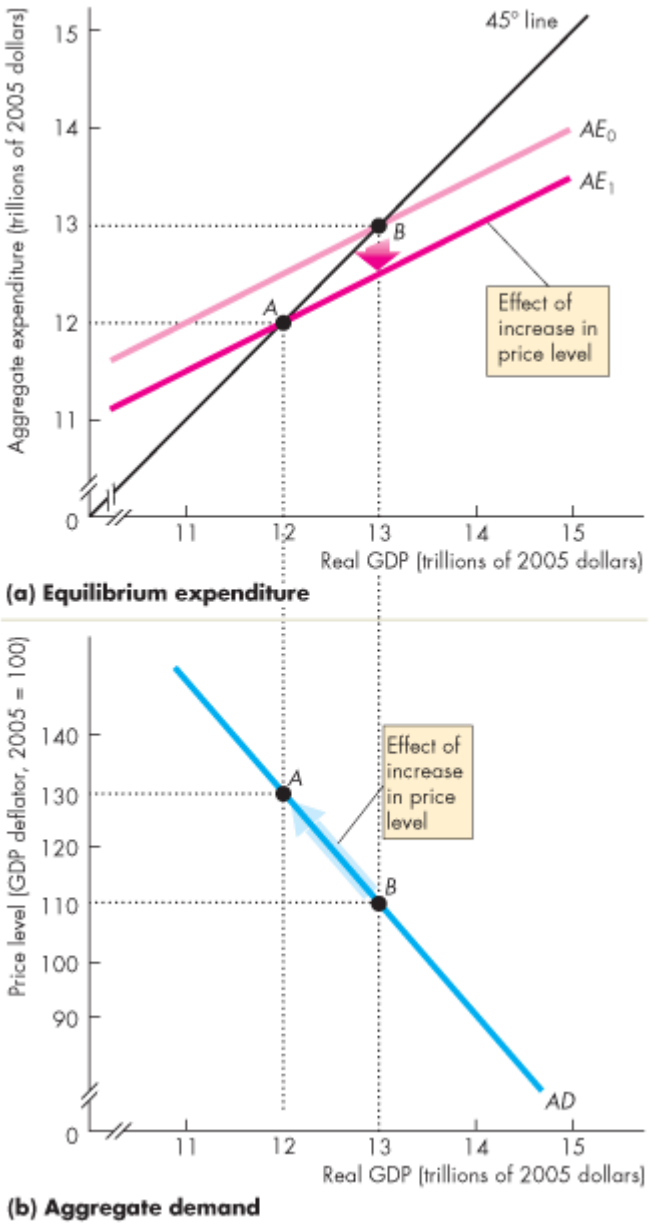
decreases the equilibrium expenditure from $13 trillion to $12 trillion.



The Multiplier and the Price Level

In Figure 28.8(b), the same rise in the price level that lowers equilibrium expenditure …

brings a movement along the *AD* curve from point *B* to point *A*.

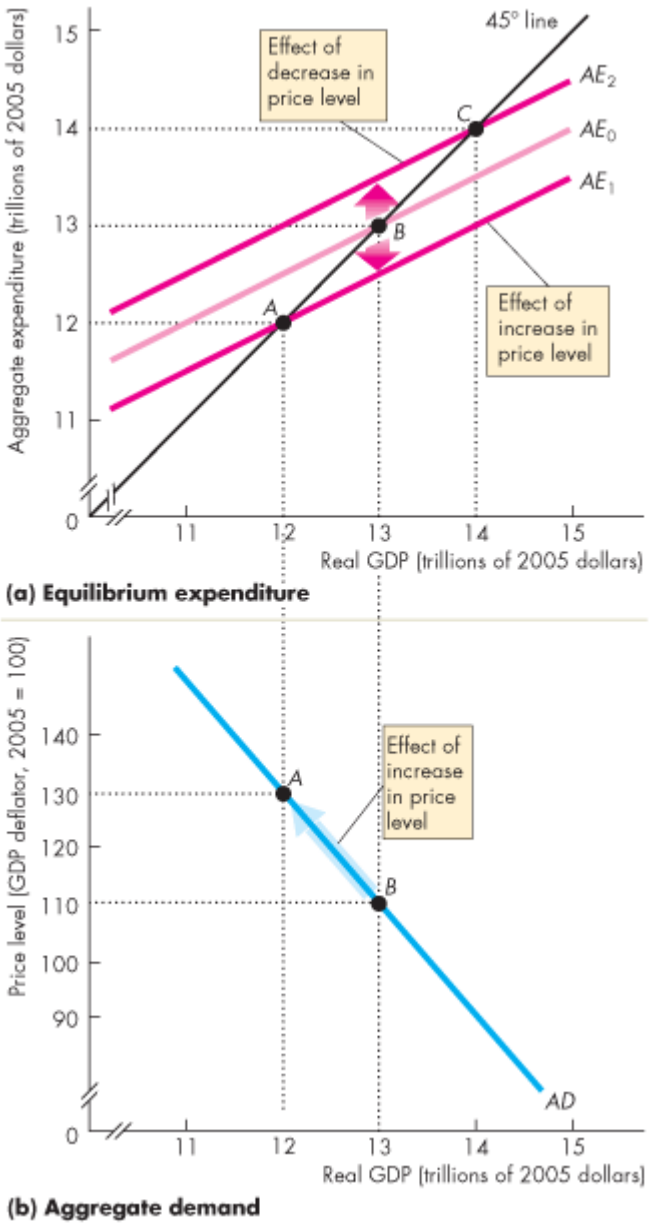


The Multiplier and the Price Level

A fall in price level from 110 to 90 …

shifts the *AE* curve from AE_0 upward to AE_2 and …

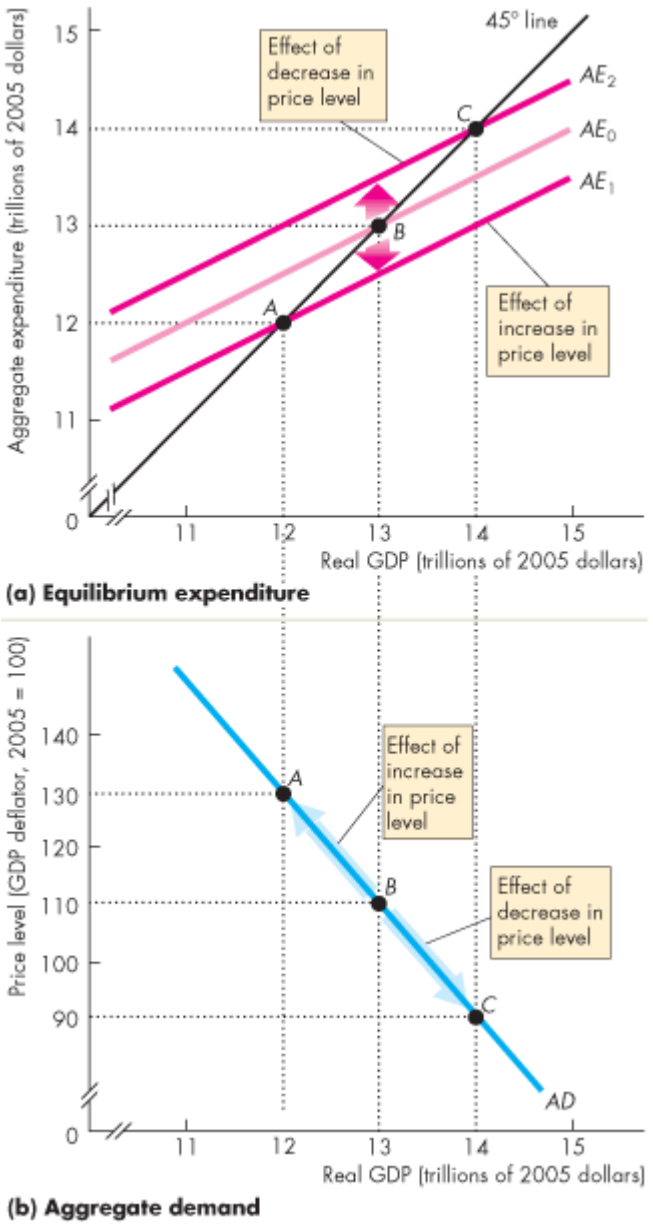
increases equilibrium expenditure from $13 trillion to $14 trillion.



The Multiplier and the Price Level

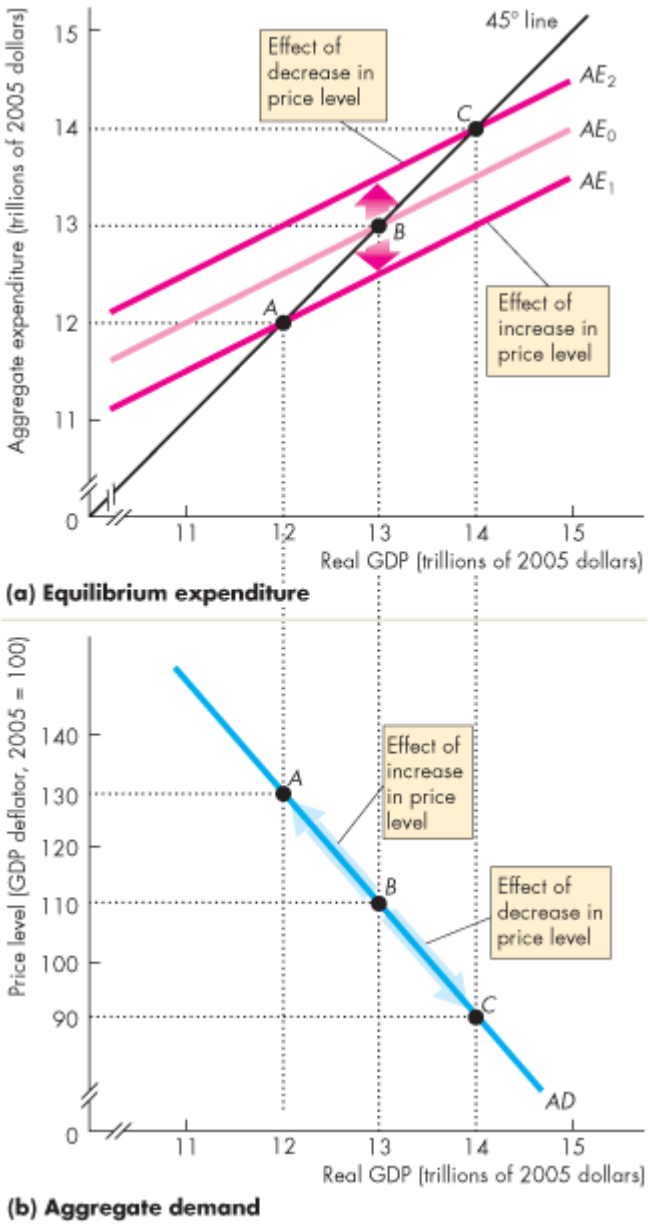
The same fall in the price level that increases equilibrium expenditure …

brings a movement along the *AD* curve from point *B* to point *C*.



The Multiplier and the Price Level

Points *A*, *B*, and *C* on the *AD* curve correspond to the equilibrium expenditure points *A*, *B*, and *C* at the intersection of the *AE* curve and the 45° line.



The Multiplier and the Price Level

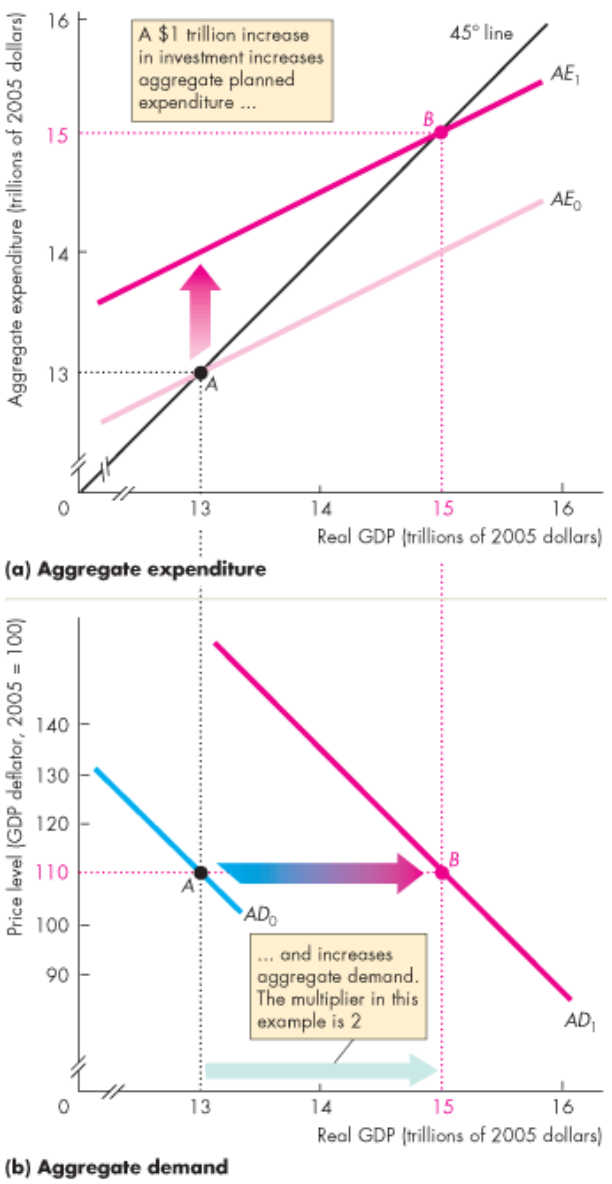
Changes in Aggregate Expenditure and Aggregate Demand

Figure 28.9 illustrates the effects of an increase in investment.

The *AE* curve shifts upward …

…and the *AD* curve shifts rightward …

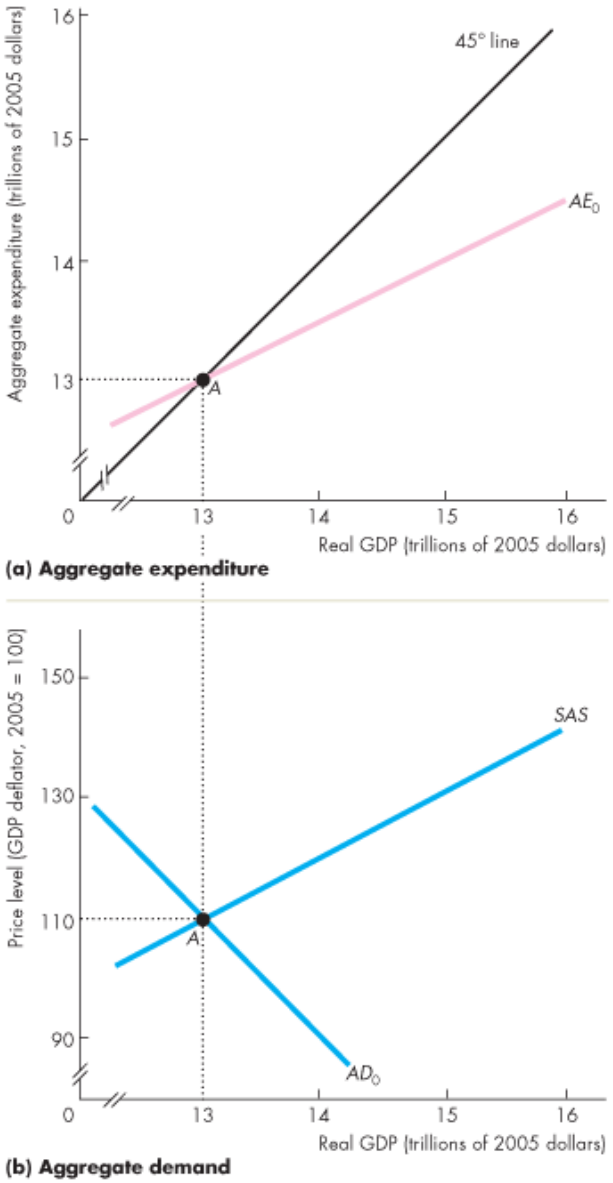
by an amount equal to the change in investment multiplied by the multiplier.



The Multiplier and the Price Level

Equilibrium Real GDP and the Price Level

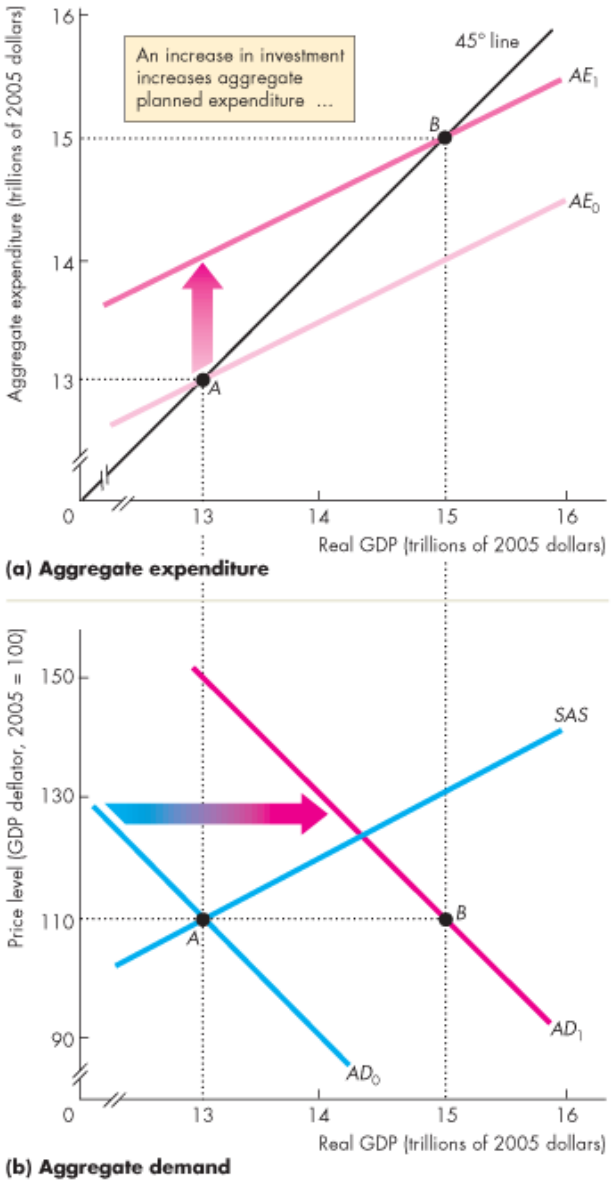
Figure 28.10 shows the effect of an increase in investment in the short run when the price level changes.



The Multiplier and the Price Level

The increase in investment shifts the *AE* curve upward and shifts the *AD* curve rightward.

With no change in the price level, real GDP would increase to $15 trillion at point *B*.



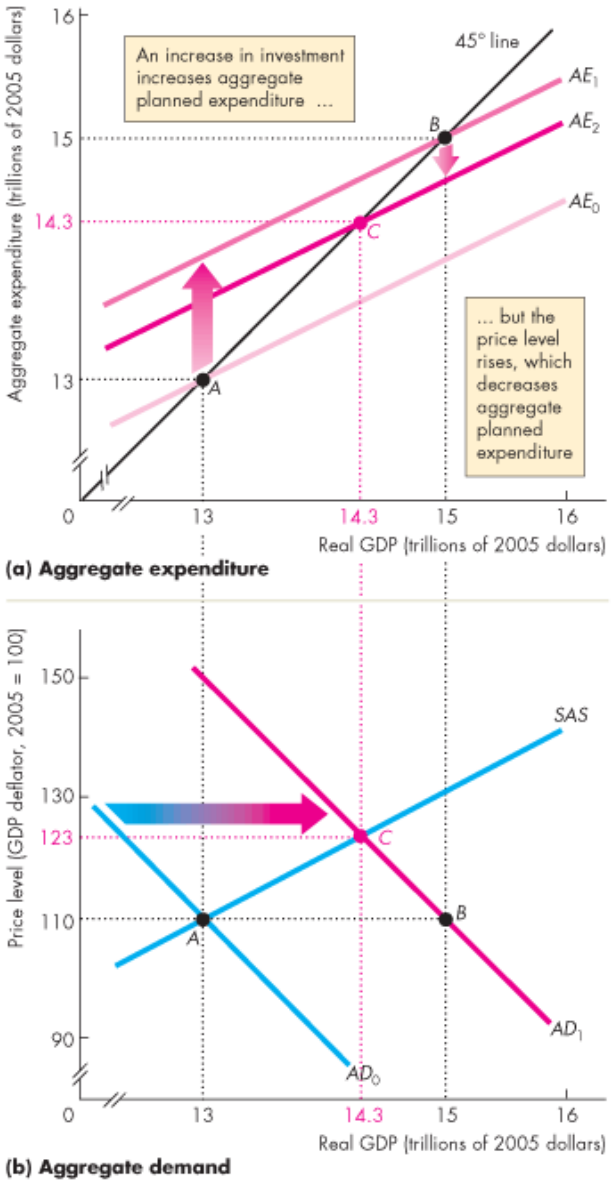
The Multiplier and the Price Level

But the price level rises. The *AE* curve shifts downward….

Equilibrium expenditure decreases to $14.3 trillion…

As the price level rises, real GDP increases along the *SAS* curve to $14.3 trillion.

The multiplier in the short run is smaller than when the price level is fixed.

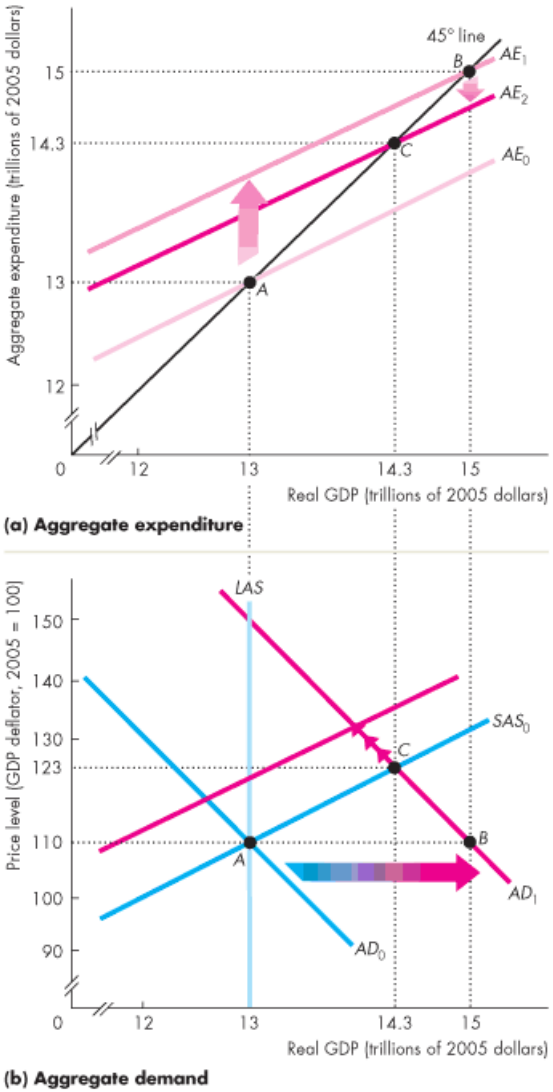


The Multiplier and the Price Level

Figure 28.11 illustrates the long-run effects.

At point *C* in part (b), there is an inflationary gap.

The money wage rate starts to rise and the *SAS* curve starts to shift leftward.



The Multiplier and the Price Level

The money wage rate will continue to rise and the *SAS* curve will continue to shift leftward, ...

until real GDP equals potential GDP.

In the long run, the multiplier is zero.