



***Aggregate Expenditures, Multiplier and Real GDP***

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# Big Concepts...

- **Aggregate Planned Expenditures and Real GDP**
- **Consumption/Savings Functions**
- **Equilibrium Expenditure**
- **Multiplier**
- **Relationship between AE and Aggregate Demand**



## The Aggregate Implications of Fixed Prices

- **In the very short run, prices are fixed and the aggregate amount that is sold depends only on the aggregate demand for goods and services.**
- **In this very short run, to understand real GDP fluctuations, we must understand aggregate demand fluctuations.**



## Expenditure Plans

- The four components of aggregate expenditure - consumption expenditure, investment, government purchases of goods and services, and net exports—sum to real GDP.
- Aggregate planned expenditure equals *planned* consumption expenditure plus *planned* investment plus *planned* government purchases plus *planned* exports minus *planned* imports.



# Expenditure Plans

**A two-way link exists between aggregate expenditure and real GDP:**

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



## Consumption Function and Saving Function

Consumption and saving are influenced by:

- **Disposable income**
- **Wealth**
- **Expected future income**
- **The real interest rate**
- **Disposable income is aggregate income (GDP) minus taxes plus transfer payments.**

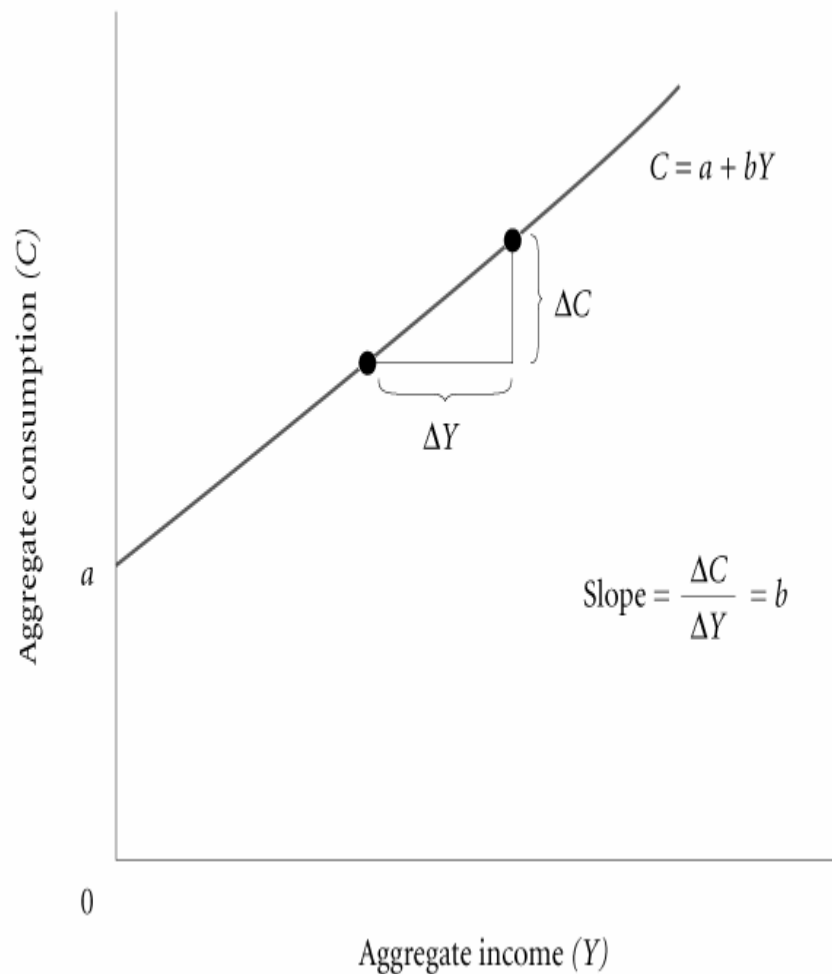


# Expenditure Plans

**To explore the two-way link between real GDP and planned consumption expenditure, we focus on the relationship between consumption expenditure and disposable income when the other factors are constant.**

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

# Consumption and Savings Functions

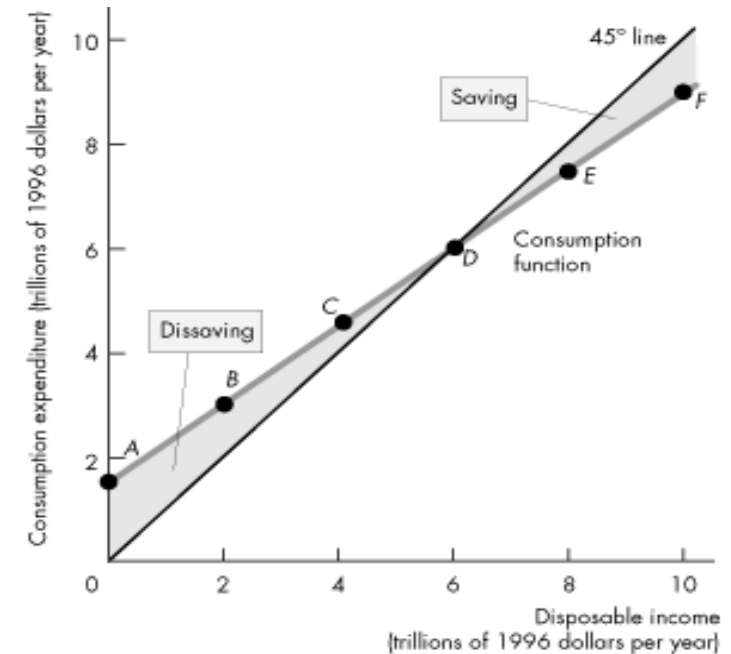


	Disposable Income (YD)	Planned Consumption Expenditure (C)	Planned Private Saving ( $S_p$ )
	Trillions of dollars per year		
<b>A</b>	<b>0</b>	<b>1.5</b>	<b>-1.5</b>
<b>B</b>	<b>2</b>	<b>3.0</b>	<b>-1.0</b>
<b>C</b>	<b>4</b>	<b>4.5</b>	<b>-0.5</b>
<b>D</b>	<b>6</b>	<b>6.0</b>	<b>0</b>
<b>E</b>	<b>8</b>	<b>7.5</b>	<b>0.5</b>
<b>F</b>	<b>10</b>	<b>9.0</b>	<b>1.0</b>

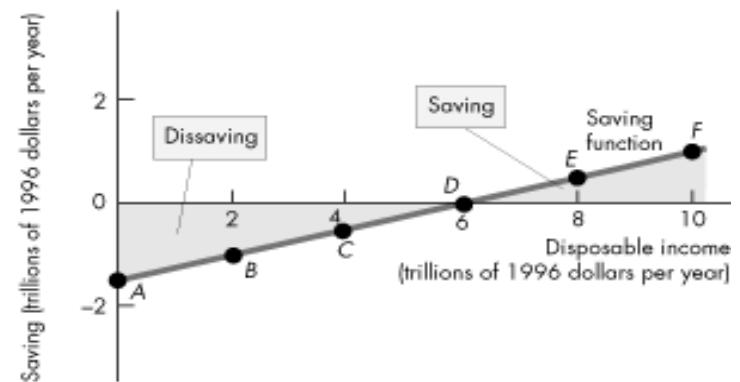


# Consumption and Savings Functions

- This Figure illustrates the consumption function and the saving function.
- Consumption Function:  
$$C = a + b \cdot YD$$
$$= 1.5 + 0.75 \cdot YD$$
- Savings Function:  
$$S = -a + MPS \cdot YD$$
$$= -1.5 + 0.25 \cdot YD$$



(a) Consumption function



(b) Saving function



## Marginal Propensity to Consume

- 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,  $\Delta C$ , divided by the change in disposable income,  $\Delta YD$ , that brought it about.
- That is:  $MPC = \Delta C / \Delta YD$



## Marginal Propensity to Save

- 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,  $\Delta S$ , divided by the change in disposable income,  $\Delta YD$ , that brought it about.
- That is:  $MPS = \Delta S_p / \Delta YD$

## Fixed Prices and Expenditure Plans

$Y_d = C + S$ .....disposable income

$APC = C / Y_d$ .....The average propensity to consume

$MPC = \Delta C / \Delta Y_d$ .....Marginal propensity to consume....b

$APS = S / Y_d$ .....The average propensity to save

$MPS = 1 - MPC$ ....Marginal propensity to save

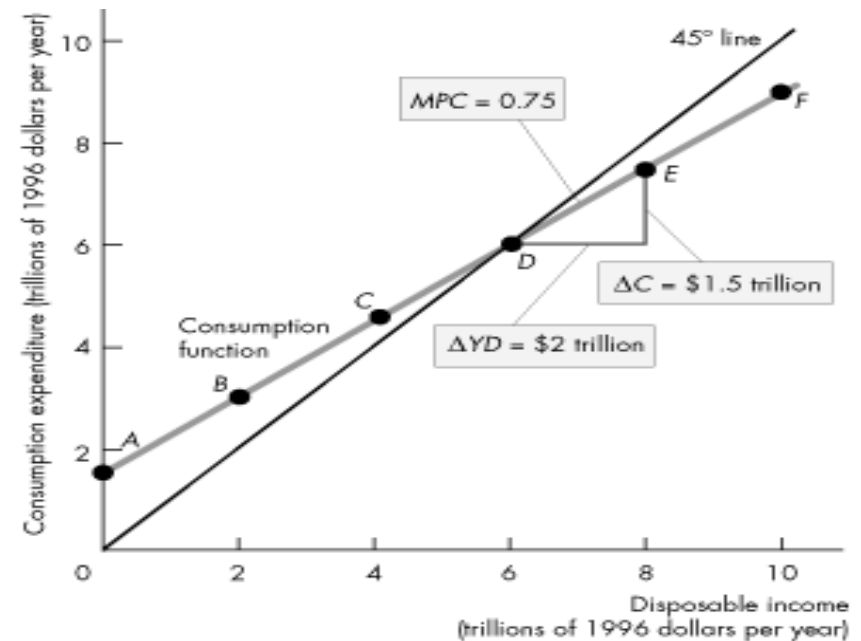
$MPC + MPS = 1$

**The Consumption Function  $C = a + b * Y_d$**

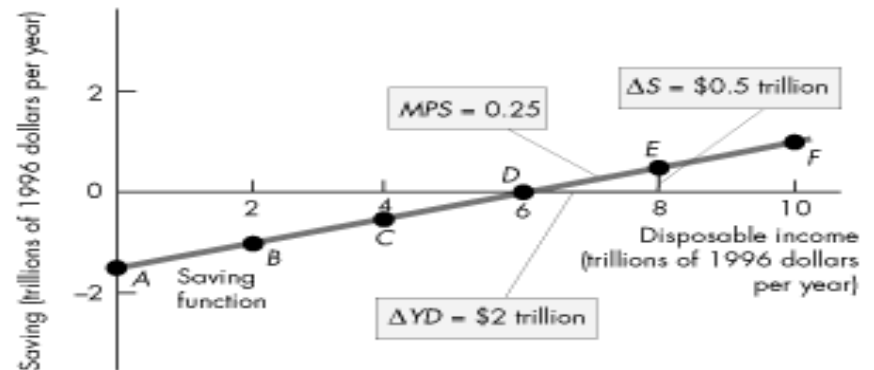
**C = Total Consumption, a = Autonomous Consumption,  
b = marginal propensity to consume, Y<sub>d</sub> = disposable  
income**

# Slopes and Marginal Propensities

- This Figure shows that the *MPC* is the slope of the consumption function and the *MPS* is the slope of the saving function.



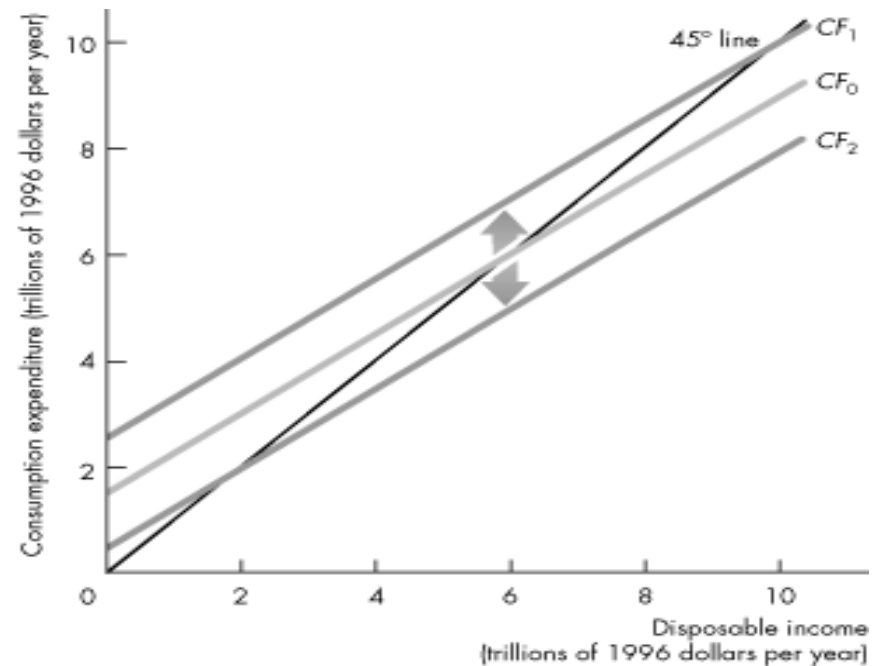
(a) Consumption function



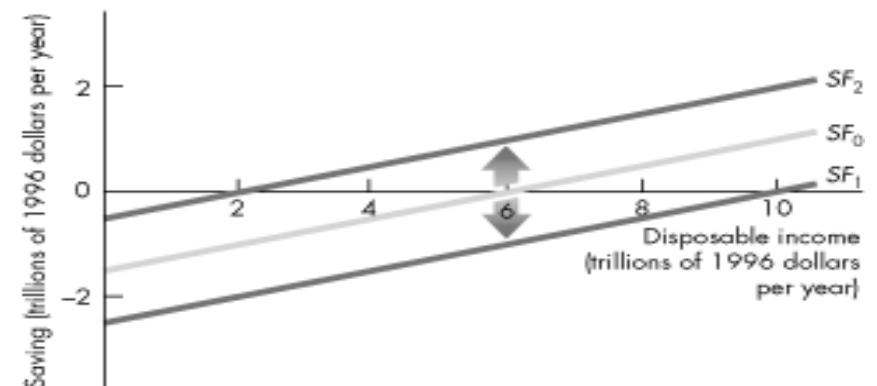
(b) Saving function

## Other Influences on Consumption Expenditure and Saving

- An upward shift of the consumption function implies a rightward shift of the aggregate demand curve.
- A downward shift of the consumption function implies a reduction / a leftward shift/ in aggregate demand.
- Shift factors include:
  - 1- Change in consumer confidence /expectations/
  - 2- Change in wealth
  - 3- Change in credit conditions
  - 4- Change in tax policy



(a) Consumption function



(b) Saving function



## Consumption as a Function of Real GDP

- **Disposable income changes when either real GDP changes or when 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 equilibrium expenditure.**



# Import Function

- **In the short run, imports are influenced primarily by the real GDP.**
- **The marginal propensity to import is the fraction of an increase in real GDP spent on imports.**





## Real GDP with a Fixed Price Level

- 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.

# Aggregate Expenditure Schedule

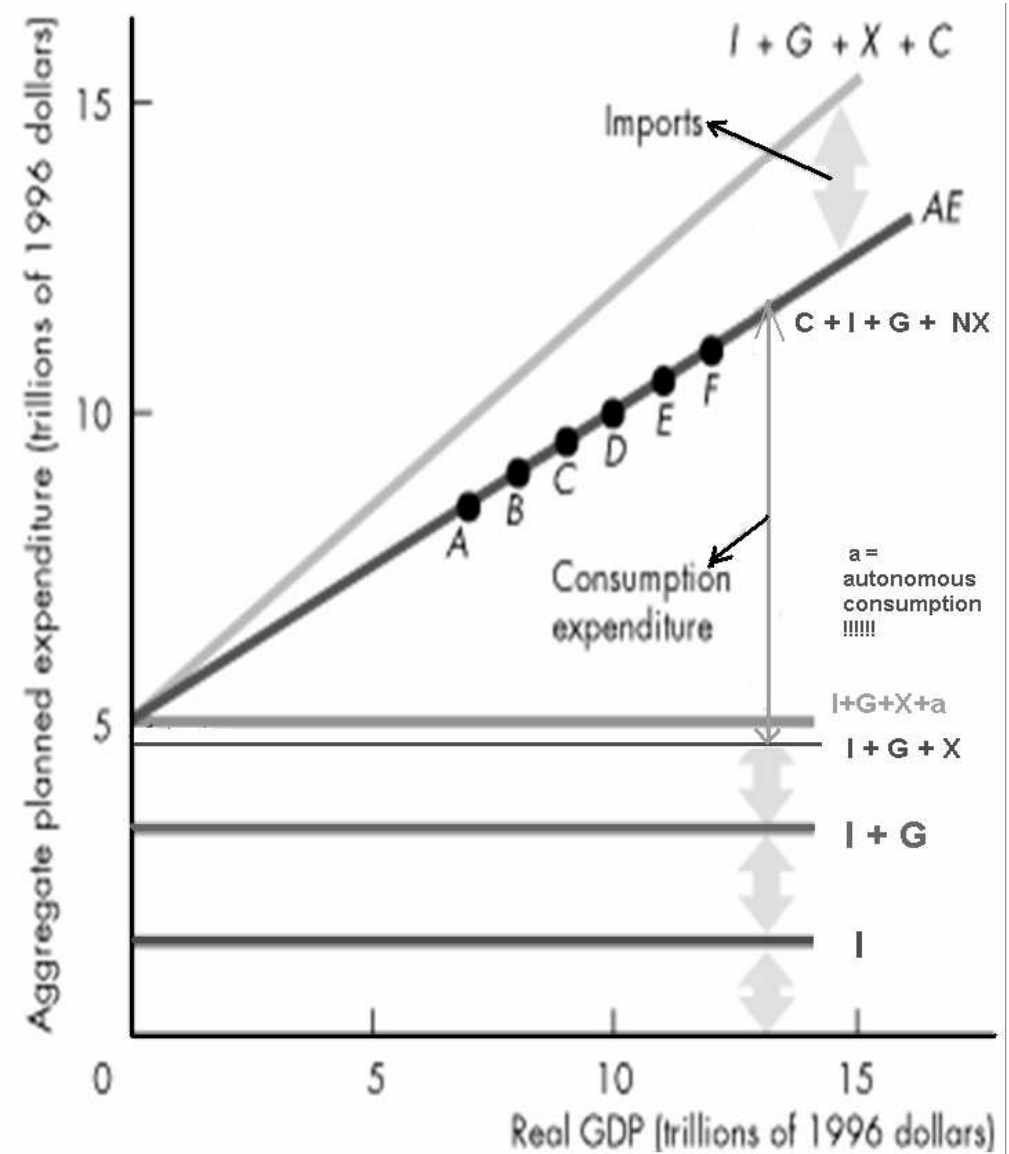
## Planned Expenditure

	Real GDP (Y)	Consumption Expenditure (C)	Investment (I)	Government Purchases (G)	Exports (X)	Imports (M)	AE = C+I+G+X-M
	TRILLIONS OF DOLLARS						
A	7	5.4	1	1.8	1.7	1.4	8.5
B	8	6.3	1	1.8	1.7	1.6	9.0
C	9	6.8	1	1.8	1.7	1.8	9.5
D	10	7.5	1	1.8	1.7	2.0	10.0
E	11	8.2	1	1.8	1.7	2.2	10.5
F	12	8.9	1	1.8	1.7	2.4	11.0

# Aggregate Planned Expenditure and Real GDP

- This Figure shows how the aggregate expenditure curve is built from its components

- $a = 0,5$  trillion
- $C = a + 0,7Y$
- $m$  – marginal propensity to import  $0,2Y$





## Real GDP with a Fixed Price Level

- **Consumption expenditure minus imports, which varies with real GDP, is induced expenditure.**
- **The sum of investment, government purchases, and exports, which does not vary with GDP, is autonomous expenditure.**



## 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.**
- **Private investment has three components**
  - Business Purchases of Plant, Equipment, and Software
  - New Home Construction
  - ***CHANGES IN INVENTORIES !!!!!!!!!!!!!!!!!!!!!!!!!!!!!***



## Equilibrium Expenditure

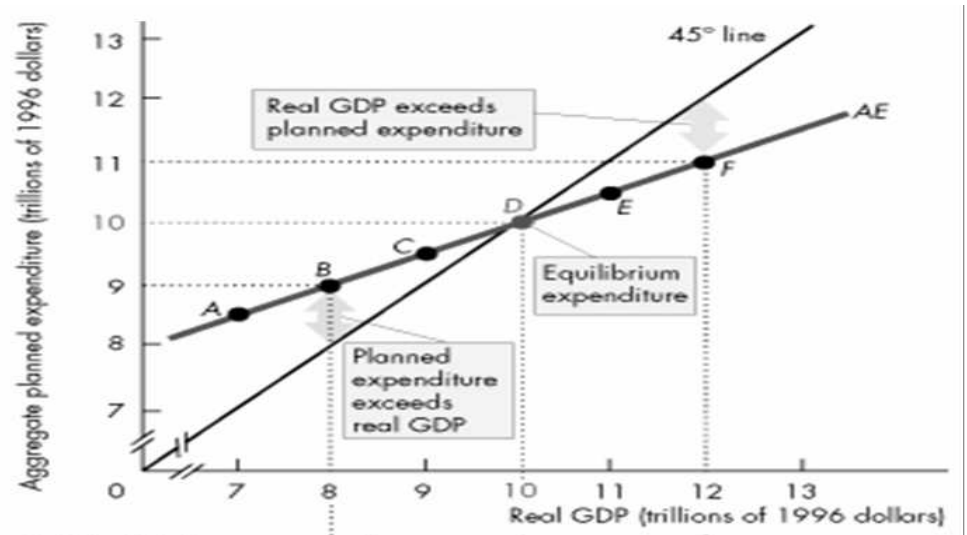
**Equilibrium expenditure is the level of aggregate expenditure that occurs when aggregate *planned* expenditure equals real GDP.**

# Equilibrium Expenditure

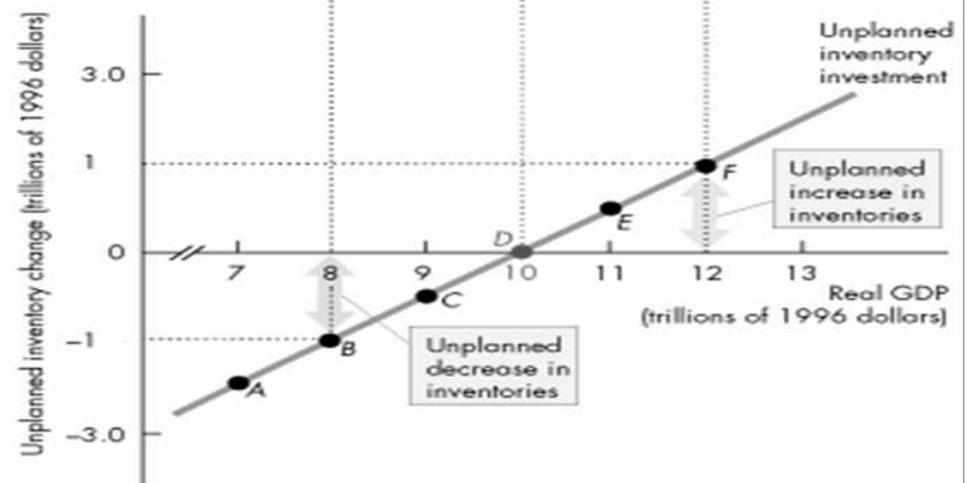
	<b>Real GDP (Y)</b>	<b>Aggregate Planned Expenditure (AE)</b>	<b>Unplanned Inventory Change (Y-AE)</b>
	Trillions of Dollars		
<b>A</b>	<b>7</b>	<b>8.5</b>	<b>-1.5</b>
<b>B</b>	<b>8</b>	<b>9.0</b>	<b>-1.0</b>
<b>C</b>	<b>9</b>	<b>9.5</b>	<b>-0.5</b>
<b>D</b>	<b>10</b>	<b>10.0</b>	<b>0</b>
<b>E</b>	<b>11</b>	<b>10.5</b>	<b>0.5</b>
<b>F</b>	<b>12</b>	<b>11.0</b>	<b>1.0</b>

# Real GDP with a Fixed Price Level

- This Figure illustrates equilibrium expenditure, which occurs at the point at which the aggregate expenditure curve crosses the 45° line and there are no unplanned changes in business inventories.



(a) Equilibrium expenditure

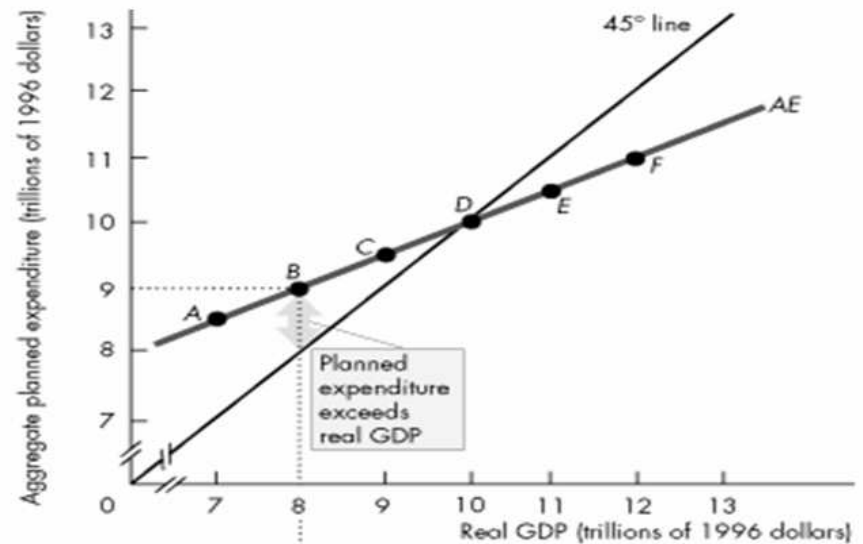


(b) Unplanned inventory changes

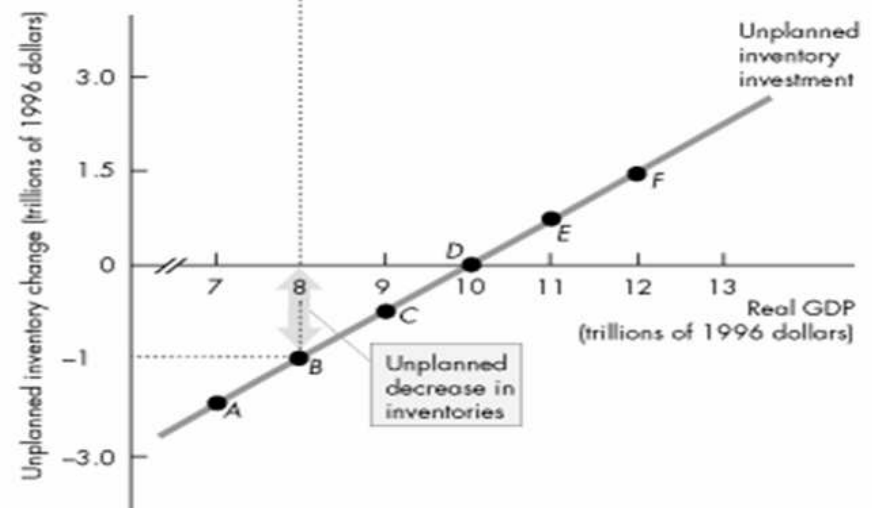


# Convergence to Equilibrium

- If aggregate planned expenditure is greater than real GDP (the *AE* curve is above the  $45^\circ$  line), an unplanned decrease in inventories [depletion] induces firms to hire workers and increase production, so real GDP increases.



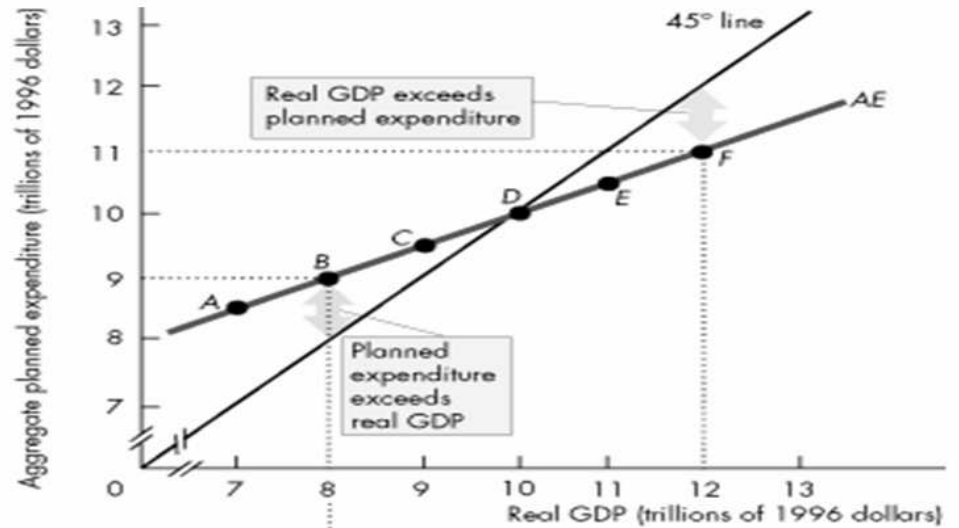
(a) Equilibrium expenditure



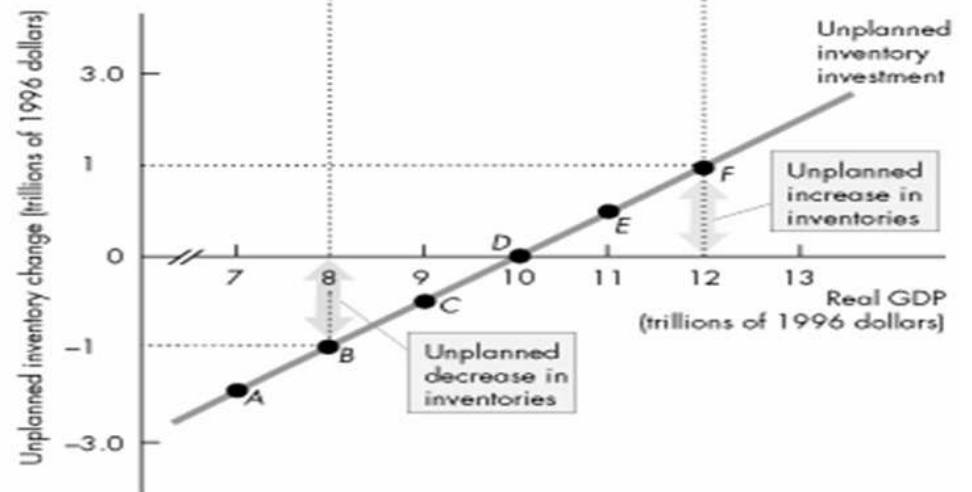
(b) Unplanned inventory changes

# Convergence to Equilibrium

- If aggregate planned expenditure is less than real GDP (the *AE* curve is below the 45° line), an unplanned increase in inventories induces firms to fire workers and decrease production, so real GDP decreases.



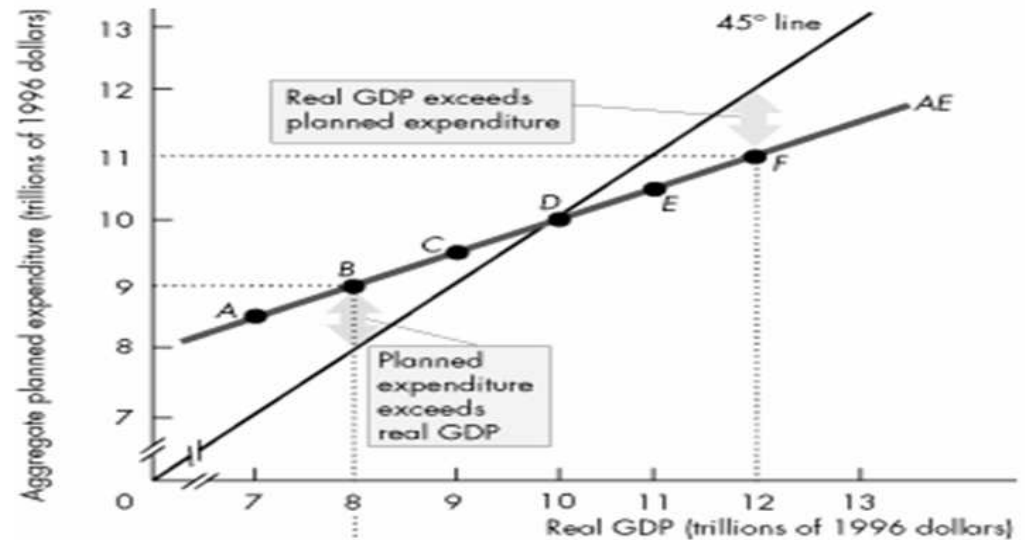
(a) Equilibrium expenditure



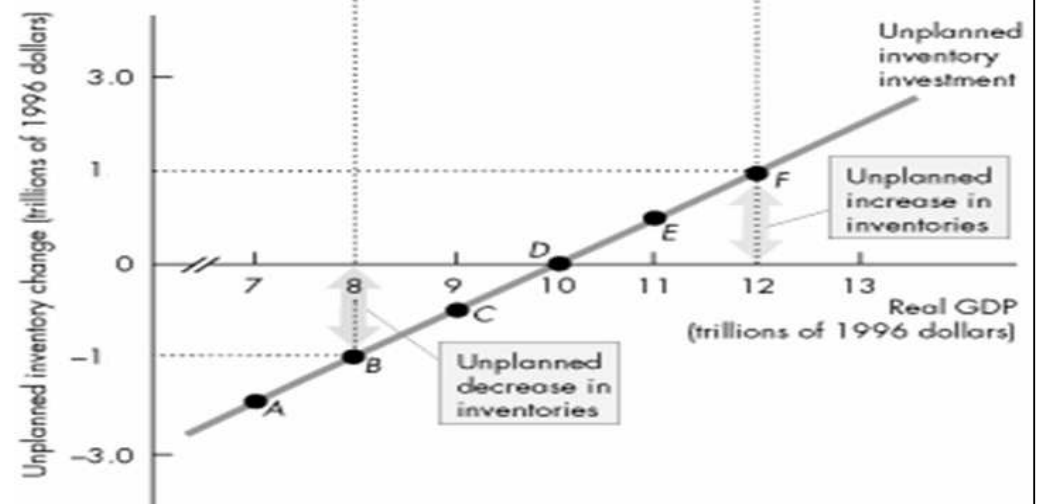
(b) Unplanned inventory changes

# Convergence to Equilibrium

- If aggregate planned expenditure equals real GDP (the *AE* curve intersects the  $45^\circ$  line), no unplanned changes in inventories occur, so firms maintain their current production and real GDP remains constant.



(a) Equilibrium expenditure



(b) Unplanned inventory changes



## The Multiplier

**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 is the rate of magnification or multiplication of increase in autonomous expenditure in terms of increased equilibrium expenditure and real GDP**

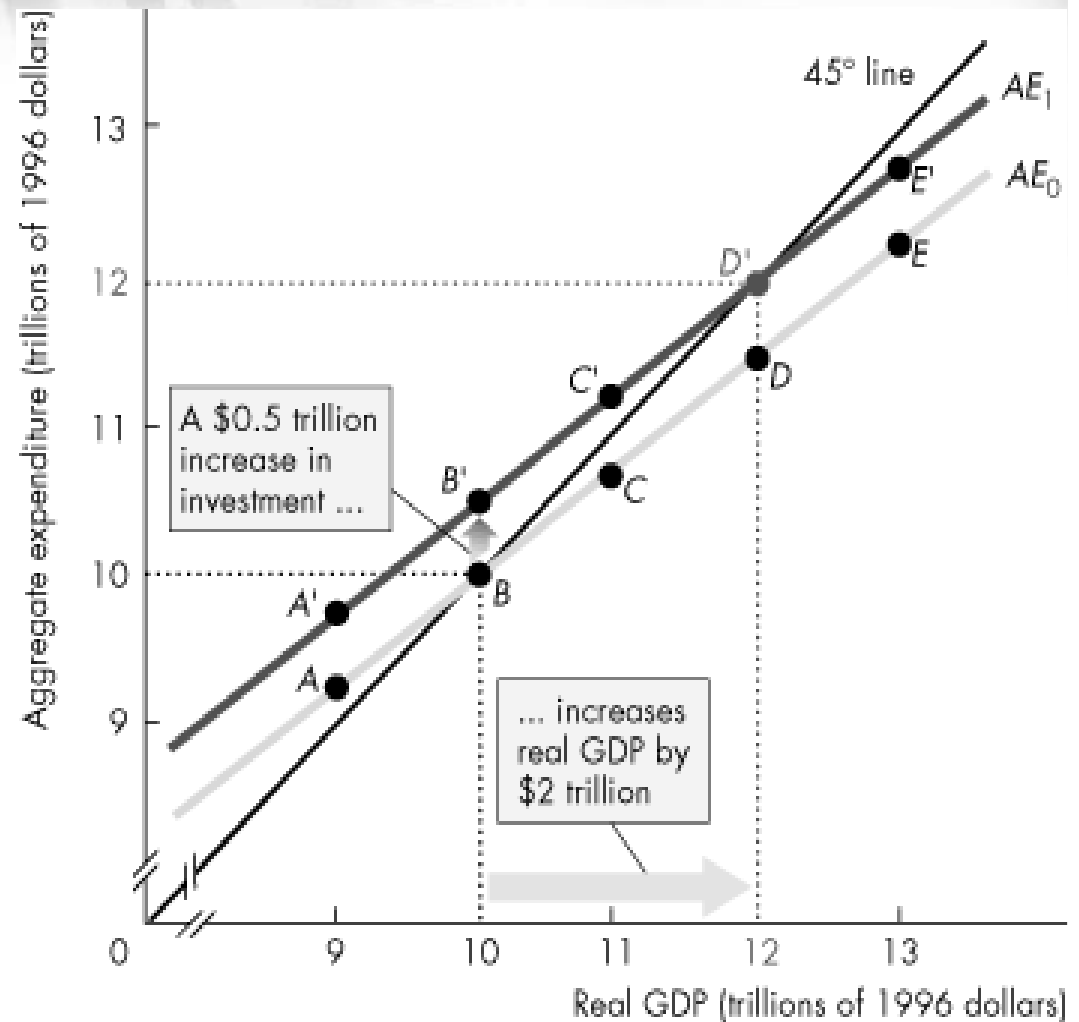


## The Basic Idea of the Multiplier

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

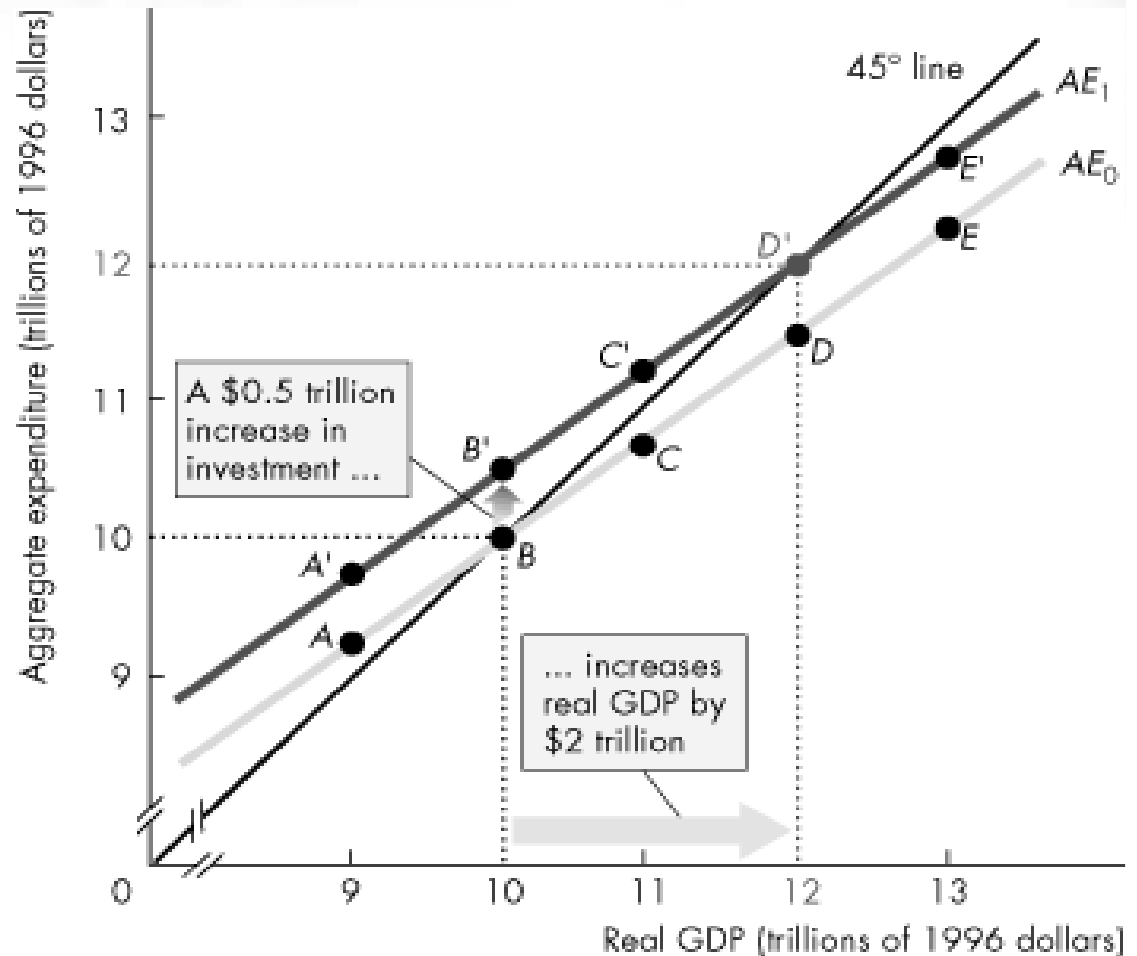
# The Multiplier Effect

- **The Multiplier Effect:**
  - The amplified change in real GDP that follows an increase in autonomous expenditure is the *Multiplier Effect*.



# The Multiplier Effect

- **When autonomous expenditure increases, inventories make an unplanned decrease, 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 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

- **Ignoring induced imports and income taxes, the marginal propensity to consume determines the magnitude of the multiplier.**
- **The multiplier equals  $1/(1 - MPC)$ , or alternatively,  $1/MPS$ .**

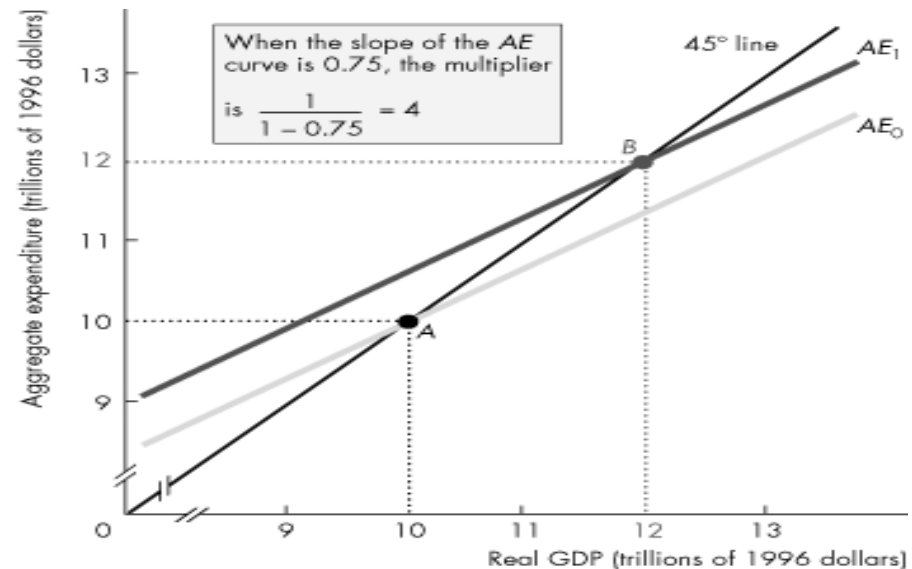


## Imports and Income Taxes

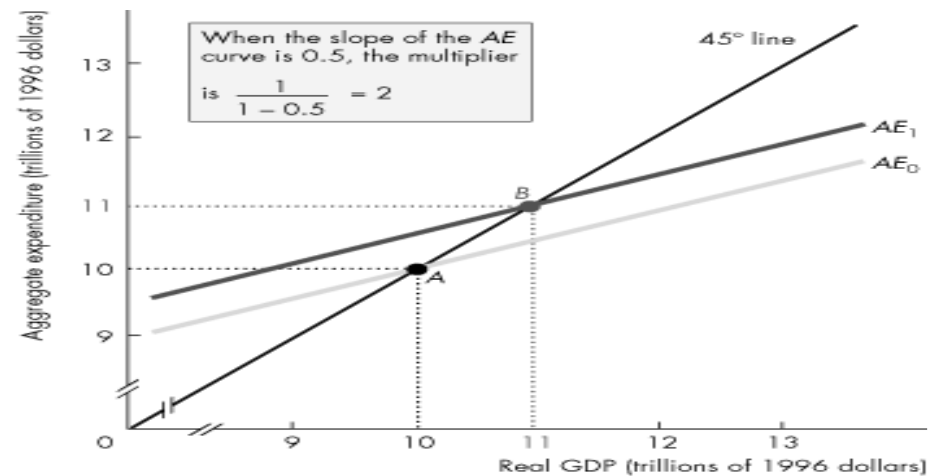
- **Income taxes and induced imports both reduce the size of the multiplier.**
- **Including income taxes and induced imports, the multiplier equals  $1/(1 - \text{slope of the } AE \text{ curve})$ .**

# The Multiplier

- This Figure shows the relation between the multiplier and the slope of the  $AE$  curve.
- In part (a) with no imports (or imports are autonomous) and no income taxes, the slope of the  $AE$  curve is 0.75 and the multiplier is 4.
- In part (b), when you include *either* income taxes or induced imports, the slope of the  $AE$  curve is 0.5 and the multiplier is 2.



(a) Multiplier is 4



(b) Multiplier is 2



## To Summarize:

- **The multiplier is larger:**
  - **The greater the marginal propensity to consume ( $c_1$ )**
  - **The smaller the marginal tax rate ( $t_1$ )**
  - **The smaller the marginal propensity to import ( $m_1$ )**
- **Note: Autonomous/Lump sum taxes,  $T_0$  and autonomous imports  $M_0$  do not affect the value of 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

- In the *equilibrium expenditure model*, the price level is constant.
  - But real firms don't hold their prices constant for long.
  - When they have an unplanned change in inventories, they change production *and prices*.
  - And the price level changes when firms change prices.
- The *aggregate supply-aggregate demand* model explains the simultaneous determination of real GDP and the price level.
- The two models are related.



## 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.



## Aggregate Expenditure and the Price Level

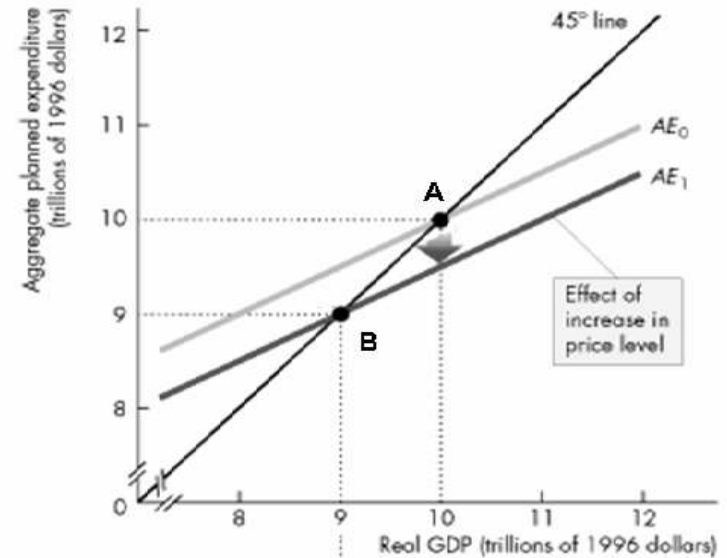
- **When the price level changes, a wealth effect and substitution effect change aggregate planned expenditure and change the quantity of real GDP demanded.**
- **The next slide illustrates the effects of a change in the price level on the *AE* curve, equilibrium expenditure, and the quantity of real GDP demanded.**



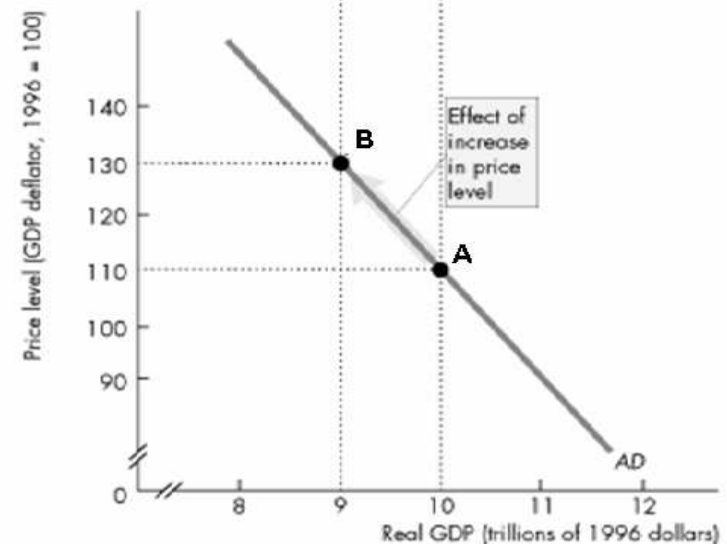
# The Multiplier and the Price Level

In this Figure (a), a rise in price level from 110 to 130 shifts the *AE* curve from *AE*<sub>0</sub> downward to *AE*<sub>1</sub> and decreases the equilibrium level of real output from \$10 trillion to \$9 trillion.

In this Figure (b), the same rise in the price level that lowers equilibrium expenditure, brings a movement along the *AD* curve to point *B*.

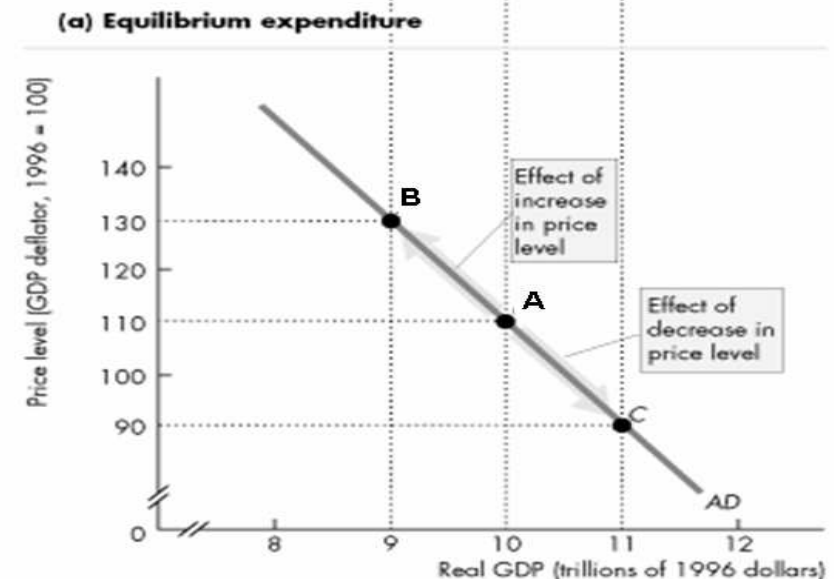
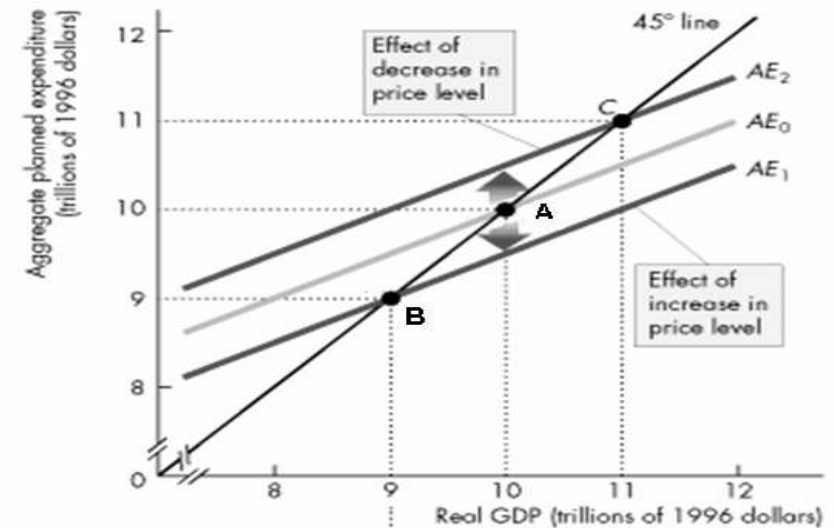


(a) Equilibrium expenditure



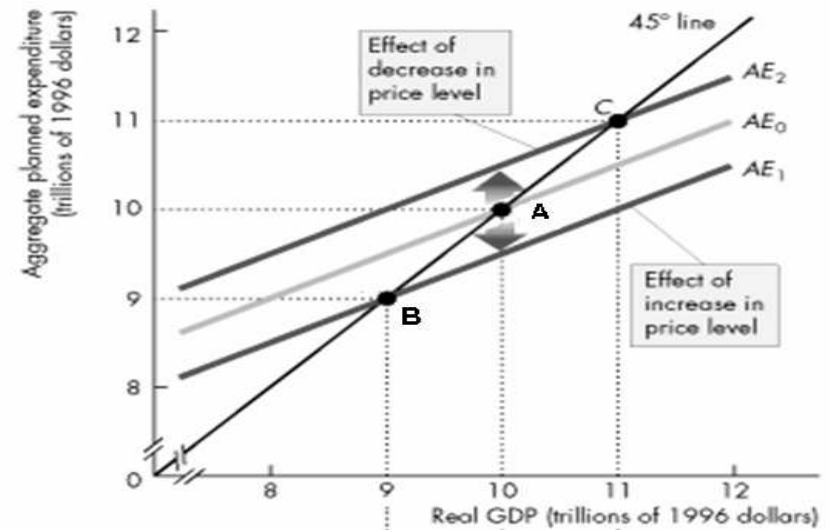
# The Multiplier and the Price Level

- A fall in price level from 110 to 90 shifts the  $AE$  curve from  $AE_0$  upward to  $AE_2$  and increases equilibrium real GDP from \$10 trillion to \$11 trillion.
- The same fall in the price level that raises equilibrium expenditure brings a movement along the  $AD$  curve to point C.

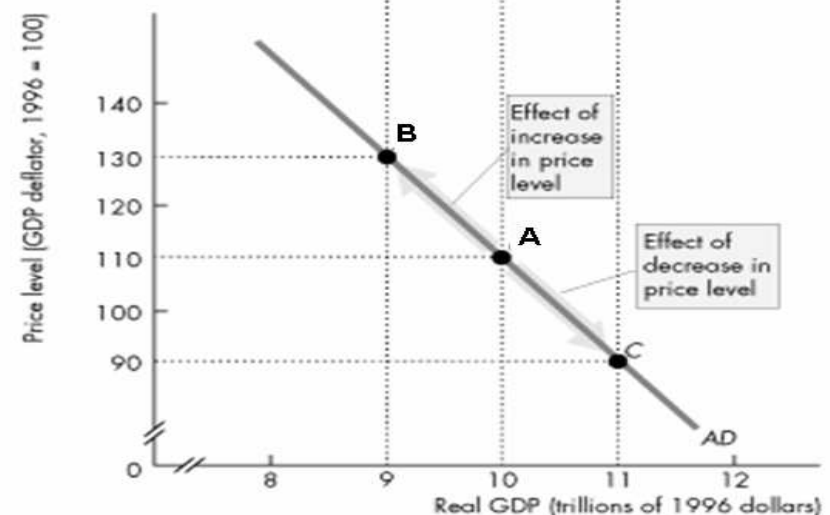


# The Multiplier and the Price Level

- 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.

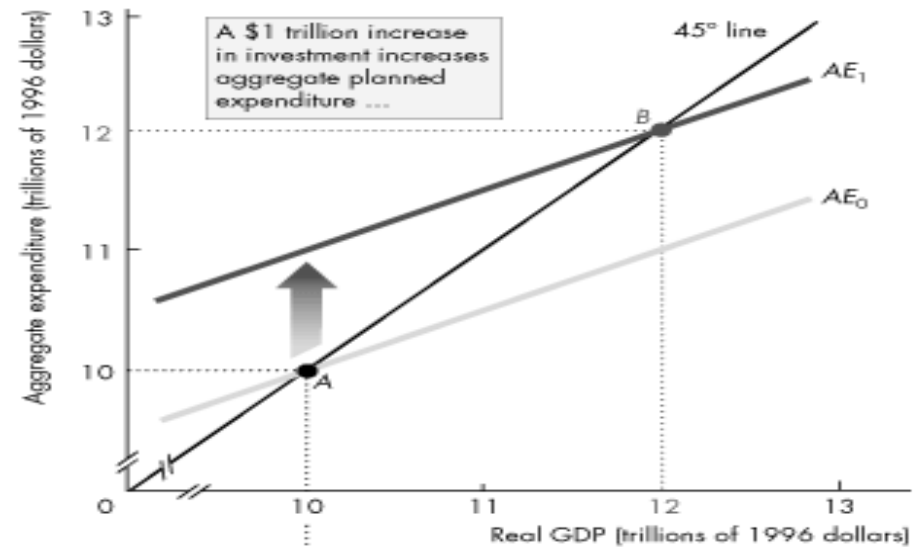


(a) Equilibrium expenditure

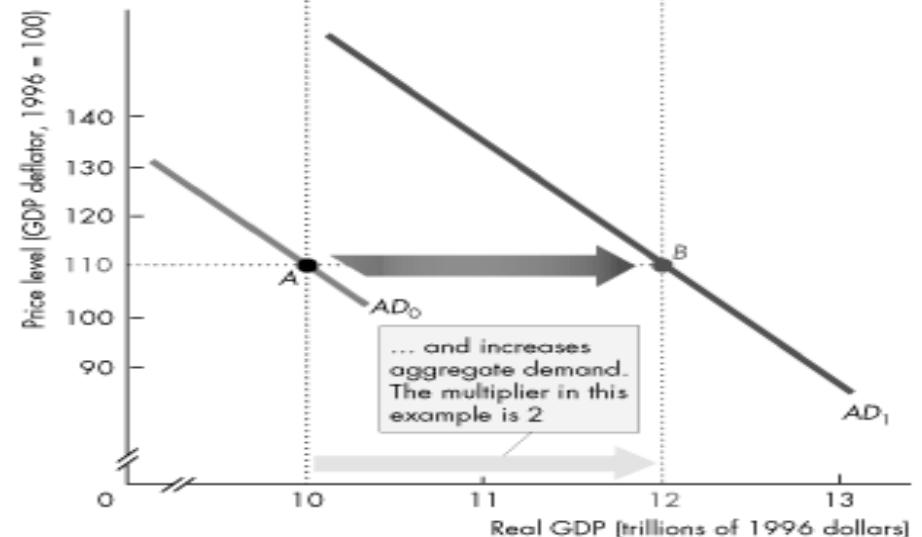


# The Multiplier and the Price Level

- This Figure illustrates the effects of an increase in autonomous expenditure.
- An increase in autonomous expenditure shifts the aggregate expenditure curve upward and shifts the aggregate demand curve rightward by the multiplied increase in equilibrium expenditure.



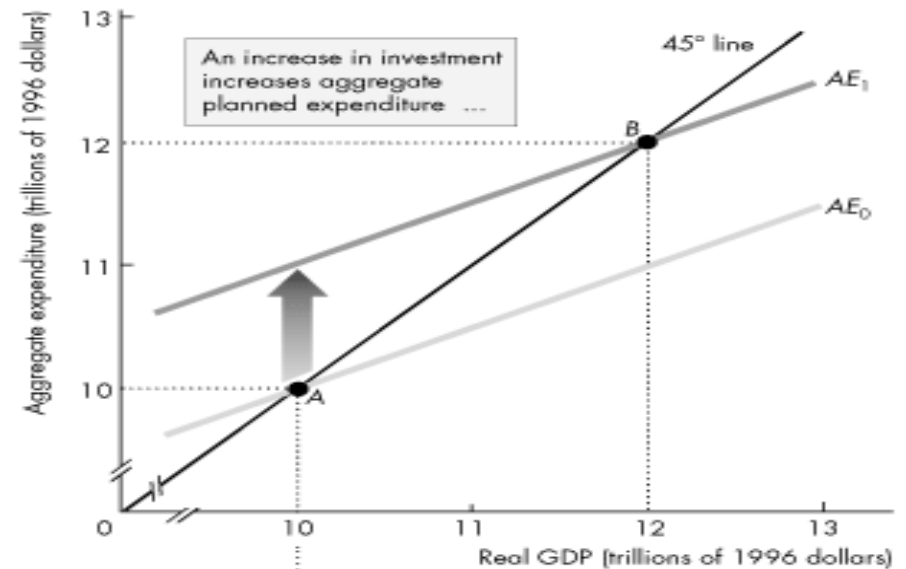
(a) Aggregate expenditure



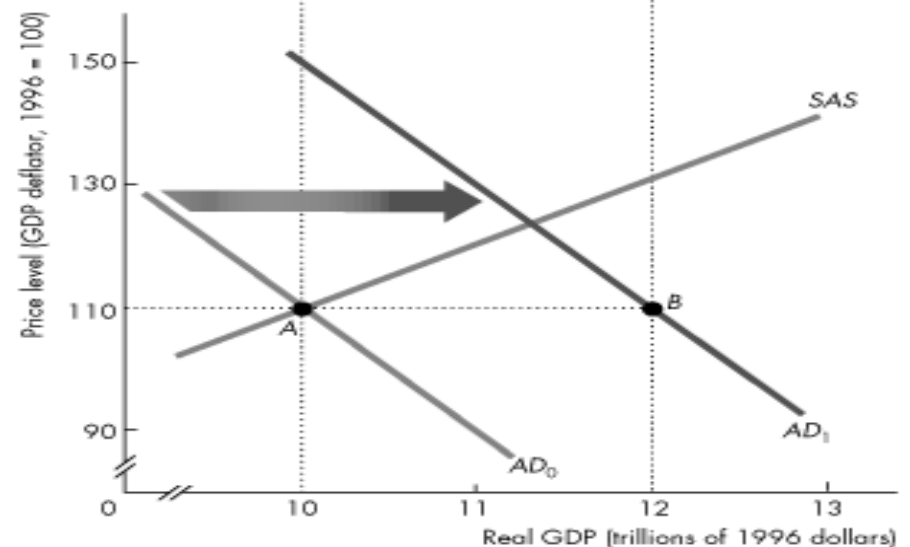
(b) Aggregate demand

# 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 \$12 trillion at point *B*.



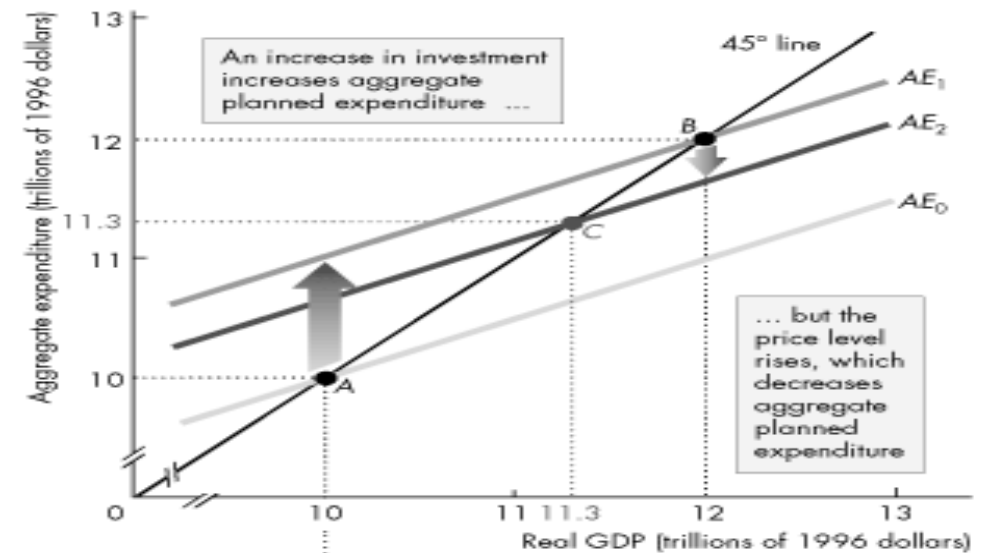
(a) Aggregate expenditure



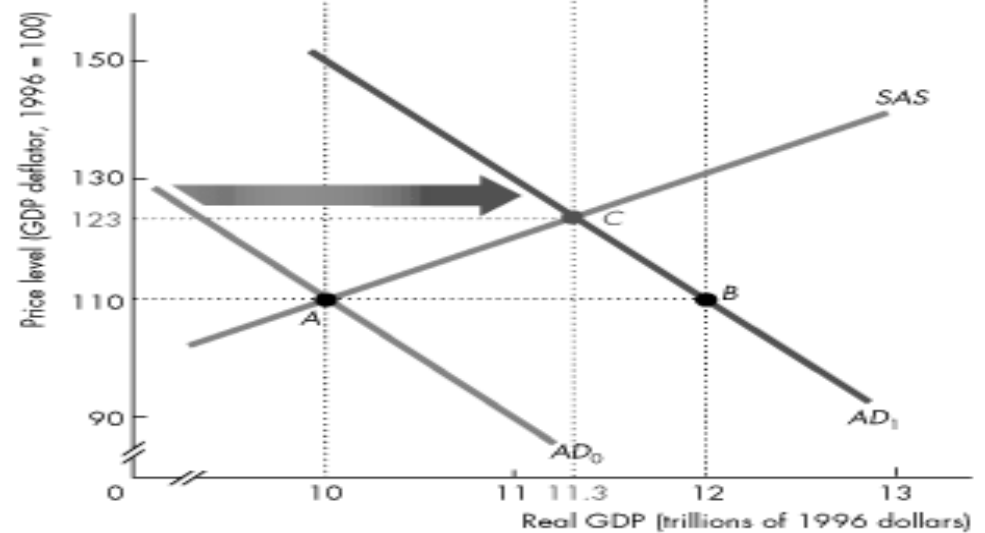
(b) Aggregate demand

# The Multiplier and the Price Level

- But the price level rises and the rise in the price level decreases aggregate planned expenditure and lowers the multiplier effect on real GDP.



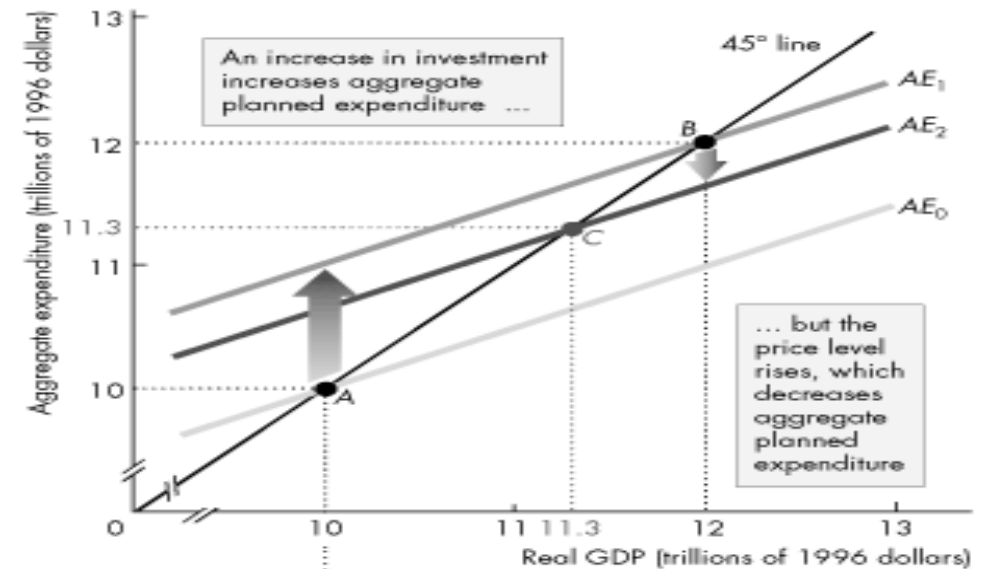
(a) Aggregate expenditure



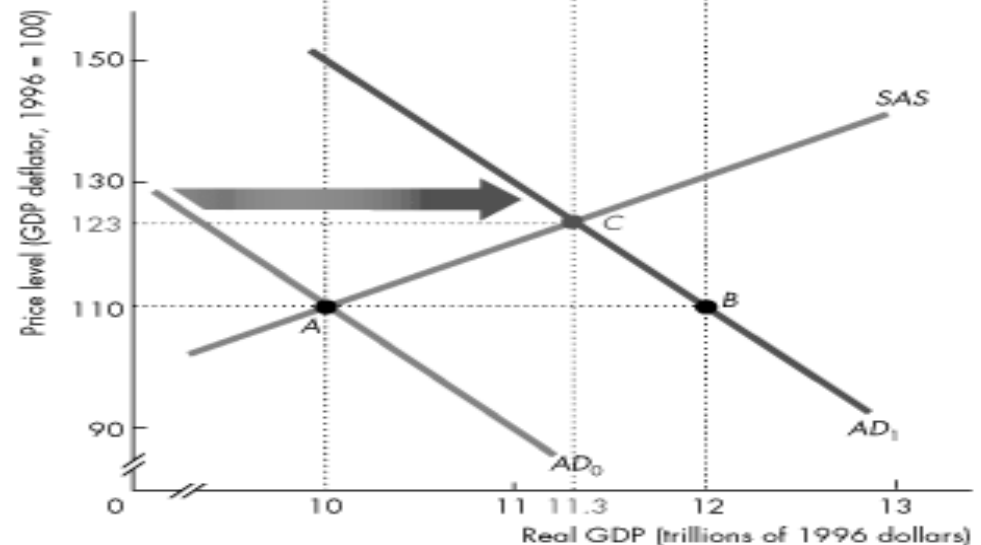
(b) Aggregate demand

# The Multiplier and the Price Level

- The *AD* curve shifts rightward by the amount of the multiplier effect but equilibrium real GDP increases by less than this amount because of the rise in the price level.



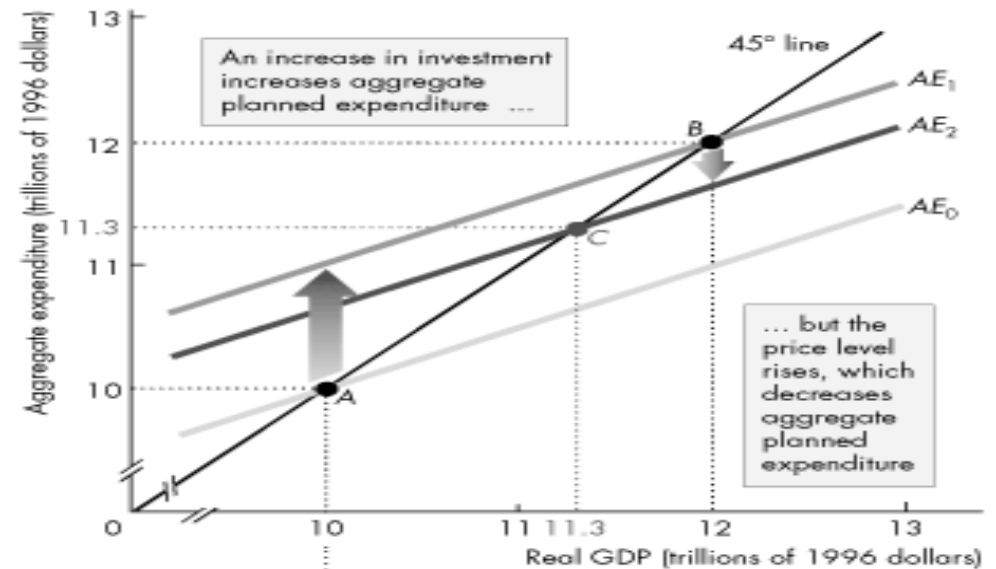
(a) Aggregate expenditure



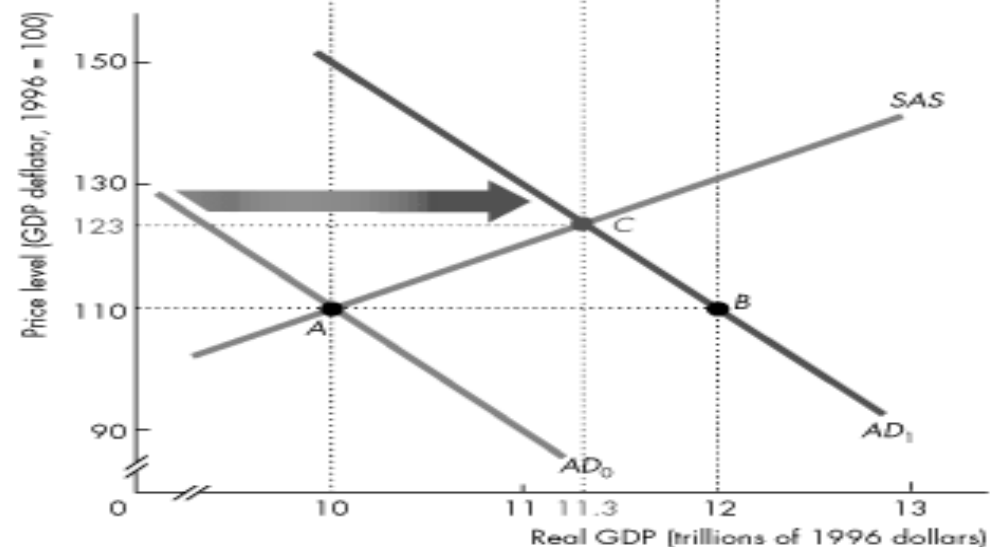
(b) Aggregate demand

# The Multiplier and the Price Level

- **Real GDP increases from \$10 trillion to \$11.3 trillion, instead of to \$12 trillion as it does with a fixed price level.**



(a) Aggregate expenditure

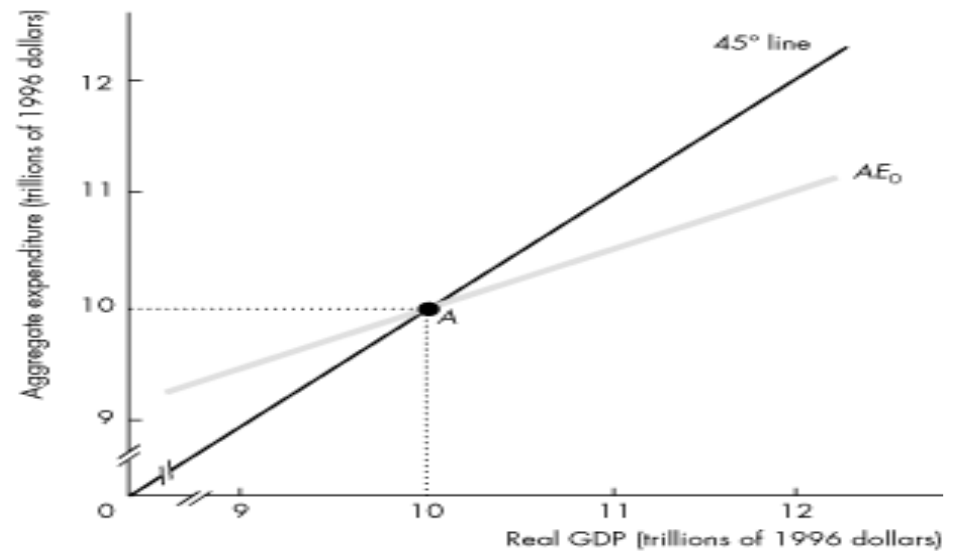


(b) Aggregate demand

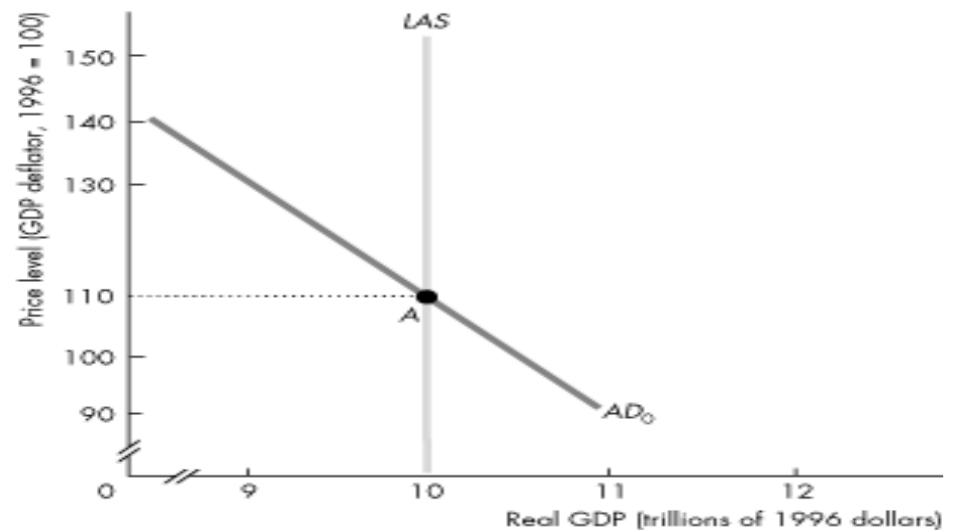


# The Multiplier and the Price Level

- This Figure illustrates the long-run effects of an increase in autonomous expenditure at full employment.



(a) Aggregate expenditure

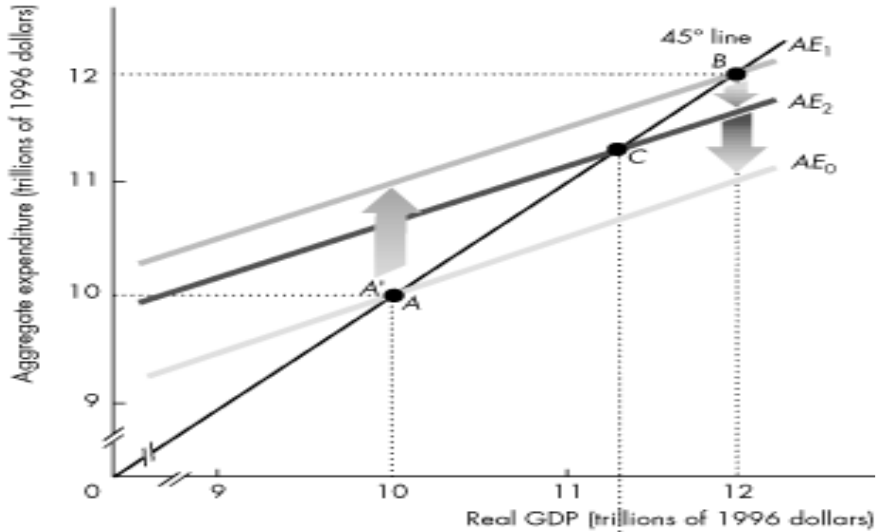


(b) Aggregate demand

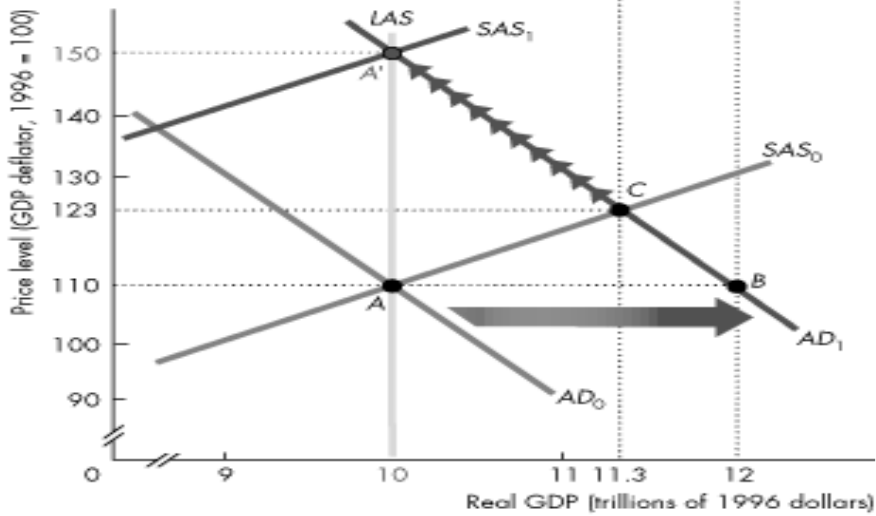


# The Multiplier and the Price Level

- If the increase in autonomous expenditure takes real GDP above potential GDP,
- the money wage rate rises, the SAS curve shifts leftward, and real GDP decreases until it is back at potential real GDP.
- The long-run multiplier is zero.



(a) Aggregate expenditure



(b) Aggregate demand



*Thank You for Attention*





# Literature

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- 2 - Fernando Quijano and Yvonn Quijano: Introduction to Macroeconomics
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