

# What Determines Aggregate Demand?

- *AS-AD model: emphasis on aggregate supply*
- *Now we are going to study a model that sheds more light on aggregate demand*
- *We will see how the two models are related*

# Keynesian Model

Assumption: ***The price level is fixed***

- *Think of a store that updates its prices every morning*
- *The store does not change prices throughout a day*
- *So, we are going to think what happens during a single day*
- *This way we are abstracting from aggregate supply*



# Keynesian Model

This model is what we call “demand driven”:

*The level of real GDP on any given day is determined by aggregate demand*

Now we need to find out what determines aggregate demand in this model

# Aggregate Planned Expenditure

The components of aggregate planned expenditure:

$$C + I + G + X - M$$

- *Planned consumption expenditure*
- *Planned investment*
- *Planned government expenditure*
- *Planned net exports*



# Aggregate Planned Expenditure

$$APE = C + I + G + X - M$$

We can find the GDP share of each component:

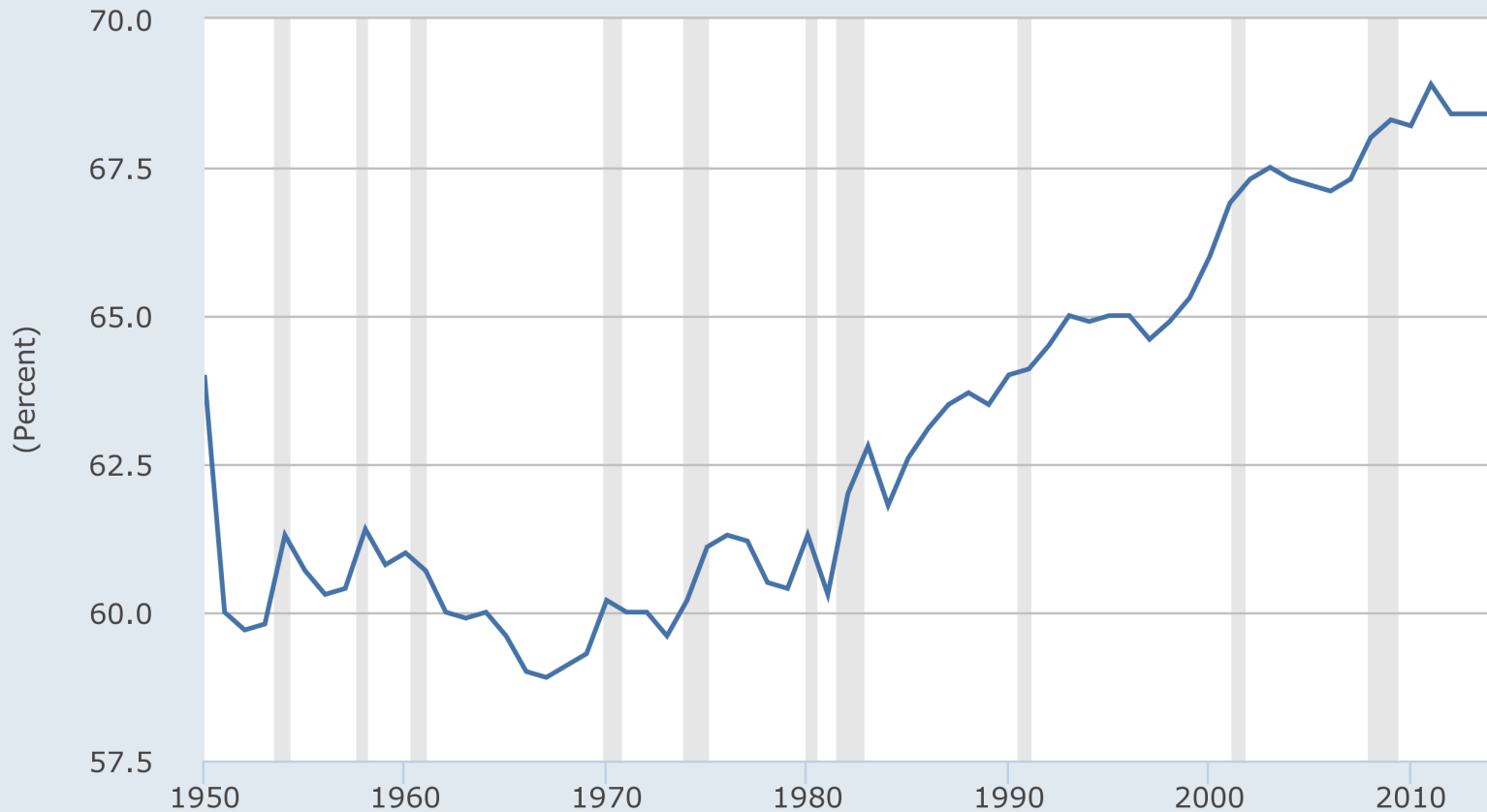
$$share_C = \frac{C}{Y}, \quad share_I = \frac{I}{Y}, \quad share_G = \frac{G}{Y}, \quad share_{NEX} = \frac{X - M}{Y}$$



# Consumption as a Share of GDP in U.S.

**FRED** 

— Shares of gross domestic product: Personal consumption expenditures



Source: US. Bureau of Economic Analysis

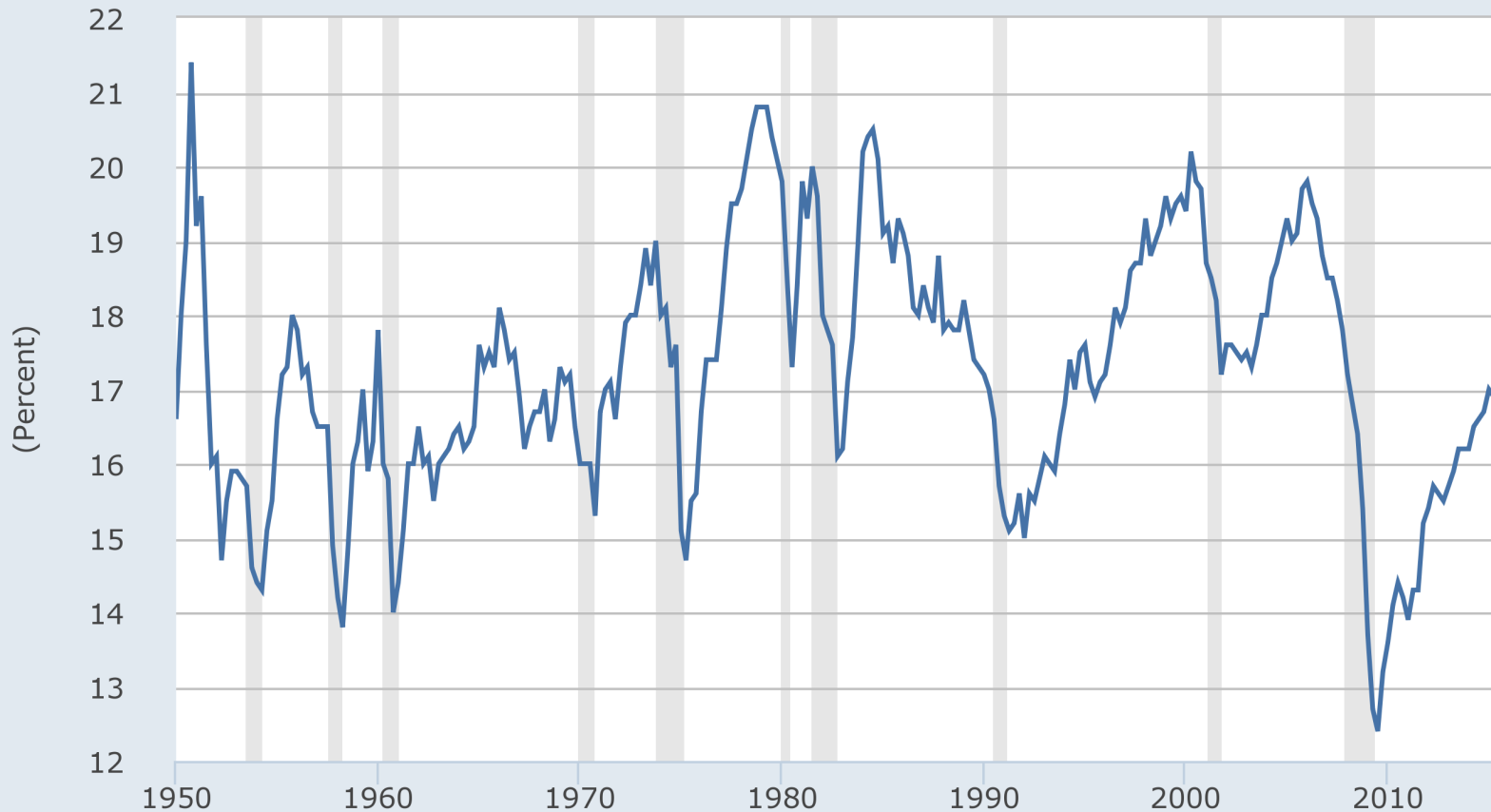
Shaded areas indicate US recessions - 2015 [research.stlouisfed.org](http://research.stlouisfed.org)



# Investment as a Share of GDP in U.S.

**FRED** 

— Shares of gross domestic product: Gross private domestic investment



Source: US. Bureau of Economic Analysis

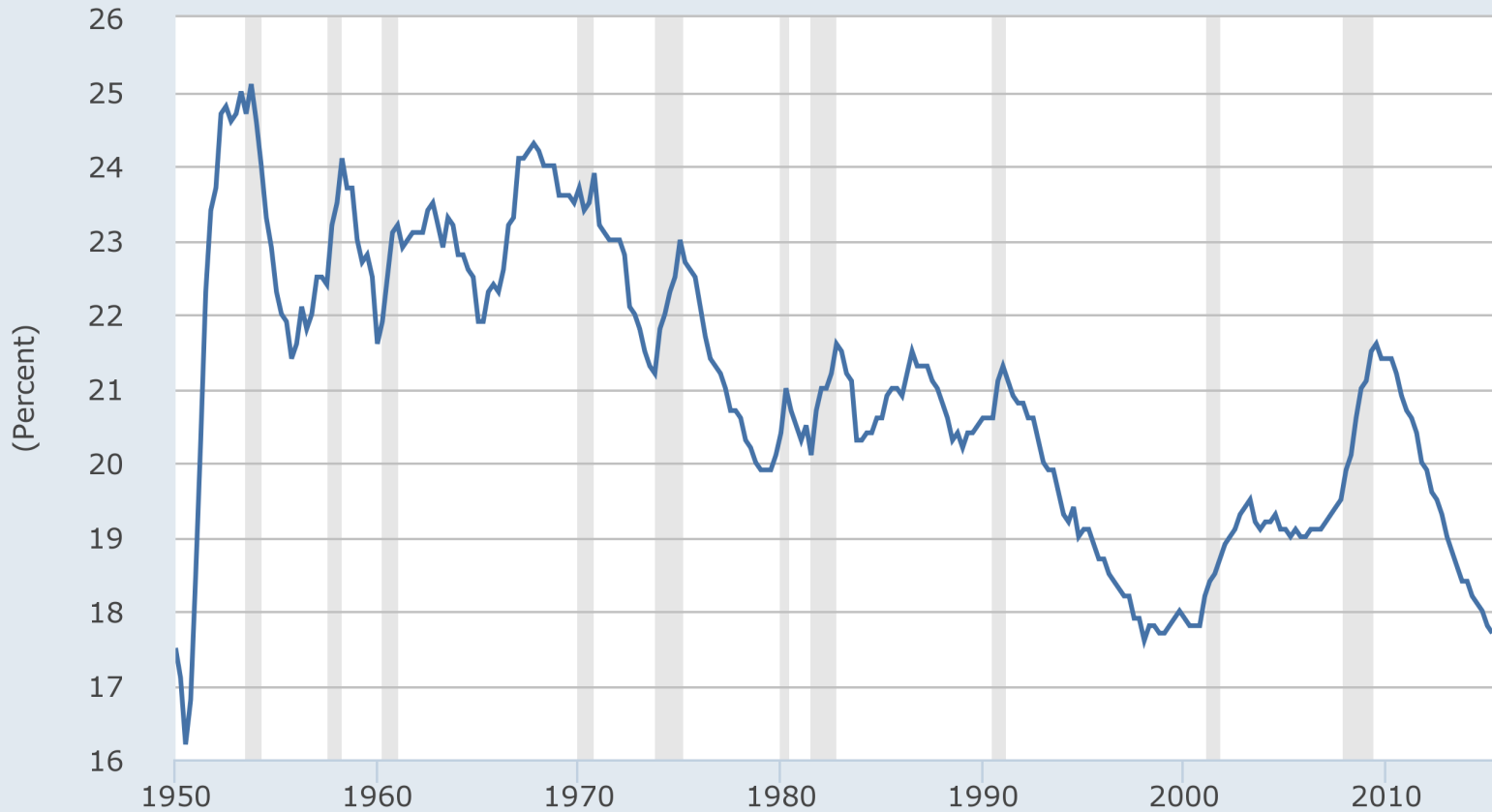
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# Gov-t Expenditure as a Share of GDP in U.S.

**FRED**

— Shares of gross domestic product: Government consumption expenditures and gross investment



Source: US. Bureau of Economic Analysis

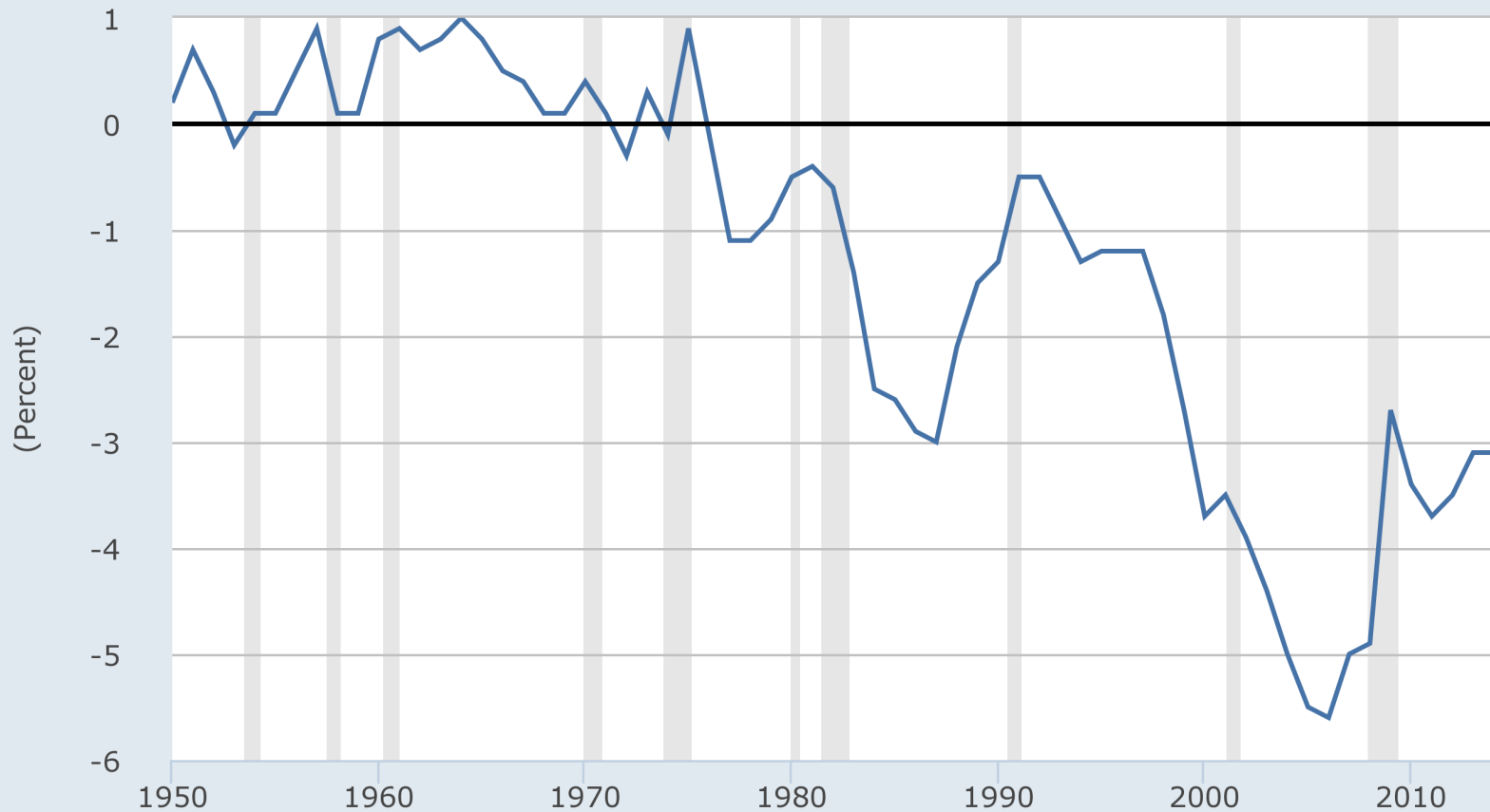
Shaded areas indicate US recessions - 2015 research.stlouisfed.org



# Net Exports as a Share of GDP in U.S.

**FRED** 

— Shares of gross domestic product: Net exports of goods and services



Source: US. Bureau of Economic Analysis

Shaded areas indicate US recessions - 2015 [research.stlouisfed.org](http://research.stlouisfed.org)

# Aggregate Planned Expenditure

- The share of net exports is very small
- Therefore, we usually abstract from net exports when studying U.S. economy
- In other words, we assume that U.S. is an autarky:

$$Y \approx C + I + G$$

- This will make our lives easier



# Consumption and Saving Plans

- Influenced by many factors but the most direct one is disposable income
- **Disposable income** is aggregate income or real GDP, minus net taxes:

$$YD = Y - T$$

- Disposable income can be spent on consumption of goods and services or saved:

$$YD = C + S$$



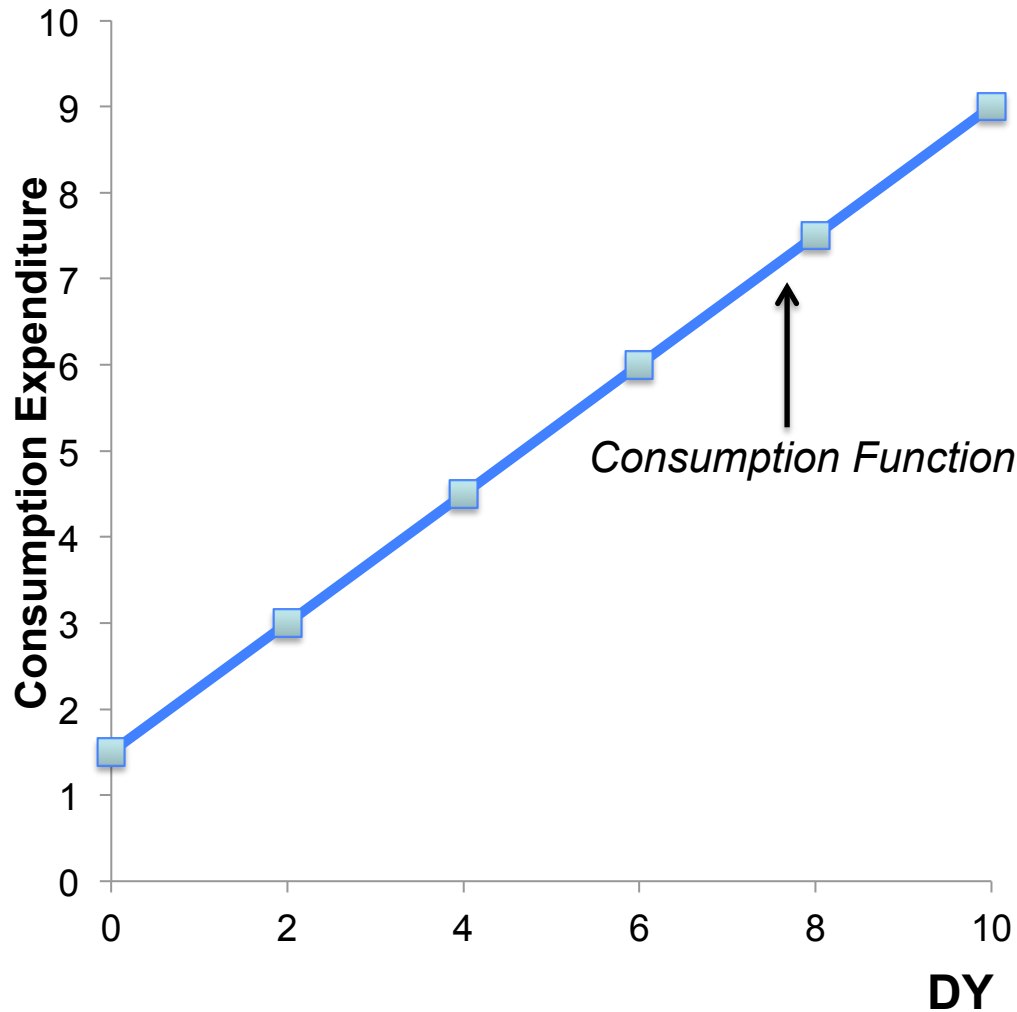
# Consumption Function

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

$$C = a + b \times YD$$



# Consumption Function



	DY	C	S
A	0	1.5	-1.5
B	2	3	
C	4	4.5	
D	6	6	
E	8	7.5	
F	10	9	

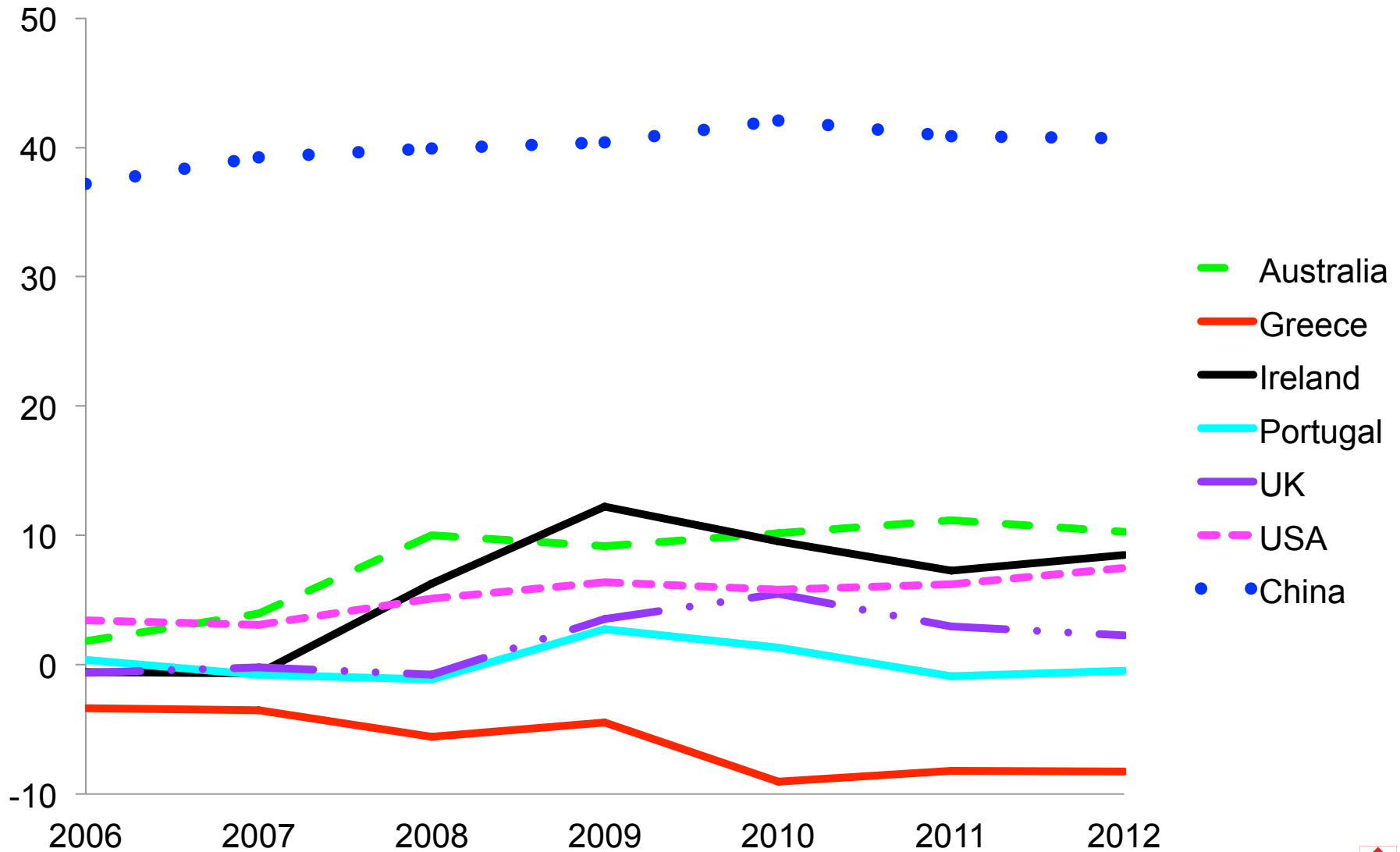
Consumption at Point A is **autonomous consumption**

Everything that is in excess of that is **induced consumption**





# Can Saving Be Negative?





# Consumption Function

- We know that disposable income is:

$$YD = Y - T$$

- We can substitute this into the consumption function:

$$C = a + b \times YD = a + b(Y - T)$$





# Aggregate Planned Expenditure as a Function of Real GDP

*Aggregate planned expenditure is:*

$$APE = C + I + G$$

*Use the consumption function:*

$$APE = a + b(Y - T) + I + G$$

*Simplify:*

$$APE = a - bT + I + G + bY$$



# Aggregate Planned Expenditure

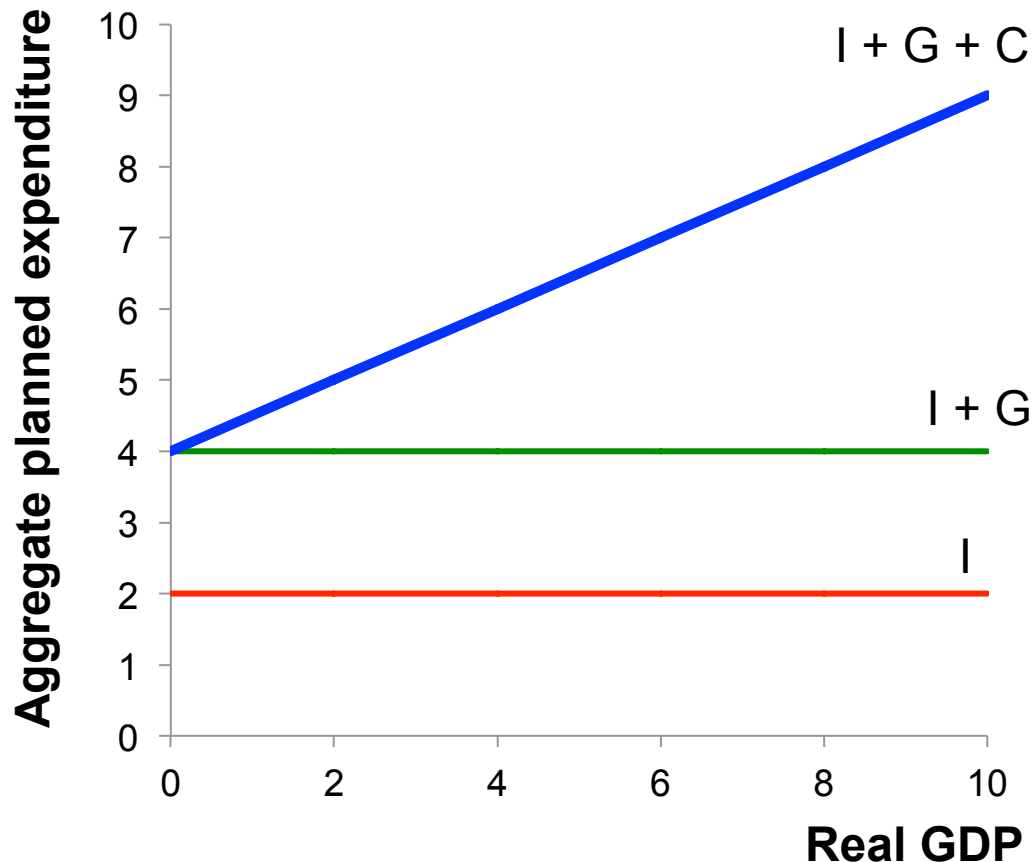
$$APE = a - bT + I + G + bY$$

- The part of aggregate planned expenditure that varies with real GDP is **induced expenditure**
- The part of aggregate planned expenditure that does not vary with GDP is **autonomous expenditure**



# Aggregate Planned Expenditure Curve

The relationship between aggregate planned expenditure and real GDP



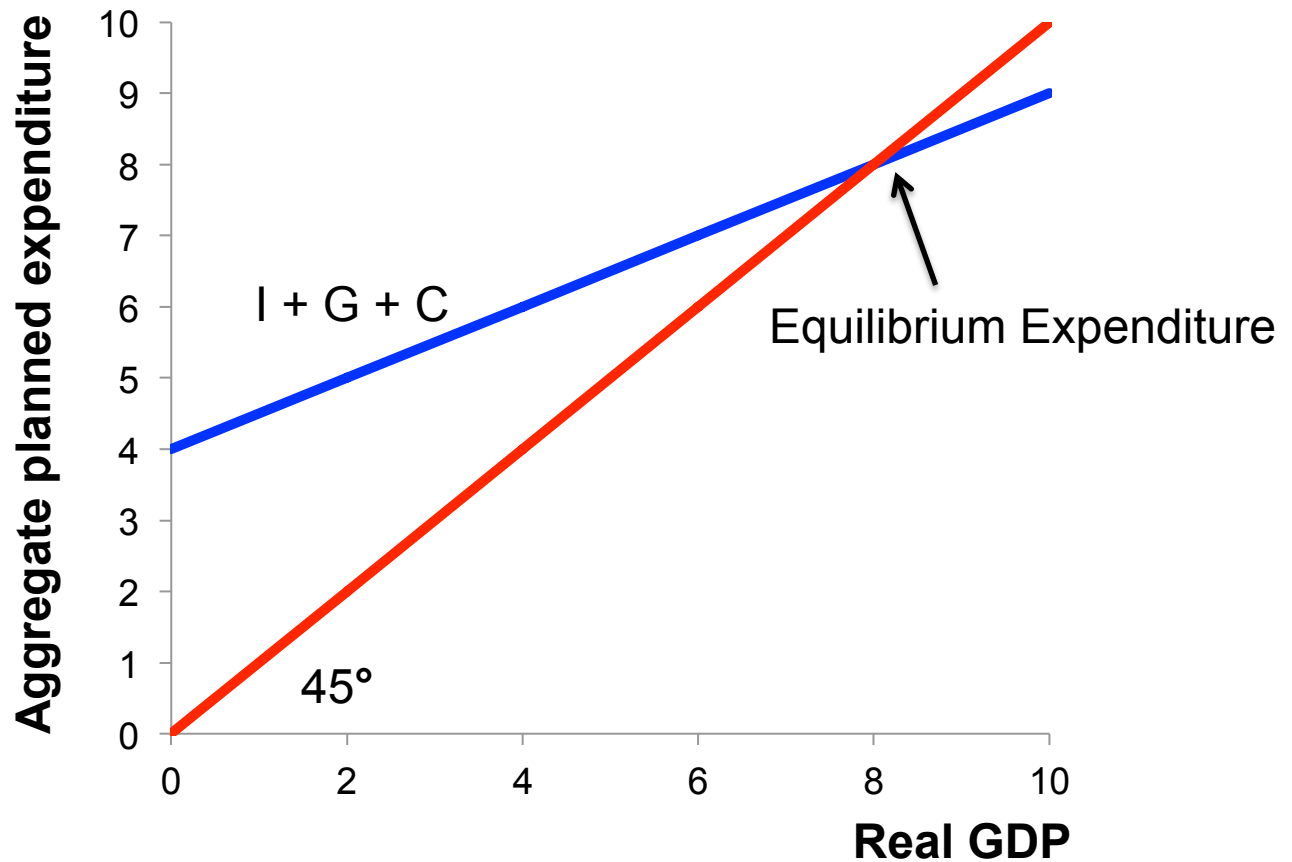


# Actual vs. Planned Expenditure

- *Aggregate planned expenditure* may differ from actual aggregate expenditure
- **Equilibrium expenditure** is the level of aggregate expenditure that occurs when aggregate *planned* expenditure equals real GDP



# Equilibrium Expenditure



# Equilibrium Expenditure

$$APE = Y$$

*Recall that:*

$$APE = a - bT + I + G + bY$$

*Therefore:*

$$Y = a - bT + I + G + bY$$

*We can collect Y:*

$$Y = \frac{1}{1 - b} \cdot (a - bT + I + G)$$

***What happens when I or G increase?***



# The Expenditure Multiplier

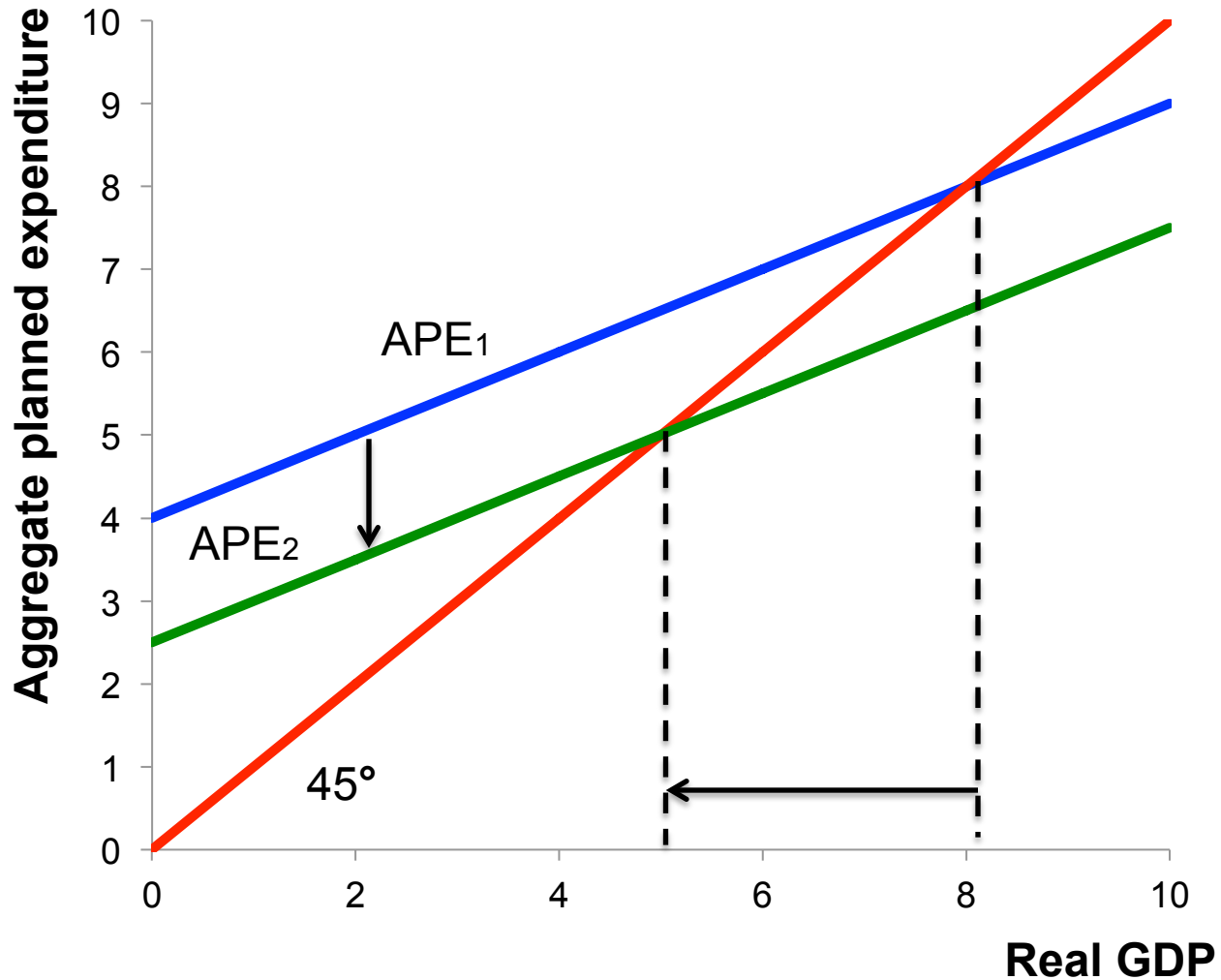
$$Y = \frac{1}{1 - b} \cdot (a - bT + I + G)$$

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

Recall that ***b*** is the slope of the APE curve



# The Expenditure Multiplier





# The Expenditure Multiplier

When gov-t expenditure decreases by 1.5:

Using the numbers from the figure:

$$b =$$

And the multiplier ( $m$ ) is:

$$m =$$



# The Expenditure Multiplier

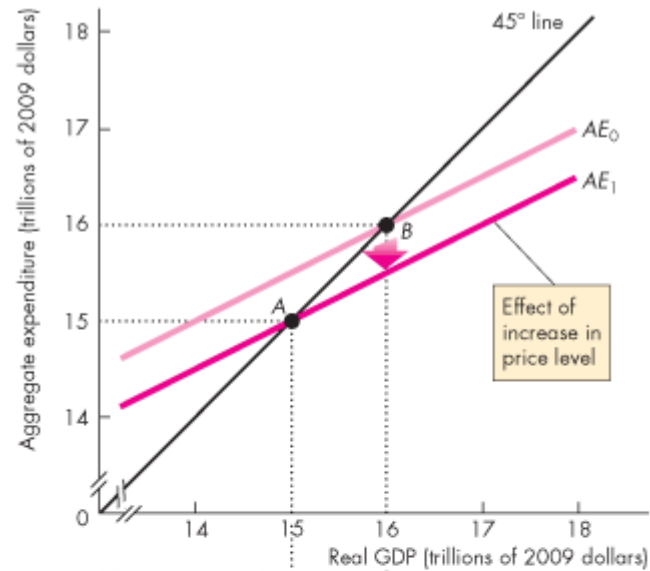
When investment increases by 1:

# The Multiplier and the Price Level

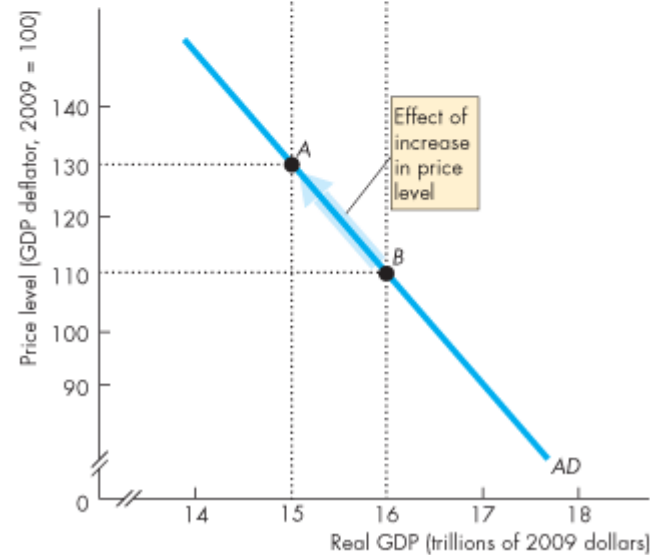
- So far, in this lecture we assumed that the price level is constant
- In reality, firms don't hold their prices constant, therefore the price level is not constant
- Recall that the *AS-AD* model simultaneously determines real GDP and the price level
- We can relate the two models



# Increase in the Price Level



(a) Equilibrium expenditure

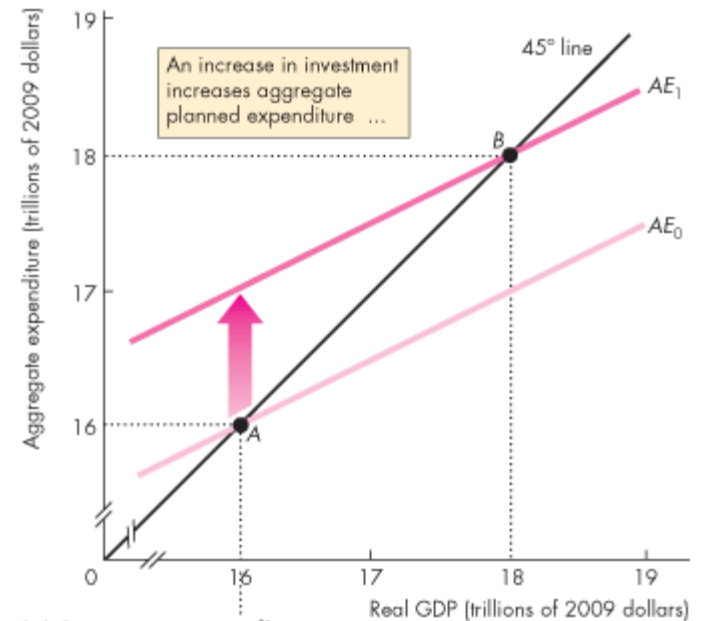


(b) Aggregate demand

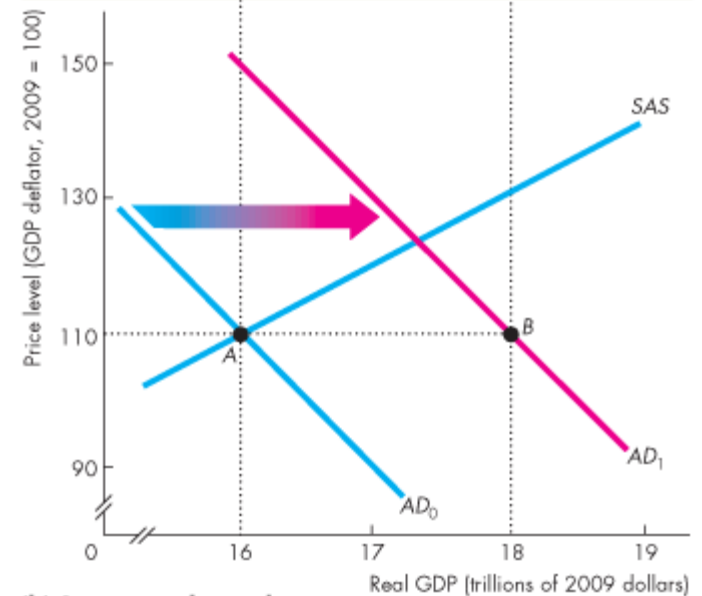
# Increase in G

The increase in gov-t expenditure shifts the  $AE$  curve upward and shifts the  $AD$  curve rightward

With no change in the price level, real GDP would increase to \$18 trillion at point  $B$



(a) Aggregate expenditure



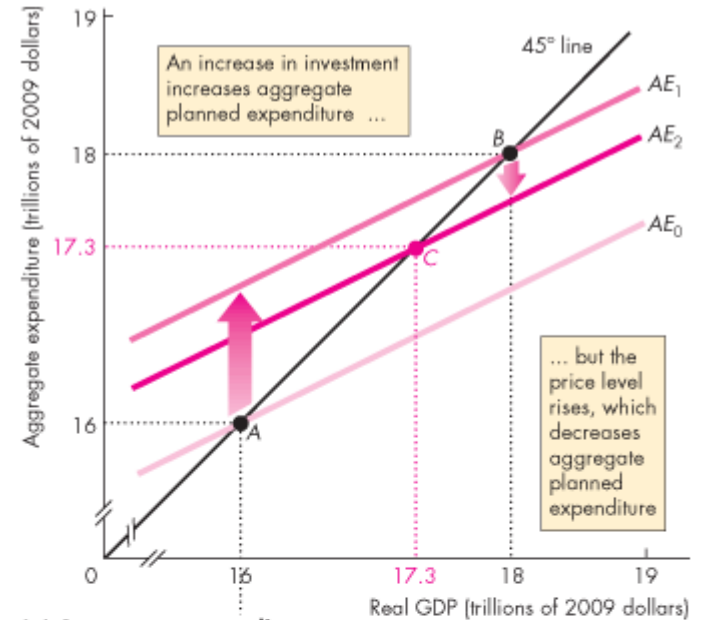
(b) Aggregate demand

# Increase in G

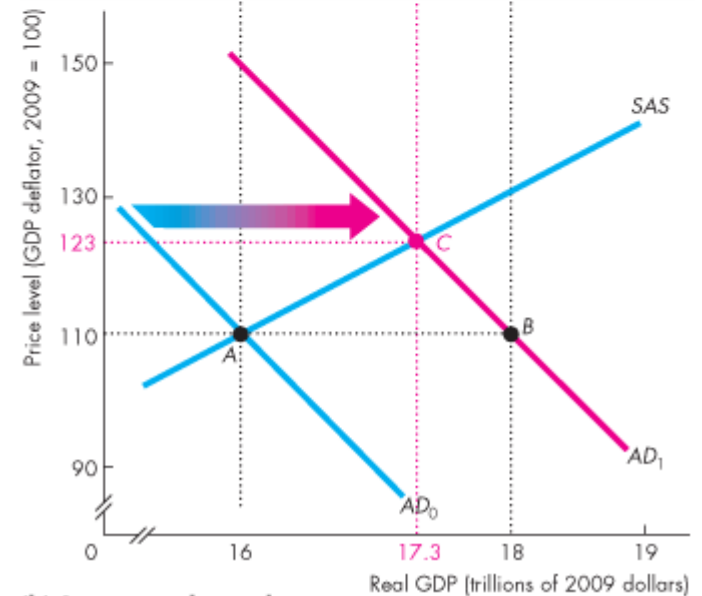
But the price level rises

The *AE* curve shifts downward

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



(a) Aggregate expenditure



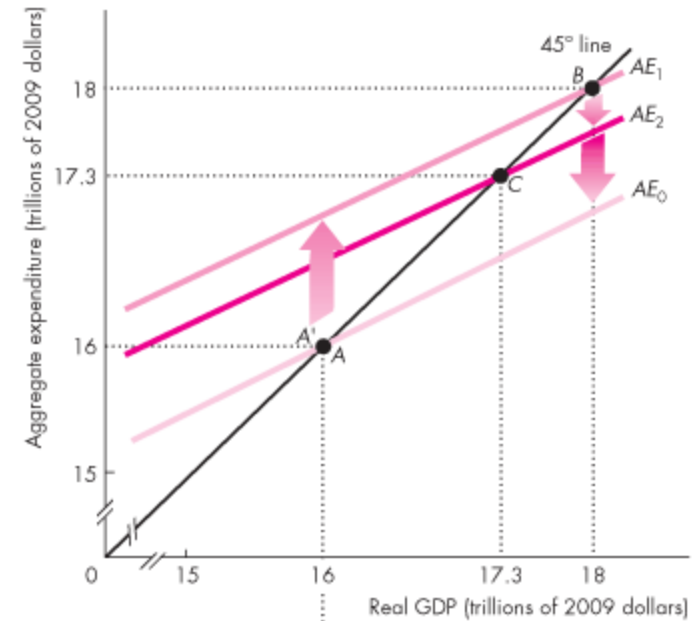
(b) Aggregate demand

# Increase in G Long-Run Effects

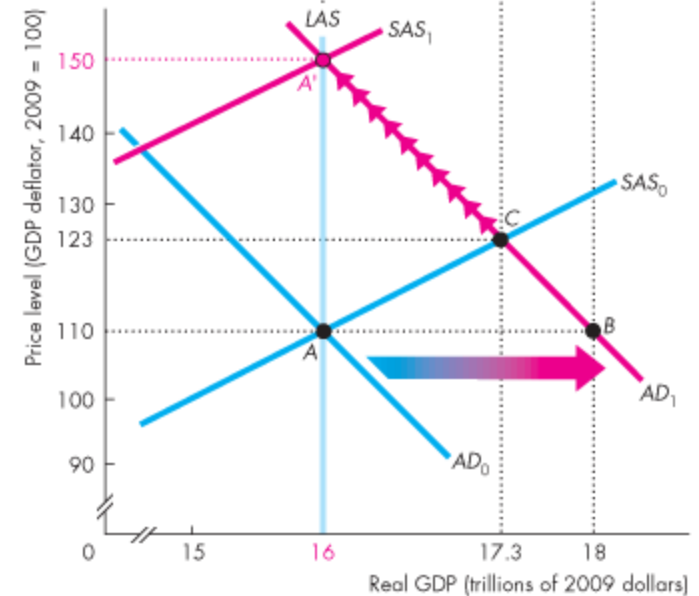
The money wage rate rises

SAS curve shifts leftward until real GDP equals potential GDP

In the long run, the multiplier is zero



(a) Aggregate expenditure



(b) Aggregate demand



# Estimated Output Multipliers of Major Provisions of the ARRA of 2009

Type of activity	Estimated output multipliers	
	Low estimate	High estimate
Purchase of goods and services by the Federal Government	0.5	2.5
Transfer payments to state and local governments for infrastructure	0.4	2.2
Transfer payments to state and local governments for other purposes	0.4	1.8
Transfer payments to individuals	0.4	2.1
One-time payments to retirees	0.2	1.0
Two-year tax cuts for lower- and middle-income people	0.3	1.5
One-year tax cut for higher-income people	0.1	0.6

Source: CBO (2012a), Table 2

<https://www.cbo.gov/sites/default/files/112th-congress-2011-2012/reports/02-22-ARRA.pdf>