

Lecture 5 Aggregate Expenditure and Output in Short Run

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Macroeconomics 201

February 17, 2025

The Road Ahead...

- 1 Aggregate Expenditure Model
- 2 Determinants of Aggregate Expenditure
- 3 Graphing Goods Market Equilibrium
- 4 Multiplier Effect
- 5 Aggregate Demand Curve

Aggregate Expenditure

- ▶ Keynes identified four categories of expenditures
 - ▶ consumption (C): expenditure by consumers
 - ▶ planned investment (I'): expenditure by firms (NO unplanned changes in inventories)
 - ▶ government purchases (G): expenditure by gov't, not including transfer payments
 - ▶ net exports (NX): net expenditure by foreigners, exports (EX) – imports (IM)
- ▶ Goods market equilibrium/IS relation

$$\underbrace{Y}_{\text{GDP}} = \underbrace{C + I' + G + NX}_{\text{aggregate expenditure (AE)}}$$

$$\Leftrightarrow \text{actual investment} = \text{planned investment}$$

Aggregate Expenditure Model

- ▶ A macro model that determines short-run output
 - ▶ relation between AE (total spending/demand) and GDP (total production/supply)
 - ▶ key assumptions: constant price level & no growth
- ▶ How AE model works
 - ▶ $AE > GDP \Rightarrow \text{inventories} \downarrow \Rightarrow (Y, N) \uparrow$
 - ▶ $AE < GDP \Rightarrow \text{inventories} \uparrow \Rightarrow (Y, N) \downarrow$
 - ▶ $AE = GDP \Rightarrow \text{inventories unchanged} \Rightarrow \text{goods market equilibrium}$
- ▶ GDP fluctuates due to changes in AE

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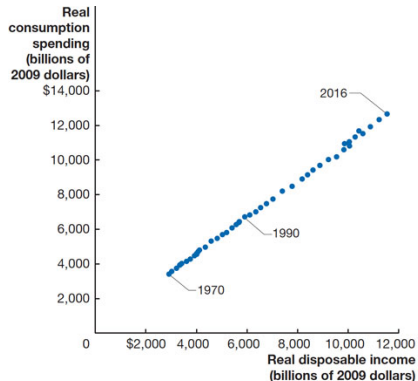
Determinants of Consumption

Consumption function

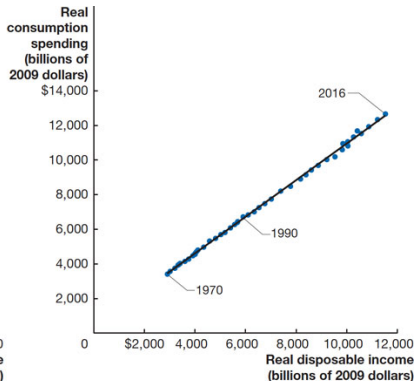
$$C = C(Y_D) = c_0 + c_1 Y_D, \quad Y_D = Y - T$$

- ▶ Some notations
 - ▶ C = consumption
 - ▶ T = net taxes (taxes net of transfers)
 - ▶ Y_D = disposable income
 - ▶ c_1 = marginal propensity to consume (MPC)
 - ▶ c_0 = autonomous consumption
- ▶ Other determinants: wealth, expected future income, **real interest rate (price of consumption today relative to tomorrow)**, price level

Consumption Function



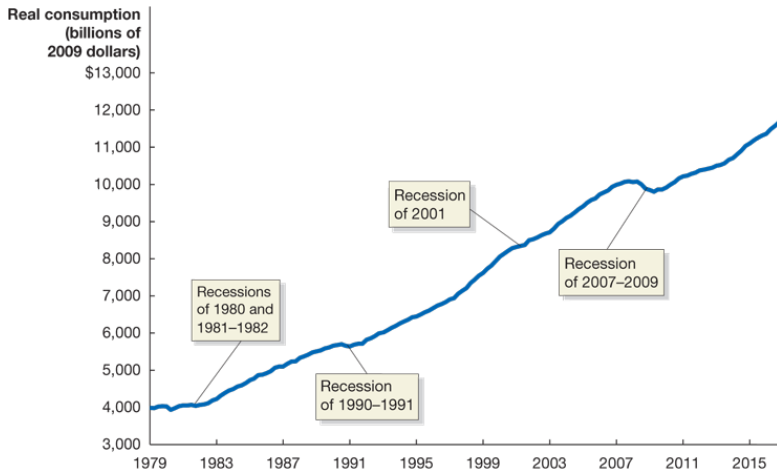
(a) Consumption and income, 1970–2016



(b) The consumption function

- ▶ Relation b/w consumption and income (source: BEA)
- ▶ $MPC = \text{slope of consumption function}$

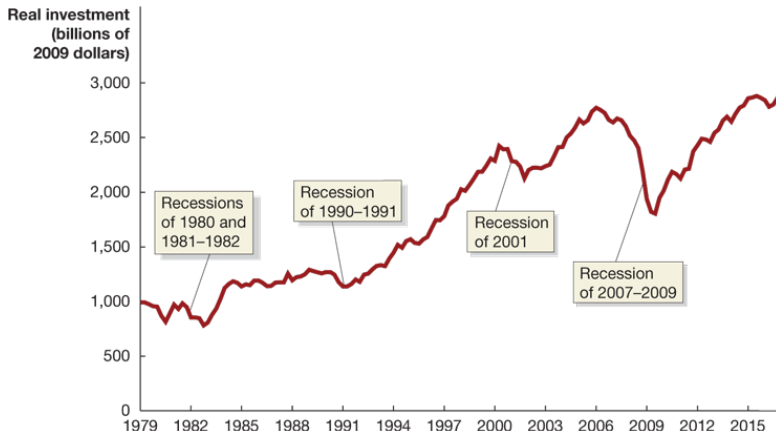
U.S. Consumption



► Real consumption, 1979-2017 (source: BEA)

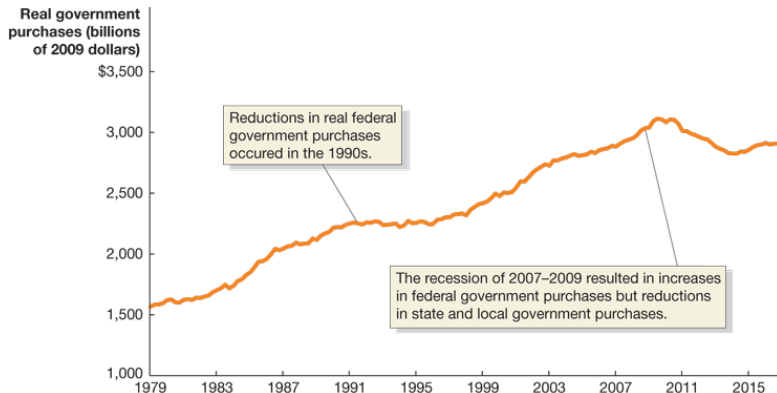
► Consumption follows smooth, upward trend

U.S. Investment



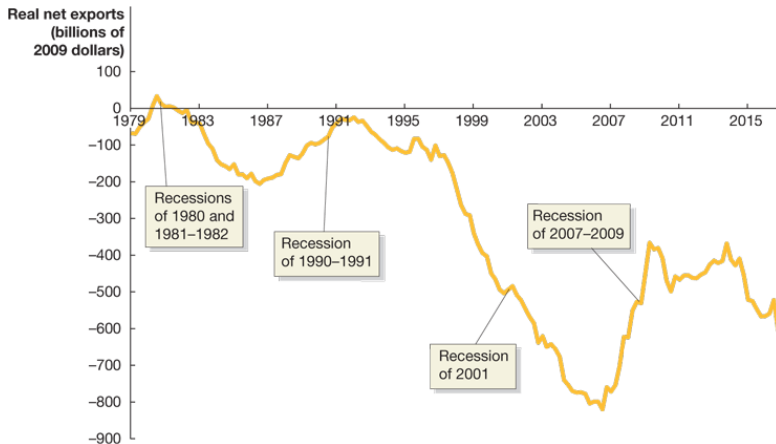
- ▶ Real investment, 1979-2017 (source: BEA)
- ▶ Investment is subject to larger changes than consumption

U.S. Government Purchases



- ▶ Real government purchases, 1979-2017 (source: BEA)
- ▶ Government purchases grew steadily in most years

U.S. Net Exports



- ▶ Real net exports, 1979-2017 (source: BEA)
- ▶ Net exports were negative in most years

Income, Consumption, and Saving

Marginal propensity to consume/save

$$\frac{\Delta Y_D}{\Delta Y_D} = \frac{\Delta C}{\Delta Y_D} + \frac{\Delta S}{\Delta Y_D} \Rightarrow 1 = \text{MPC} + \text{MPS}$$

- ▶ Some remarks
 - ▶ Δ means 'change in'
 - ▶ $\text{MPC} = \Delta C / \Delta Y_D = \Delta C / \Delta Y$
 - ▶ $\Delta S / \Delta Y_D =$ marginal propensity to save (MPS)
- ▶ Example: consumption increases from \$8,000 to \$8,600 as national income increases from \$9,000 to \$10,000

$$\text{MPC} = \frac{\$8,600 - \$8,000}{\$10,000 - \$9,000} = 0.6, \text{ MPS} = 1 - \text{MPC} = 0.4$$

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Solving for Equilibrium Output

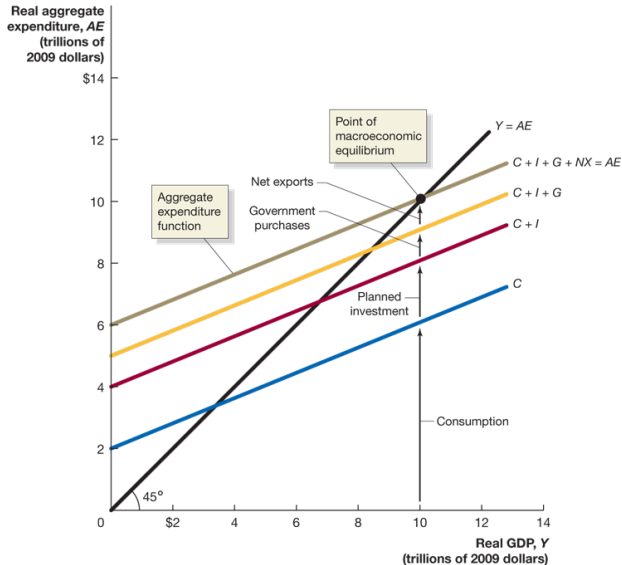
Equilibrium output

$$Y = c_0 + c_1(Y - T) + I + G + NX$$
$$\Rightarrow Y = \frac{1}{1 - c_1} [c_0 + I + G + NX - c_1 T]$$

- ▶ Some remarks
 - ▶ autonomous spending: $c_0 + I + G + NX - c_1 T$
 - ▶ multiplier: $1/(1 - c_1) > 1$ ($0 < c_1 < 1$)
autonomous spending $\uparrow \Rightarrow Y \uparrow$ more than one for one
- ▶ Example: $C = 500 + .5Y_D$, $Y_D = Y - T$, $T = 600$, $I = 300$, $G = 2000$, and $NX = 0$

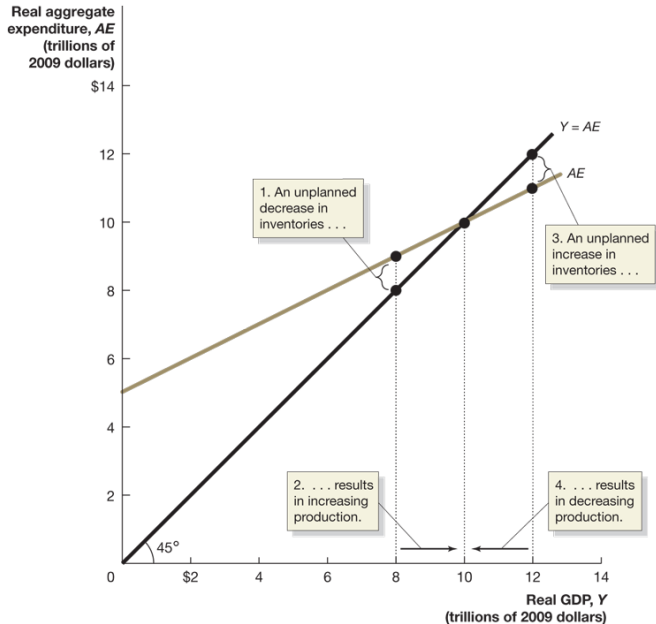
$$Y = 5000, \quad \text{multiplier} = 2$$

Goods Market Equilibrium

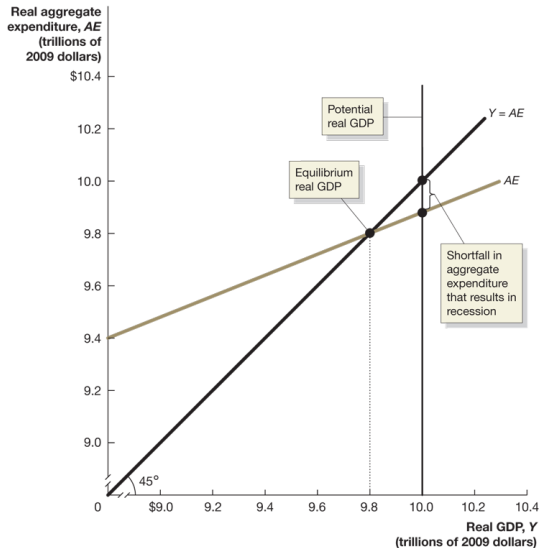


► 45°-line diagram or Keynesian cross

Goods Market Equilibrium (Cont'd)



Graphing Economic Recession

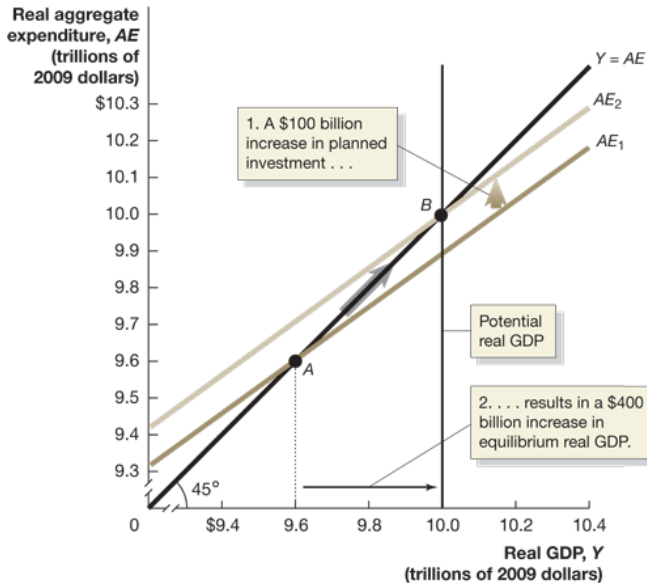


- Paradox of thrift: short-run vs. long-run

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Graphing Multiplier Effect



Example: Multiplier Effect

Round	Change in I	Change in C	Change in Y
1	\$100	\$0	\$100
2	\$0	\$75	\$75
3	\$0	\$56	\$56
4	\$0	\$42	\$42
\vdots	\vdots	\vdots	\vdots

► Example: $MPC = 0.75$, $I \uparrow$ by \$100

► Calculate multiplier

$$\Delta Y = \$100 \times (1 + MPC + MPC^2 + MPC^3 + \dots)$$

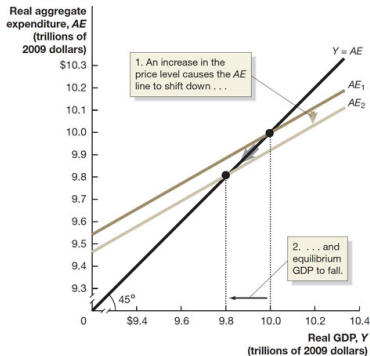
$$\Rightarrow \text{multiplier} = \frac{\Delta Y}{\Delta I} = \frac{1}{1 - MPC} = 4 \quad (\text{why?})$$

► Higher MPC leads to higher multiplier

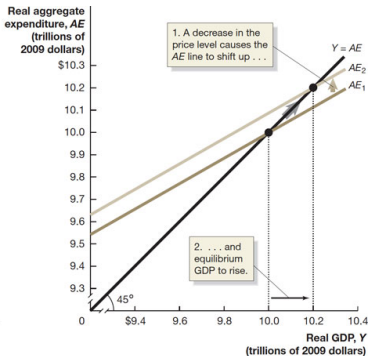
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Effect of Price Level Change



(a) The effect of a higher price level on real GDP

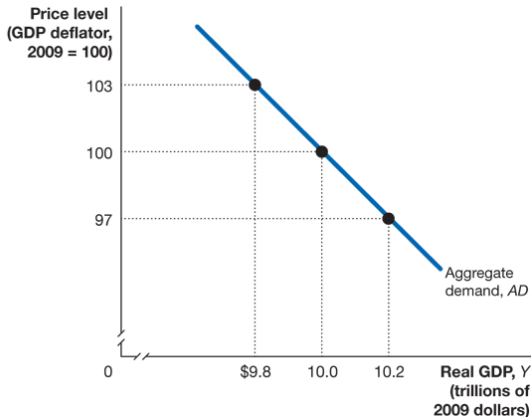


(b) The effect of a lower price level on real GDP

- ▶ $P \uparrow (\downarrow) \Rightarrow \text{real value of wealth} \downarrow (\uparrow) \Rightarrow C \downarrow (\uparrow)$
- ▶ $P \uparrow (\downarrow) \Rightarrow \text{exports} \downarrow (\uparrow), \text{imports} \uparrow (\downarrow) \Rightarrow NX \downarrow (\uparrow)$
- ▶ $P \uparrow (\downarrow) \text{ with unchanged money supply} \Rightarrow i \uparrow (\downarrow) \Rightarrow I \downarrow (\uparrow)$

Aggregate Demand Curve: First Pass

Price Level	Equilibrium Real GDP
97	\$10.2 trillion
100	10.0 trillion
103	9.8 trillion



- Inverse relation between price level and real GDP, known as aggregate demand curve

Readings & Exercises

- ▶ Readings

- ▶ HO: chapter 12

- ▶ BJ: lecture 2 (sec. 1, 2, 3) (supplementary)

- ▶ Exercises

- ▶ HO: problem 1.4, 2.11, 3.12, 4.9, 4.13, D12.1