Lecture 5: Aggregate Expenditure and Output in Short Run

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Course: Macroeconomics 201

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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**

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

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

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 ⇒ inventories ↓ ⇒ (Y,N) ↑
  - AE < GDP ⇒ inventories ↑ ⇒ (Y,N) ↓
  - AE = GDP ⇒ inventories unchanged ⇒ goods market equilibrium
- GDP fluctuates due to changes in AE

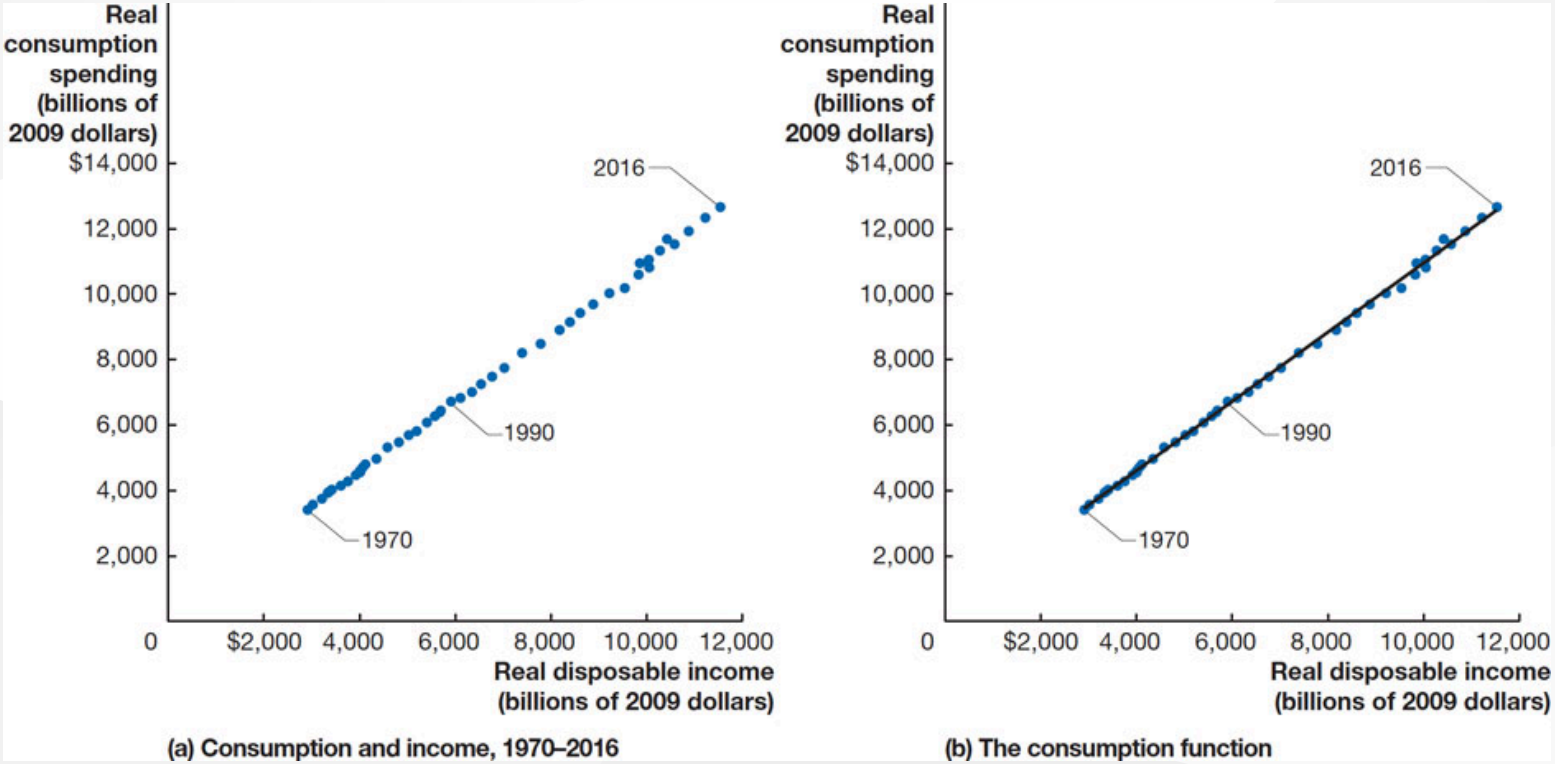
Determinants of Consumption

Consumption function

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

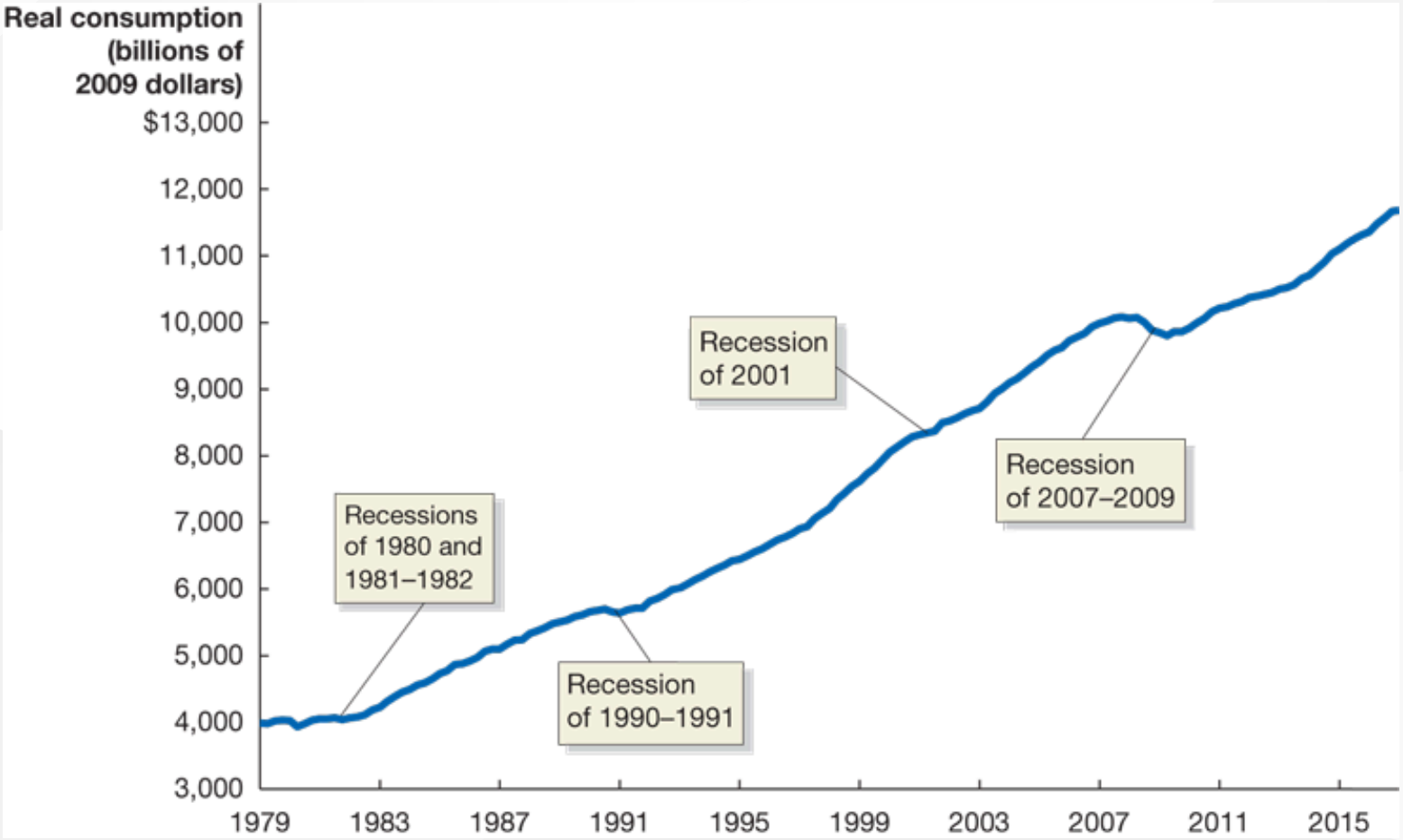
- Some notations
  - C = consumption
  - T = net taxes (taxes net of transfers)
  - Y_D = disposable income
  - c_1 = marginal propensity to consume (MPC)
  - c_0 = autonomous consumption
- Other determinants: wealth, expected future income, **real interest rate (price of consumption today relative to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

Consumption Function



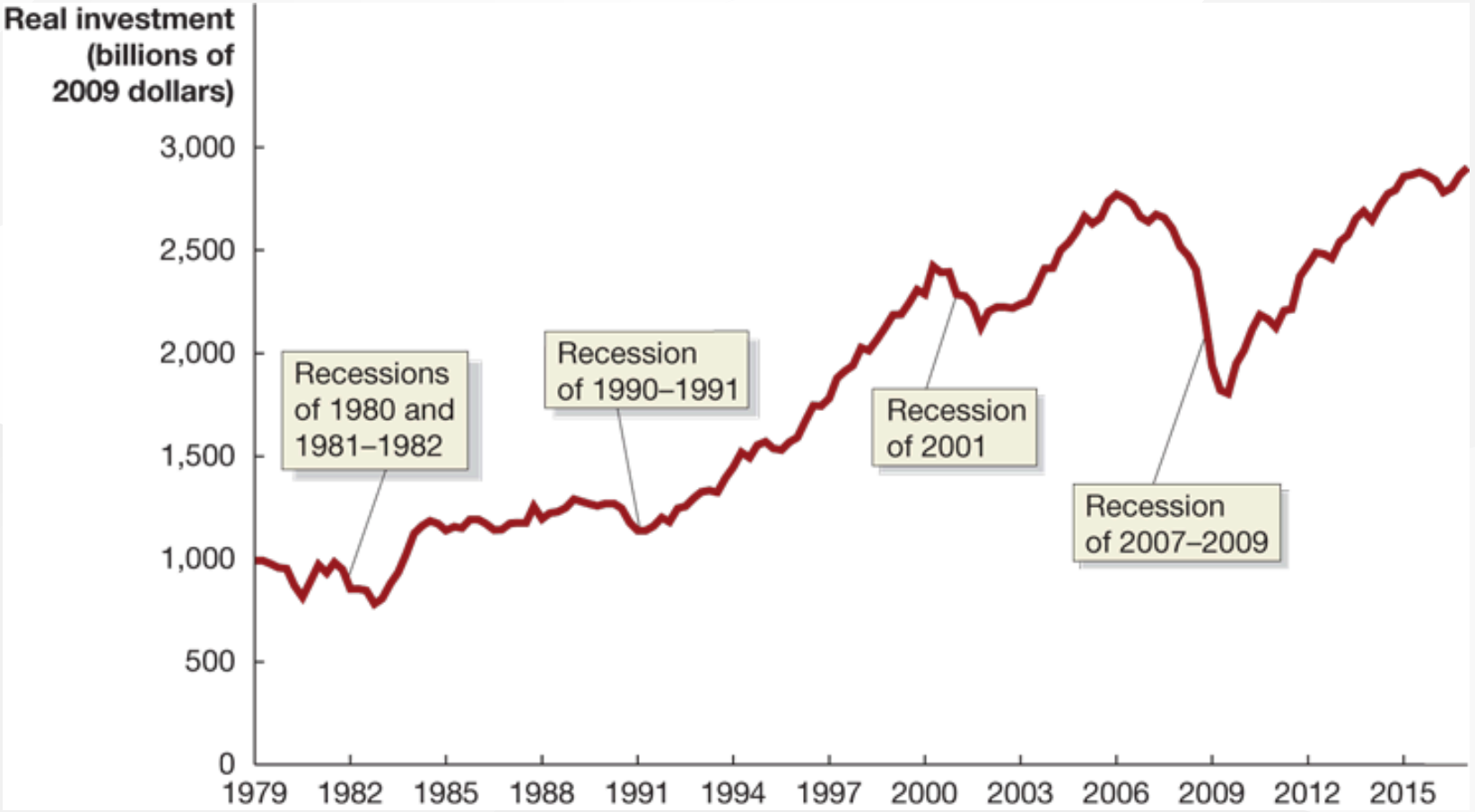
- Relation b/w consumption and income (source: BEA)
- MPC = slope of consumption function

U.S. Consumption



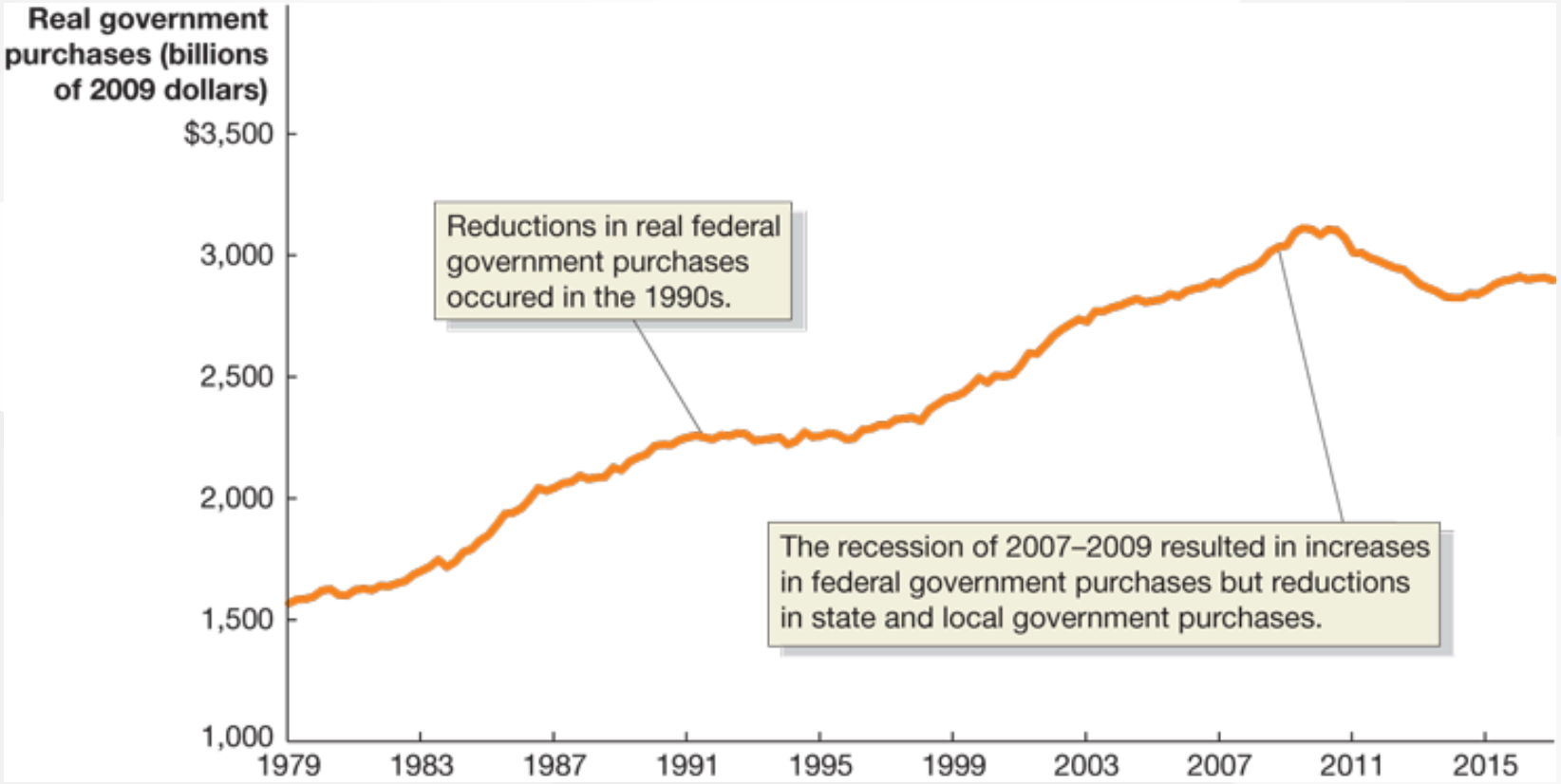
- Real consumption, 1979-2017 (source: BEA)
- Consumption follows smooth, upward trend

U.S. Investment



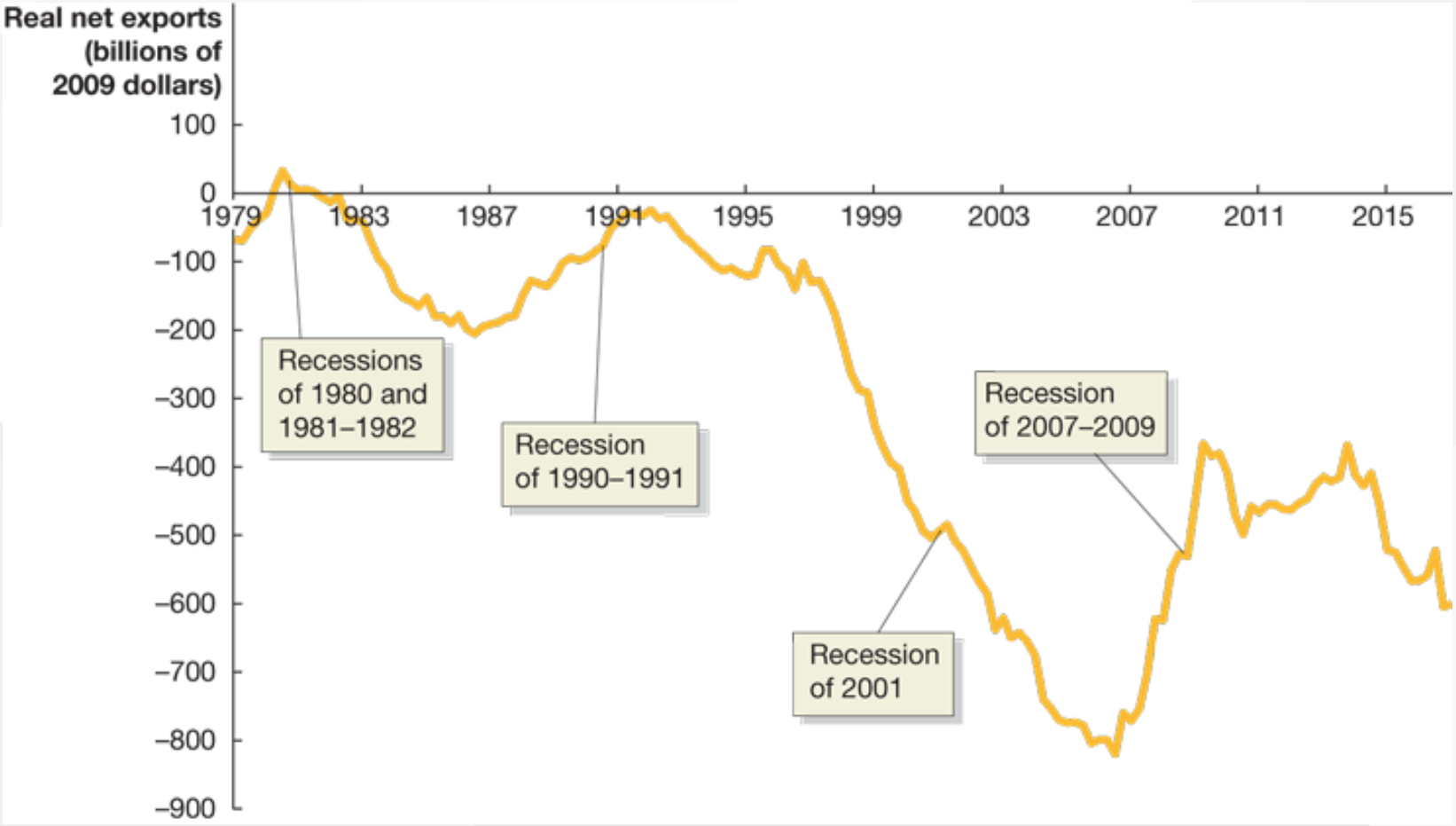
- Real investment, 1979-2017 (source: BEA)
- Investment is subject to larger changes than consumption

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

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

- Some remarks
  - Δ means 'change in'
  - 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

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

Solving for Equilibrium Output

Equilibrium output

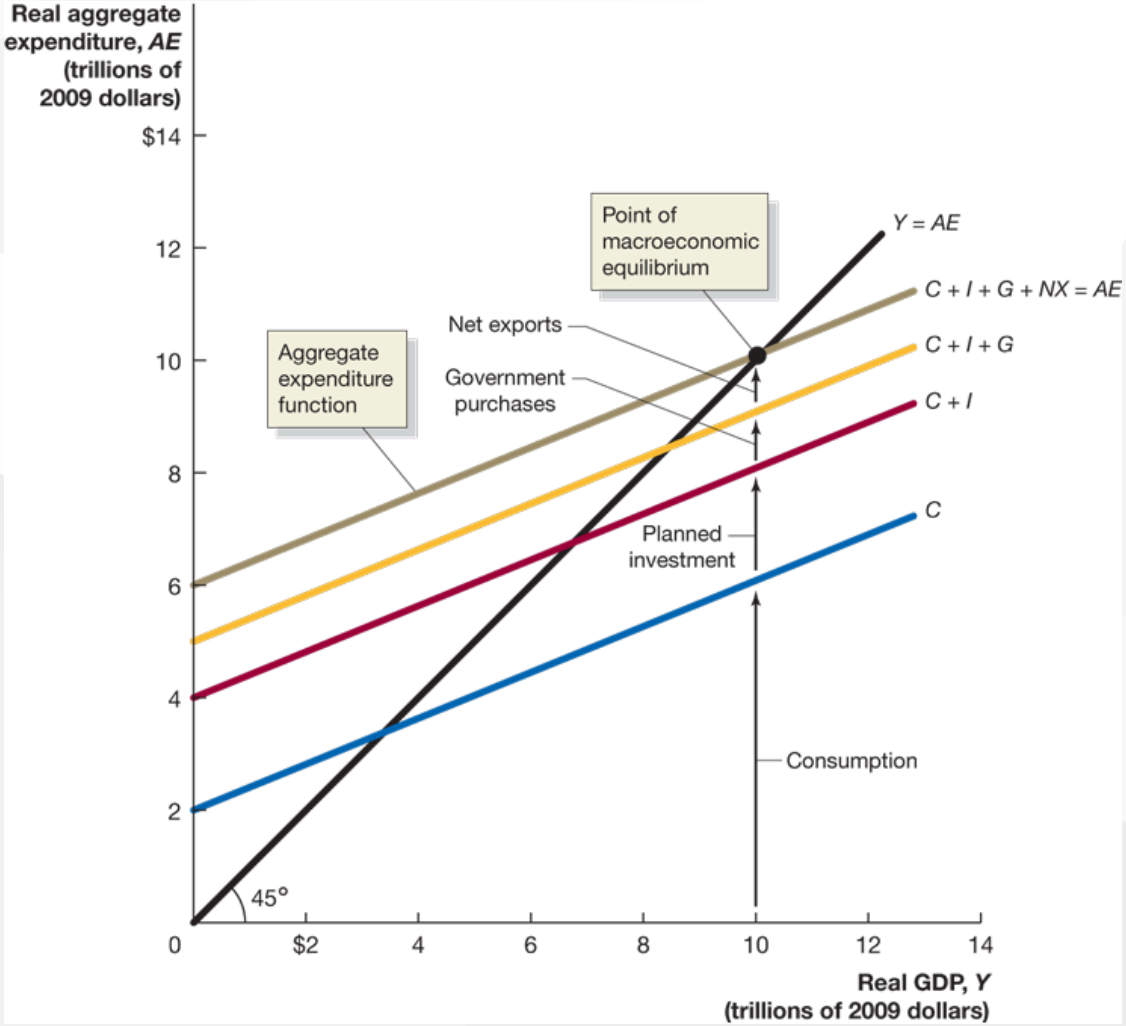
$$Y = c_0 + c_1(Y - T) + I + G + NX$$
$$\Rightarrow \quad Y = \frac{1}{1 - c_1}[c_0 + I + G + NX - c_1 T]$$

- Some remarks
  - autonomous spending: $c_0 + I + G + NX - c_1 T$
  - multiplier: $1/(1 - c_1) > 1$ $(0 < c_1 < 1)$

    autonomous spending ↑ ⇒ Y↑ more than one for one
- Example: $C = 500 + .5Y_D, Y_D = Y - T, T = 600, I = 300, G = 2000$, and $NX = 0$

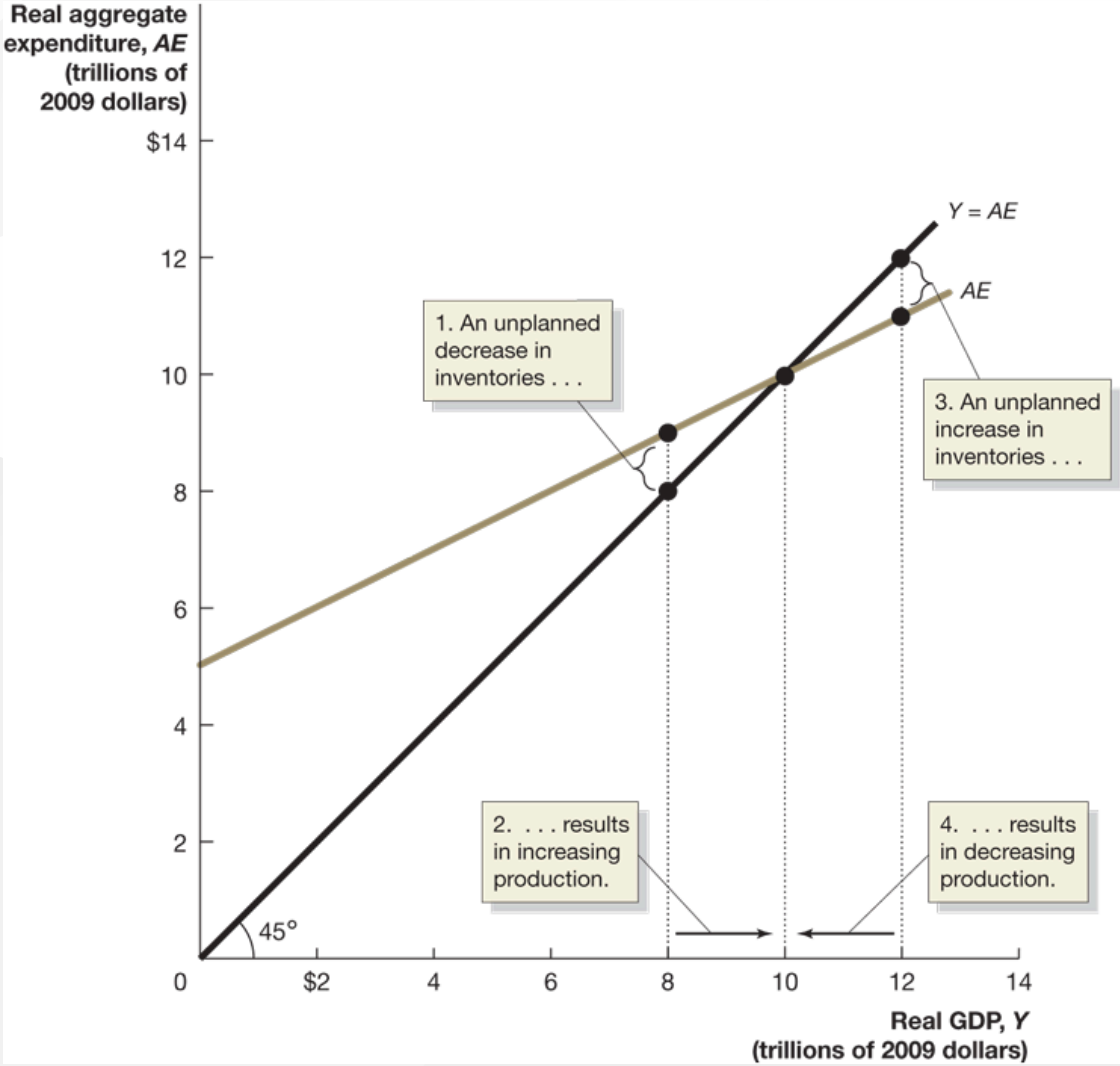
$$Y = 5000, \quad \text{multiplier} = 2$$

Goods Market Equilibrium

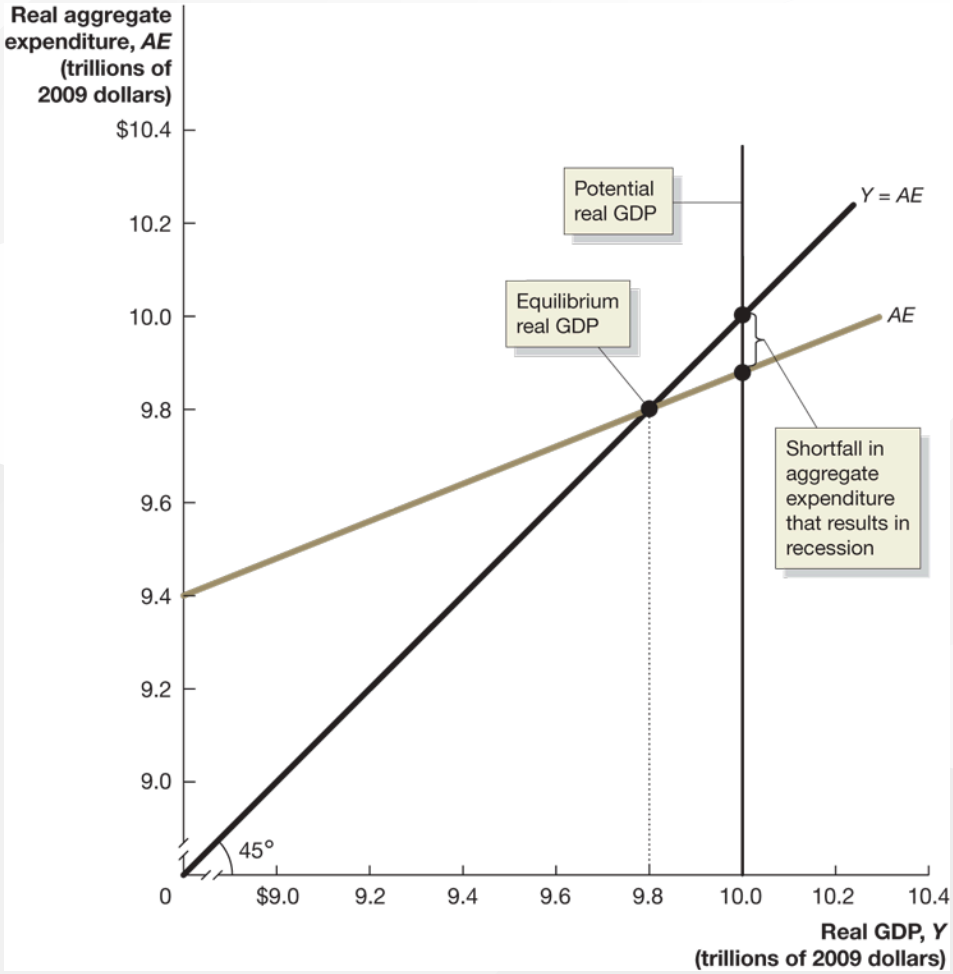


- 45°-line diagram or Keynesian cross

Goods Market Equilibrium (Cont'd)

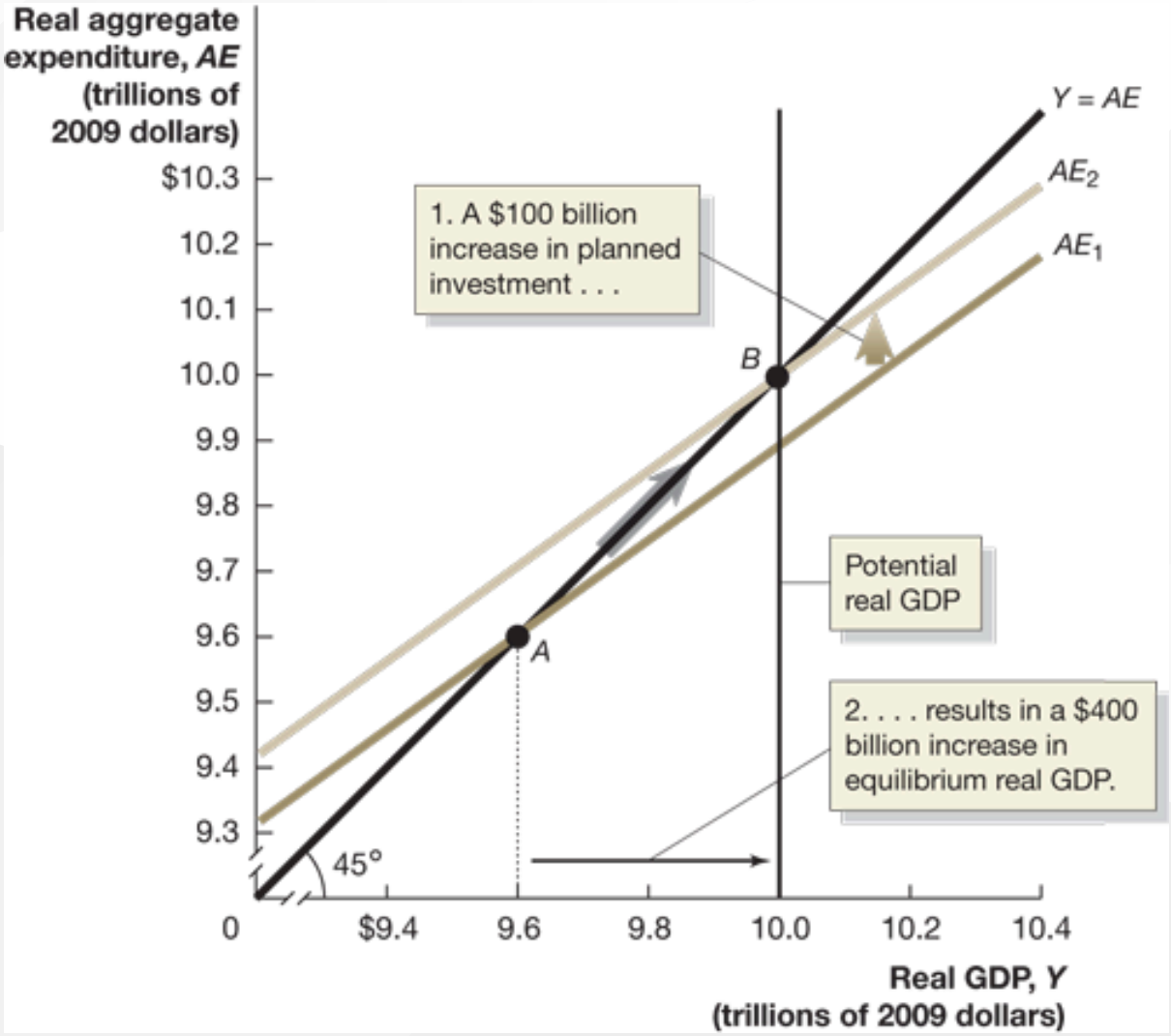


Graphing Economic Recession



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

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
⋮	⋮	⋮	⋮

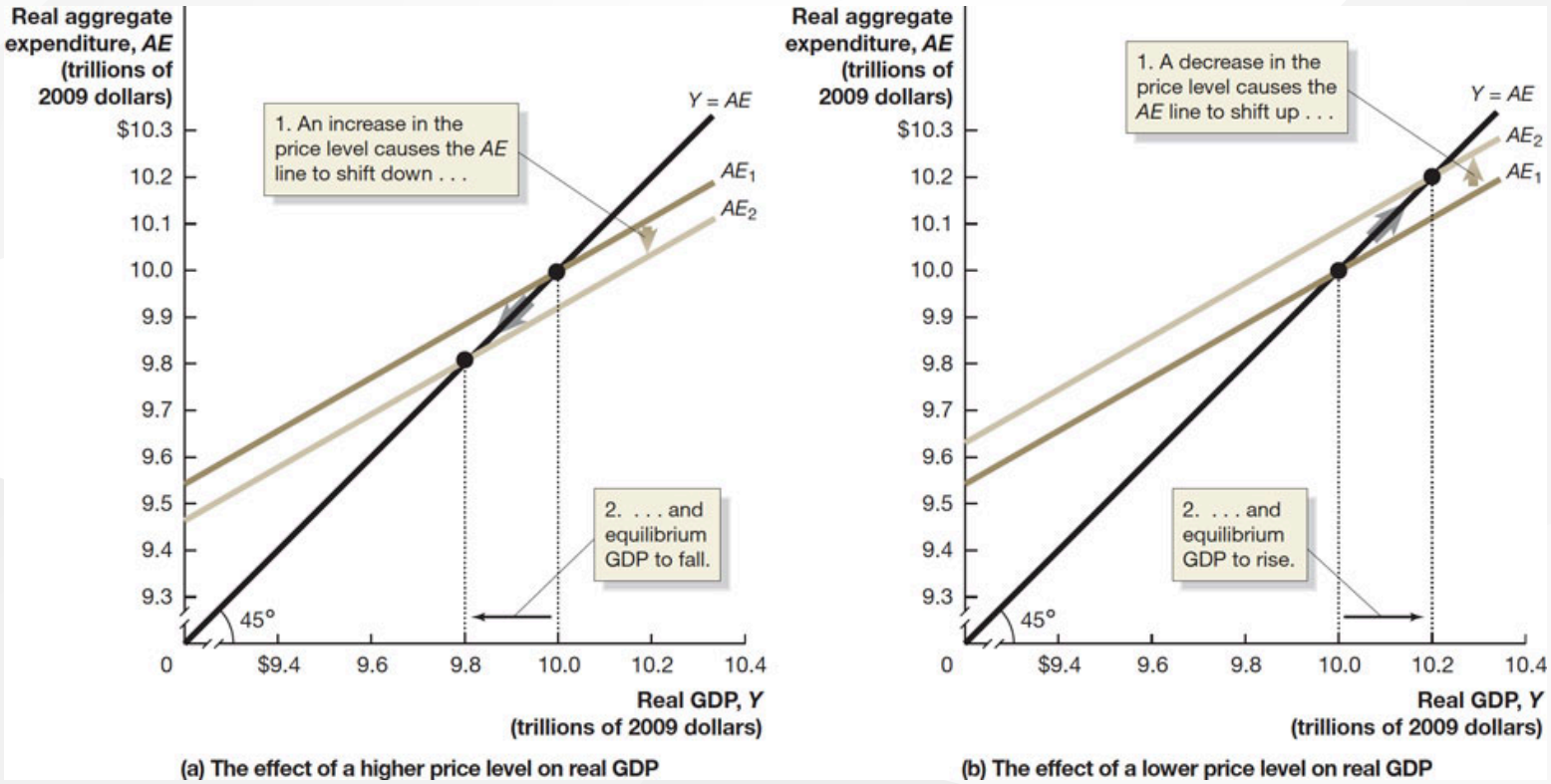
- Example: MPC = 0.75, $I \uparrow$ by \$100
- Calculate multiplier

$$\Delta Y = \$100 \times (1 + \text{MPC} + \text{MPC}^2 + \text{MPC}^3 + \cdots)$$

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

- Higher MPC leads to higher multiplier

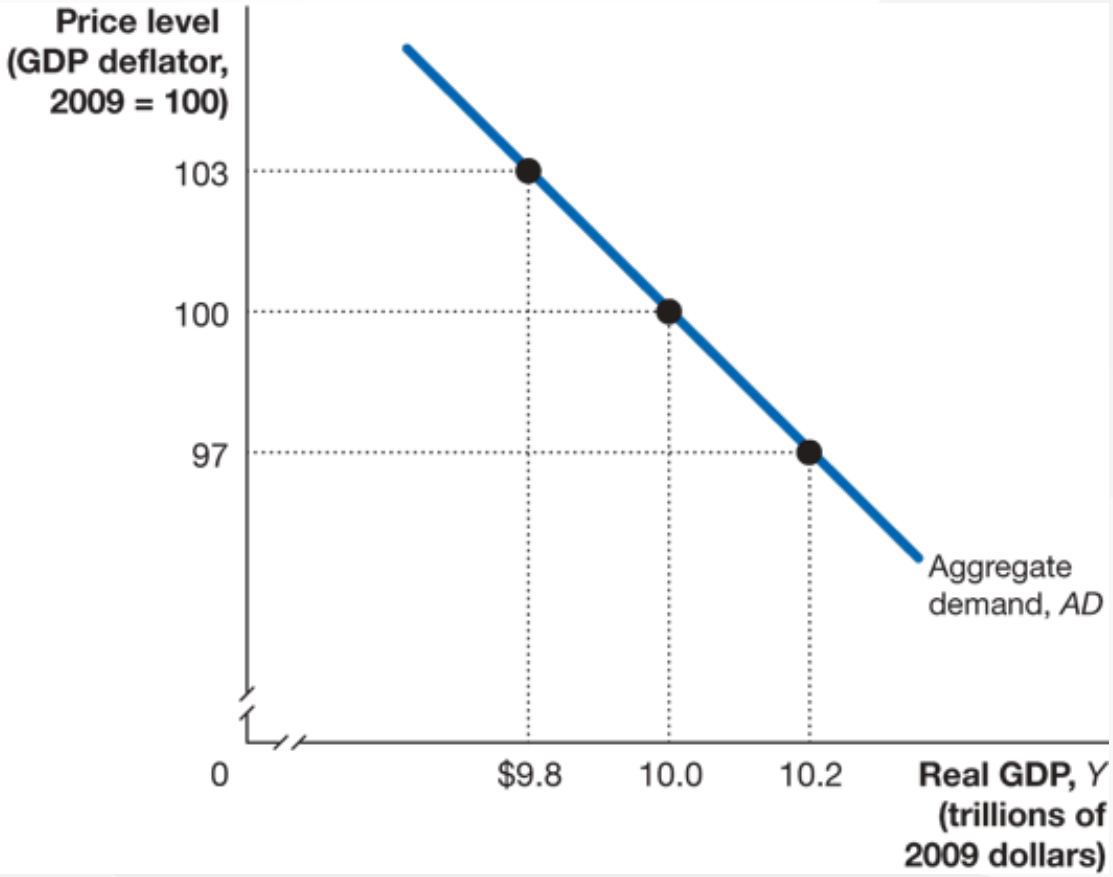
Effect of Price Level Change



- $P \uparrow (\downarrow) \Rightarrow$ real value of wealth $\downarrow (\uparrow) \Rightarrow C \downarrow (\uparrow)$
- $P \uparrow (\downarrow) \Rightarrow$ exports $\downarrow (\uparrow)$, imports $\uparrow (\downarrow) \Rightarrow NX \downarrow (\uparrow)$
- $P \uparrow (\downarrow)$ 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