Lecture 5. Goods and Financial Markets: The IS-LM Model

Reading: Blanchard, Chapter 5

In the previous lecture…

- Money supply, M^S, is determined jointly by the central bank and commercial banks.
- Money demand, M^D, is given by $M^D = \$Y\ L(i)$.
- Central bank supplies monetary base.
- Credit creation generates money multiplier.

- i_{ff} is determined by $M^S = M^D$, with i_d as the ceiling.
- Central bank adjusts M^S to achieve a targeted level for i_{ff}

Outline

- A Brief History of the IS-LM Model / the short run
- Derivations
  - The Goods Market and the IS Relation
  - Financial Markets and the LM Relation
- Applications
  - Fiscal Policies in the IS-LM Model
  - Monetary Policies in the IS-LM Model
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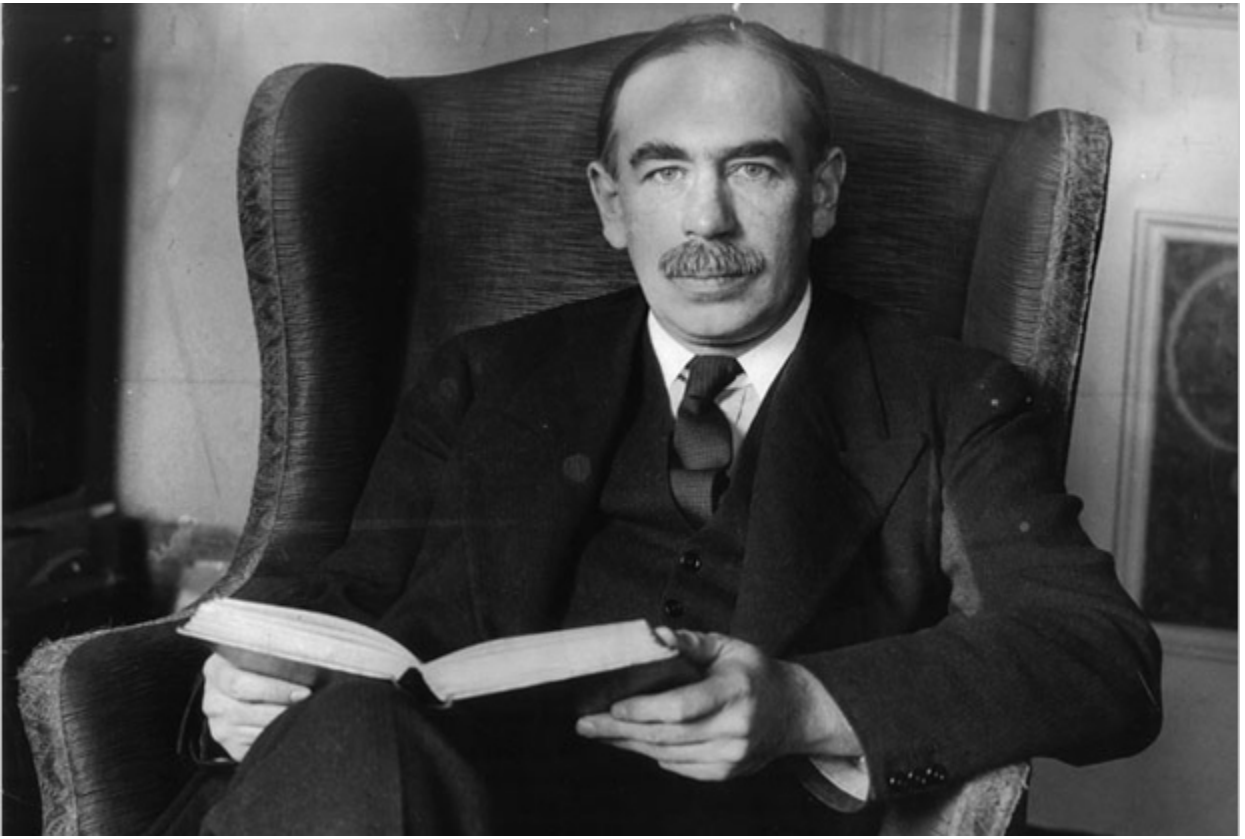
Keynes and the Great Depression (Ch. 24.1)



- His book, *General Theory of Employment, Interest, and Money*, was published in 1936 amid the Great Depression.
- He emphasized the role of aggregate demand in determining output in the short run.
- This is why we call our model the Keynesian cross, where output, Y, is determined by demand, Z.

Hicks, Hansen, and the IS-LM Model

- Keynes' *General Theory* was fundamental but nearly impenetrable.

- According to John Hicks, one of Keynes' main contributions is the joint description of goods and financial markets.
- Hicks' analysis was extended by Alvin Hansen in the early 1940s.
- Hicks and Hansen called their formalization the IS-LM model.

- After more than 70 years since it was developed, is it still a useful model? Yes, as long as prices are sticky.

The Short Run

- The IS-LM model captures much of what happens in the economy in *the short run*.
- In this course: the IS-LM model = P does not change.
- Remember that prices are "sticky," so it does not change very quickly.

- Of course, it is unrealistic to assume that P is constant. However, it may not be a bad assumption when we think about economic events happening in several quarters or at most a few years.
- This assumption will be relaxed when we study the medium run.

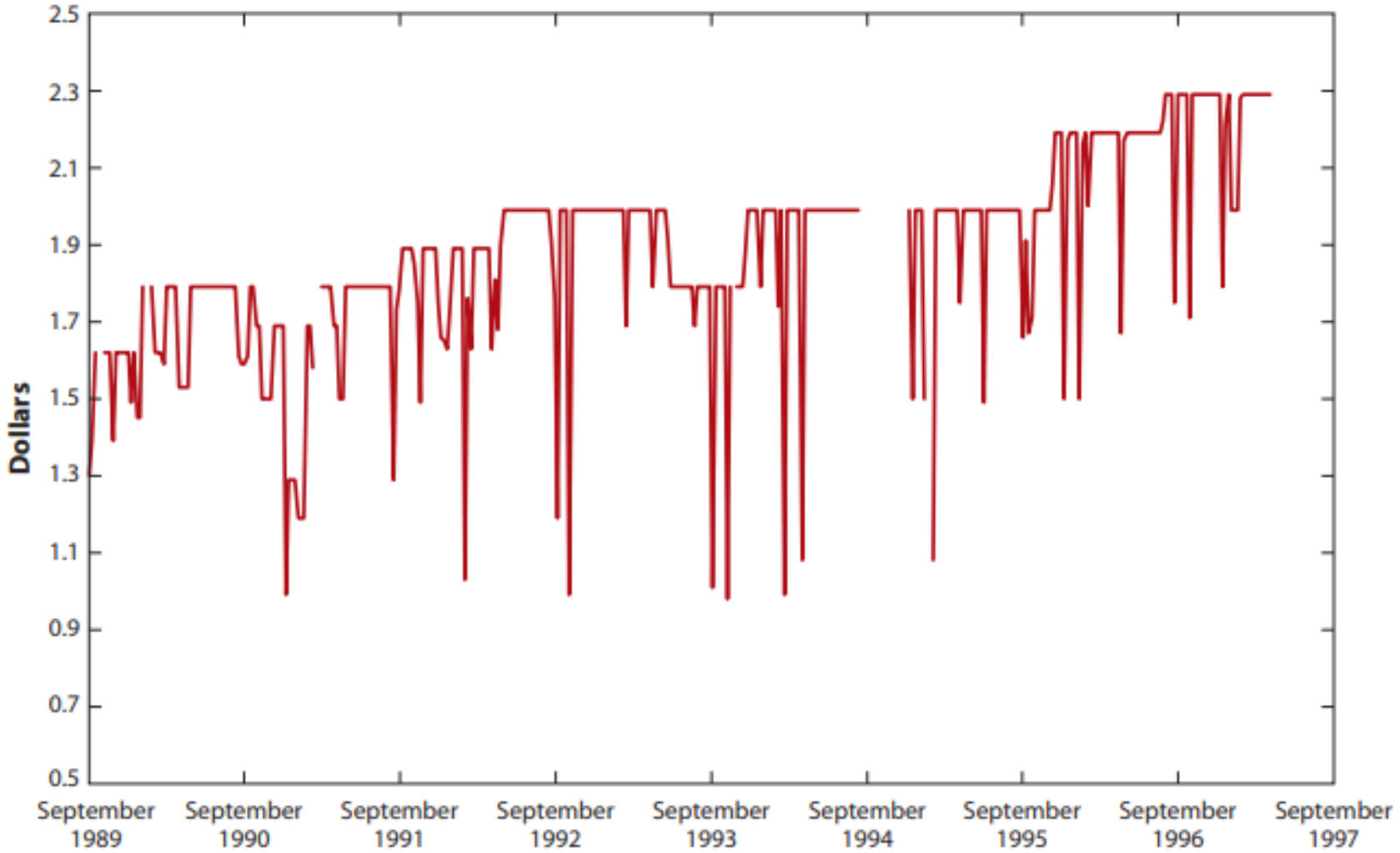


Figure 2

Price series of Nabisco Premium Saltines (16 oz) at a Dominick's Finer Foods store in Chicago.

- Source: Nakamura, E. and J. Steinsson (2014), Price Rigidity: Microeconomic Evidence and Macroeconomic Implications.
- From Lecture 2.

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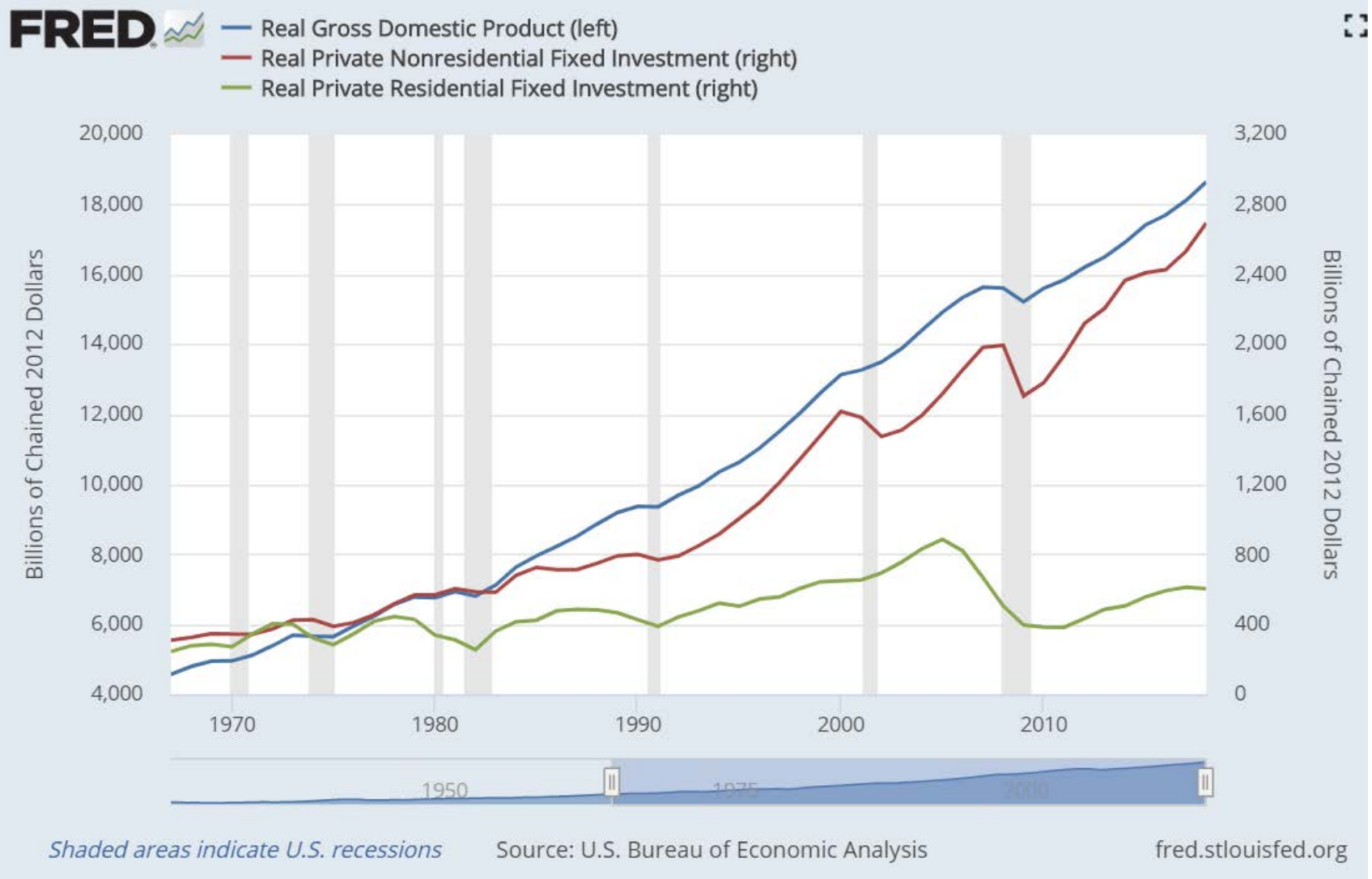
The Goods Market and the IS Relation

- In Chapter 3, we studied the Keynesian cross.
- Demand $Z = C + I + G = C(Y - T) + \bar{I} + G$
- Supply Y = Income Y.

- It is unrealistic to assume that investment is constant.
- New assumption: $I = I(Y, i)$
- When volume of business (level of sales) $Y \uparrow$, to produce more, firms buy new machines, build new factory, etc. So, $I \uparrow$.
- To finance new investment, firms usually borrow money. When i is high, the cost of investment is also high.

Real GDP and real investment in the US



- Y and I tend to move together.
- I is more volatile than Y.

The Goods Market

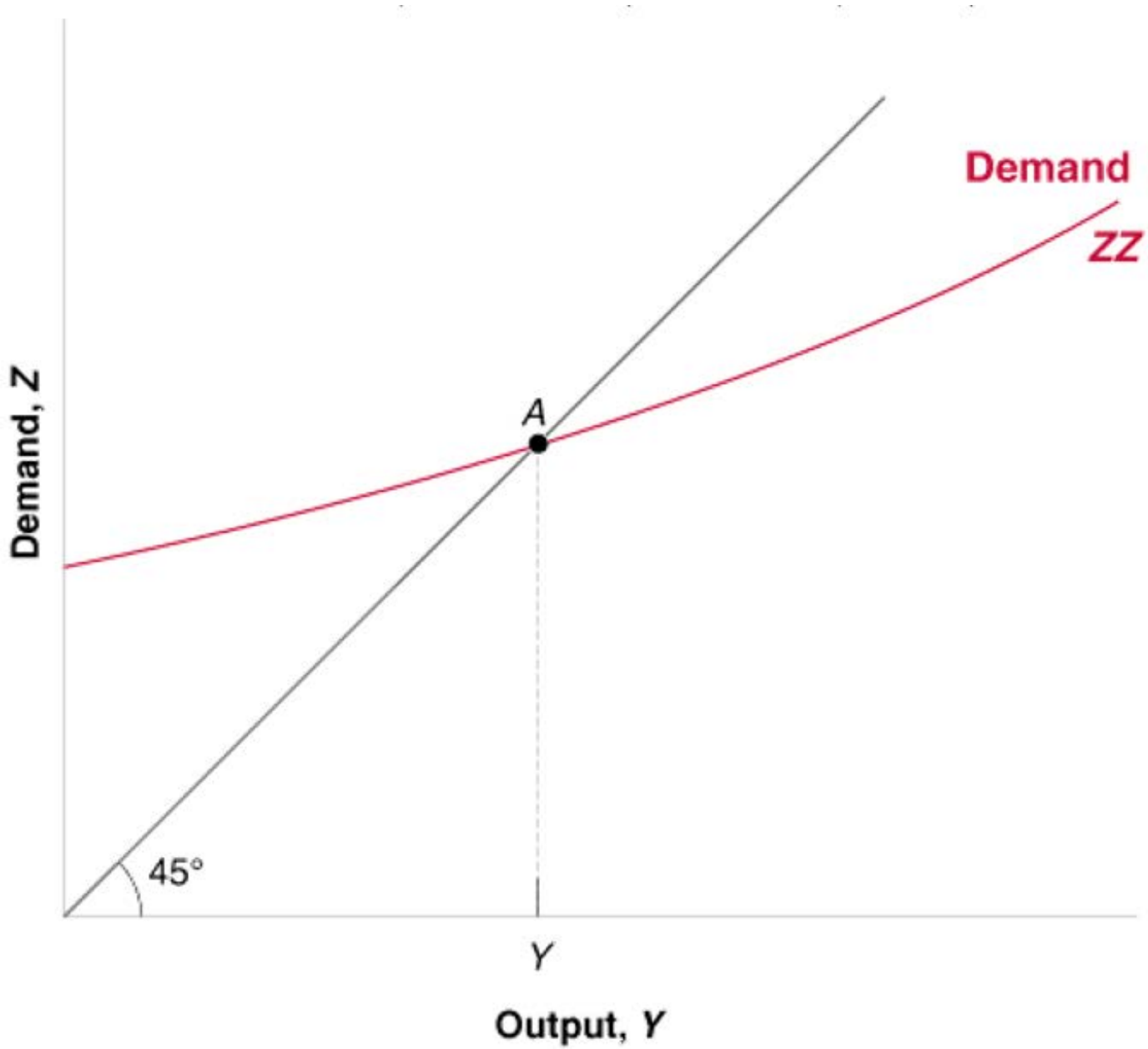
- $Z = C(Y - T) + I(Y, i) + G$
- Assumption: MPC + "Marginal propensity to invest (MPI)" < 1
- Equilibrium condition for the goods market: $Y = Z$.

- Goal: To characterize the equilibrium output Y in the goods market as a function of the interest rate i

Given i.

- $Z = C(Y - T) + I(Y, i) + G$
- Assumption:

  MPC + MPI < 1
- The ZZ curve now is (flatter/steeper) than the curve with $I = \bar{I}$.



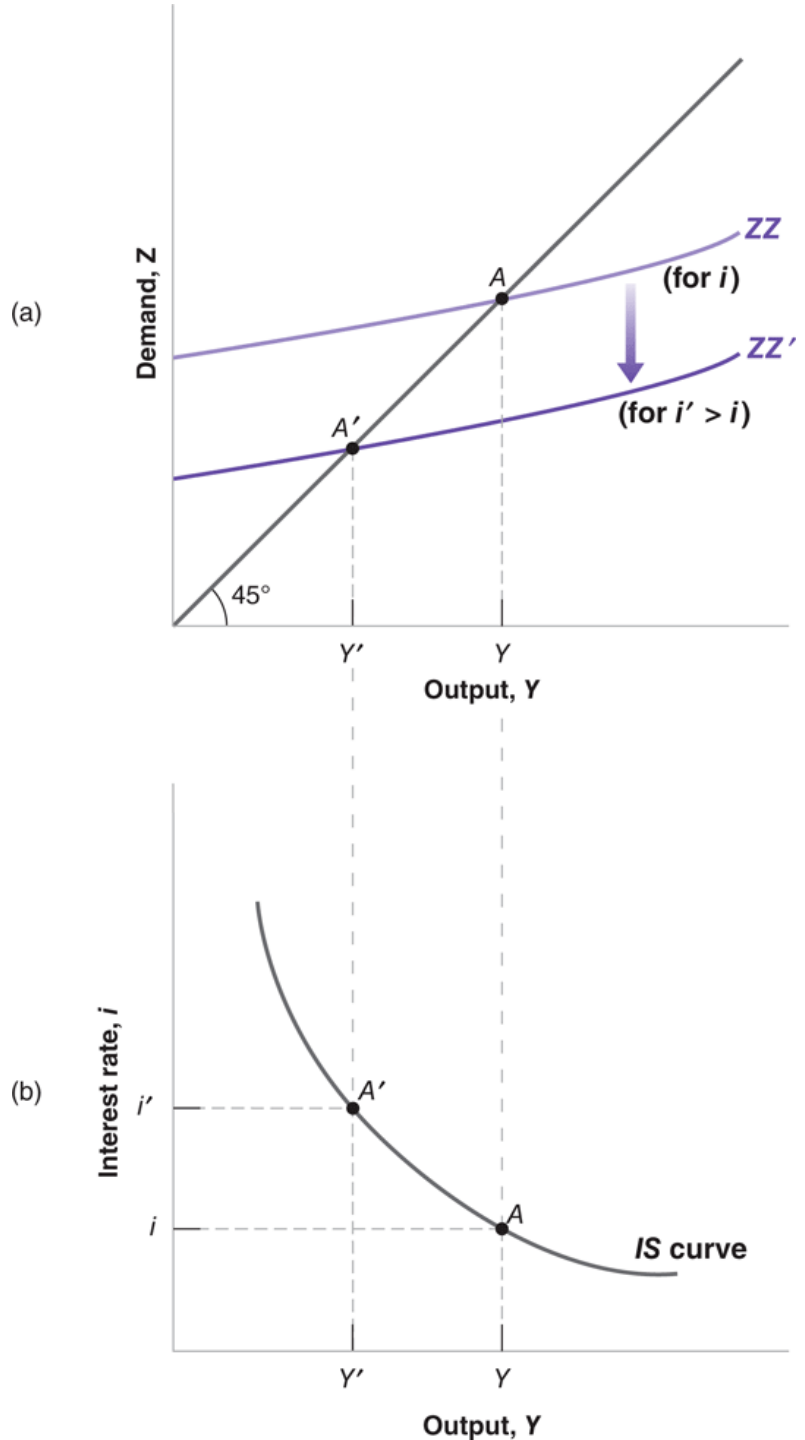
What if $i \uparrow$ to i'?

- $I(Y, i) \downarrow$ at any level of output Y
- $Z = C(Y - T) + I(Y, i) + G$

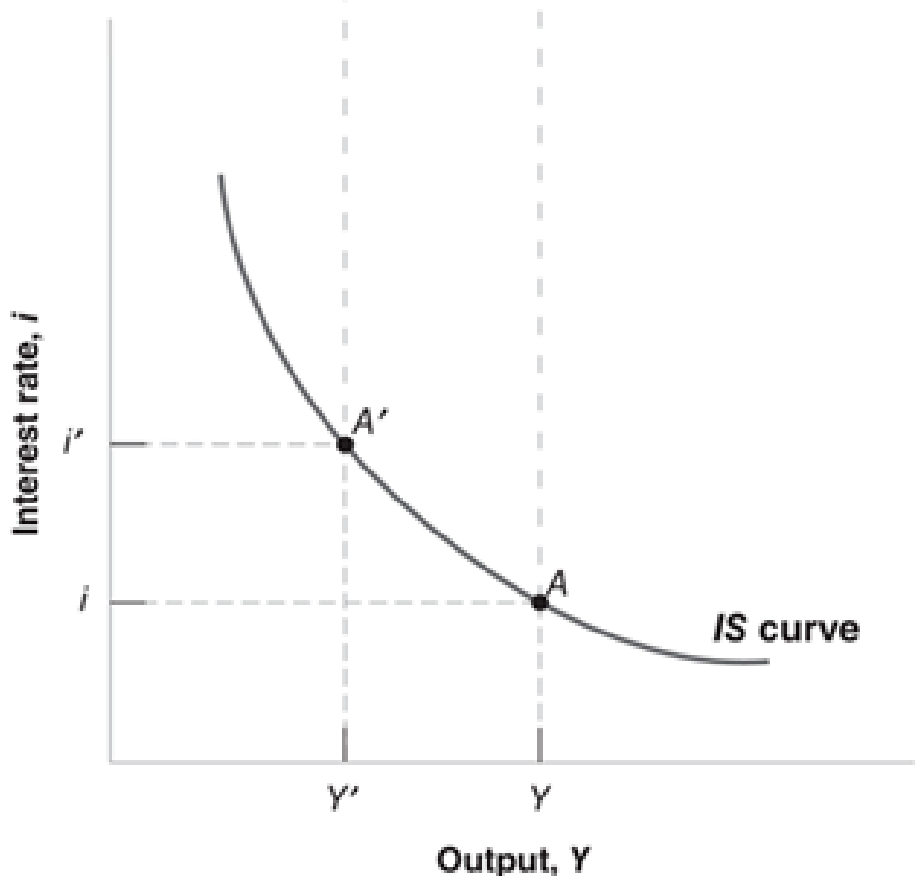
decreases at any level of output Y

- ZZ curve shifts downward.
- The equilibrium output

  $Y \downarrow$ to Y'.



The IS (Investment-Saving) Curve



- Remember that $Y = Z$ is equivalent to $I = S + (T - G) = Private\ Saving + Public\ Saving$.
- As $i \downarrow$, the equilibrium output in the goods market $Y \uparrow$.

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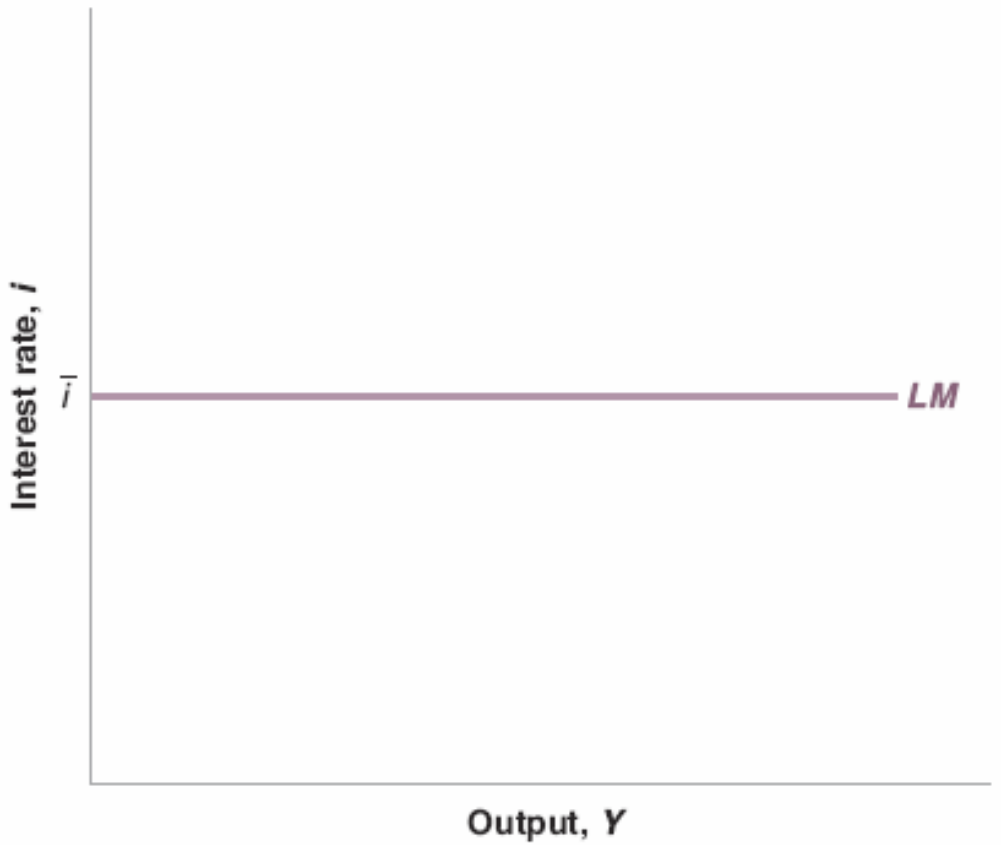
In the real world, CBs seem to choose i directly.

- "Based on our regular economic and monetary analyses, we decided to **keep the key ECB interest rates unchanged**."-Lagarde, President of ECB, Jan 23, 2020.
- https://www.ecb.europa.eu/press/pressconf/2020/html/ecb.is200123~0bc778277b.en.html
- "The effects of the coronavirus will weigh on economic activity in the near term and pose risks to the economic outlook. In light of these developments, the Committee decided to **lower the target range for the federal funds rate to 0 to 1/4 percent**."-FOMC Statement, March 15, 2020.
- https://www.federalreserve.gov/newsevents/pressreleases/monetary20200315a.htm
- "The Federal Open Market Committee of the US Fed announced last night to adjust downward the target range for the US federal funds rate by 100 basis points to 0-0.25%. In light of the Fed's decision, the Hong Kong Monetary Authority (HKMA) also adjusted downward the Base Rate today. **The Base Rate is set at 0.86% today** according to a pre-set formula."-HKMA, March 16, 2020.
- https://www.hkma.gov.hk/eng/news-and-media/press-releases/2020/03/20200316-4/

The LM (Liquidity-Money) Relation



- The CB targets i. The chosen value is denoted by $\bar{\imath}$.

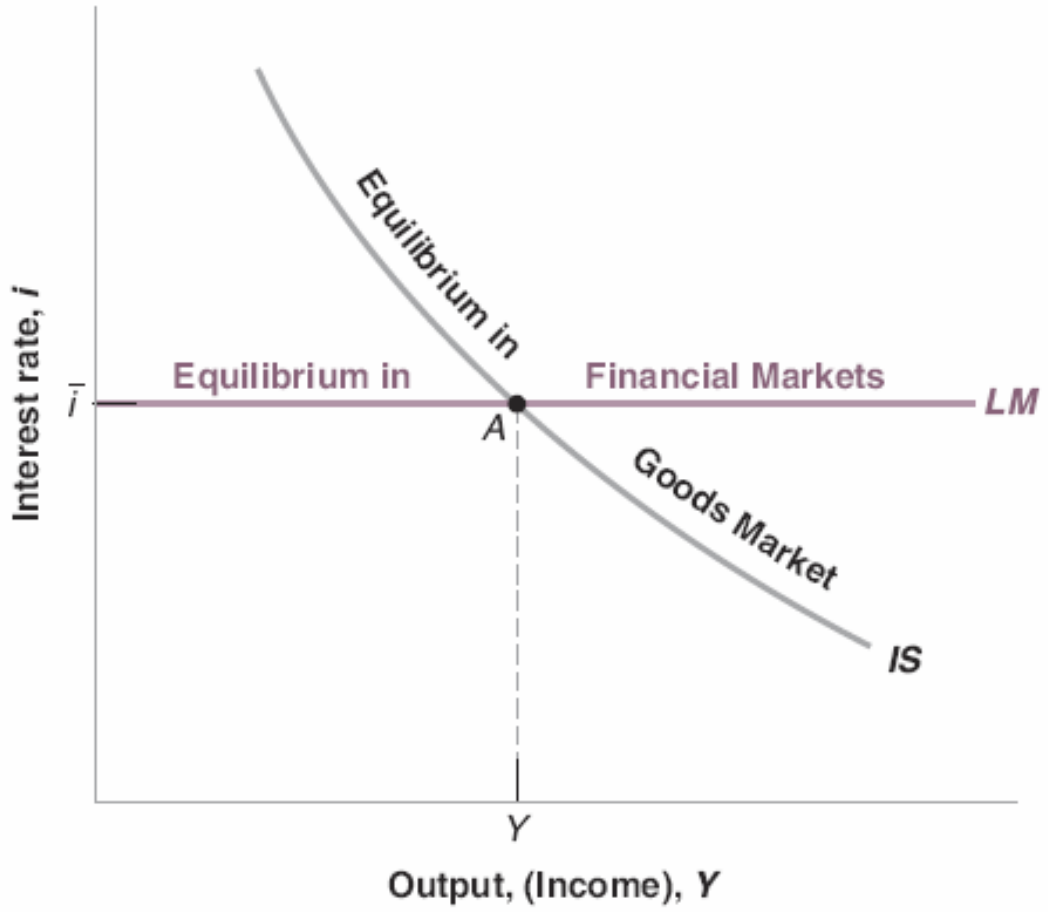
The Money Market and the LM Relation

- Equilibrium condition: $M^S = M^D \quad \Leftrightarrow \quad \frac{M^S}{P} = \frac{M^D}{P}.$

$$\frac{M^S}{P} = \frac{M^D}{P} = \frac{\$Y}{P} L(i) = Y\, L(i).$$

Real Money Supply = Real Money Demand

The IS-LM model



- Each point on the *IS* curve represents an equilibrium in the goods market.
- Each point on the *LM* curve represents an equilibrium in the money market.

The General Equilibrium (in the short run)

- IS Relation: $Y = C(Y - T) + I(Y, i) + G$

  $\Rightarrow$ IS Curve: Given T, G, and i, what is the equilibrium output Y in the goods market?

- LM Relation: $i = \bar{\imath}$

  $\Rightarrow$ LM Curve: i is selected by the CB. It is achieved by adjusting M^S to satisfy $\frac{M}{P} = YL(\bar{\imath})$, given P, Y, and the target interest rate $\bar{\imath}$.

- Where the two curves intersect (point A), both goods and money markets are cleared (i.e., in equilibrium): "General Equilibrium"

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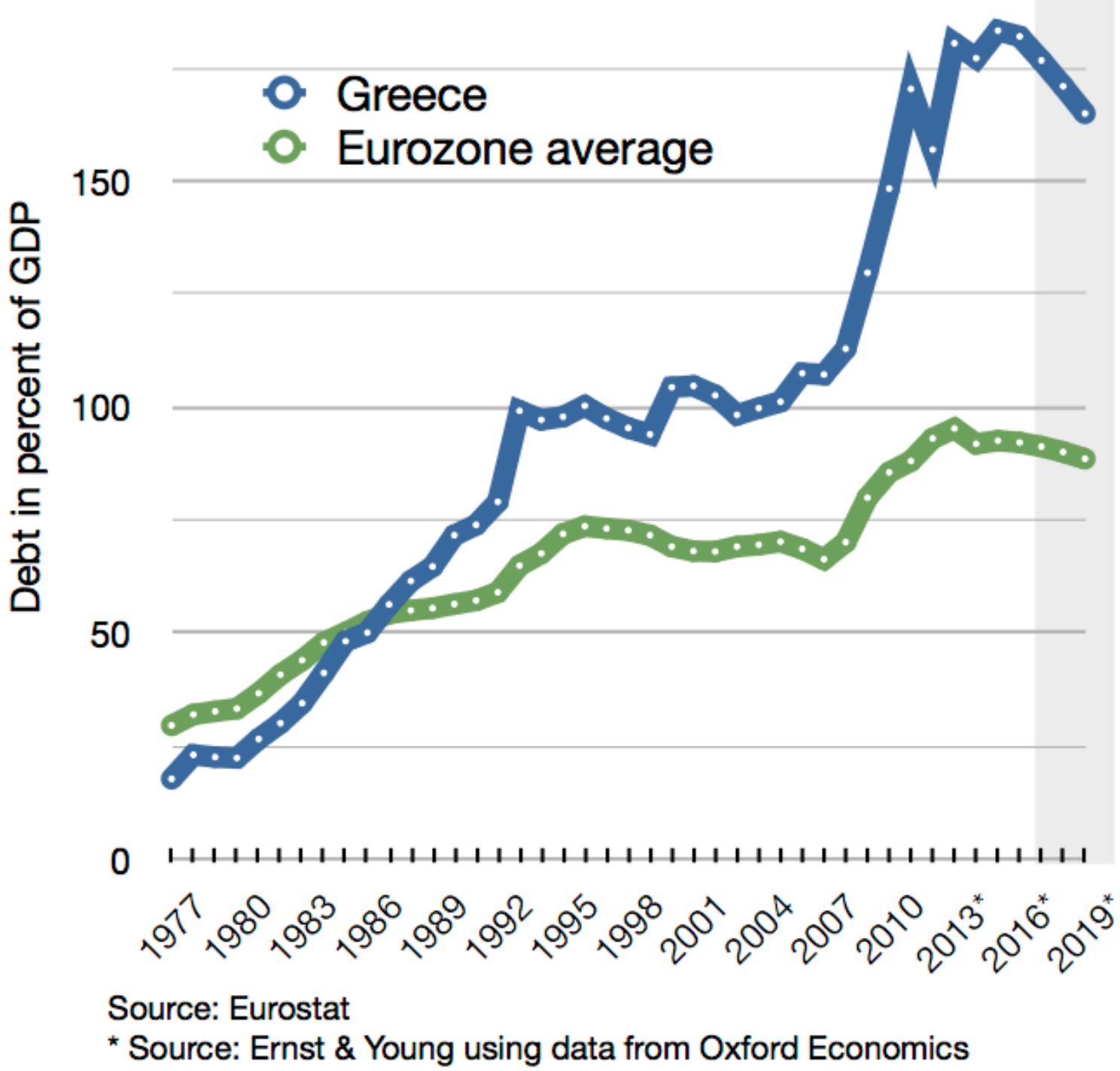
Fiscal Contraction / Consolidation

- Suppose that the govt. decides to reduce the budget deficit by $T \uparrow$ while G unchanged.

- Why a fiscal contraction?
  - sustainability of the govt. debt

The Greek crisis

- Source: https://en.wikipedia.org/wiki/Greek_government-debt_crisis
- Around 2009-2010, it became clear that debt-to-GDP ratio in Greece is too high.
- The government enacted 12 rounds of tax increases, spending cuts, etc.



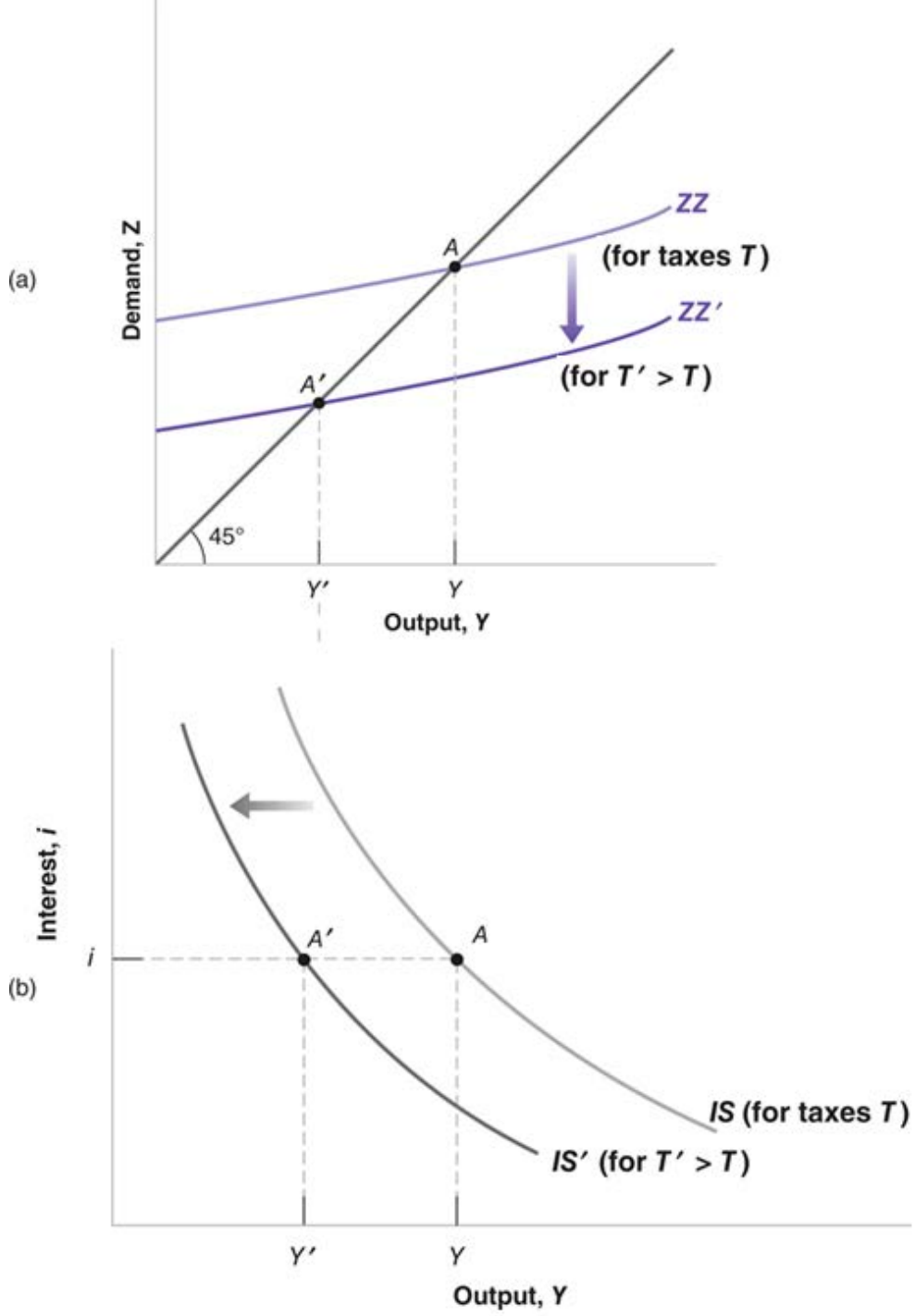
…and people hated it.

- source: https://en.wikipedia.org/wiki/Greek_government-debt_crisis
- protest against the austerity measures in Athens (29 May 2011).

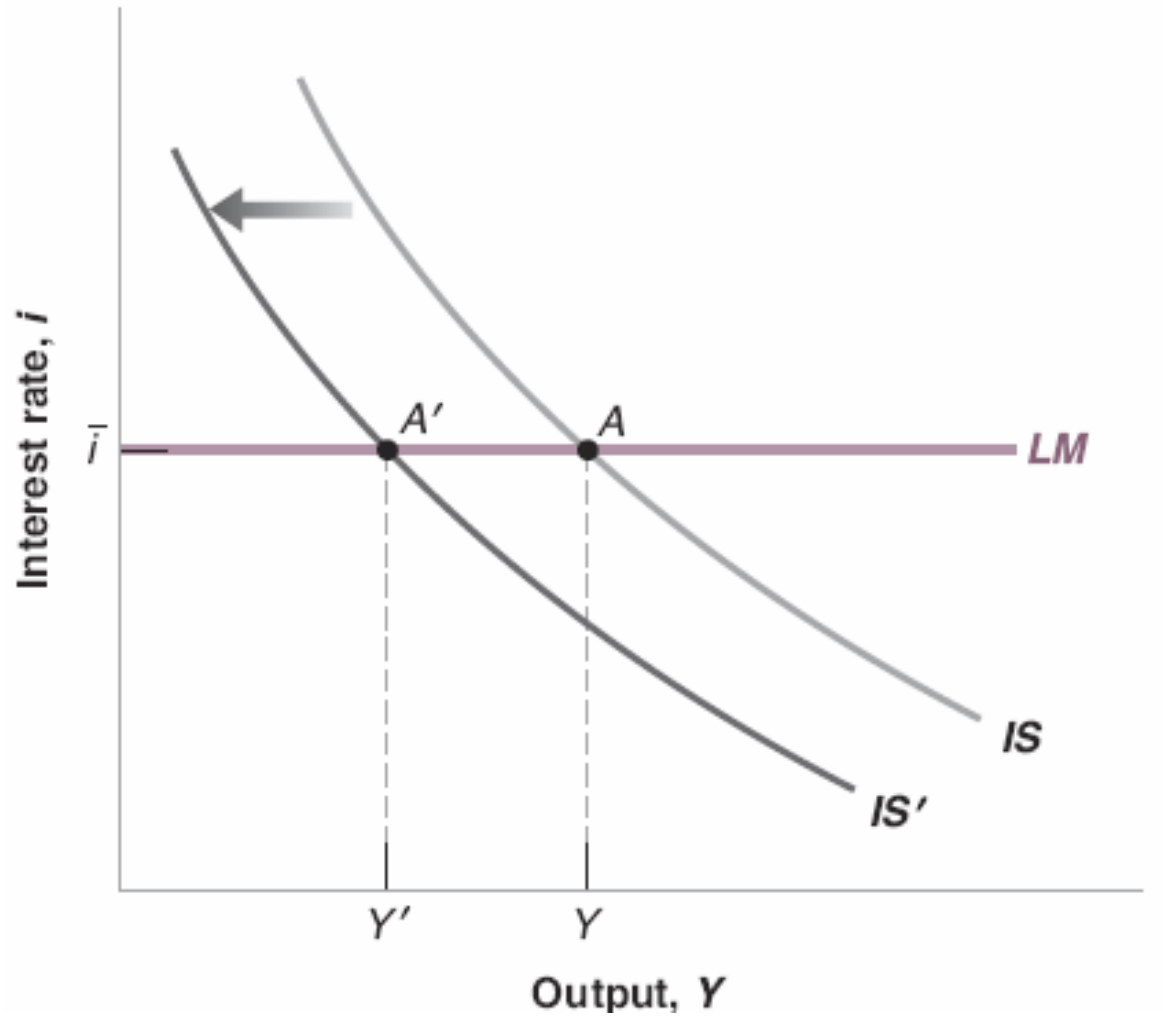
What happens if $T \uparrow$ (in the short run)?

- Shifts of the IS Curve
- Suppose that the govt. wants to reduce the budget deficit by collecting more taxes.
- $T \uparrow$ to T'
- For each i, the equilibrium output Y decreases. Thus, the IS curve shifts $\leftarrow$.

- What if $G \uparrow$? $c_0 \uparrow$?



When $T \uparrow$ to T'.



- $T \uparrow \rightarrow$ For each i, the goods market equilibrium output $Y \downarrow$
  $\rightarrow$ The IS curve shifts to the left.
- As we move along the LM curve from A to A':

$Y \downarrow \rightarrow$ less transaction $\rightarrow M^D \downarrow \rightarrow$ CB reduces M^S to keep i at $\bar{\imath}$.

Determine what happens to the following variables.

- C
- I
- G
- T
- Public Saving
- Private Saving

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Monetary expansion / easing

- The CB decreases i by increasing M^S.

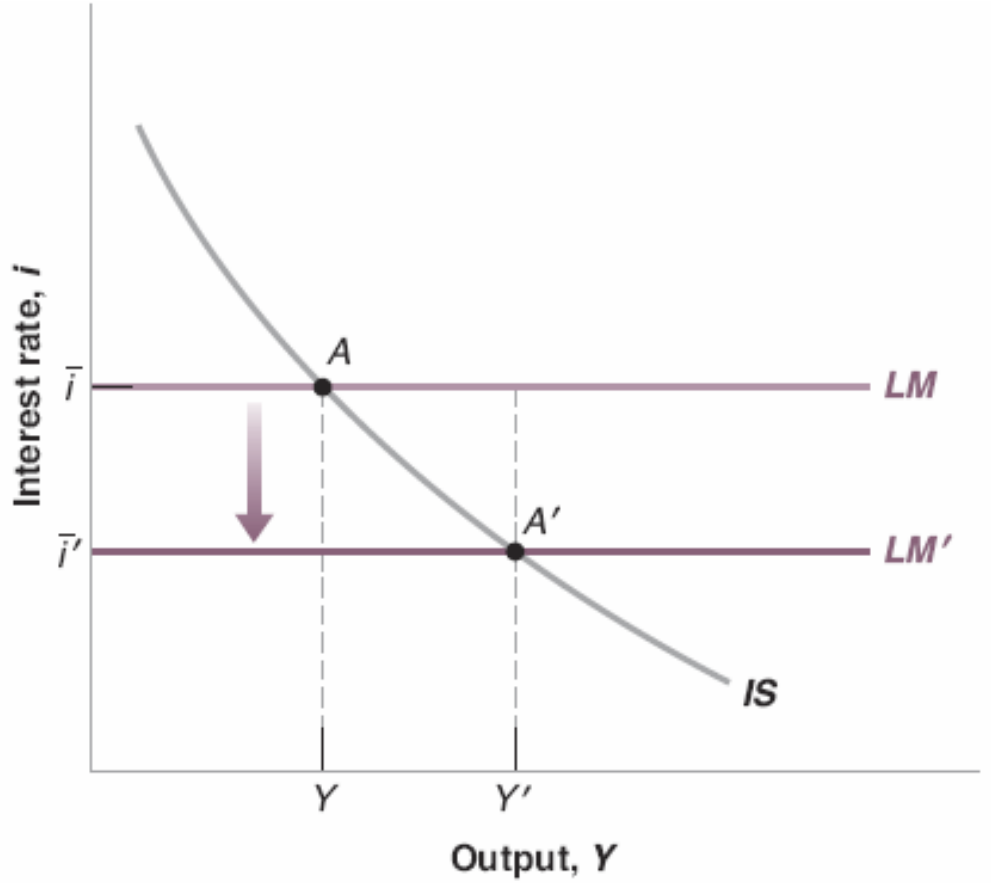
- US case:

8 regular FOMC (Federal Open Market Committee) meetings in a year. After each meeting, the FRB announces their new target interest rate and adjusts M^S to achieve the new rate.

FOMC Statement, March 3, 2020

- The fundamentals of the U.S. economy remain strong. However, the coronavirus poses evolving risks to economic activity. In light of these risks and in support of achieving its maximum employment and price stability goals, **the Federal Open Market Committee decided today to lower the target range for the federal funds rate by 1/2 percentage point, to 1 to 1-1/4 percent**. The Committee is closely monitoring developments and their implications for the economic outlook and will use its tools and act as appropriate to support the economy.
- https://www.federalreserve.gov/newsevents/pressreleases/monetary20200303a.htm

Shifts of the LM Curve



- Suppose that the CB lowers $\bar{\imath}$.
- This is achieved by increasing M^S via expansionary OMOs.

- $\frac{M}{P} \uparrow \rightarrow$ For each Y, the money market equilibrium interest rate $i \downarrow$

  $\rightarrow$ The LM curve shifts downward.
- As we move along the IS curve from A to A':

  $i \downarrow \rightarrow I(Y, i) \uparrow \rightarrow Y \uparrow$.

- $M_{A'} > M_A$
- Why? $\frac{M_{A'}}{P} = Y_{A'} L(\bar{\imath}') > Y_A L(\bar{\imath}') > Y_A L(\bar{\imath}) = \frac{M_A}{P}$

Determine what happens to the following variables.

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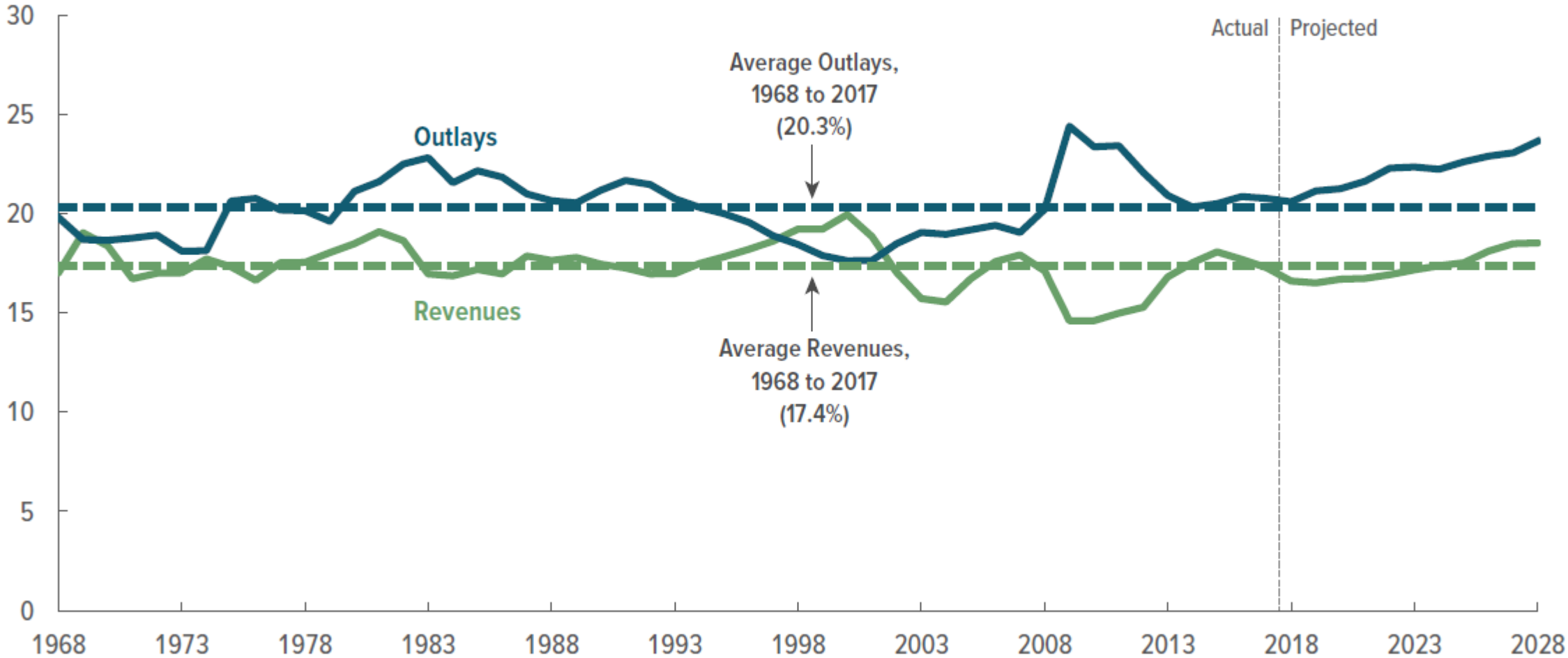
A fiscal consolidation + a monetary expansion

- When Bill Clinton was elected President in 1992, one of his priorities was to reduce the budget deficit using a combination of cuts in spending and increases in taxes.
- Clinton was worried because $T \uparrow$ and $G \downarrow \rightarrow Y \downarrow$
- The right strategy was to combine a fiscal contraction (by the govt) with a monetary expansion (by the CB).

Figure 4-2.

Total Revenues and Outlays

Percentage of Gross Domestic Product



Source: Congressional Budget Office.

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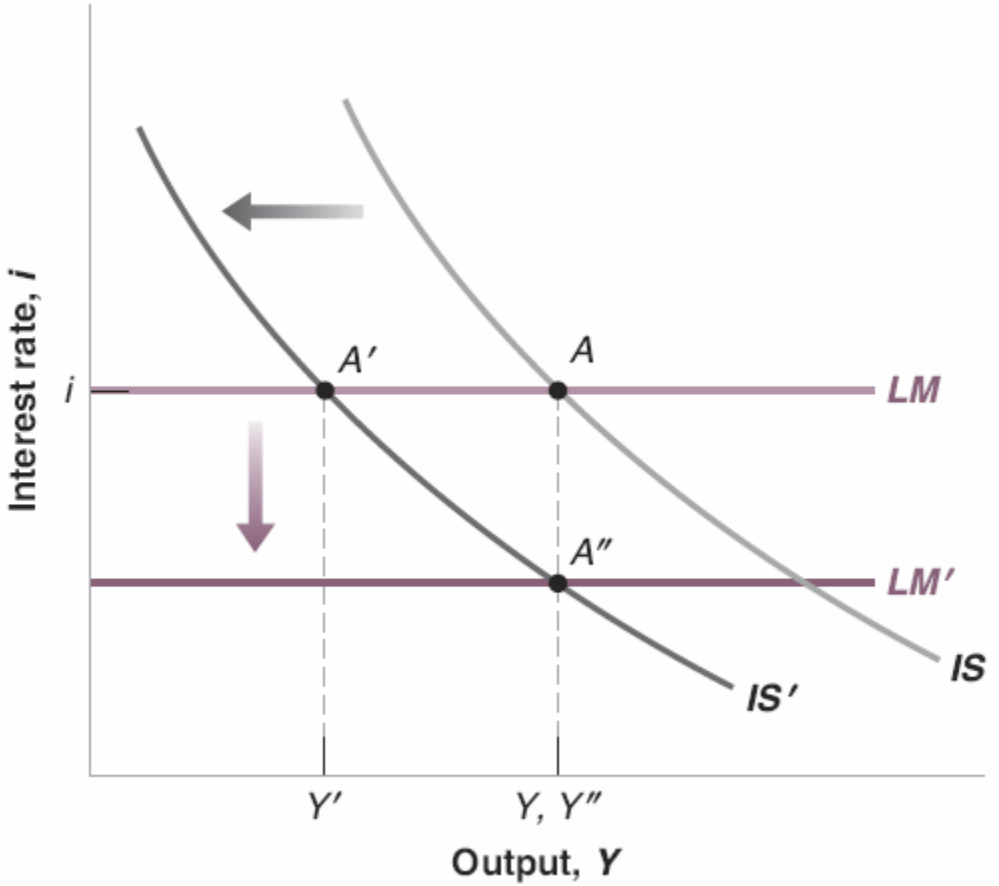

In the next class…

- We review the global financial crisis in 2007-08.
- We extend the IS-LM model and study the macroeconomic effects of financial turmoil and policy responses.

- Blanchard, Chapter 6.