

# IS-LM Equilibrium

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# 0.1 Introduction

In this section you will learn how to

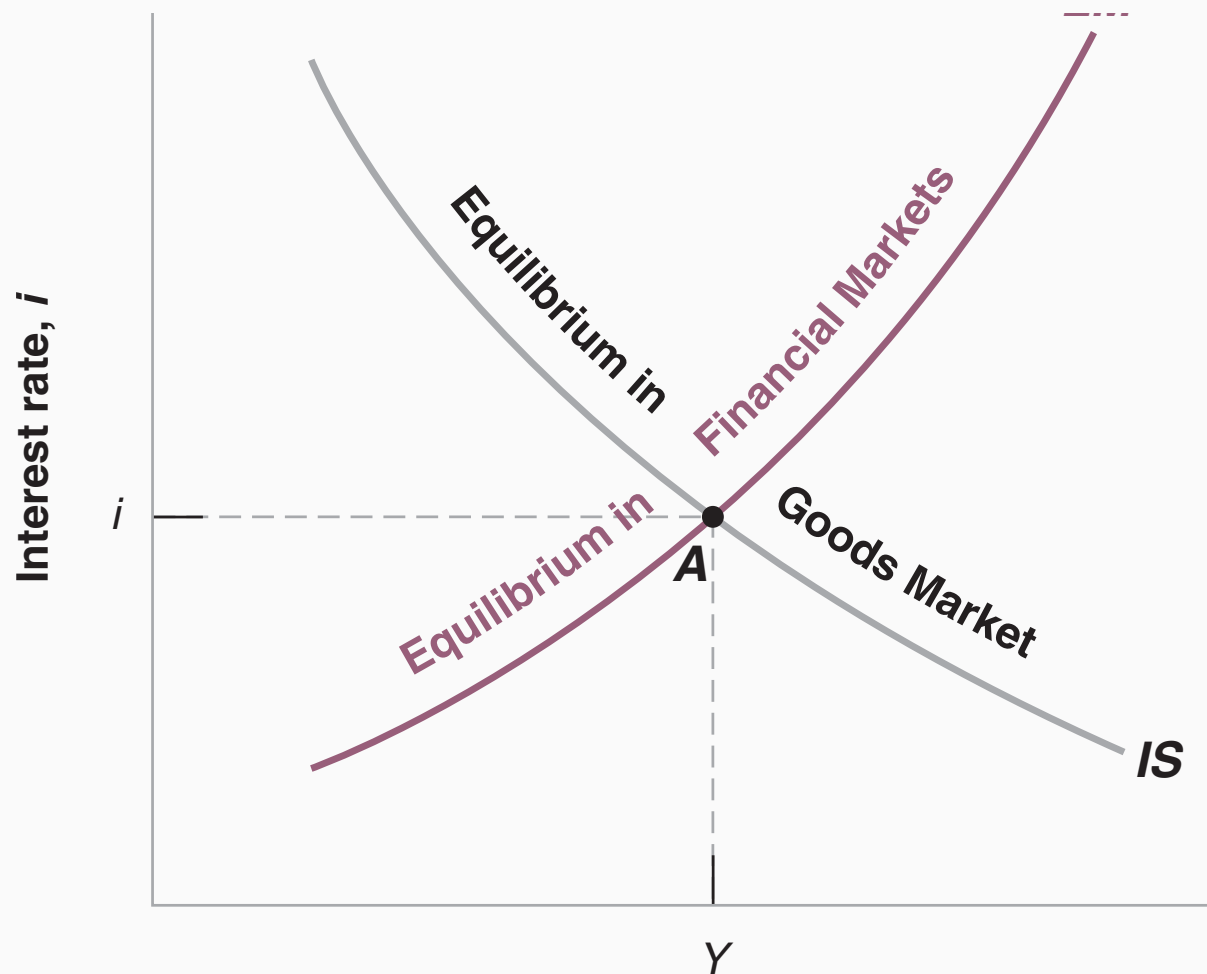
1. put IS and LM together and derive the equilibrium;
2. determine the effects of shocks and policies on equilibrium output and interest rate

## 0.2 Model Summary

- Endogenous objects:  $Y, i$
- Exogenous objects:  $\bar{I}, c_0, G, T$ 
  - also  $M$ , which we take as controlled by CB for now
- Equations:
  - IS:  $Y = C(Y - T) + I(Y, i) + G$
  - LM:  $M/P = YL(i)$

Interactive IS-LM Model

## 0.3 IS-LM Graph



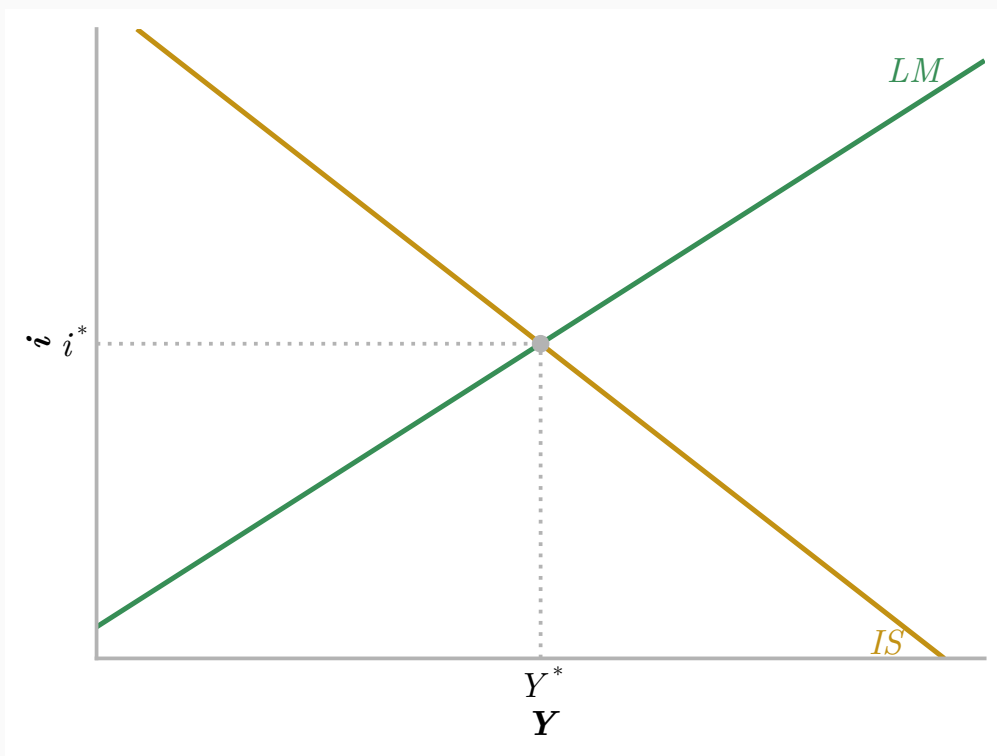
What happens in each market in each quadrant?

*Blanchard, Macroeconomics, 5th ed.*

# I Applications

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## I.I Increasing taxes



IS:  $Y = C(Y - T) + I(Y, i) + G$ . LM:  $M/P = YL(i)$ . The shock:  $T \uparrow$

The process...

## 1.2 Taxes and Investment

- A common argument:
  - higher taxes reduce disposable income and saving
  - saving = investment
  - **investment must fall**
- Another common argument:
  - higher taxes reduce the government deficit
  - more money available for investment
  - **investment rises**
- Which argument is right?

## I.3 What happens in the model?

Identity:  $I = S^P + S^G$

Public saving:  $S^G = T - G$

- rises by the change in  $T$
- assuming  $G$  is unchanged!

Private saving:  $S^P = Y - T - C(Y - T)$

- $(Y - T) \downarrow$
- $MPC < 1 \implies C \downarrow$  by less than  $Y - T$
- $S^P \downarrow$

Net change in  $S$  is ambiguous.

## I.4 Increasing Taxes

What is missing in our analysis?

- The **government budget constraint**.

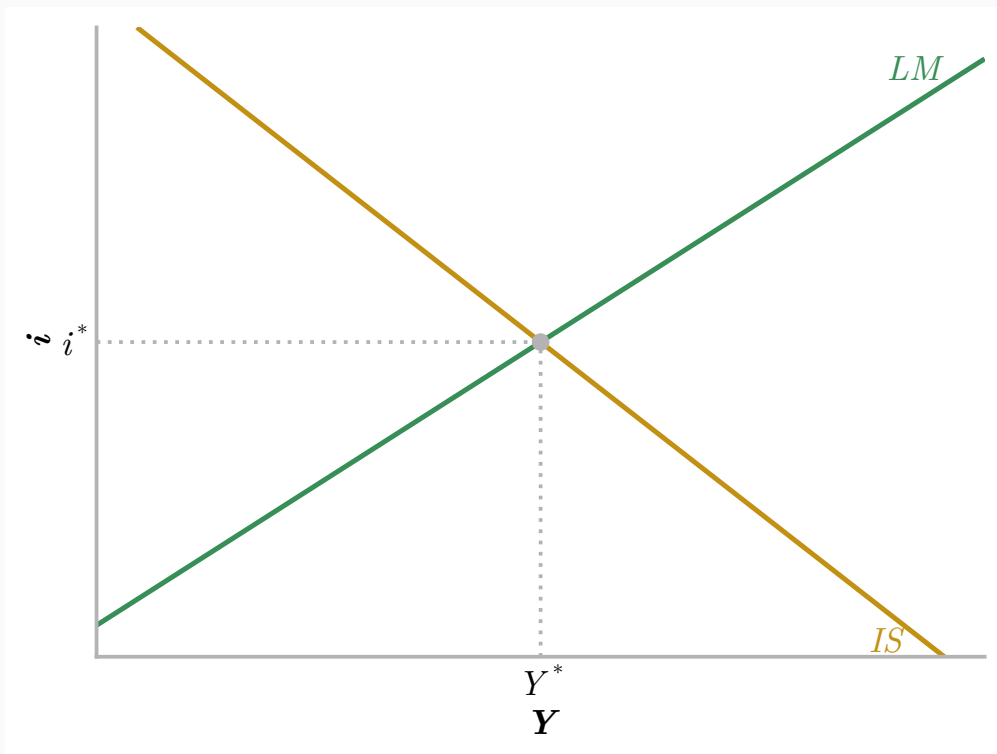
The government cannot raise taxes without changing another policy.

The revenue has to go somewhere.

- Either  $G \uparrow$  or public debt  $\downarrow$ .

A limitation of the IS/LM model.

## 1.5 Monetary expansion



IS:  $Y = C(Y - T) + I(Y, i) + G$ . LM:  $M/P = YL(i)$ . The shock:  $M \uparrow$

## I.6 Monetary Transmission

The link between monetary and real sector is the interest rate.

$$M \uparrow \implies i \downarrow \implies I \uparrow$$

What happens when investment is very interest inelastic?

- $I = \bar{I} + b_1 Y - b_2 i$
- $b_2$  is small

## I.7 Policy mix

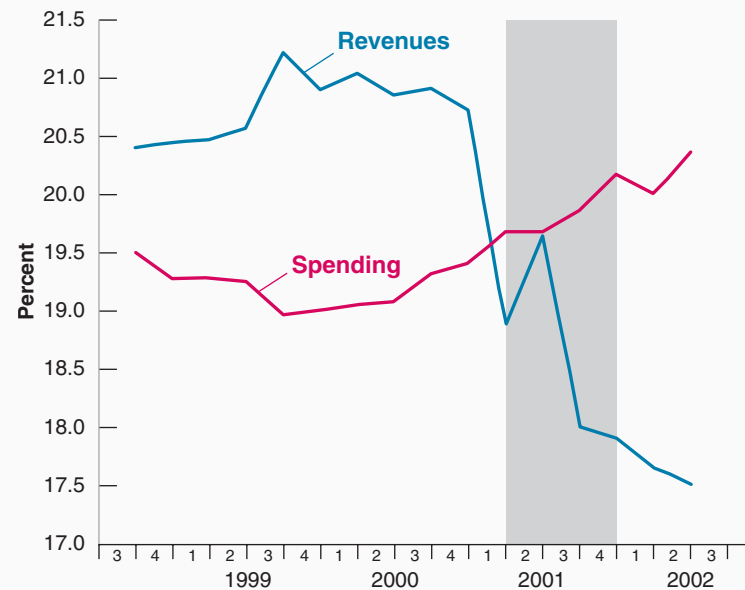
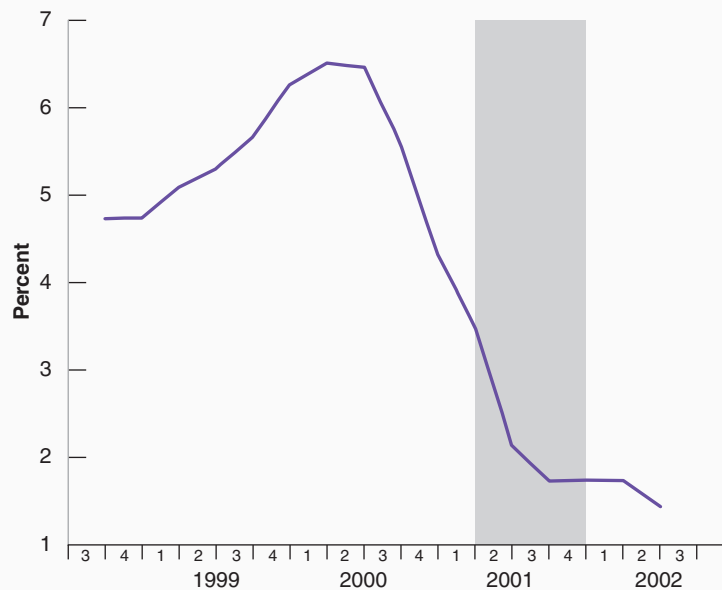
The government can, in principle, move  $Y$  and  $i$  independently.

- Monetary expansion:  $Y \uparrow, i \downarrow$
- Fiscal expansion:  $Y \uparrow, i \uparrow$
- Combination:  $Y \uparrow, i$  unchanged

In a typical recession, monetary and fiscal policies expand.

## 1.8 Example: 2001 Recession

The shock: bursting of the tech bubble  $\Rightarrow I \downarrow$



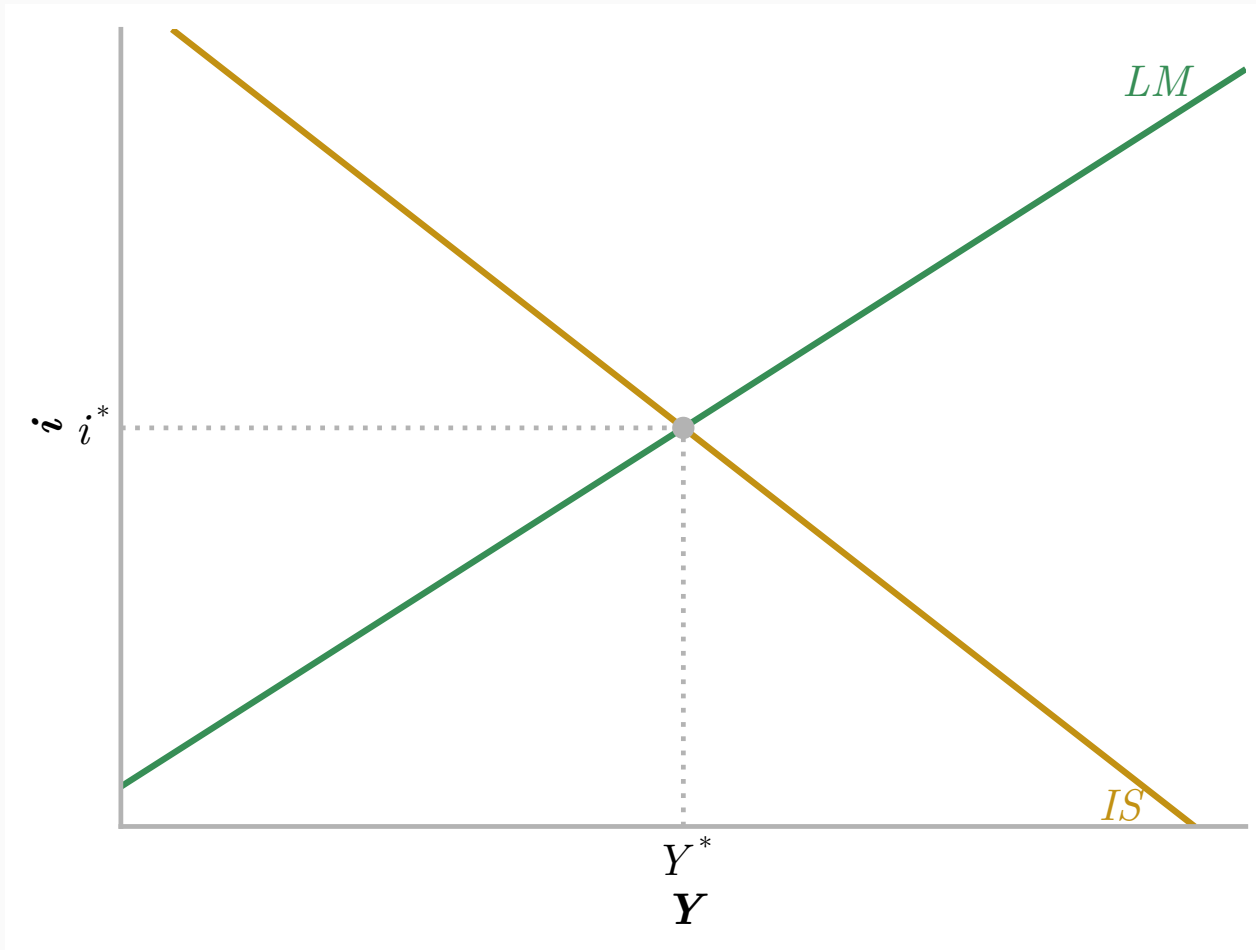
Federal funds rate

Note that spending moves very slowly.

Government spending / revenue

Revenues  $\rightarrow$  automatic stabilizer.

## I.9 Analysis of the 2001 Recession

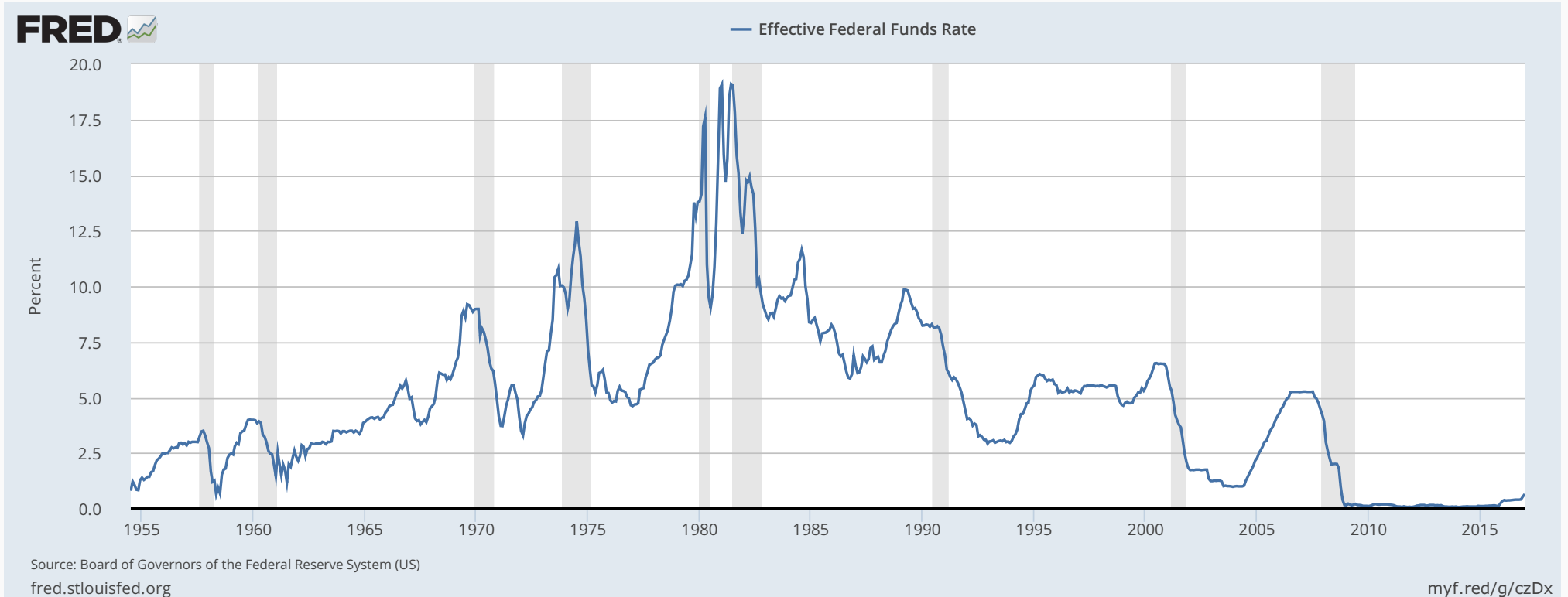


## 2 Liquidity trap

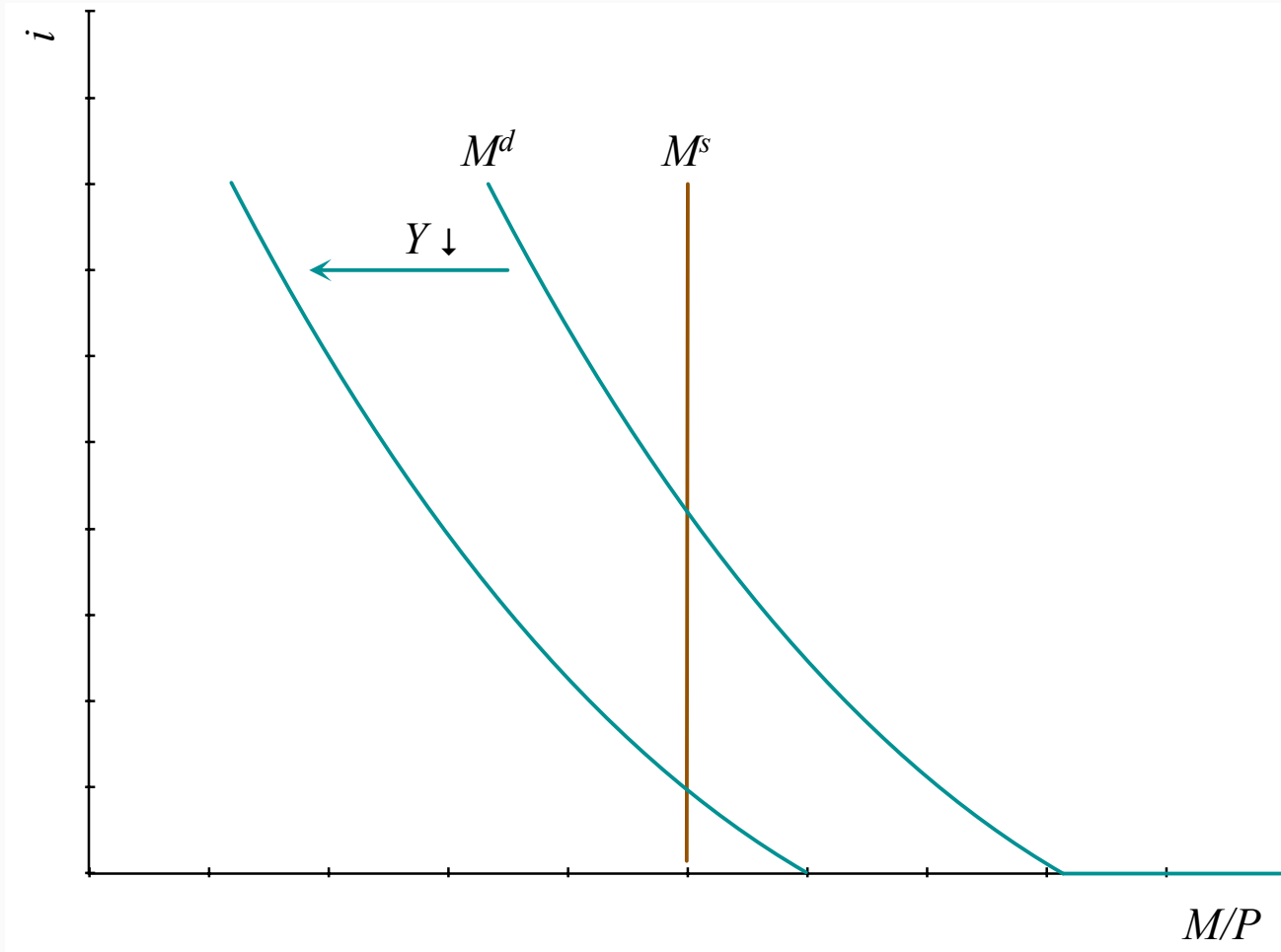
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## 2.1 Liquidity Traps

Real interest rates have been near zero for some time.  
What does this imply for monetary policy?



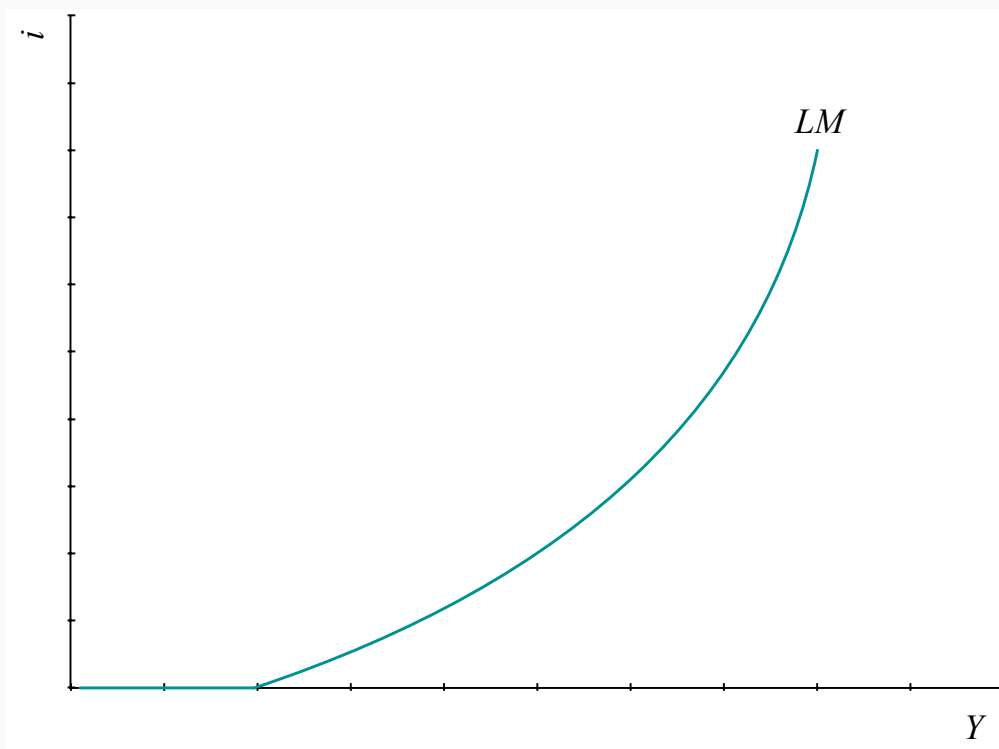
## 2.2 Liquidity Trap



The LM curve turns flat

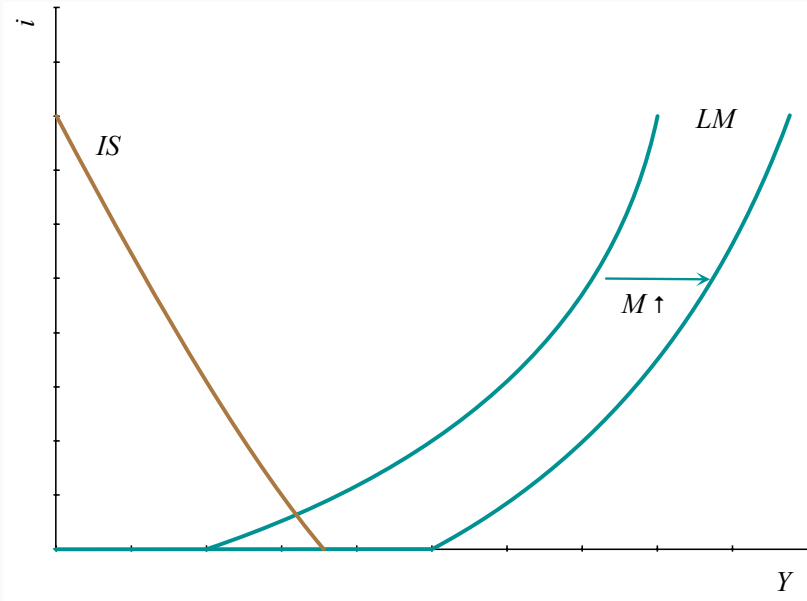
- The LM curve is derived by varying  $Y$  and tracing out  $i, M/P$  points that clear the money market.
- For low  $Y$  the interest rate hits 0 and the LM curve becomes flat.

## 2.3 Liquidity Trap



The LM curve is flat at 0 interest rates.

## 2.4 Liquidity Trap: Monetary Policy

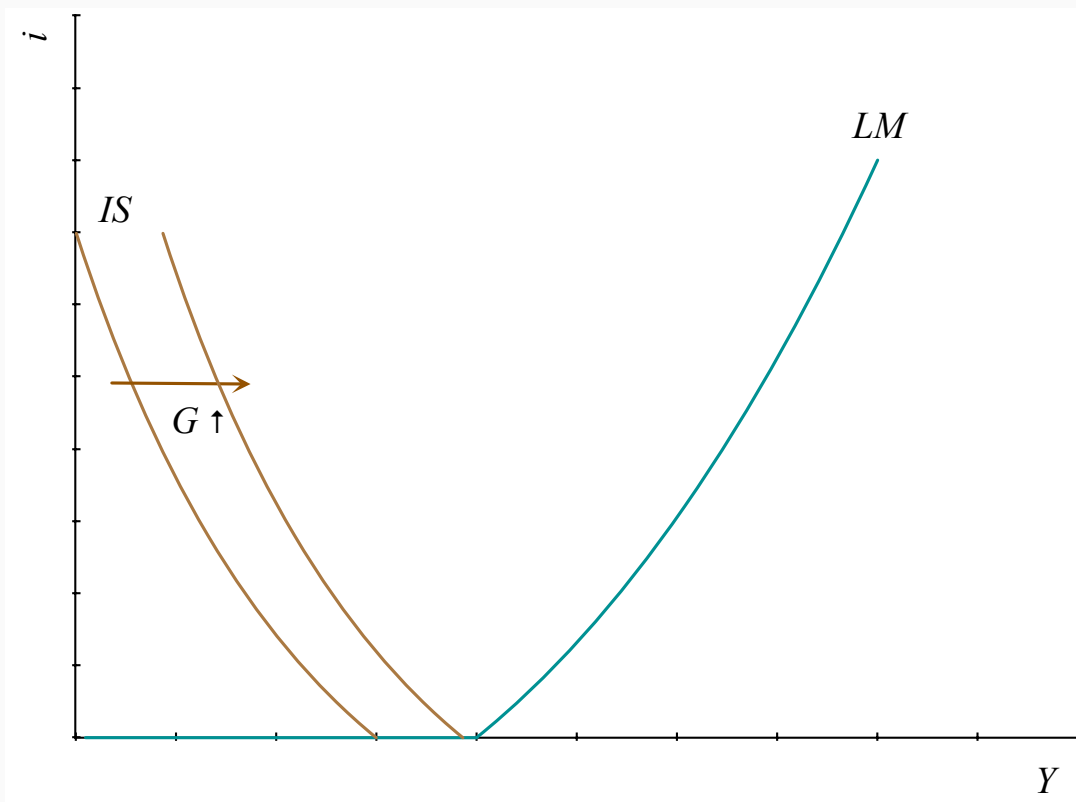


Monetary policy becomes ineffective

## 2.5 Policy options in a liquidity trap

If the interest rate is zero, what can the Fed do?

## 2.6 Liquidity Trap: Fiscal Policy



Fiscal policy becomes highly effective

## 3 Summary

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## 3.1 A Few Major Caveats

The IS-LM model makes the government look too powerful.

- By raising  $G$  it can achieve any level of  $Y$ .
- When is this a reasonable shortcut?

It looks like saving lowers output.

- What is missing?

## 3.2 Why Do We Still Have Recessions?

In the model, the government can stabilize output too easily.

Real world complications:

1. Big and variable lags until policies become effective
2. Lags in diagnosis and implementation of policies
3. Expansionary fiscal policies create debt
4. Expansionary monetary policies create inflation

### 3.3 An important point to remember

The IS-LM model makes strong assumptions: fixed prices, elastic supply, government can borrow without cost.

When applying the model, you need to consider how these assumptions modify the results.

(Or build a more comprehensive model)

## 3.4 Reading

Blanchard, Macroeconomics, 7th ed.

- ch. 5 and 9.2