# IS-LM Equilibrium

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# Objectives

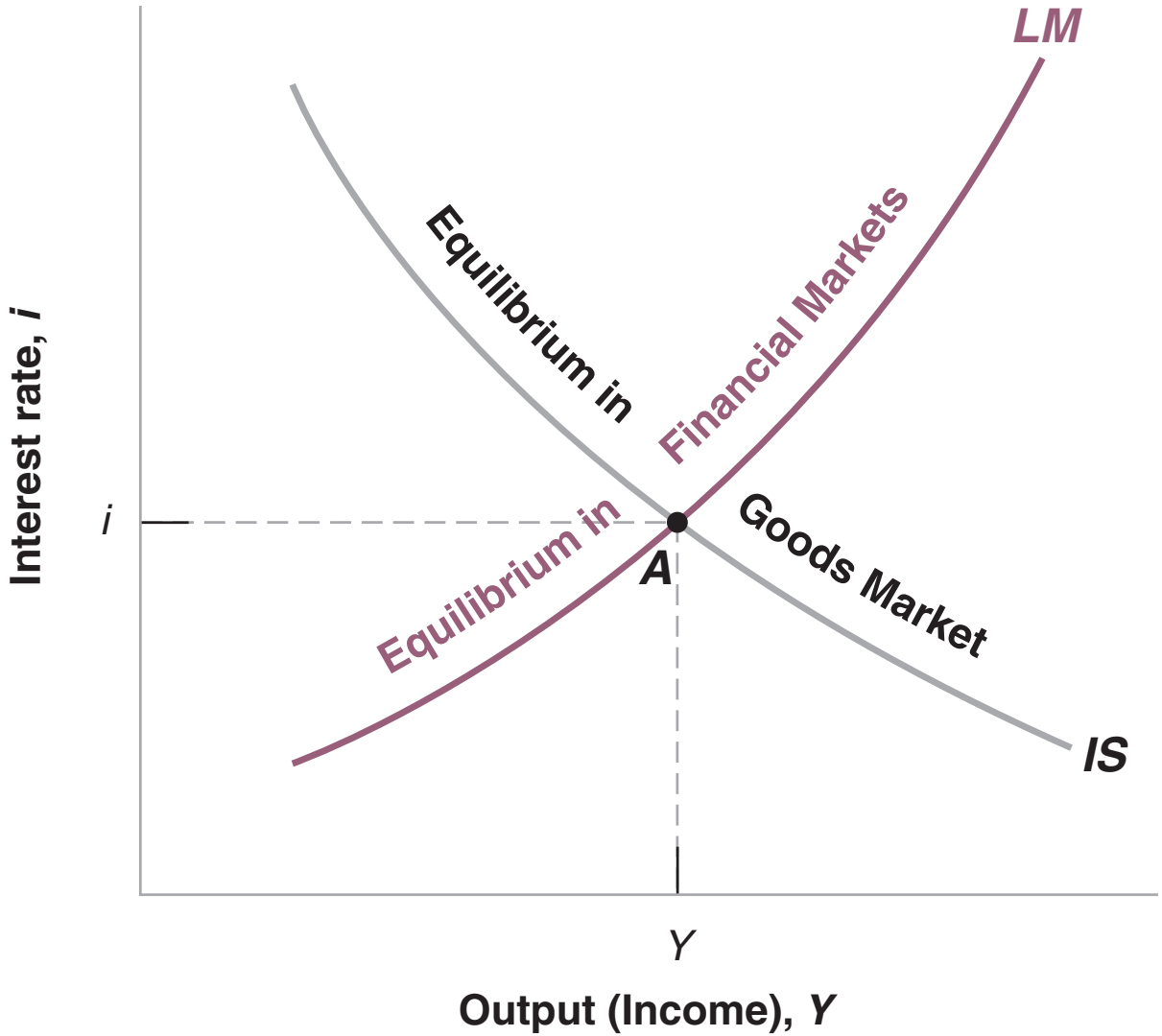
In this section you will learn how to

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

# 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: $M/P = YL(i)$

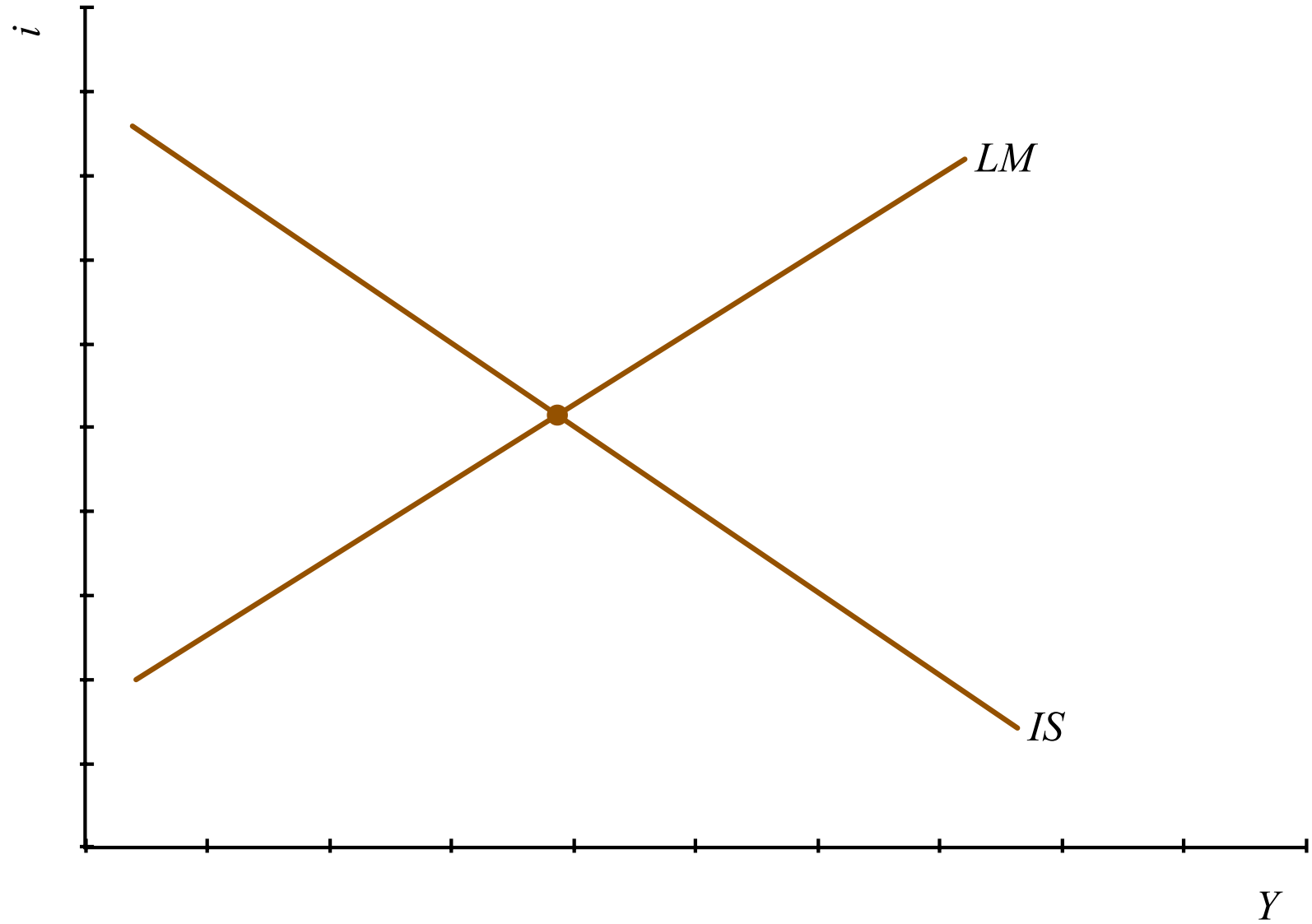
# IS-LM Graph




What happens in each market in each quadrant?

# Applications

# Increasing Taxes




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

# Increasing Taxes: The Process

Key point:

- $Y \downarrow \Longrightarrow$ agents hold too much money.
- Selling money means buying bonds.
- This drives up bond prices.
- This drives down interest rates.
- This stimulates demand for goods.

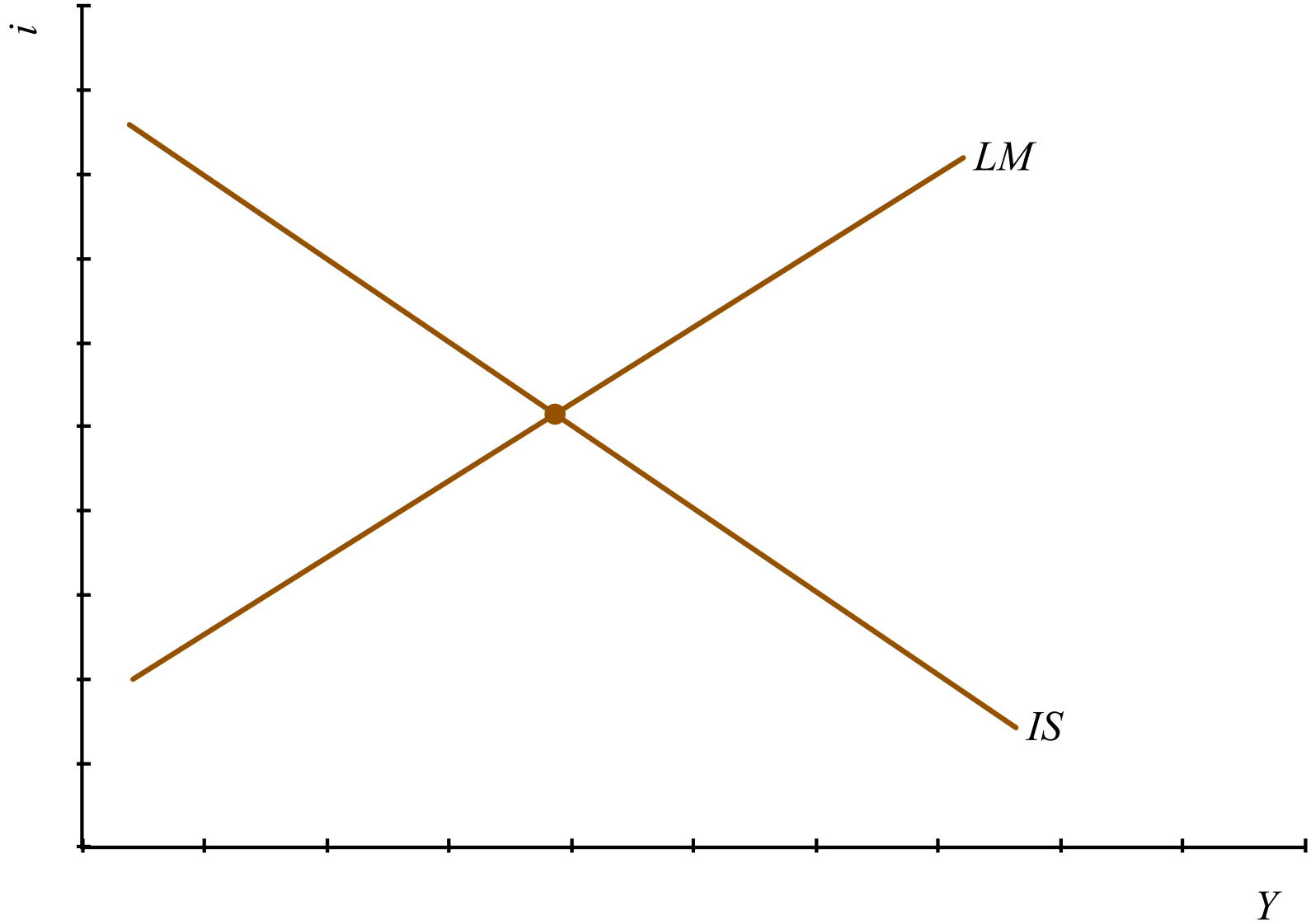
# Taxes and Investment

- 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
- Which argument is right?

# Increasing Taxes

What is missing in our analysis?

# Monetary Expansion

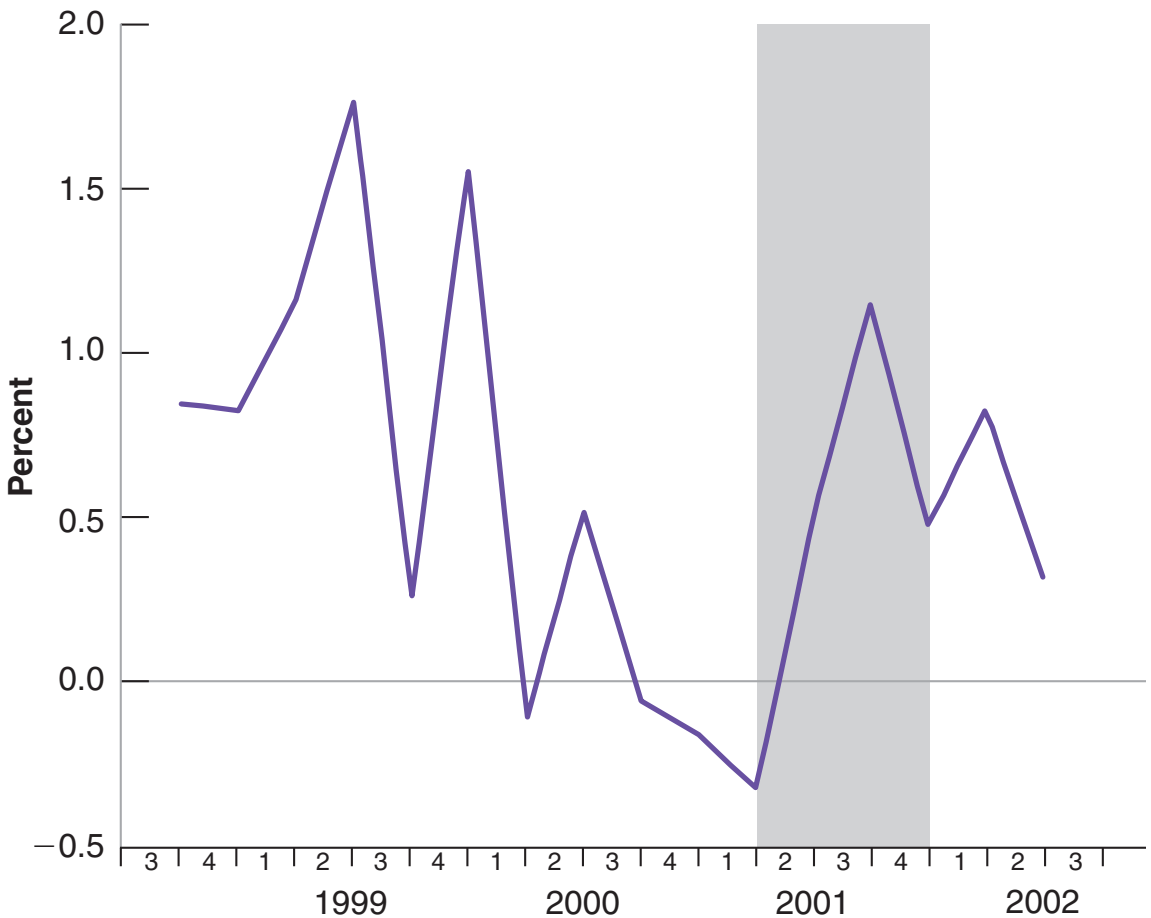



IS: $Y = C(Y-T) + I(Y,i) + G$. LM: $M/P = YL(i)$. The shock: $M \uparrow$

# Policy Mix

- By combining monetary and fiscal policy, 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

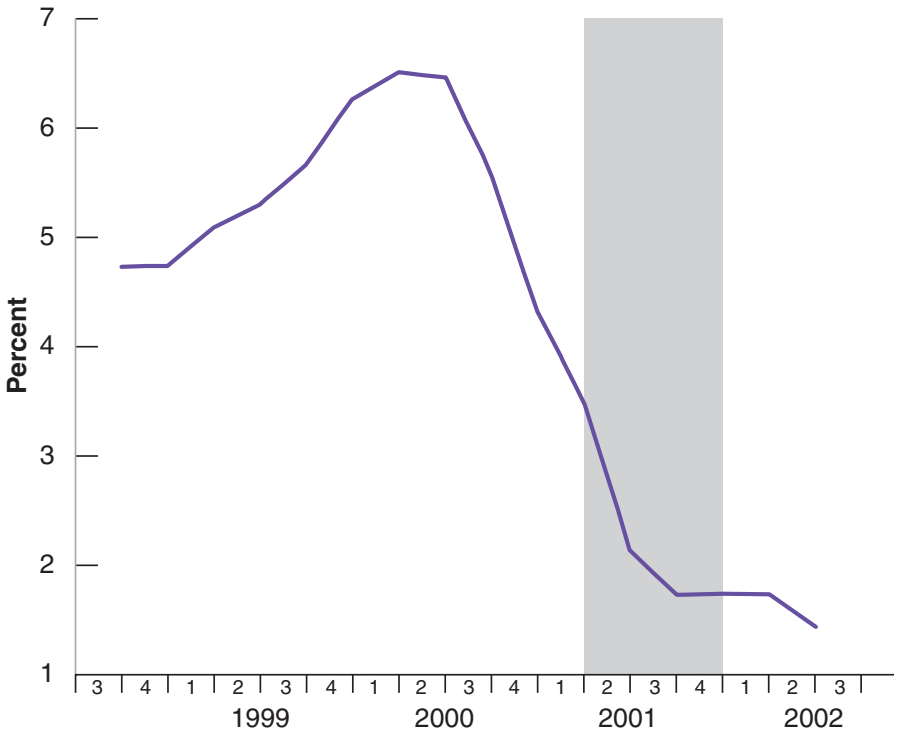
# Example: 2001 Recession



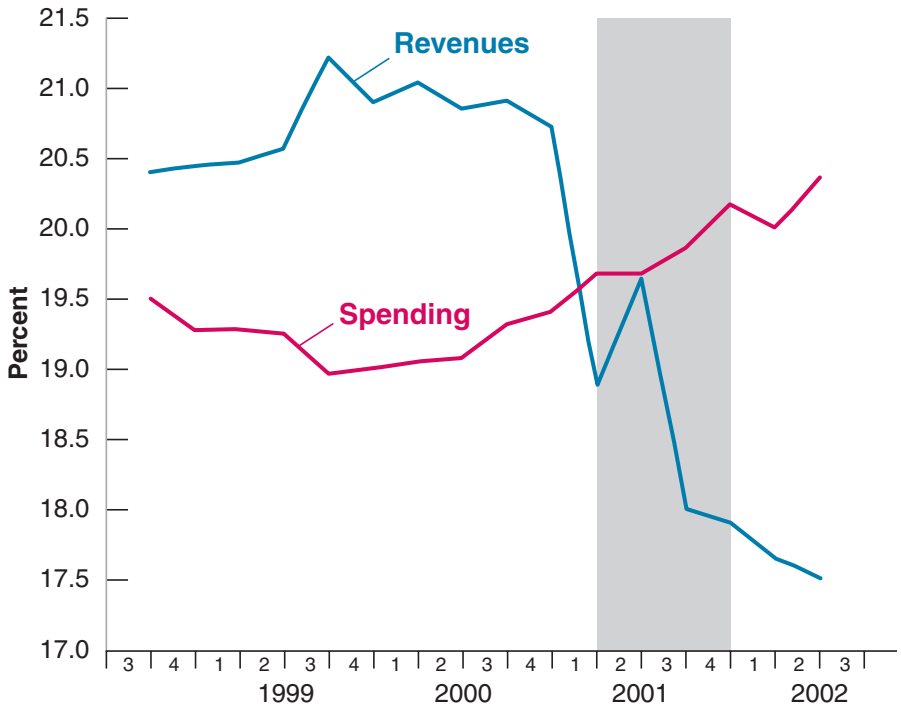

Growth rate of output

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

# Policy Responses

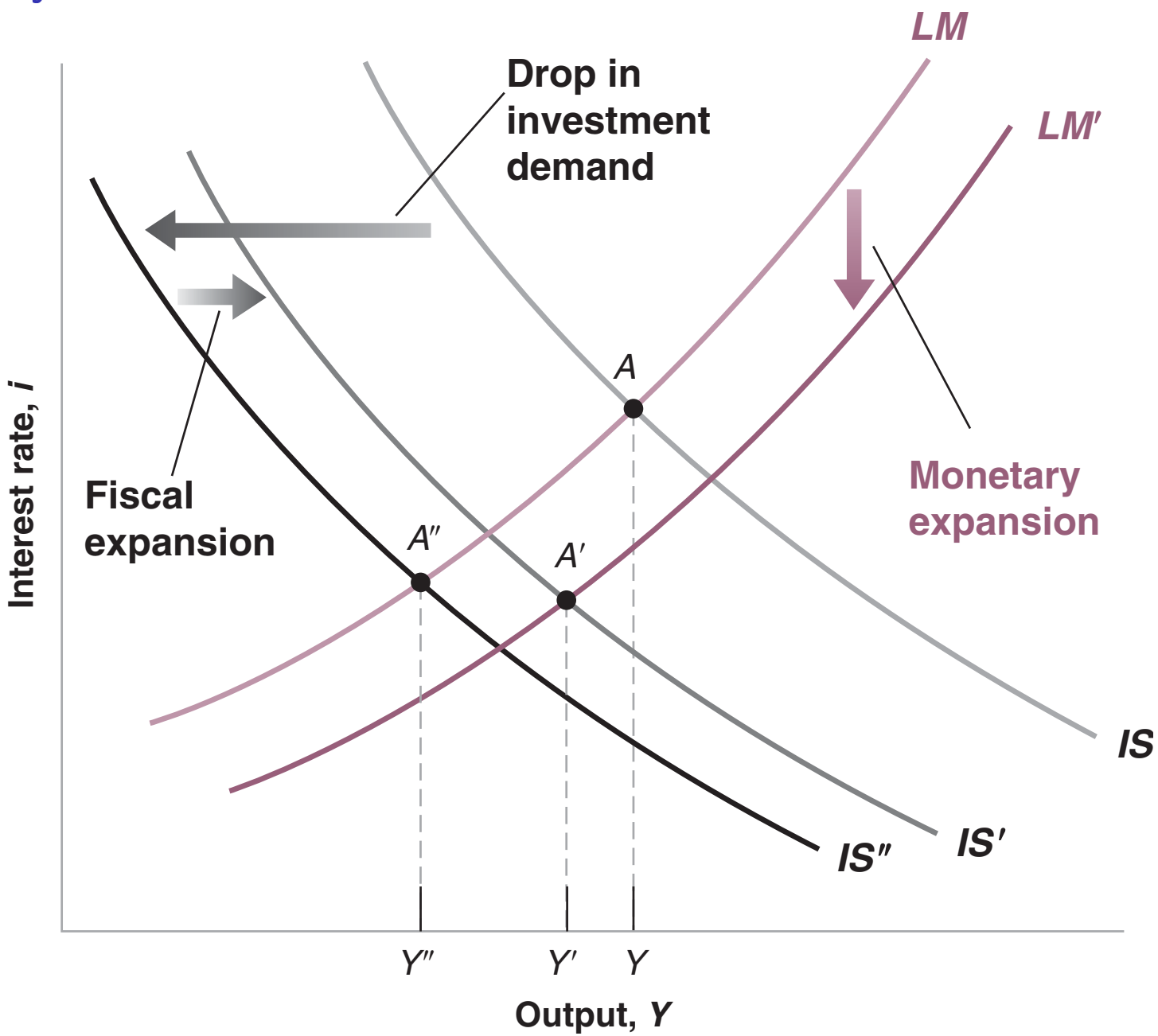



Federal funds rate




Government spending / revenue

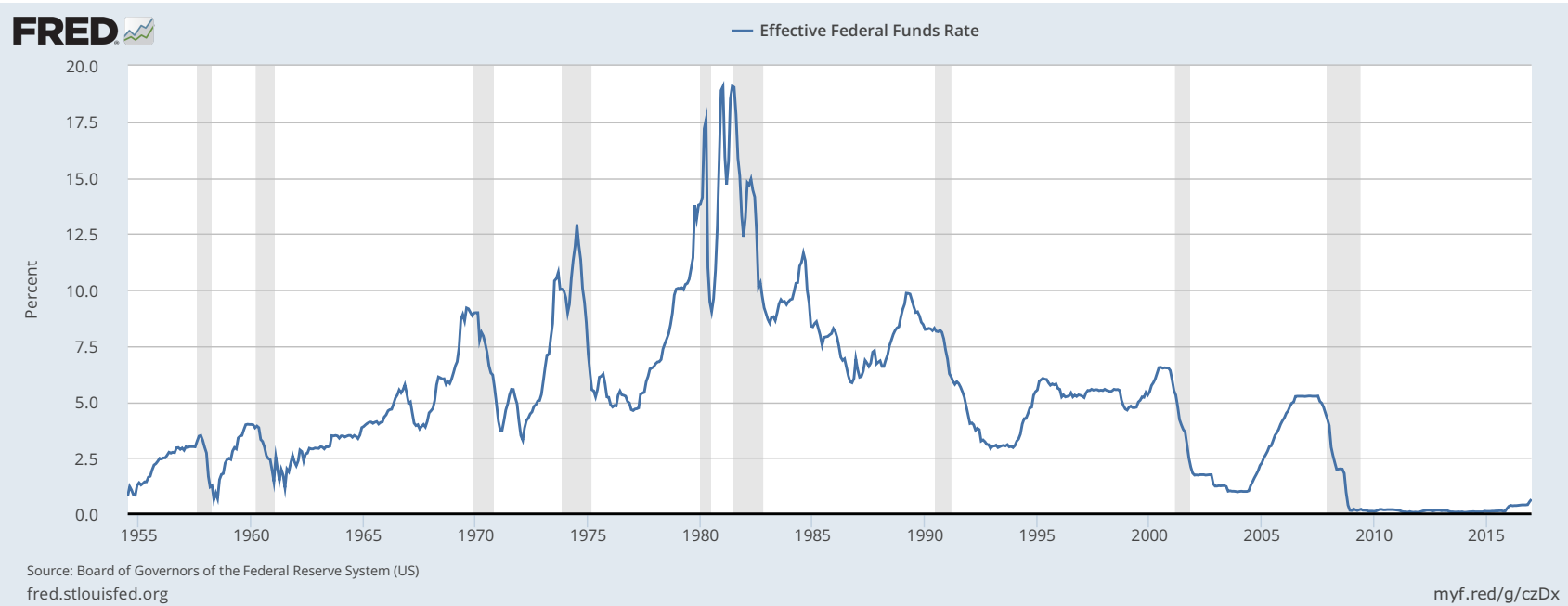
# Analysis of the 2001 Recession



# Liquidity Traps

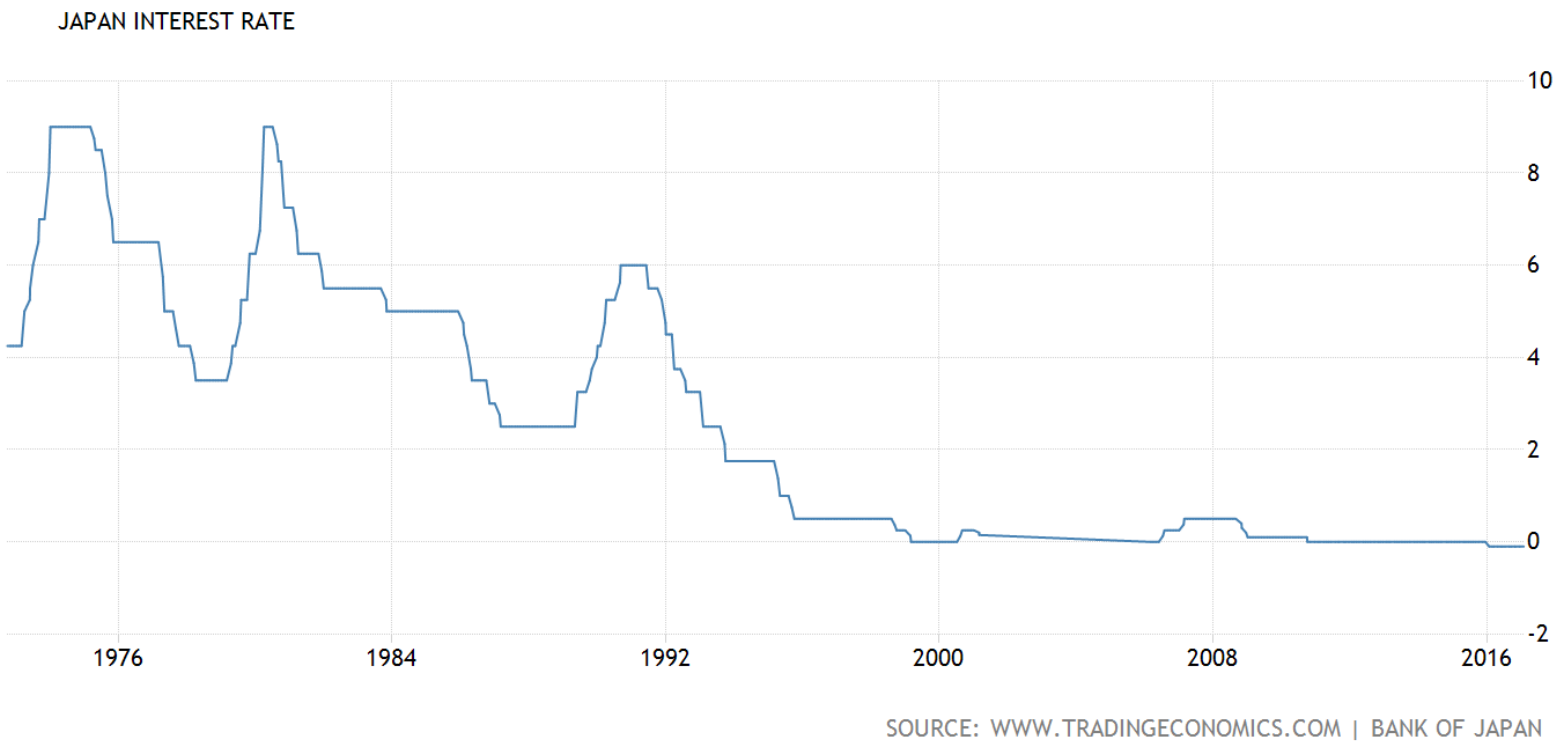
- Why do monetary policies have such a hard time pulling Japan out of recession?
- Real interest rates near zero
- Suggests flat LM curve
- “Liquidity trap”

# US Federal Funds Rate



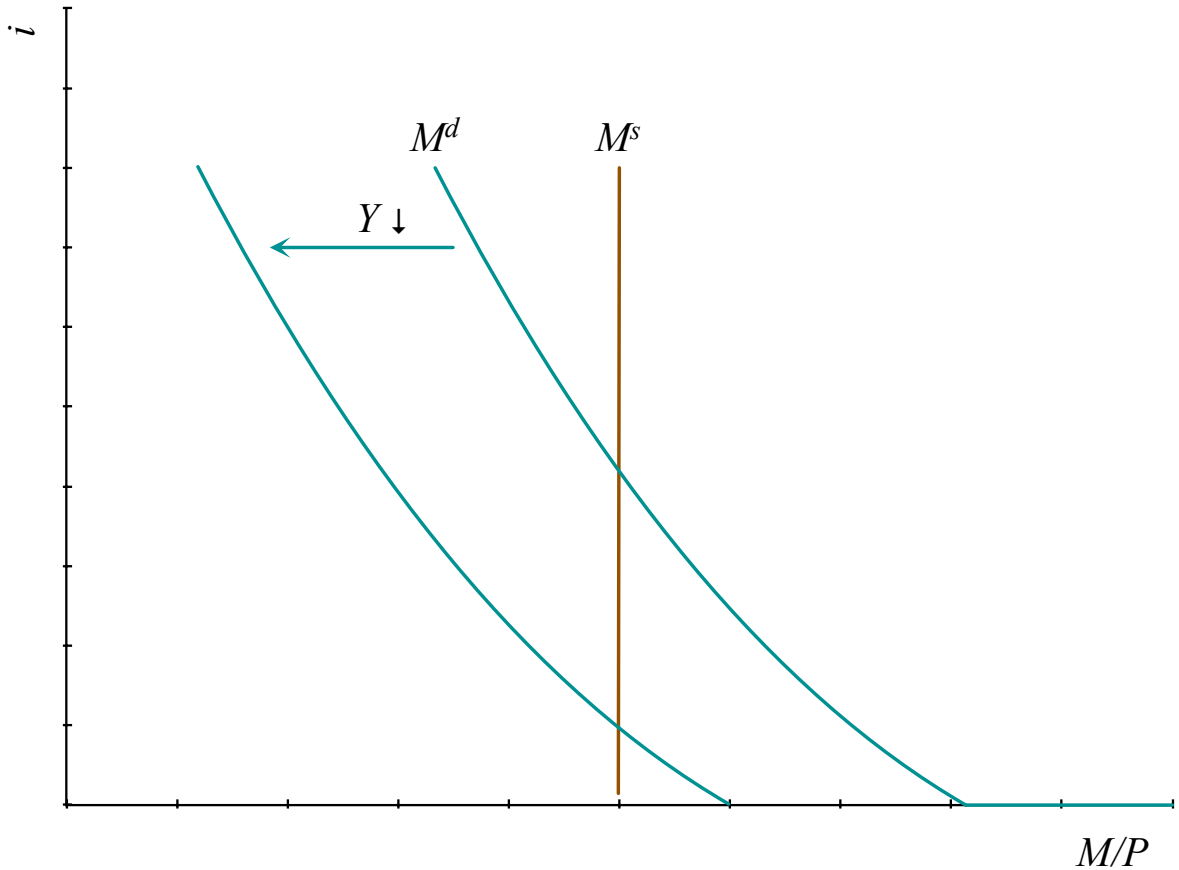

Soure: Fred

# Japan's Central Bank Rate



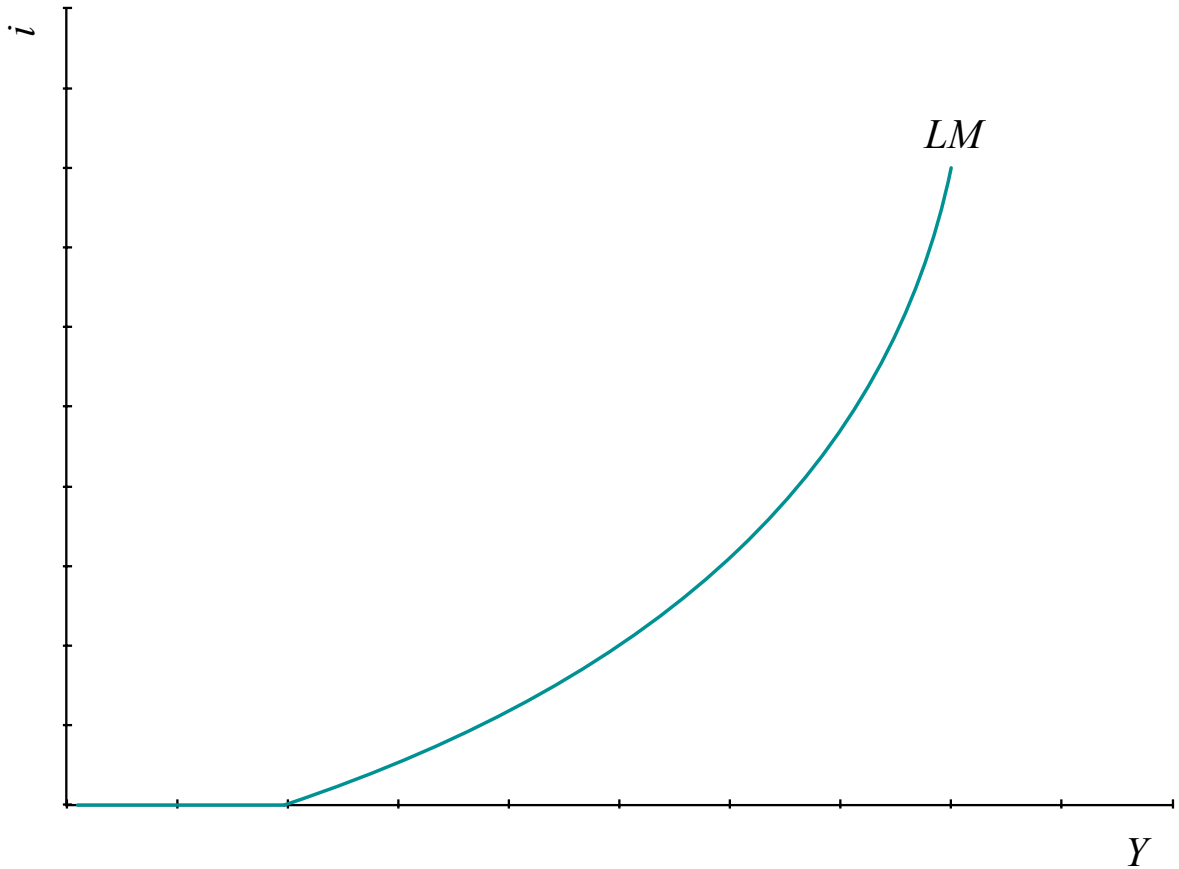

Source: Trading Economics

# Liquidity Trap



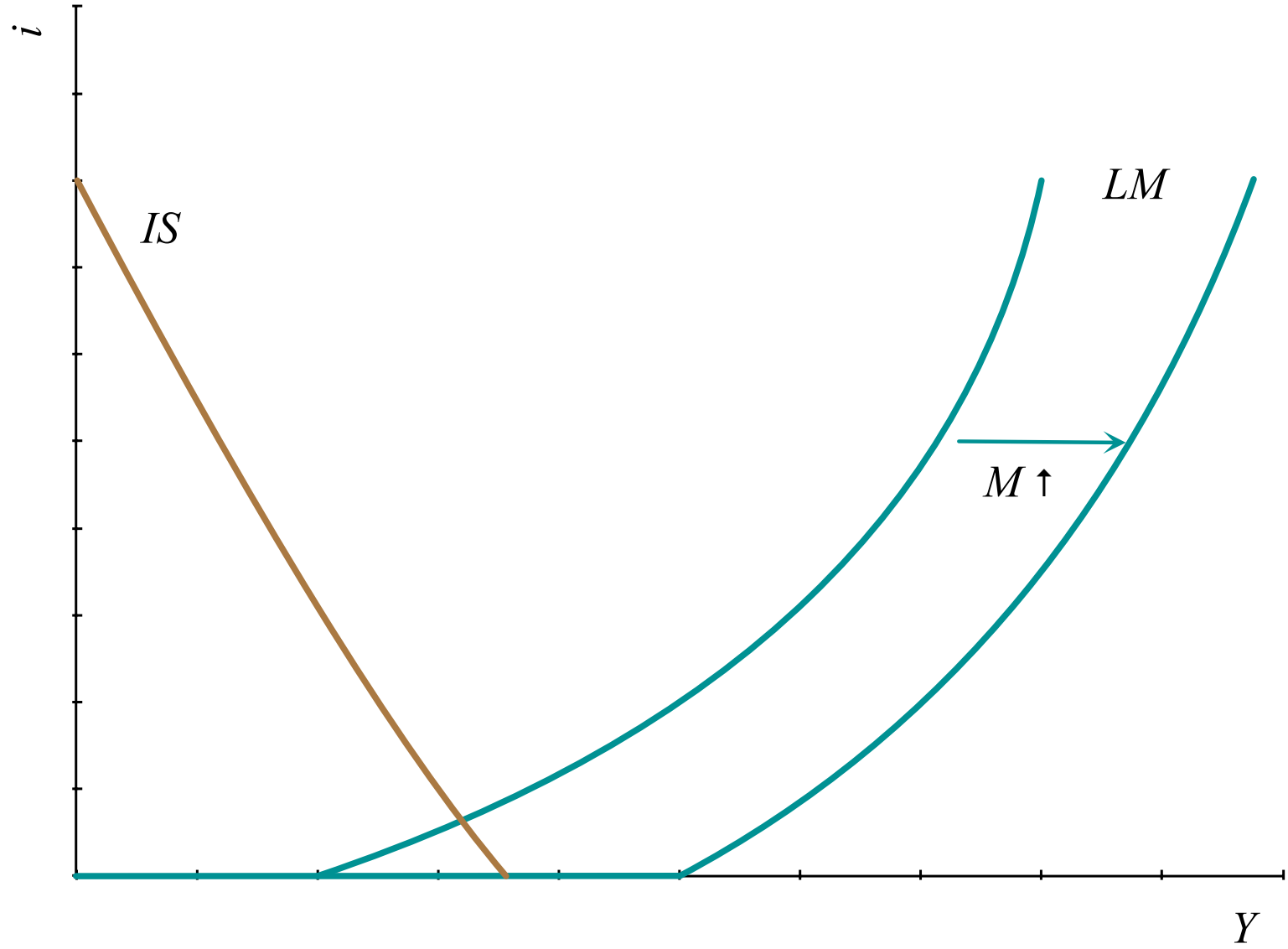

- The LM curve is derived by varying $Y$ and tracing out $i, M/P$ points that clear the money market.
- For low $Y$ the interest rate hits 0 and the LM curve becomes flat.

# Liquidity Trap




The LM curve is flat at 0 interest rates.

# Liquidity Trap: Monetary Policy

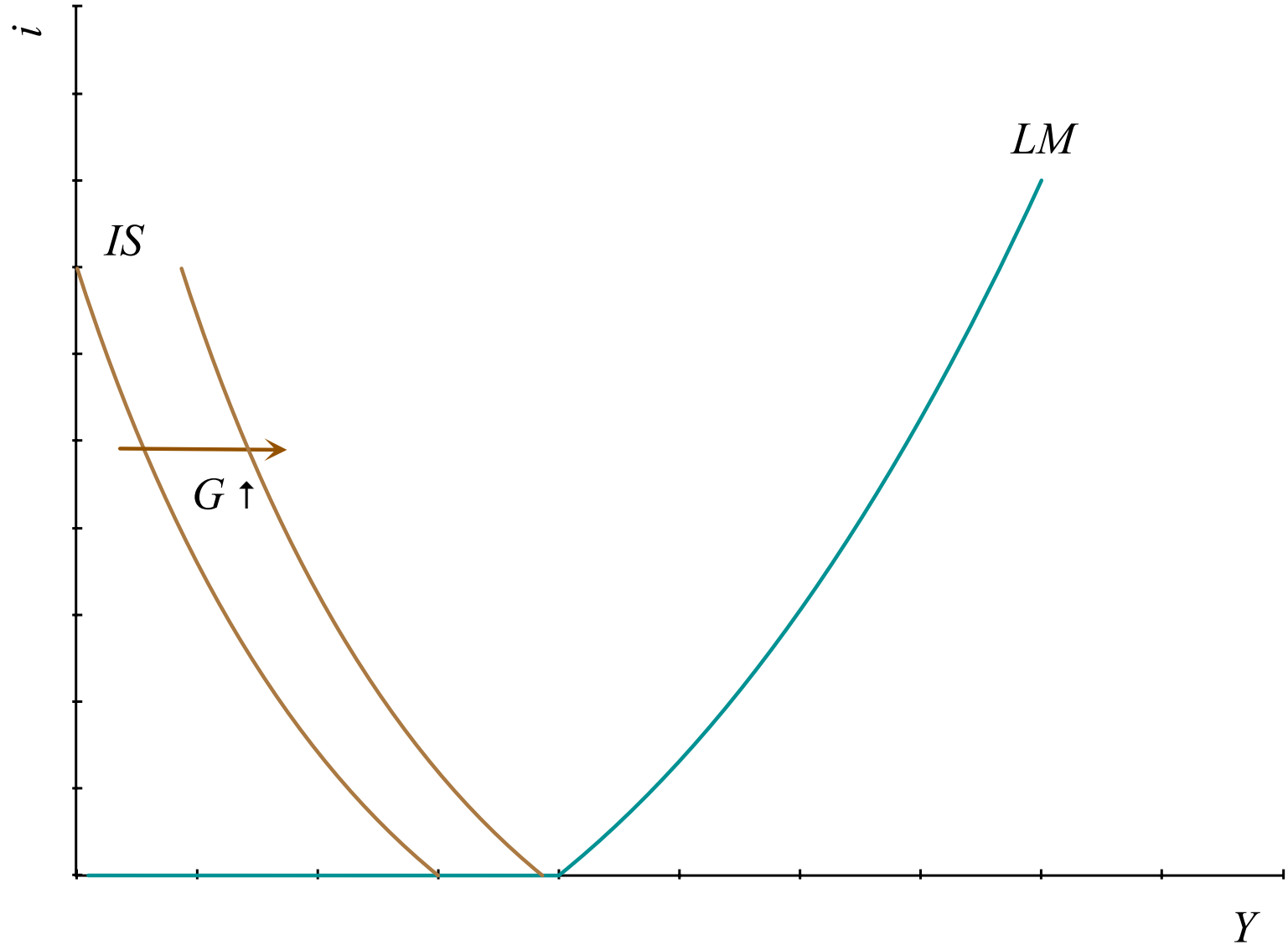



Monetary policy becomes ineffective

# Policy options in a liquidity trap

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

# Liquidity Trap: Fiscal Policy




Fiscal policy becomes highly effective

# 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?

# 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

## 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)

# Reading

Blanchard and Johnson (2013), ch. 5 and 9.2

# References I

Blanchard, O. and D. Johnson (2013): *Macroeconomics*, Boston: Pearson, 6th ed.