

# LECTURE 9

## IS-LM | LM SUBMODEL

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# TWO TYPES OF ASSETS

1. **money**: used for transactions but pays no interest
  - **currency**: coins & bills
  - **checkable deposits**: funds deposited in accounts at banks and other financial institutions against which checks can be written
2. **bonds**: pay a positive rate of interest ( $i$ ) but cannot be used for transaction
  - how do people allocate wealth between money & bonds?

# DEMAND FOR MONEY FROM TRANSACTIONS

- people want to avoid selling bonds whenever they need money for transaction: **people hold more money when they conduct more transactions**
  - you have \$50,000 in wealth and spend \$3,000 a month
  - maybe you need 2 months of spending on hand
  - you keep in money:  $2 \times \$3,000 = \$6,000$
  - you invest in bonds:  $\$50,000 - \$6,000 = \$44,000$
  - you would keep more money if you spent more

# INTEREST RATE

- bonds pay an interest rate: **the higher the interest rate, the more beneficial it is to hold bonds, and the more costly it is to hold money**
- bonds are held through money-market mutual funds
- in the early 1980s, the interest rate on money-market funds reached 14% per year: people moved their wealth from checking accounts to these funds to earn interest
- today interest rates are much lower (~0%) so it makes less sense to hold bonds in money-market mutual funds

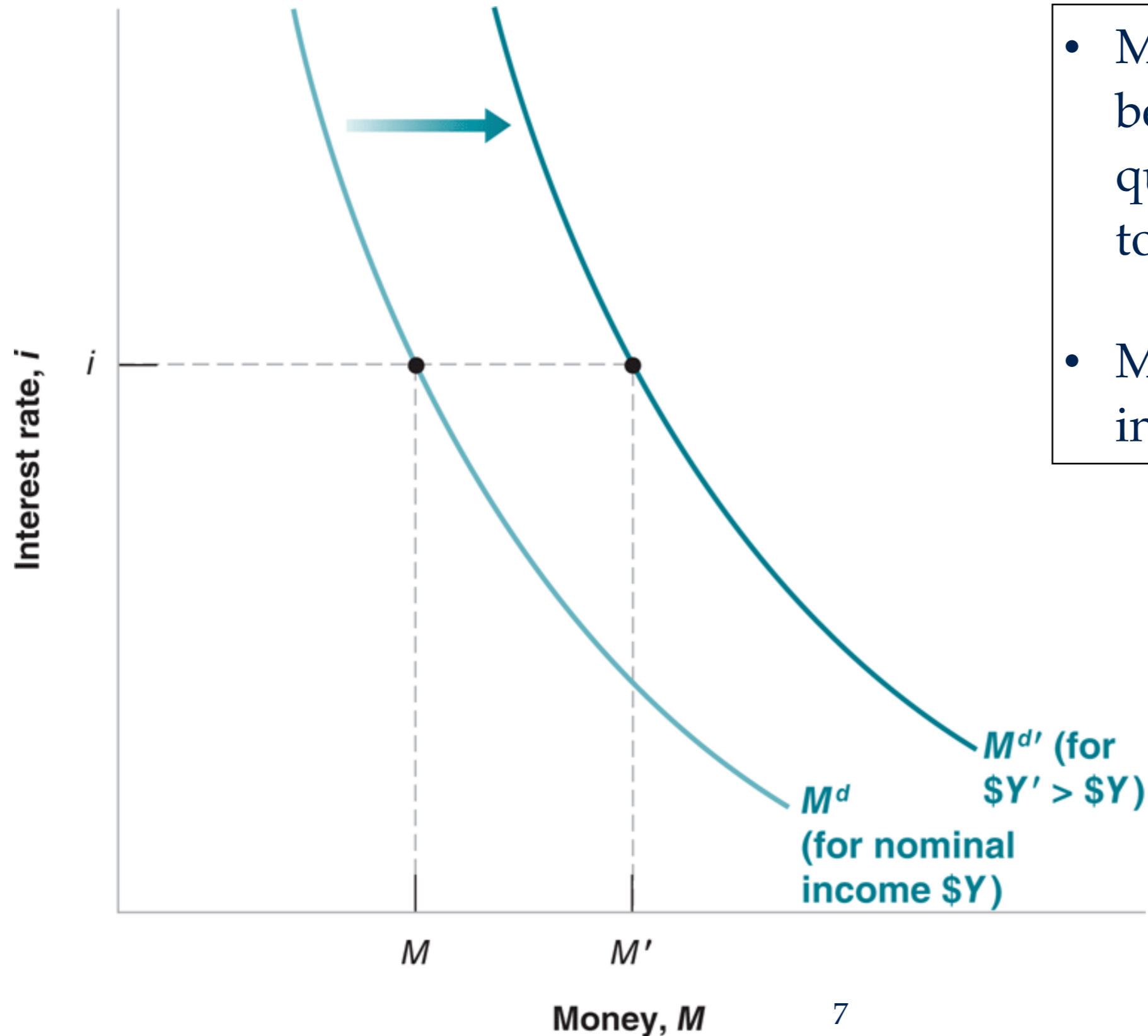
# PRICE OF BONDS

- suppose a bond promises to pay \$100 a year from now
- the price of the bond today is \$P
- the interest rate  $i$  is the return on the investment of \$P
  - by definition of a rate of return:  $i = (100 - P) / P$
  - equivalently,  $(1+i) \times P = 100$
  - bond price and interest rate are directly related:  $P = 100 / (1+i)$
- higher bond price  $\longrightarrow$  lower interest rate (lower return)
- lower bond price  $\longrightarrow$  higher interest rate (higher return)

# THE DEMAND FOR MONEY

- money demand increases with income ( $Y$ ) but decreases with interest rate ( $i$ )
  - because more income means more transactions
  - and a higher interest rate makes holding money more costly relative to bonds
- shape of money demand:  $M^d(i, Y) = Y \times L(i)$  with  $L'(i) < 0$ 
  - $Y$ : income in the economy
  - $i$ : interest rate on bonds
  - $L(i)$  : the fraction of income that consumers hold in money to conduct transactions (decreasing in interest rate  $i$ )

# THE DEMAND FOR MONEY



- $M^d$  is a demand curve because it links a quantity demanded ( $M$ ) to a price ( $i$ )
- $M^d$  is decreasing in  $i$  but increasing in  $Y$

# THE SUPPLY OF MONEY

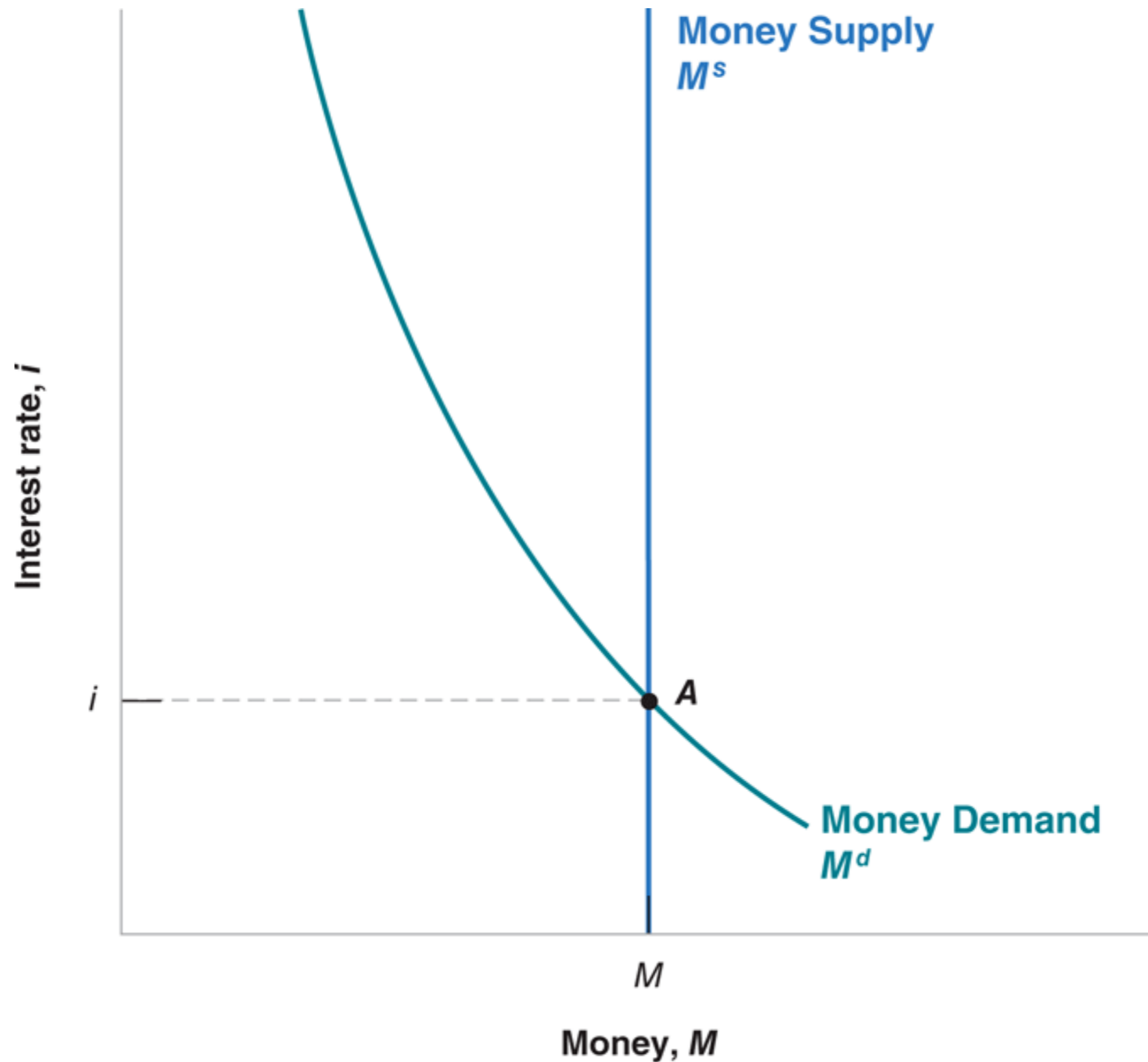
- in reality, 2 types of money:
  - currency supplied by the central bank
  - checkable deposits supplied by banks
- assumption for now: the only money is currency
- the central bank supplies a quantity of money  $M > 0$ 
  - then the money supply is  $M^s = M$



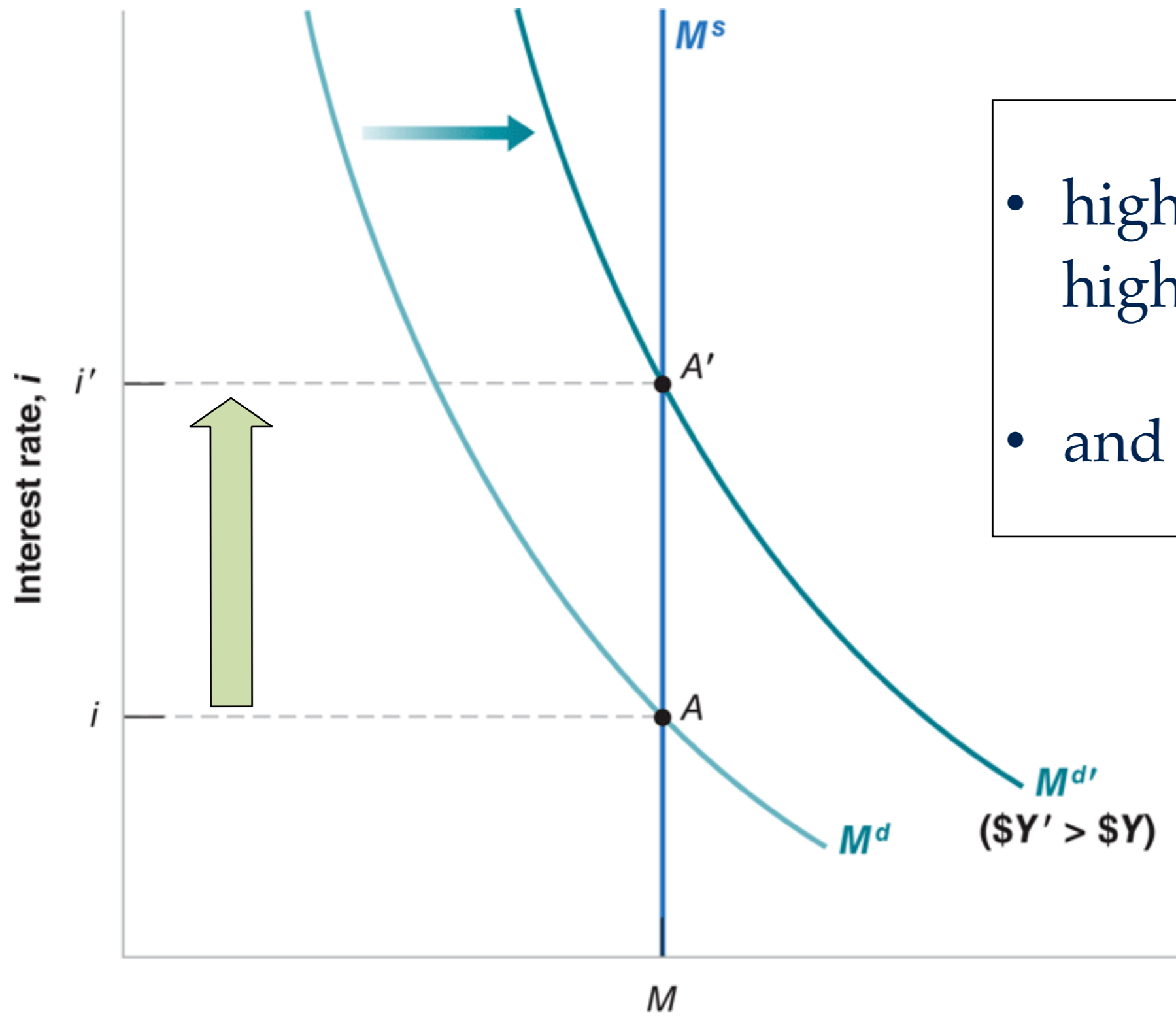
# MARKET-CLEARING CONDITION

- the money market clears:
  - money supply = money demand
  - $M^s = M^d(i, Y)$  so  $M = Y \times L(i)$
  - the market-clearing condition determines the interest rate  $i$
- when the money market clears:
  - consumers are willing to absorb all the currency circulated by the central bank
  - consumers are able to get all the currency they desire

# LM EQUILIBRIUM DIAGRAM

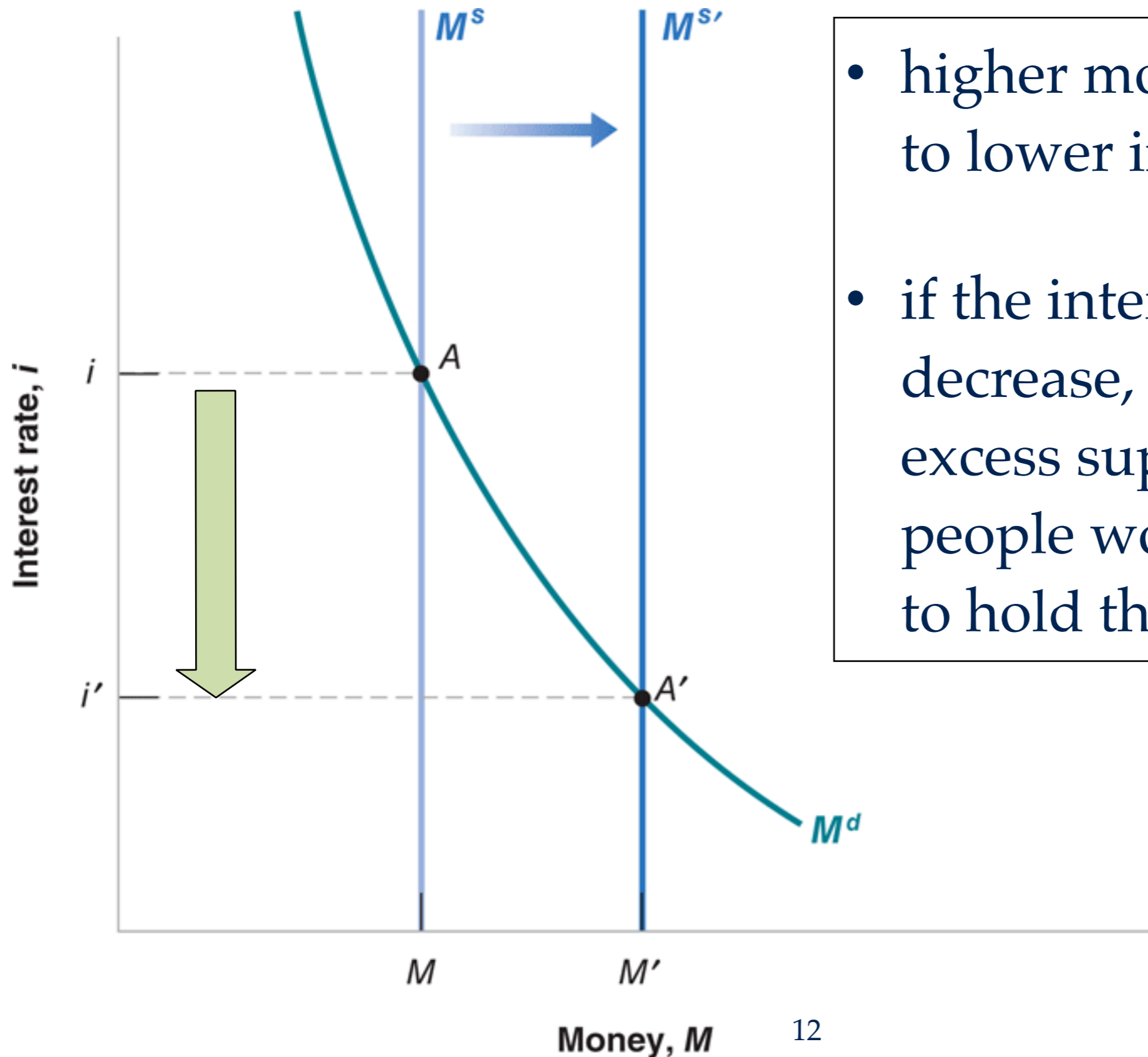


# INCREASE IN INCOME



- higher income leads to higher money demand
- and higher interest rate

# INCREASE IN MONEY SUPPLY



- higher money supply leads to lower interest rate
- if the interest rate did not decrease, there would be an excess supply of money: people would be unwilling to hold the extra money