

# Principles of Macroeconomics

## Module 4.1

Savings, Investment, and Financial Markets

# Savers and Borrowers

Financial system is designed to bring together borrowers and savers

- **Borrowers: (demand funds) require funds for investment**
  - Require loans to purchase new capital, new home, ect.
- **Savers: (supply funds) have excess funds after satisfying needs/wants**
  - Can hold on to excess funds and gain no interest
  - Put excess funds into the financial system and gain interest income

# The Market for Loanable Funds

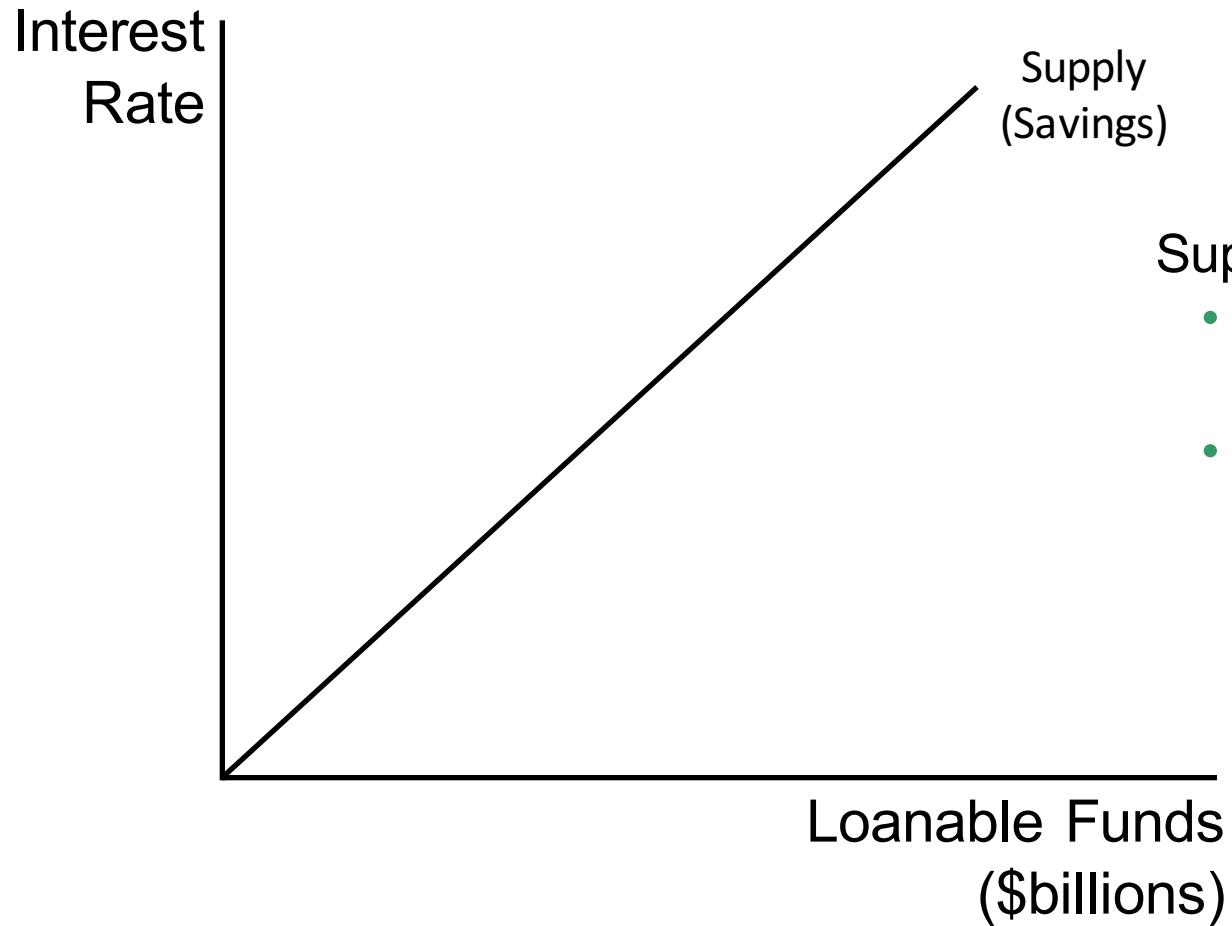
Supply and demand model that explains

- How to determine interest rates
- The allocation of loans to borrowers

Assume: only one financial market

- All savers deposit their saving in this market.
- All borrowers take out loans from this market.
- There is one interest rate, which is both the return to saving and the cost of borrowing

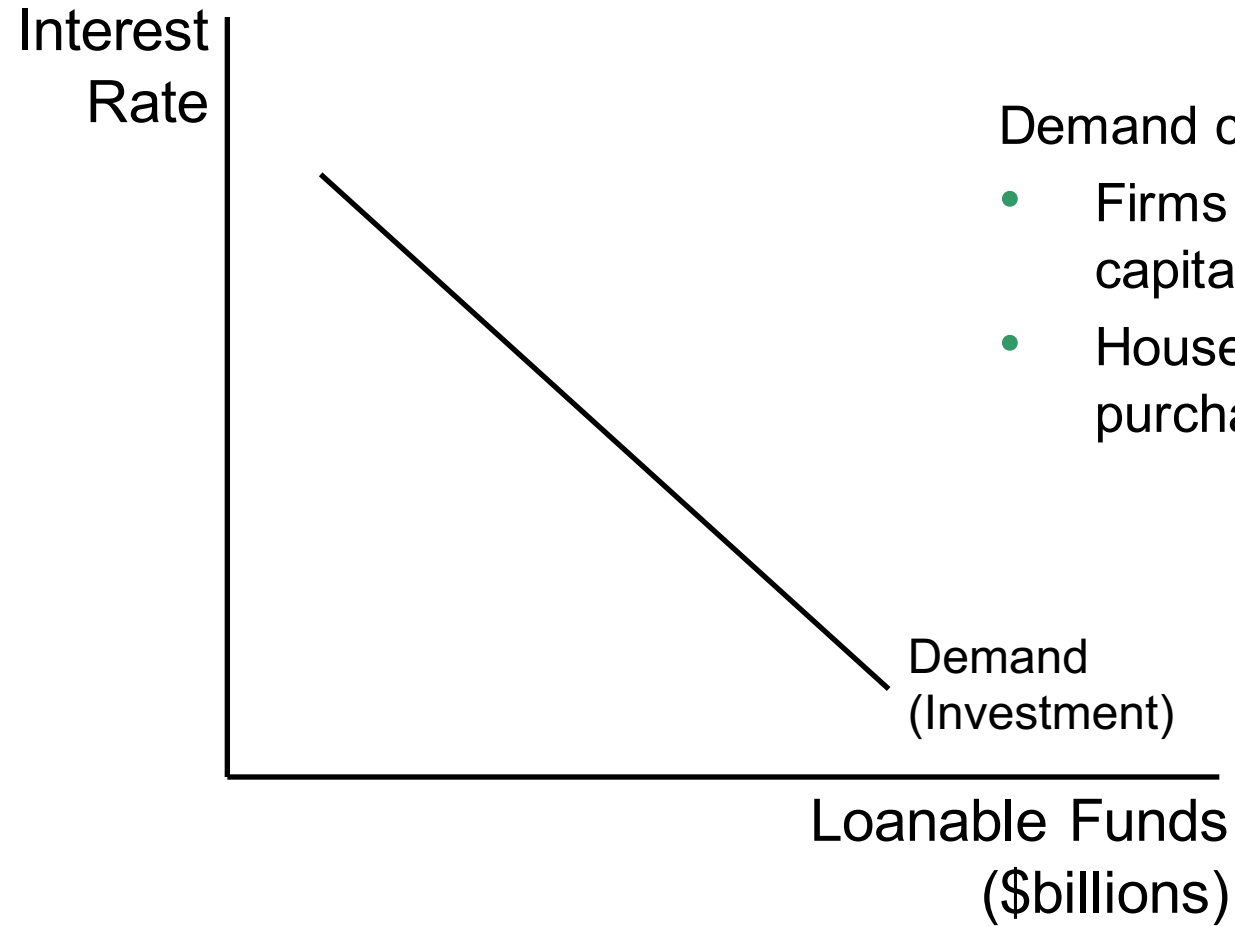
# Supply of Loanable Funds



Supply comes from:

- Households with extra income
- Positive public saving

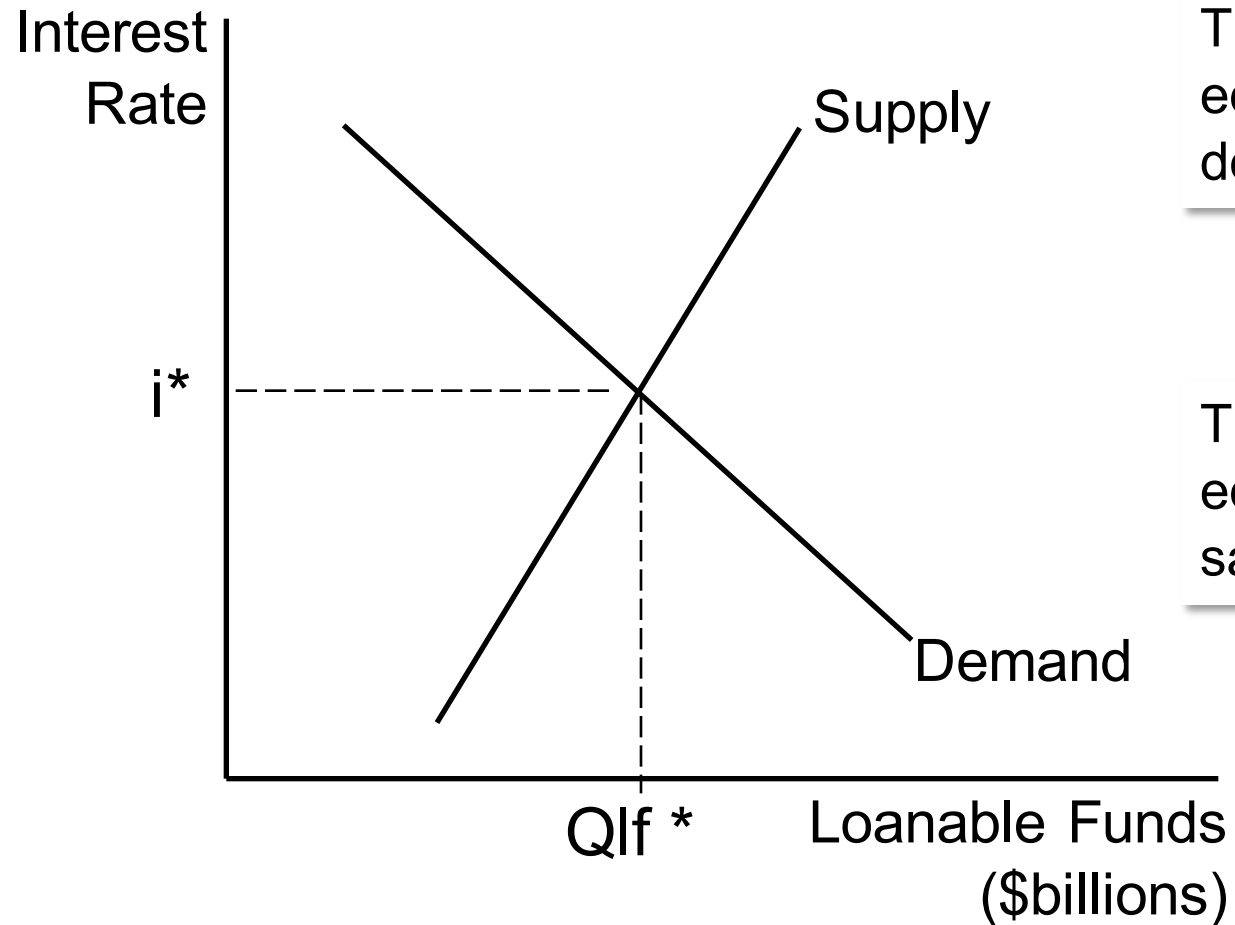
# Demand for Loanable Funds



Demand comes from:

- Firms borrow the funds for new capital
- Households borrow to purchase new houses

# Equilibrium



The interest rate adjusts to equate supply and demand.

The eq. quantity of L.F. equals investment and saving.

# Changes in Loanable Funds Market

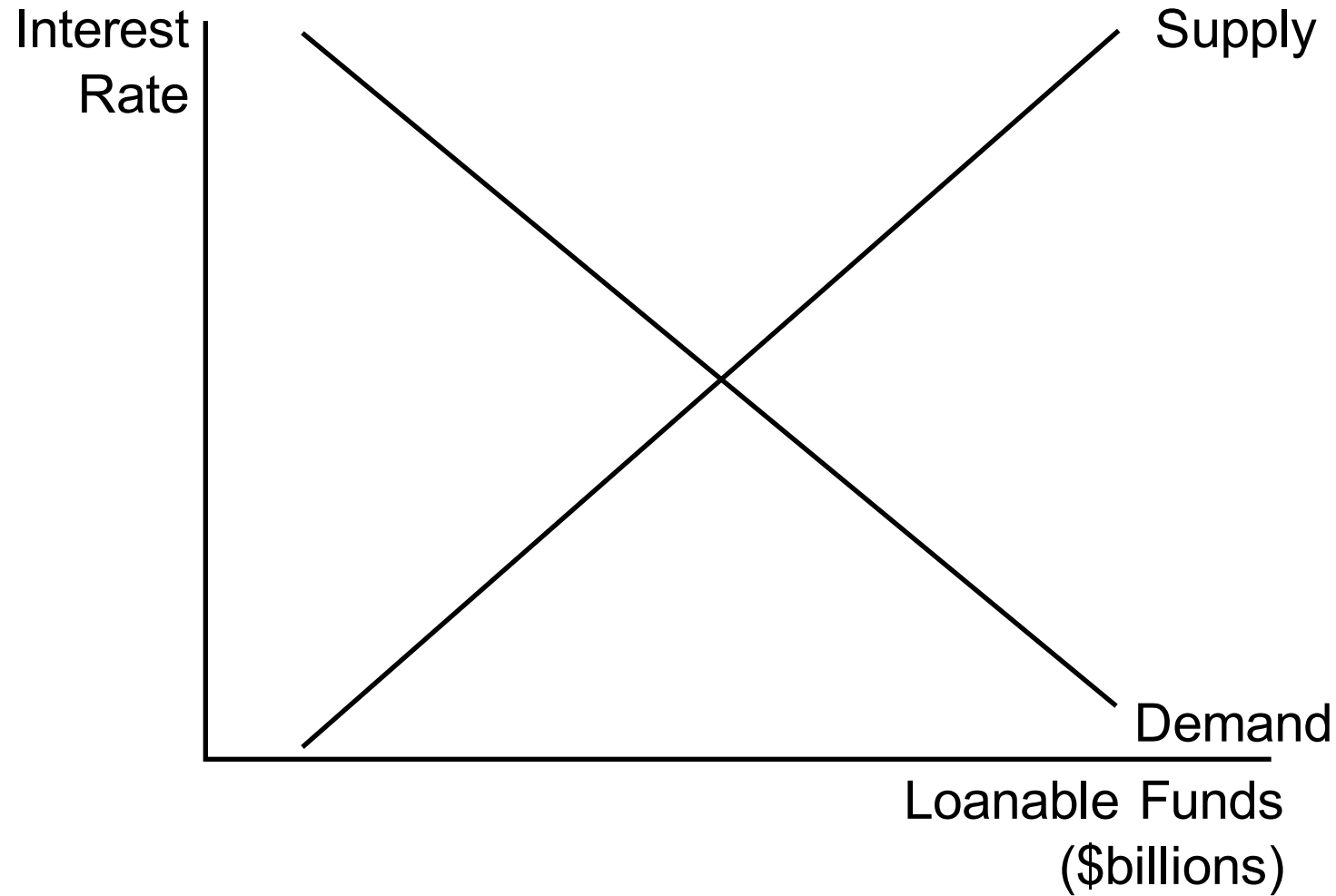
Consider the impact of government policies on the loanable funds market:

- (1) Suppose the government decreases taxes on interest income
- (2) Suppose the government provides a tax credit for firms investing in green technology

- What is the impact on the loanable funds market?
- Decide which curve shifts and why.
- Draw out the impact of each policy and analyze the new equilibrium.

# Changes in Loanable Funds Market (1)

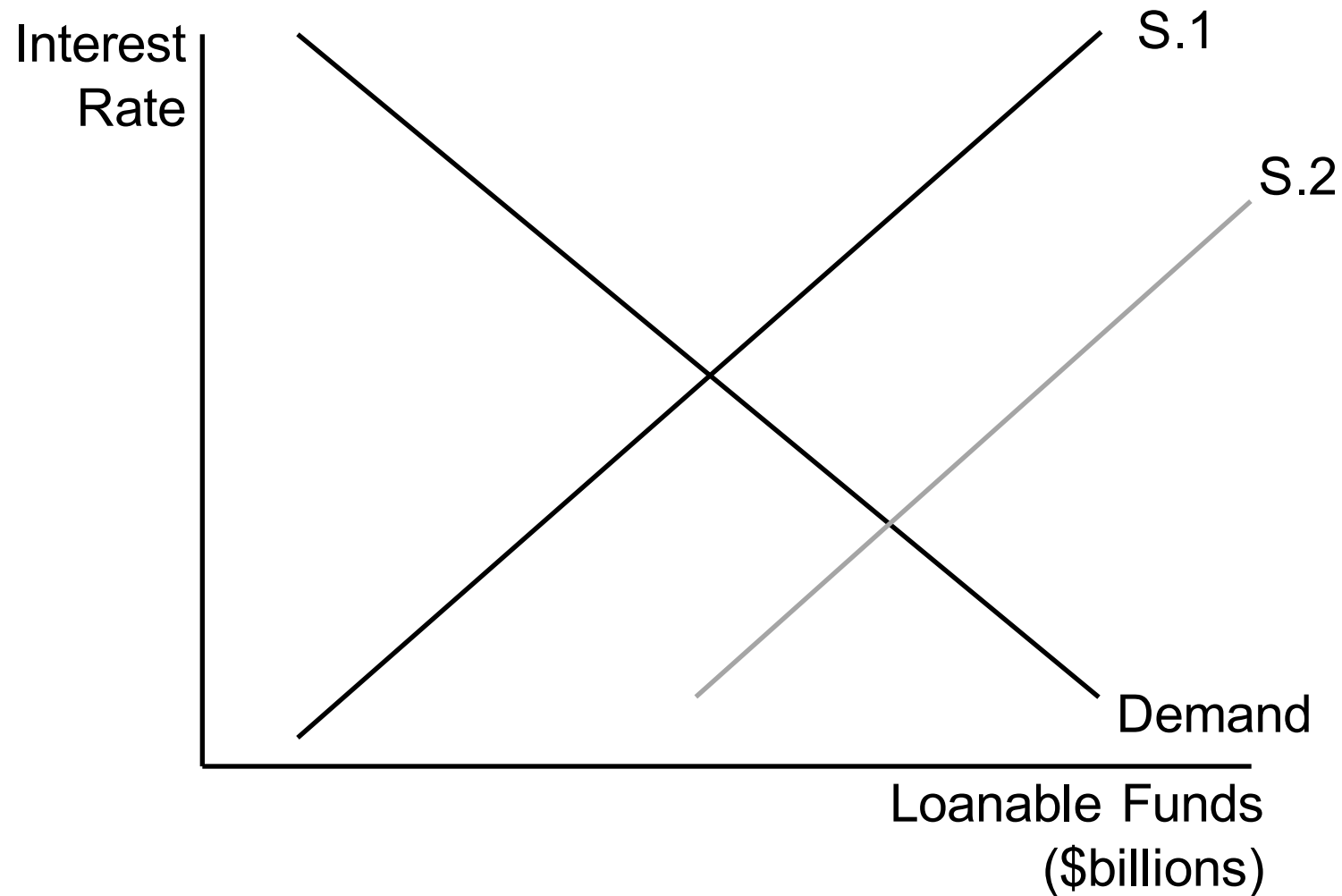
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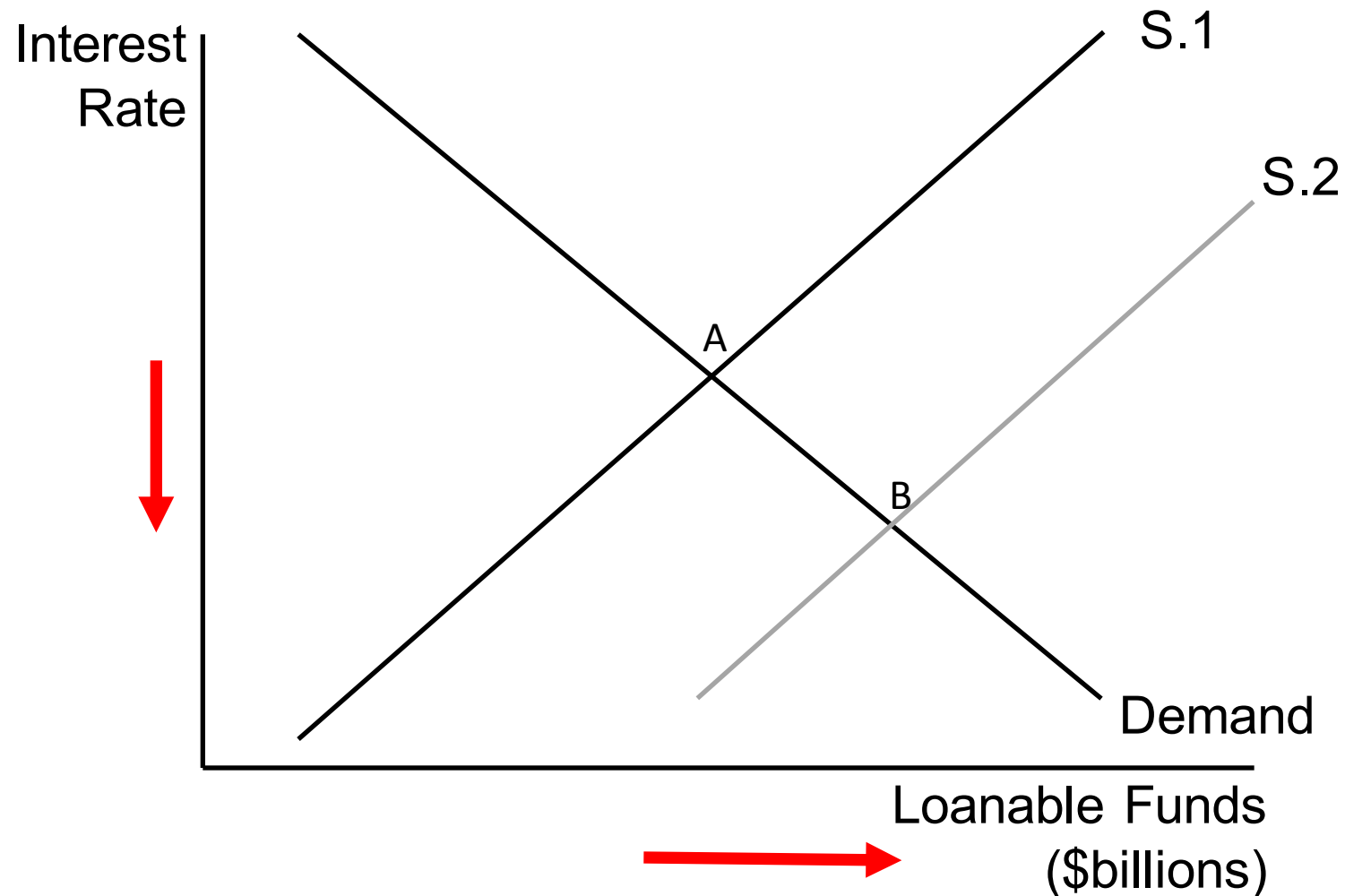
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# Changes in Loanable Funds Market

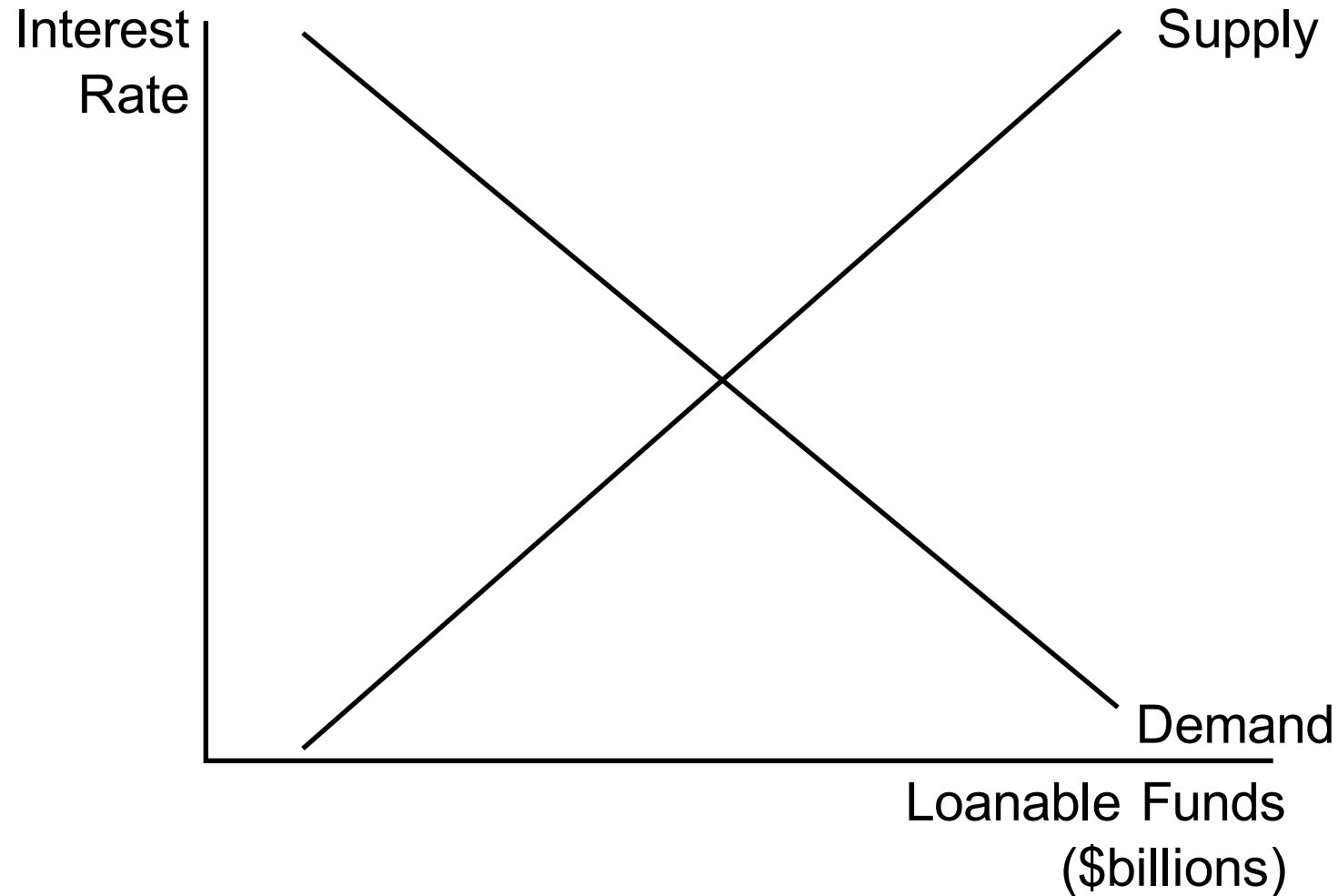
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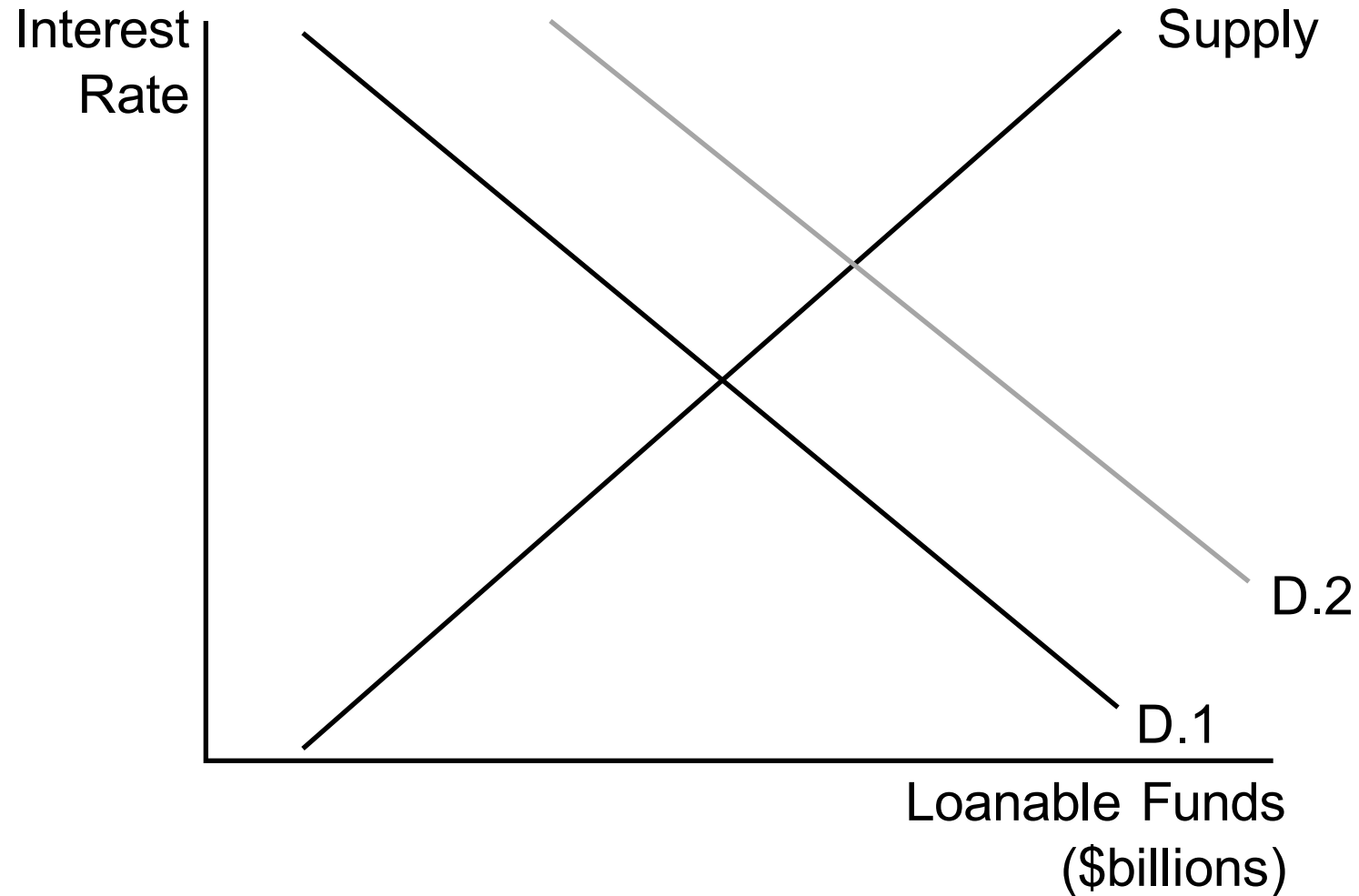
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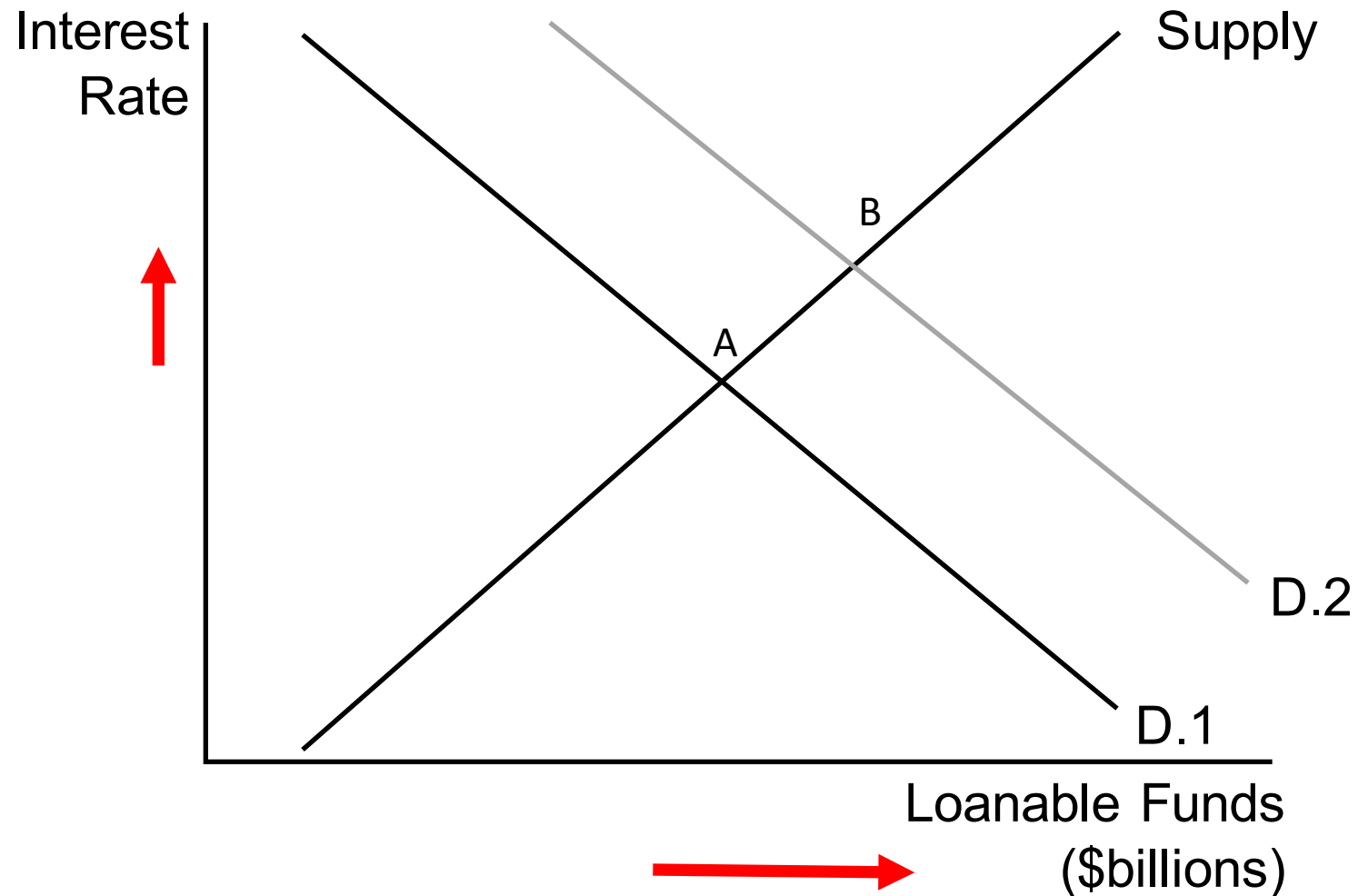
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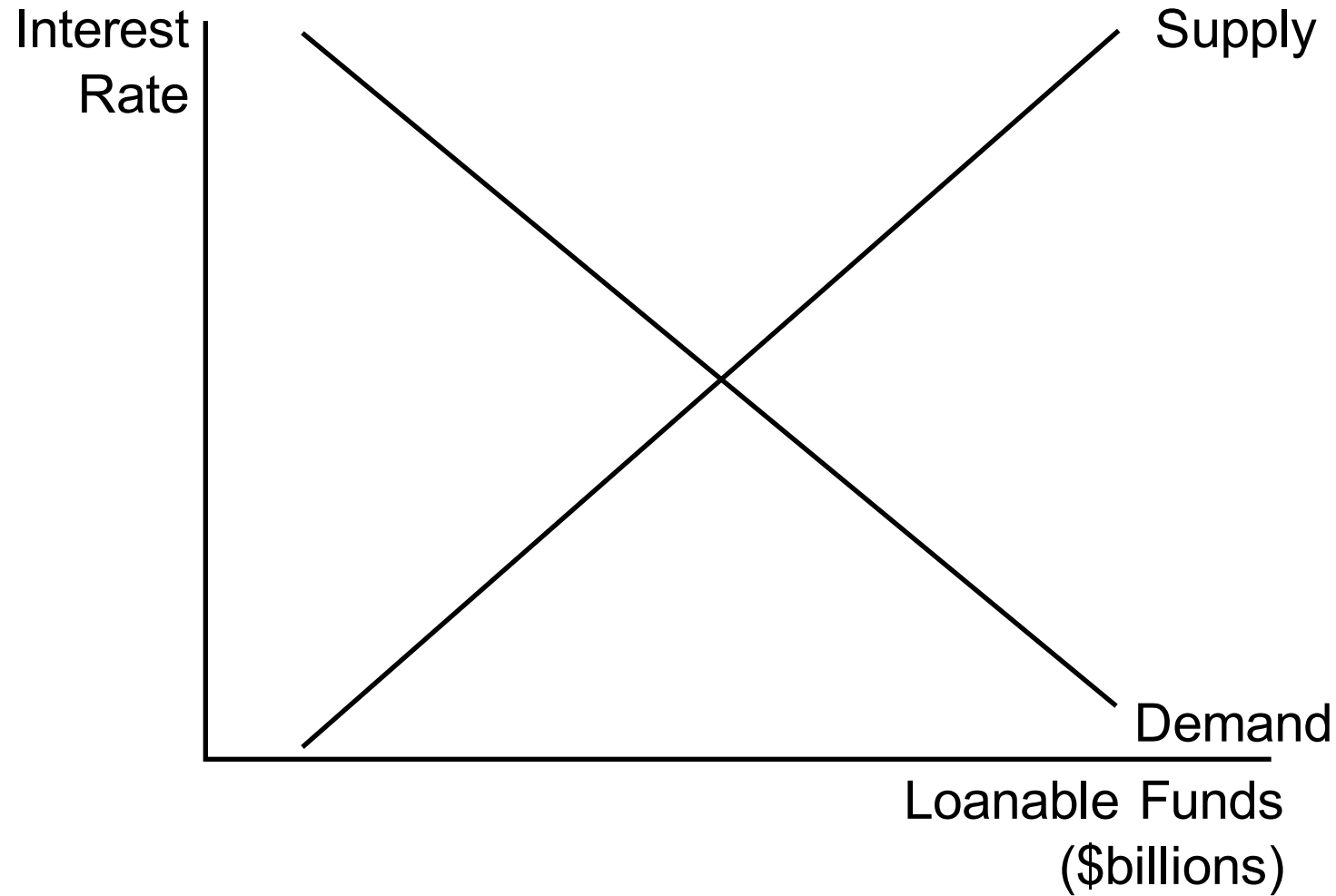
# Impact of Government Budget Deficit

Suppose the government is running a budget deficit and needs to finance the shortfall in tax revenue by issuing government bonds.

- What is the impact on the loanable funds market?
- Decide which curve shifts and why.
- Draw out the impact of each policy and analyze the new equilibrium

# Changes in Loanable Funds Market (3)

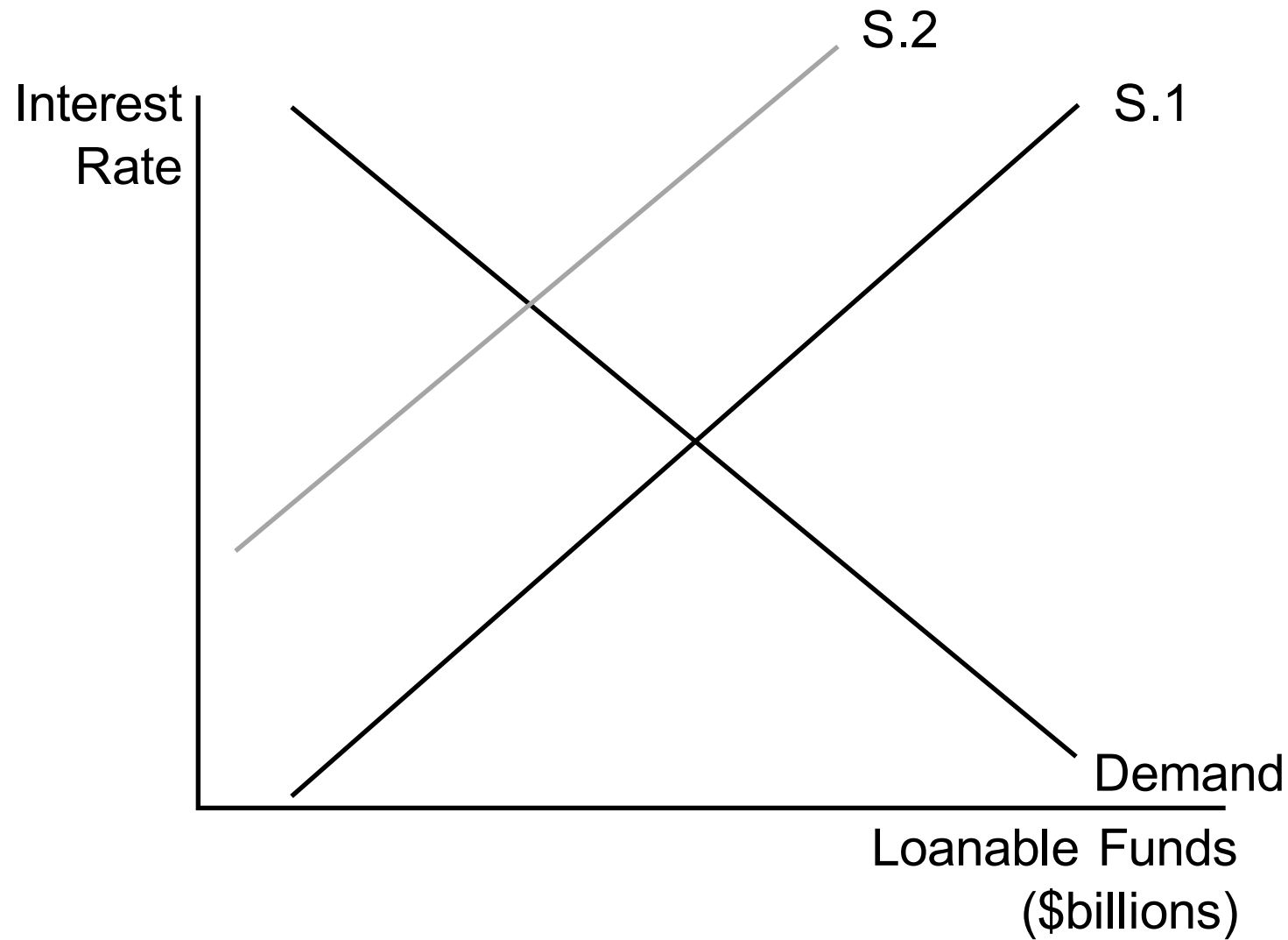
(3) Gov't finances budget deficit with new bonds





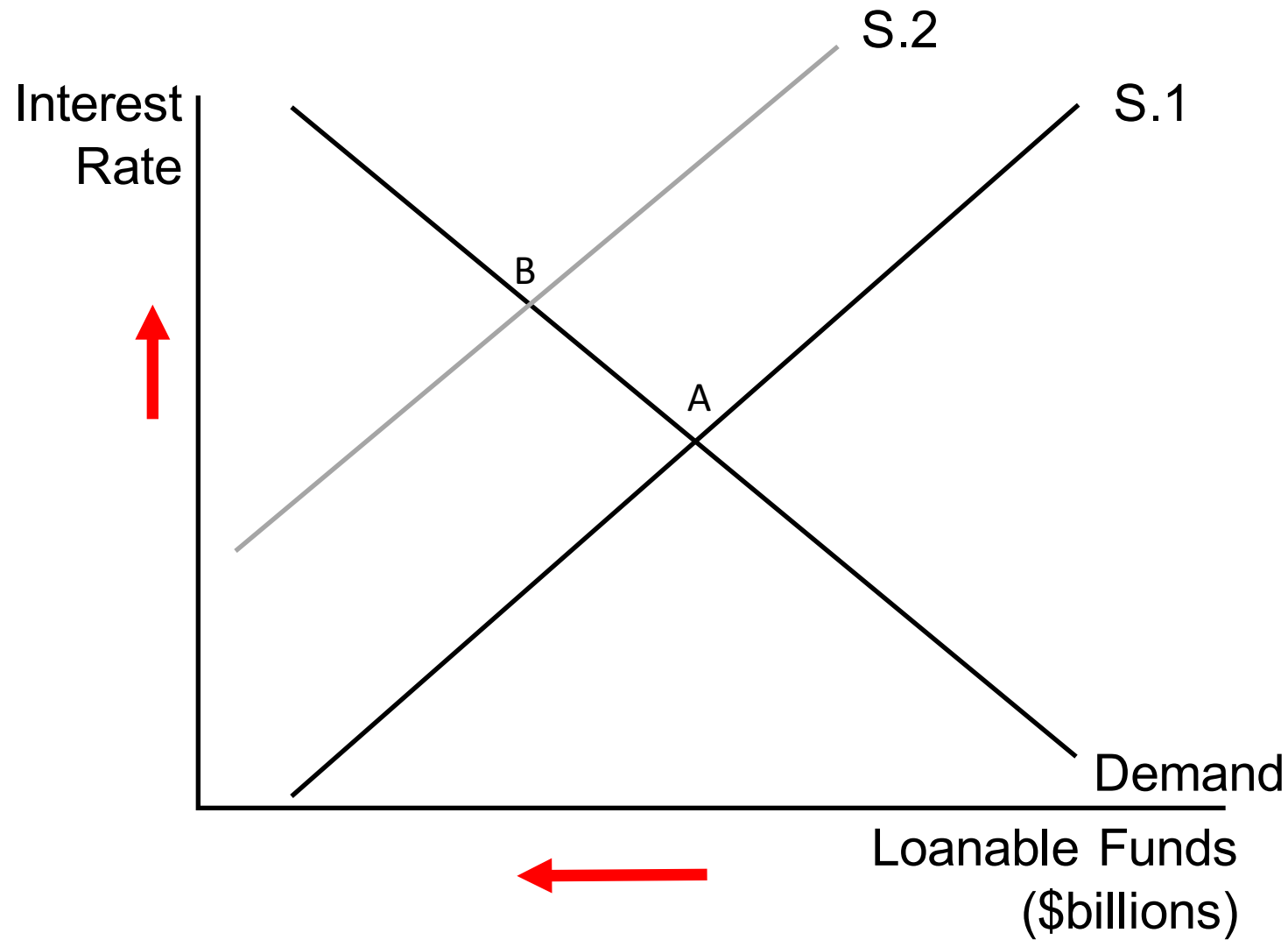
# Changes in Loanable Funds Market (3)

(3) Gov't finances budget deficit with new bonds



# Changes in Loanable Funds Market (3)

(3) Gov't finances budget deficit with new bonds



# Key Takeaways

- The loanable funds market is determined by the interaction between suppliers of loans (savers) and demand for loans (borrowers)
- Price of a loan = interest rates which is determined by:
  - How much people want to save at a given rate
  - How many loans will be taken out at that rate
- Gov't policies can influence S/D of loans
- Gov't deficits cause crowding out and lower investment

# **Money and the Federal Reserve**

**Principles of Macroeconomics  
Module 4.1 (B)**

# What is Money?

**Money is a set of assets in an economy that people regularly use to buy goods and services from other people**

Serves Three Functions:

- 1. Medium of Exchange** -- ability to purchase what we want
- 2. Unit of Account** – ability to assign a value to an item
- 3. Store of value** – ability to compare values in different time periods

# Historical Types of Money

**Commodity Money:** the use of a commodity as money which itself holds intrinsic value

→ Gold coins, cowry shells, diamonds

**Fiat Money:** money that has value by government decree, in itself holds no value

→ currency bills (US dollar)

# Money and Liquidity

**Liquidity**: Ease with which an asset can be converted into the economy's medium of exchange

→ ***Cash is the most liquid asset***

# Money in the Economy

## M1:

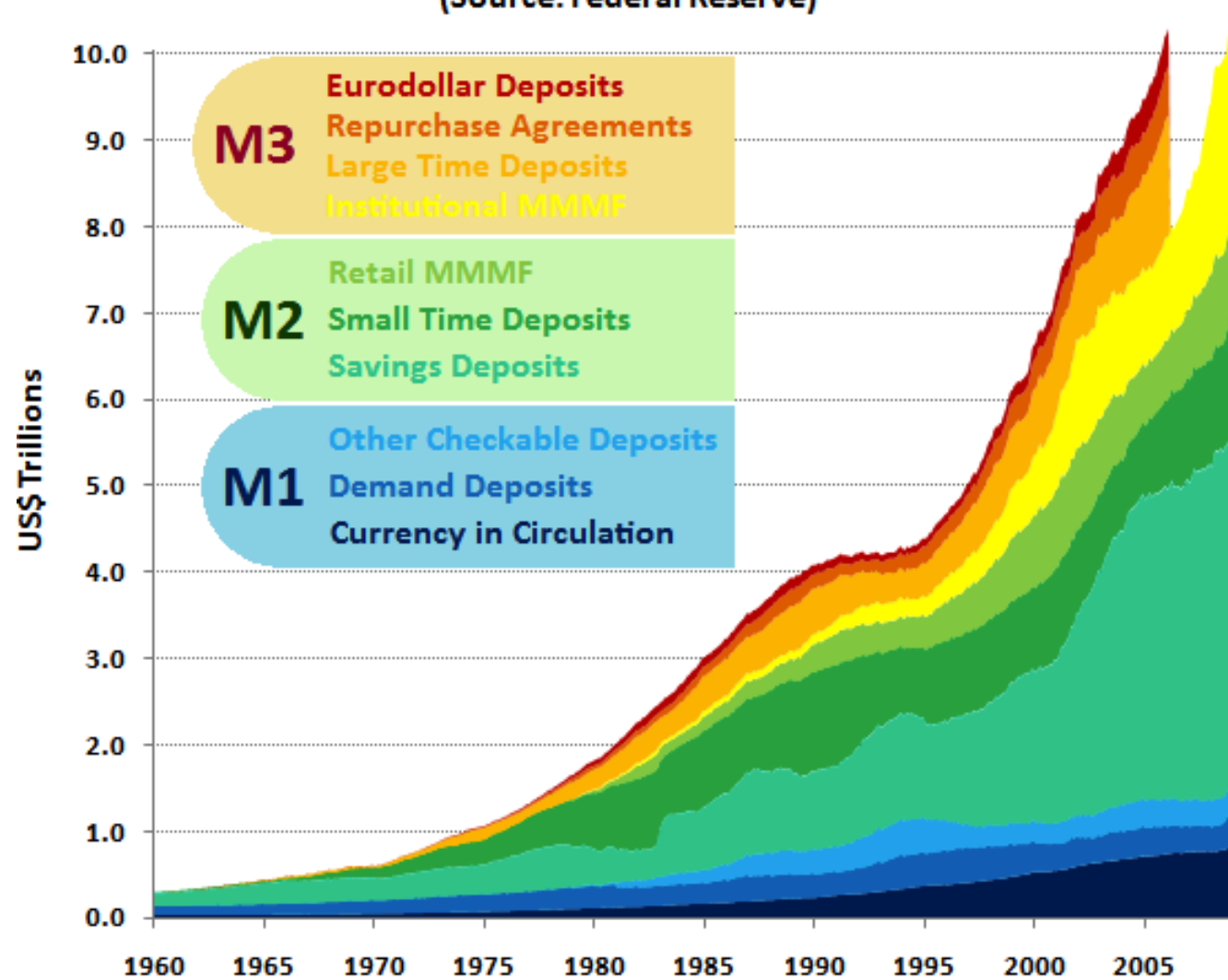
Most liquid form of money

## M2:

M1+Time/Savings deposits

## Components of U.S. Monetary Aggregates

(Source: Federal Reserve)



Note: M3 includes all components of M2  
M2 includes all components of M1



# Determining Money Supply

**The central bank in a country controls the money supply and sets monetary policy**

*US Central Bank: [The Federal Reserve](#)*

# Determining Money Supply

The Two Objectives of the Federal Reserve:

**1. Control money supply through:**

- Open Market Operations
- Lending to banks (lender of last resort)
- Influencing reserve ratios

**2. Oversee and regulate the banking system**

- Clear check transactions
- Track bank liquidity and health
- Lending to banks when the need it (Lender of Last Resort)

# Federal Reserve System

- 12 Regional Banks that oversee regional banking operations
- Federal Open Market Committee (FOMC)– Determines Monetary Policy
  - Chairperson of Federal Reserve
  - FOMC: Board of Governors (7 members) + 5 Regional bank presidents
  - Meet regularly to determine monetary policy

# Key Takeaways

- Money is the most liquid form of assets available to people
- People choose between more liquidity or more return with deciding where to put their wealth
- Money Supply is determined by the Federal Reserve – Central Bank of the United States
- The Fed plays a key role in the economy – determining the quantity of money and influencing interest rates

# Principles of Macroeconomics

## Module 4.1

Time Value of Money

# Time Value of Money

**Value of Money:** Money today is more valuable today than in the future

What would you choose?

- \$500 today
- \$500 in 3 years

# Time Value of Money

- **Present value:** the amount of money needed today to yield that future value of money at prevailing interest rates

$$\text{Present Value} = \frac{\text{Future Value}}{(1 + r)^n}$$

- **Future value:** the amount the money will be worth at a given future date, when allowed to earn interest at the prevailing rate

$$\text{Future Value} = (\text{Present Value}) * (1 + r)^n$$

## Assumptions:

- Inflation = 0%
- Interest rates do not change over the given time period
- Do no withdraw any funds from the account

# Time Value of Money

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## Assumptions:

- Inflation = 0%
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- Do not withdraw any funds from the account



# Test your understanding

Suppose you receive \$100 today and you put it in the bank where you can gain 5% interest. What will it be worth in 10 years?

# Test your understanding

Suppose you receive \$100 today and you put it in the bank where you can gain 5% interest. What will it be worth in 10 years?

$$PV = \$100$$

$$i = 5\%$$

$$n = 10$$

$$FV = \$100 * (1 + 5\%)^{10}$$

$$FV = \$163$$

# Test your understanding

Suppose you are 20 years old today and your grandmother promises you \$500 when you turn 25. How much is this gift worth to you today if the interest rate is 10%?

# Test your understanding

Suppose you are 20 years old today and your grandmother promises you \$500 when you turn 25. How much is this gift worth to you today if the interest rate is 10%?

$$FV = \$500$$

$$i = 10\%$$

$$n = 5$$

$$PV = \frac{\$500}{(1+10\%)^5}$$

$$PV = \$310$$

# Key Takeaways

- To determine the future value vs. present value of money – need to think in terms of *opportunity costs*
- Interest rates – influence the opportunity cost of money today vs. money in the future
- Because you can gain interest income on money you receive TODAY, it is worth more than the same amount of money you would receive in the future

# **Banks, Money Supply and Money Creation**

**Principles of Macroeconomics  
Module 4.1 (D)**

# Banks and Monetary Policy

- Banks play a key role in the financial system
- By lending out part of their deposits, banks “create” money:  
*Loans give money to people that previously did not have it to buy goods and services*

## → Fractional Reserve Banking System

- When the Fed sets monetary policy, it must consider the impact of the fractional reserve banking system
- Fed sets minimum limit for the share of deposits banks must hold in reserve (ie: cannot loan out)

**Reserve ratio ( $R$ )** – *Share of deposits banks hold as reserve*

*Total reserves / Total deposits*

# Bank's Assets & Liabilities

Bank A			
Assets		Liabilities	
Reserves	\$ 10	Deposits	\$100
Loans	\$ 90		

**Reserve ratio ( $R$ ) = 10%**

***By loaning out a share of deposits to borrowers,  
Banks create money!***

Loans provide money to people who did not previously have it to purchase goods and services



<b>Bank A</b>			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 10	Deposits	\$100
Loans	\$ 90		

<b>Bank B</b>			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 9	Deposits	\$90
Loans	\$ 81		

<b>Bank C</b>			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 8.10	Deposits	\$81
Loans	\$ 72.90		

- Lou deposits \$100 into his bank account
- Bank A holds 10% as reserves (\$10)
- Bank A loans out 90% (\$90) to Jane
- Jane uses the \$90 to buy new supplies for her business from Bill

Bank A			
Assets		Liabilities	
Reserves	\$ 10	Deposits	\$100
Loans	\$ 90		

Bank B			
Assets		Liabilities	
Reserves	\$ 9	Deposits	\$90
Loans	\$ 81		

Bank C			
Assets		Liabilities	
Reserves	\$ 8.10	Deposits	\$81
Loans	\$ 72.90		

- Bill deposits \$90 into his bank account
- Bank B holds 10% as reserves (\$9)
- Bank A loans out 90% (\$81) to Tim
- Tim uses the \$81 to buy new tools from Sal

Bank A			
Assets		Liabilities	
Reserves	\$ 10	Deposits	\$100
Loans	\$ 90		

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Assets		Liabilities	
Reserves	\$ 9	Deposits	\$90
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Bank C			
Assets		Liabilities	
Reserves	\$ 8.10	Deposits	\$81
Loans	\$ 72.90		

- Sal deposits \$81 into his bank account
- Bank B holds 10% as reserves (\$8.10)
- Bank A loans out 90% (\$72.90) to Sara
- Sara uses the \$72.90 to buy a new machine for her shop

<b>Bank A</b>			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 10	Deposits	\$100
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Reserves	\$ 8.10	Deposits	\$81
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*The money continues to filter through the banking system until there is no more left to loan out*

**Three banks created =  
\$90 + \$81 + \$72.90 =  
\$243.90**

## Money Creation Through Banking System

Suppose Fed increases money supply by \$100

- Increase in deposits by \$100
- Increase in loans by \$90
- New Money Supply =  $\$100 + \$90 = \$190$
- *Increase in MS will filter through the banking system and money will be created through the deposit-loan process of banks*

***A fractional reserve banking system creates money, but not wealth.***

# Money Creation Through Banking System

**Money multiplier (MM):** the amount of money the banking system generates with each dollar of reserves

**By how much the money supply increase as it filters through the banking system**

$$\text{Money Multiplier} = 1 / \text{Reserve Ratio}$$

<b>Bank A</b>			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 10	Deposits	\$100
Loans	\$ 90		

<b>Bank B</b>			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 9	Deposits	\$90
Loans	\$ 81		

<b>Bank C</b>			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 8.10	Deposits	\$81
Loans	\$ 72.90		

- Lou receives \$100 from the Federal Reserve in exchange for his bonds. He deposits that money into Bank A.

Change in MS = +\$100  
 Money created by the banking system = \$100 \* (1/10%) = \$1000

# Test your understanding

Suppose the Federal Reserve increases the money supply by \$1000. The reserve requirement is 12.5%.

- What is the money multiplier?
- What is the new money supply in this fractional reserve banking system



# Test your understanding

Suppose the Federal Reserve increases the money supply by \$1000. The reserve requirement is 12.5%.

- What is the money multiplier?
- $MM = 1/12.5\% = 8$
- What is the new money supply in this fractional reserve banking system
- $NEW MS = (\$1000 * 8) = \$8000$

# Key Takeaways

- The banking system is crucial in the money creation process. By loaning out part of deposits – banks create money (but not wealth)
- The Fed's setting of the money supply is not perfect, since it cannot control the amount of deposits nor the lending rate above the reserve requirement

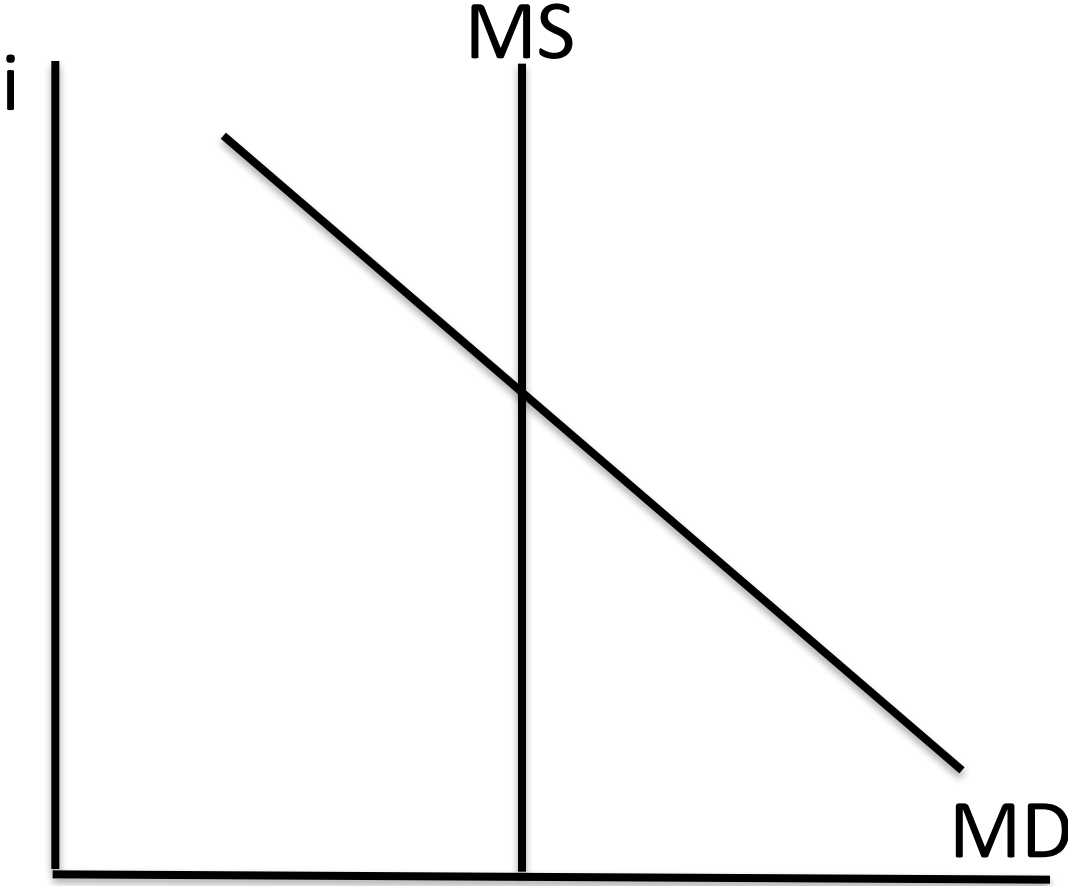
# **Money Market and Equilibrium**

**Principles of Macroeconomics  
Module 4.1 (E)**

# Money Supply and Money Demand

- Money supply (MS) is determined mainly by the Federal Reserve
  - *Quantity of money is fixed*
  - *When the Fed adjusts MS: it impacts the interest rate*
  - ***Discount Rate: Interest rate at which Fed lends to banks***
- Money demand (MD) reflects how much wealth people want to hold in a liquid form
  - Main determinant: Interest rates
  - **At high interest rates:** people prefer to keep more wealth in interest-bearing assets (low MD)
  - **At low interest rates:** people prefer to keep more wealth in liquid form (high MD)

# Money Equilibrium



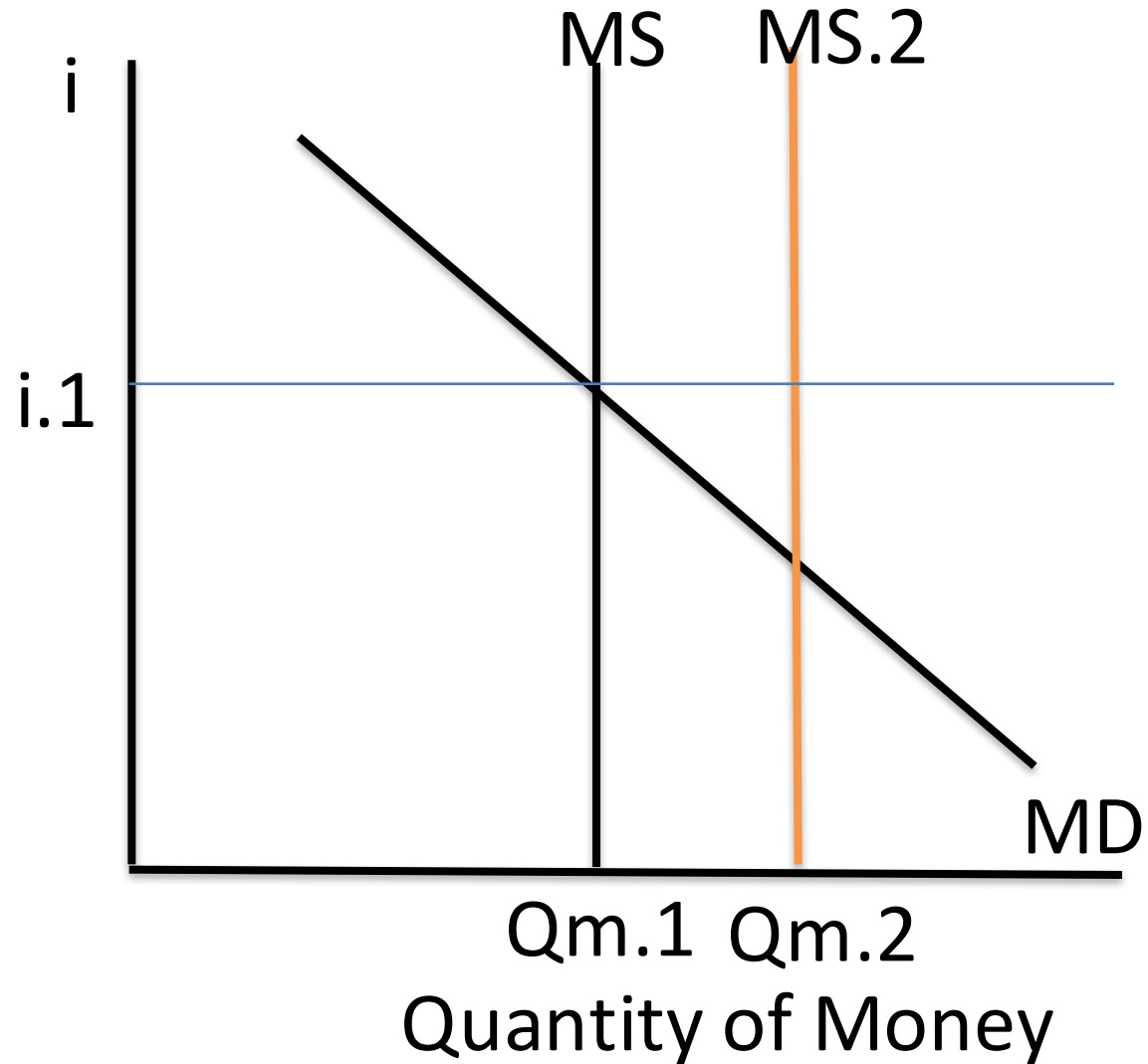
Quantity of Money  
Interest Rates adjust to bring MD = MS

# Changes in Money Supply

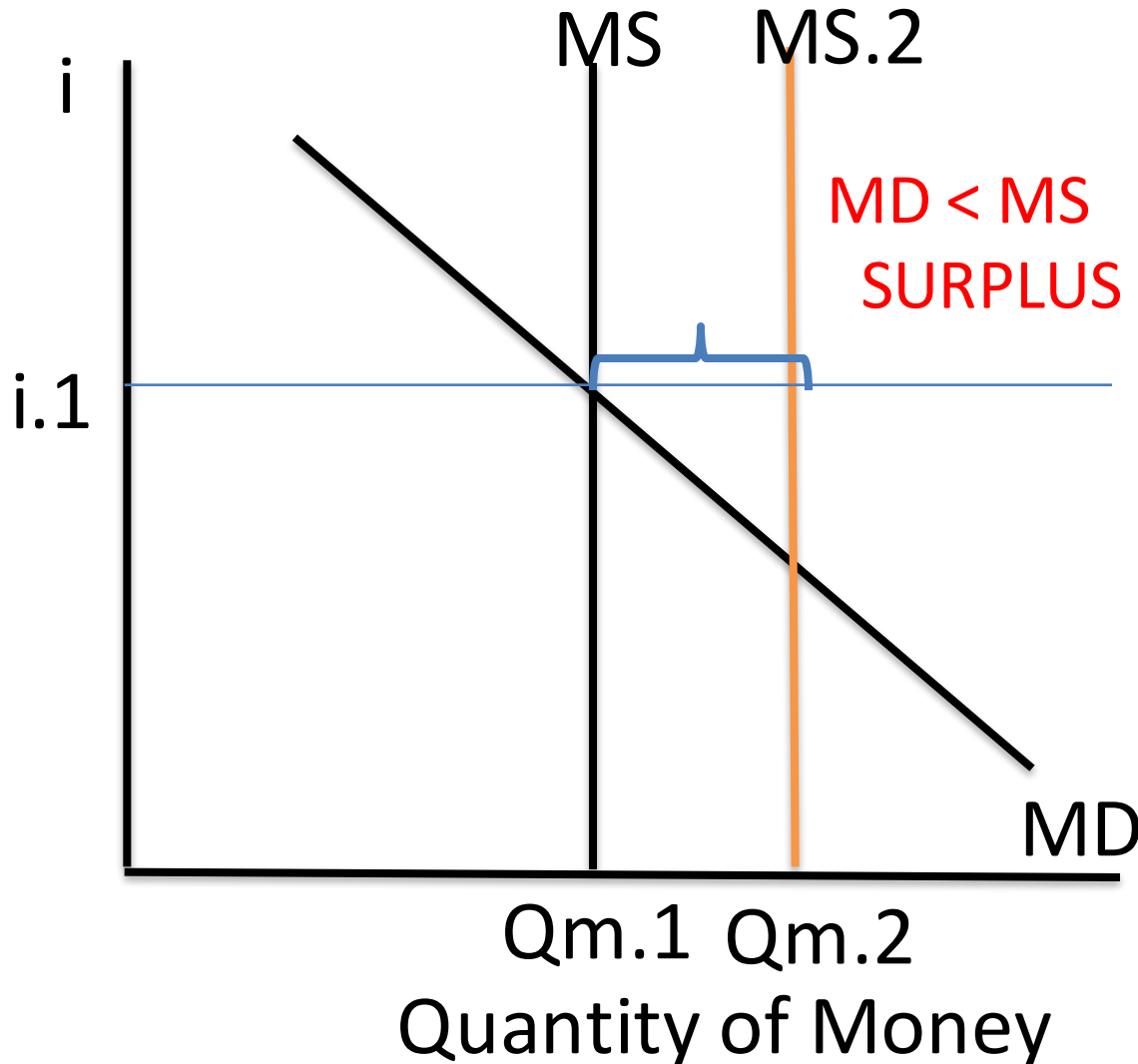
Suppose the Fed decides to increase the money supply through open market operations. It decides to buy bonds from the public.

- What happens to the new equilibrium price level, value of money and equilibrium quantity of money?
- In the interim (before price level adjusts), is there a surplus or shortage of money?

# Changes in Money Supply

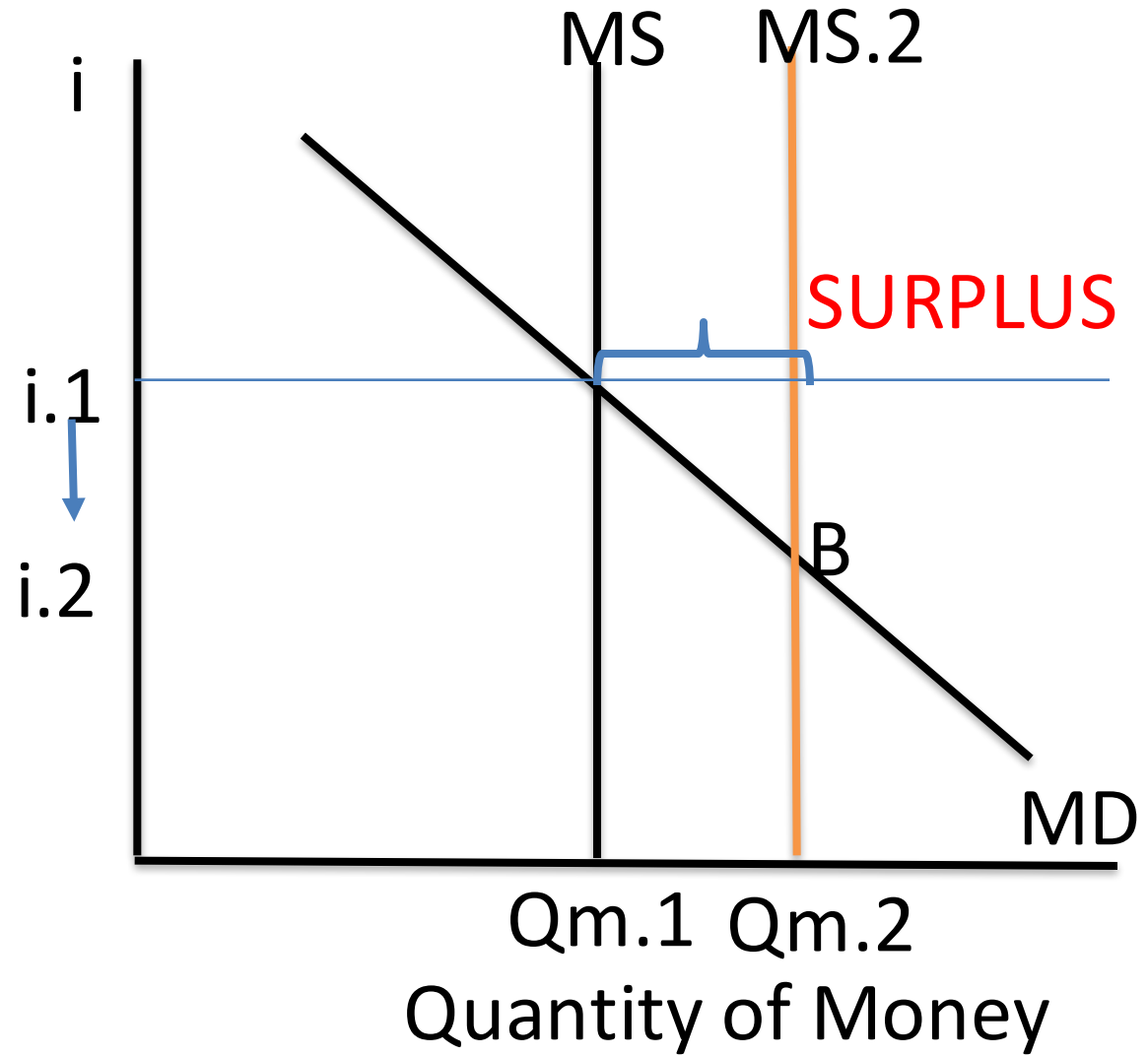


# Changes in Money Supply





# Changes in Money Supply



# Coping with Surplus of Money

When there is a surplus of money, people try to get rid of it:

- Using the surplus to purchase goods and services → more demand → price of goods increases
- Putting money in the loanable funds market → more loans available → Increase in demand for goods

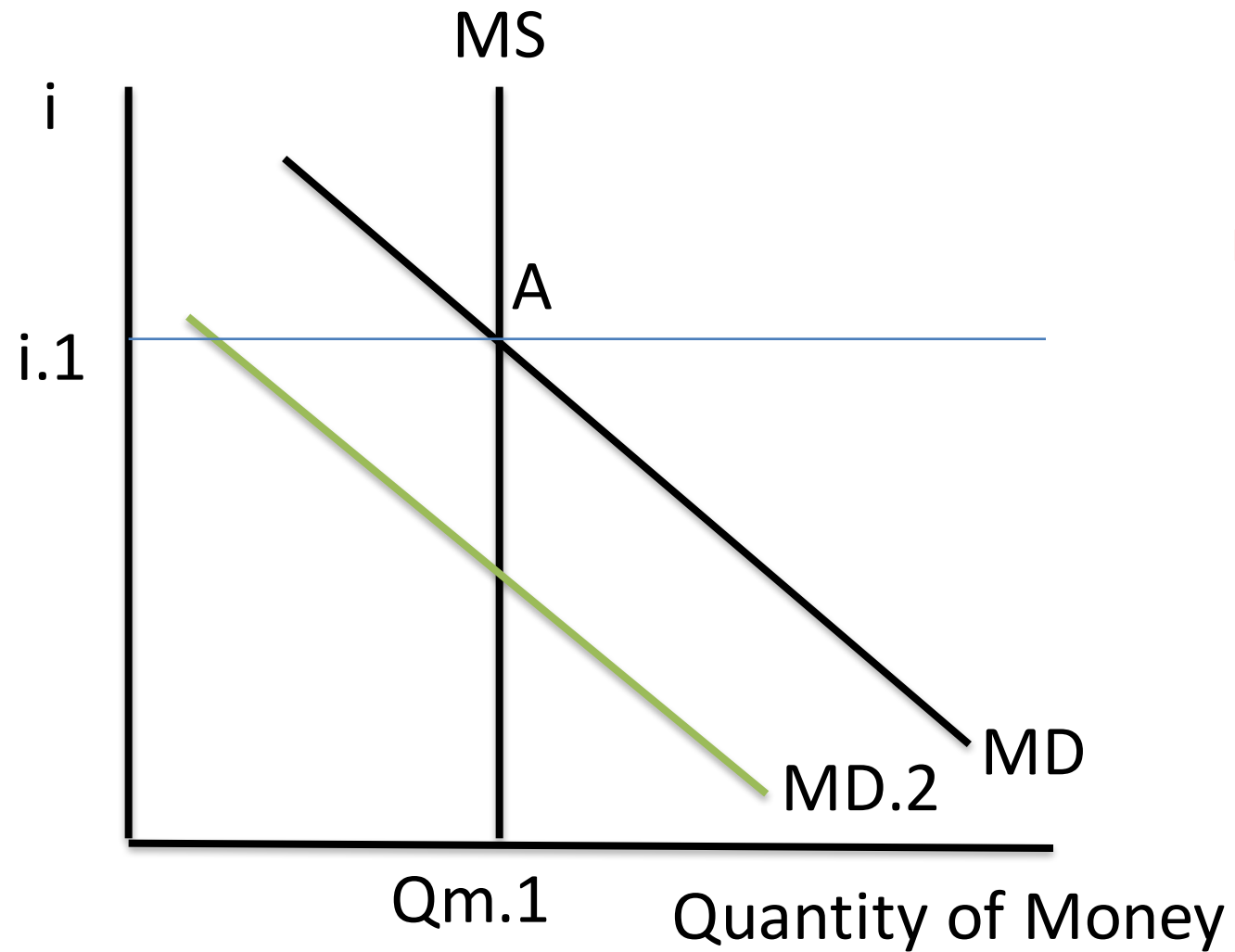
$\uparrow MS = \uparrow \textit{savings} = \downarrow \textit{interest rates}$

$\uparrow MS = \uparrow \textit{demand for goods} = \uparrow \textit{price level}$

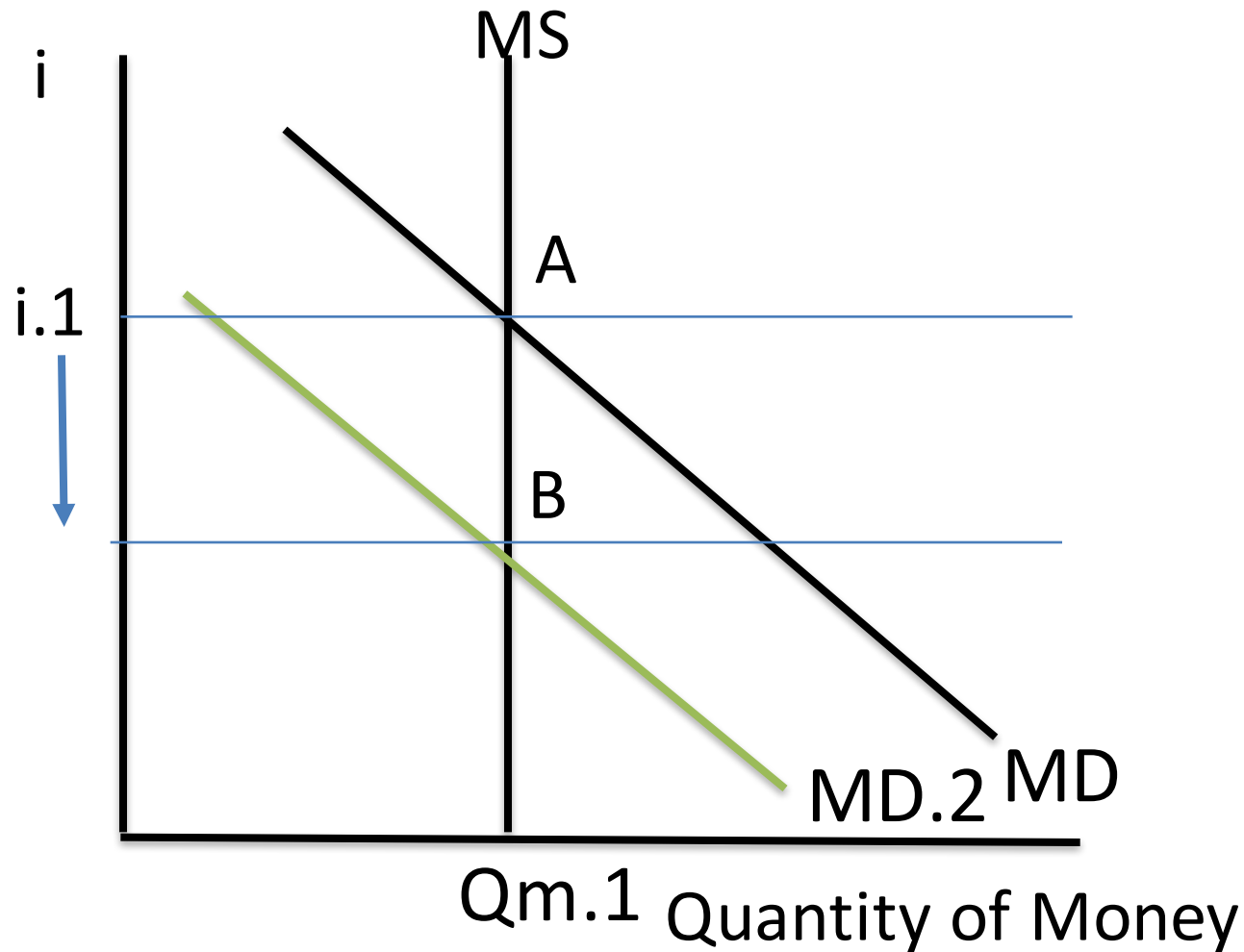
# Test your understanding - 1

Suppose credit cards become more readily available to the general adult population, making it easier to purchase goods and services without carrying cash around everywhere.

- Graph the Md-Ms diagram
- Which curve shifts and why?
- Illustrate the change this will have on the money market.
- What happens to the new equilibrium price level, value of money and equilibrium quantity of money?



Credit cards become more readily available to the general adult population, making it easier to purchase goods and services without carrying cash around everywhere.



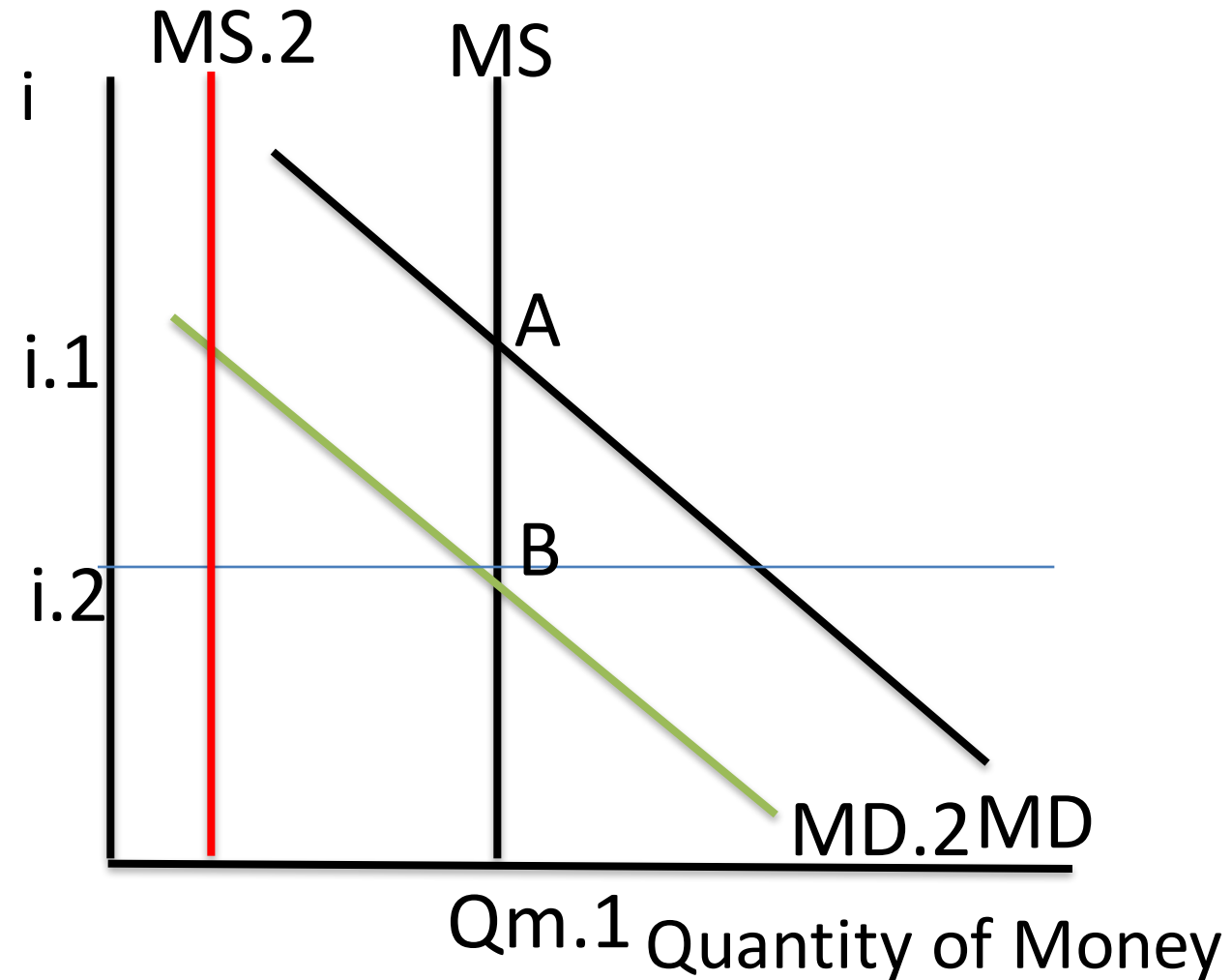
Credit cards become more readily available to the general adult population, making it easier to purchase goods and services without carrying cash around everywhere.

# Test your understanding - 2

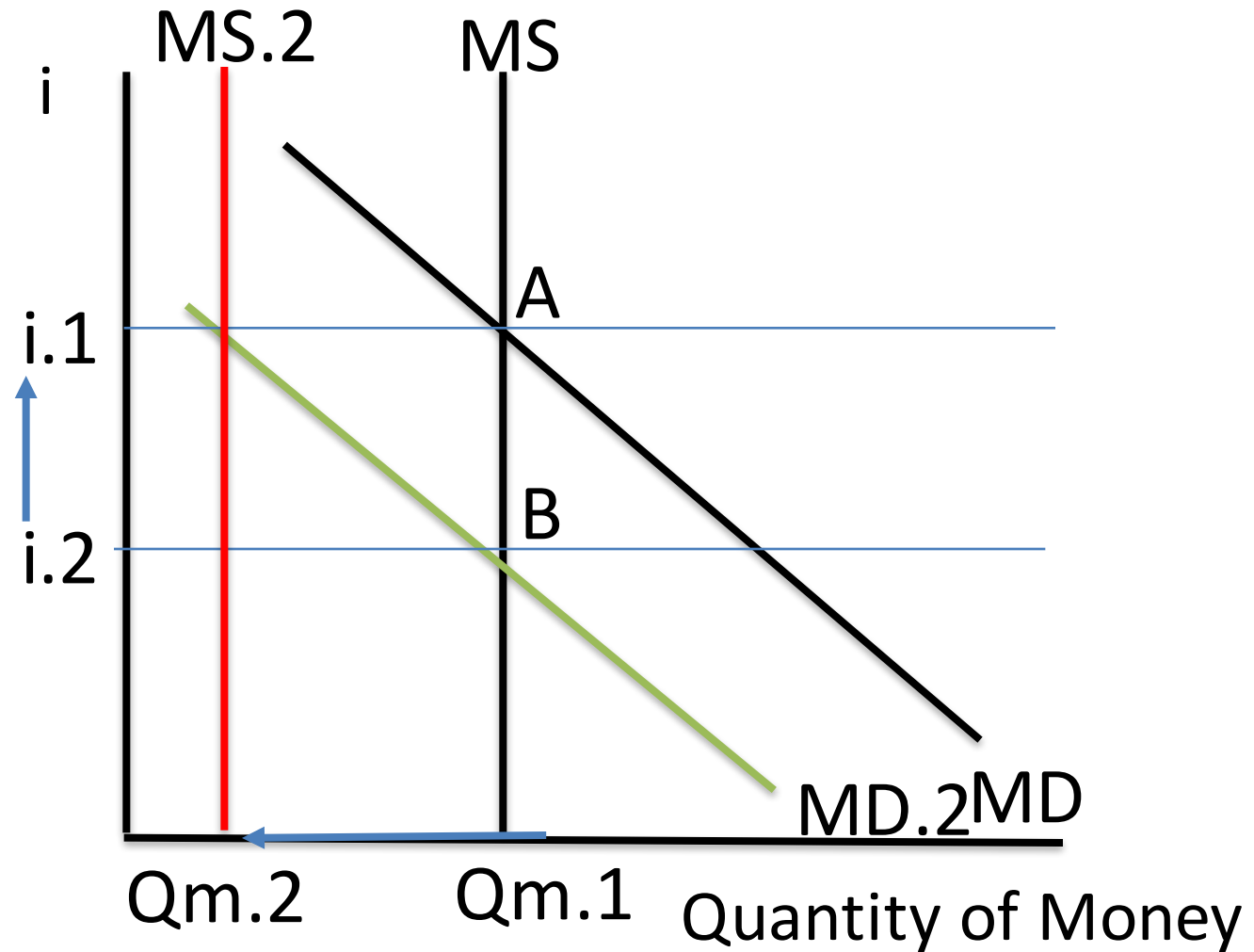
In response to the previous scenario, the Fed becomes concerned about inflation and prefers to keep the interest rate at  $i.1$  (original interest rate).

- What can the Fed do with the money supply to impact the money market?

## Fed's response to inflation pressure



## Fed's response to inflation pressure





# Key Takeaways

- Money growth influences price levels and inflation in the economy
- Changes in MD come from a change in liquidity preferences in households – do they want to hold more/less wealth in liquid form?
- Changes in MS only come from the Federal Reserve – *no entity except for the central bank can change money supply*

# **Financial Tools: Bonds, Stocks and Other**

**Principles of Macroeconomics  
Module 4.1 (F)**

# Financial Tools

- Interest bearing assets come in many forms:
  - Bonds
  - Stocks
  - Savings accounts
  - Certificates of Deposit
  - Time Deposits
- All of these return some portion of people's investment as interest income

# Bonds

- **Bonds are certificates of indebtedness**
  - **Corporate Bonds:** Corporations issue bonds to raise funds for an investment project
  - **Government Bonds:** Governments issue bonds to raise funds to cover the shortfall in tax revenue
  - At the time of maturity: Principle is repaid
  - Over the time to maturity: Interest payments made by the bond issuer to the bond holder
  - Bondholders give a “loan” to the bond issuer
  - They do not own part of the company or government

# Pricing Bonds

- Factors that affect the bond price:
  - Time to maturity
    - Longer time to maturity has a higher bond price
  - Riskiness of repayment
    - More risky bonds have a higher bond price
  - Interest rates
    - When interest rates are high –you can gain more interest income by putting your money in other (higher) interest bearing assets than the bond
    - Higher interest rates: Lower bond prices

# Stocks

- Owners of stock have part-ownership in a company
- Only publicly traded companies issue stocks
- The value of the stock reflects:
  - The expectations on profitability of the firm
  - Supply/Demand for the stock

# Principles of Macroeconomics

## Module 4.2

Central Bank and Control of the Money Supply

# Central Bank and Control of the Money Supply

- Monetary policy and the role of the Federal Reserve in determining the money supply
- Goals the Federal Reserve are:
  - to control the money supply in the economy
  - to regulate the banking system
- Control over the money supply
  - influence interest rates
- Relationship between the money supply and the interest rate is what we call the **theory of liquidity preferences**
  - interest rates are going to adjust to keep money supply and money demand together



# Central Bank and Control of the Money Supply

- The money market equilibrium where we have the money demand and money supply graphs as well as the value of money and the price level determining this relationship
- How can we reconcile the graphs that we saw previously with the value of money and the price level with the adjustments in money supply impacting interest rates?
  - We're going to see is that the money market and the loanable funds market are going to be closely related in the sense that the interest rate effect is going to be the strongest effect that we see.
  - Understand how we can link the money market with the loanable funds market so that we can explain changes in the money supply with respect to changes in interest rates.

# Central Bank and Control of the Money Supply

- An increase in the money supply
  - Would lead to a surplus of money temporarily at the given price level
- The strongest and most prevalent way that people get rid of this surplus of money
  - Putting that money into interest-bearing assets so that we see a shift in the supply of loanable funds
  - Therefore we see an increase in the money supply.
- So an increase in the money supply
  - A subsequent rise in the price level and a shift out of the supply of loanable funds
  - a decrease in the interest rate

# Central Bank and Control of the Money Supply

- Merge these two markets together
  - an increase in the money supply is going to lead to a decrease in interest rates.
- On the other hand, a decrease in the money supply
  - lead to a shortage of money
- People take money out of their savings, out of their interest-bearing assets to buy bonds from the Federal Reserve
  - this decreases the supply of loanable funds and increases the interest rate

# Central Bank and Control of the Money Supply

- One of the most prevalent ways that the Federal Reserve can impact the money supply is through the buying and selling of bonds to the public
  - open market operations
- If they want to increase the money supply
  - Federal Reserve will buy bonds from the public in exchange for money
  - By doing so it takes bonds from the public and gives the public money in exchange and increases the money supply
- If they want to decrease the money supply
  - They will sell bonds to the public
  - They give people bonds and take their money in exchange, and by doing so decreasing the supply of money in the economy

# Central Bank and Control of the Money Supply

- Another way is through setting the discount rate
- The **discount rate** is the rate at which banks lend to each other
- High discount rate, banks are not going to want to lend to each other
- More expensive for them to do so, so they'll hold onto more reserves just in case
- So the money creation process is going to be smaller—that multiplier effect is going to be smaller

# Central Bank and Control of the Money Supply

- Another way that the Federal Reserve can influence the money creation process is the setting reserve requirements
- They'll set a minimum of reserve ratios that the banks have to hold
- If that minimum is high then the money creation process is going to be smaller because the banks are going to be required to hold onto more reserves
- The Federal Reserve tries not to change the reserve requirements frequently because you can disrupt banking business

# Central Bank and Control of the Money Supply

- Lastly, the Federal Reserve can choose to pay interest to the banks' reserves
  - The higher the interest that they are paying to banks the more reserves the banks will hold
  - Therefore the smaller the money creation process is
- These last three steps are a way for the Federal Reserve to impact the creation of money in the banking system and indirectly influence the money supply

# Principles of Macroeconomics

## Module 4.2

Real and Nominal Interest Rates



# Classical Dichotomy

Refers to the separation of nominal and real variables

- Nominal Variables: Measured in monetary terms
  - The price of an apple is \$2
  - The price of a banana is \$1
- Real Variables: Measured in physical units (or relative terms)
  - The price of an apple is 2 bananas
  - The price of a banana is  $\frac{1}{2}$  apple

Changes in the money supply – *Nominal changes*

**Monetary Neutrality: Changes in the money supply will not impact real variables**

# Fischer Effect

- Nominal interest rates adjust one-for-one to the inflation rate

$$\text{Real } i = \text{nominal } i - \text{inflation}$$

- Change in inflation  $\rightarrow$  impacts nominal interest rate not real interest rate
- Important implications for taxing interest income, debt repayment, and savings

# Fischer Effect and Taxes

Suppose Country A and Country B both set taxes on interest income to 20%. Country A's inflation is 1%, Country B's inflation is 10%. Complete the following table:

	Country A	Country B
<b>Real Interest Rate</b>	3%	3%
<b>Inflation Rate</b>	1%	10%
<b>Nominal Interest Rate</b>		
<b>Reduction in Nominal Interest from 20% tax</b>		
<b>After-tax Nominal Rate</b>		
<b>After-tax Real Rate</b>		

Which country is likely to have lower savings rates?

# Fischer Effect and Taxes

Suppose Country A and Country B both set taxes on interest income to 20%. Country A's inflation is 1%, Country B's inflation is 10%. Complete the following table:

	Country A	Country B
<b>Real Interest Rate</b>	3%	3%
<b>Inflation Rate</b>	1%	10%
<b>Nominal Interest Rate</b>	$3\% + 1\% = 4\%$	$3\% + 10\% = 13\%$
<b>Reduction in Nominal Interest from 20% tax</b>		
<b>After-tax Nominal Rate</b>		
<b>After-tax Real Rate</b>		

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<b>Nominal Interest Rate</b>	4%	13%
<b>Reduction in Nominal Interest from 20% tax</b>	$4 * 0.2 = 0.8\%$	$13 * 0.2 = 2.6\%$
<b>After-tax Nominal Rate</b>		
<b>After-tax Real Rate</b>		

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# Fischer Effect and Taxes

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<b>Reduction in Nominal Interest from 20% tax</b>	0.8%	2.6%
<b>After-tax Nominal Rate</b>	$4 - 0.8 = 3.2\%$	$13 - 2.6 = 10.4\%$
<b>After-tax Real Rate</b>		

Which country is likely to have lower savings rates?

# Fischer Effect and Taxes

Suppose Country A and Country B both set taxes on interest income to 20%. Country A's inflation is 1%, Country B's inflation is 10%. Complete the following table:

	Country A	Country B
Real Interest Rate	3%	3%
Inflation Rate	1%	10%
Nominal Interest Rate	4%	13%
Reduction in Nominal Interest from 20% tax	0.8%	2.6%
After-tax Nominal Rate	3.2%	10.4%
After-tax Real Rate	$3.2\% - 1\% = 2.2\%$	$10.4\% - 10\% = 0.4\%$

Which country is likely to have lower savings rates? **Country B**

# Key Takeaways

- Inflation impacts interest rates and therefore the real value of money
- Fischer Effect tells us that nominal rates will adjust one-for-one to changing inflation
- High inflation is bad for savers



# **Quantity Theory of Money**

**Principles of Macroeconomics  
Module 4.2 (C)**

# Classical Dichotomy

Refers to the separation of nominal and real variables

- Nominal Variables: Measured in monetary terms

The price of an apple is \$2

The price of a banana is \$1

- Real Variables: Measured in physical units (or relative terms)

The price of an apple is 2 bananas

The price of a banana is  $\frac{1}{2}$  apple

Changes in the money supply – ***Nominal changes***

**Monetary Neutrality: Changes in the money supply will not impact real variables**

# The Velocity of Money

**Velocity of money:** the rate at which money changes hands

Notation:

$P \times Y$  = nominal GDP  
= (price level) x (real GDP)

$M$  = money supply

$V$  = velocity

**Velocity of money :** 
$$V = \frac{P \times Y}{M}$$

**Quantity Equation :** 
$$M \times V = P \times Y$$

# Test your Understanding

- If the nominal GDP is \$10,000 and the money supply is \$5,000, what is the velocity of money?

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- If the nominal GDP is \$10,000 and the money supply is \$5,000, what is the velocity of money?
- $V = \text{NGDP} / \text{MS}$
- $V = \$10,000 / \$5,000$
- $V = 2$

# Example of Quantity Theory of Money

Suppose we have the following values:

$$Y = \$5000; V = 5; M = \$2000; P = 2$$

- Quantity Equation  $\rightarrow MV = PY$
- $\$2000 * 5 = \$5000 * 2 \rightarrow \$10,000 = \$10,000$

# Example of Quantity Theory of Money

Suppose we have the following values:

$$Y = \$5000; V = 5; M = \$2000; P = 2$$

$$\text{Quantity Equation} = \$10,000$$

If money supply increases to \$3000, how would each variable change to keep the equation in balance?

- $M = \$3000$
- Quantity Equation  $\rightarrow \$3000 * 5 = \$5000 * 2 \rightarrow \$15,000$   
= / \$10,000

# Example of Quantity Theory of Money

If money supply increases to \$3000, how would each variable change to keep the equation in balance?

- $M = \$3000$
- Quantity Equation  $\rightarrow \$3000 * 5 = \$5000 * 2 \rightarrow \$15,000 = \$10,000$

- $Y = 7500$ :
- $\$3000 * 5 = \$7500 * 2 \rightarrow 15,000 = 15,000$



# Example of Quantity Theory of Money

If money supply increases to \$3000, how would each variable change to keep the equation in balance?

- $M = \$3000$
- Quantity Equation  $\rightarrow \$3000 * 5 = \$5000 * 2 \rightarrow \$15,000 = \$10,000$

- $V = 3.33$ :
- $\$3000 * 3.33 = \$5000 * 2 \rightarrow 10,000 = 15,000$

## Example of Quantity Theory of Money

If money supply increases to \$3000, how would each variable change to keep the equation in balance?

- $M = \$3000$
- Quantity Equation  $\rightarrow \$3000 * 5 = \$5000 * 2 \rightarrow \$15,000 = \$10,000$

- $P = 3$ :
- $\$3000 * 5 = \$5000 * 3 \rightarrow 15,000 = 15,000$

*Prices are the only other nominal variable in this equation. If money supply changes, prices will adjust accordingly to keep the quantity equation in balance*

# Example of Quantity Theory of Money

If money supply increases to \$3000, how would each variable change to keep the equation in balance?

- $M = \$3000$
- Quantity Equation  $\rightarrow \$3000 * 5 = \$5000 * 2 \rightarrow \$15,000 = \$10,000$

- If  $P = 3$
- Nominal GDP =  $\$5,000 * 3 = \$15,000$

*Nominal GDP will increase with an increase in the money supply because prices rise*

# Key Takeaways

- Quantity theory of money explains that prices will adjust to bring money demand and money supply into equilibrium