

**Macroeconomics Series 2:
Money Demand, Money Supply
and Quantity Theory of Money**

by

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Lecture Outline

1. Demand for money
2. Determination of interest rate in the money market
3. Quantity Theory of Money

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1. Demand for money - Outline

- Meaning of demand for money
- Factors affecting the demand for money
- Transaction demand for money
- Precautionary demand for money
- Asset demand for money
- Money demand as a function of nominal interest rate and income

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1. Demand for money

- Holding money
 - § To use money, one must hold money.
- If people desire to hold money, there is a demand for money.

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1. Demand for money

The Influences on Money Holding

The quantity of money people hold depends on:

- 1) The price level
- 2) The interest rate
- 3) Real GDP
- 4) Financial innovation

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1. Demand for money

The Price Level

Nominal money is the quantity of money measured in dollars.

- The quantity of nominal money demanded is proportional to the price level.
- If price increases by 10%, people will hold 10% more of money to buy the same bundle of goods. For example, if you spent \$20 to buy a cup of tea and a toast before, now you need to hold \$2 more to buy the same bundle.

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1. Demand for money

Real money is the quantity of money measured in constant dollars.

- Real money is equal to nominal money divided by price level. Real money measure what it will buy.
- In the above example, real money = $\$22/1.1 = \20 . The quantity of real money demanded is independent of the price level.

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1. Demand for money

The Interest Rate

- The opportunity cost of holding money is the interest rate a person could earn on assets they could hold instead of money.
- Higher interest rate (higher opportunity cost) causes lower money demand.

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1. Demand for money

Real GDP

- Money holdings depend upon planned spending.
- The quantity of money demanded in the economy as a whole depends on Real GDP.
- Higher income leads to higher expenditure. People hold more money to finance the higher volume of expenditure.

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1. Demand for money

Financial Innovation

Changing technologies affect the quantity of money held. These include:

- Daily interest checking deposits
- Automatic transfers between checking and savings deposits
- Automatic teller machines
- Credit cards

In general, the above innovation reduces the demand for money.

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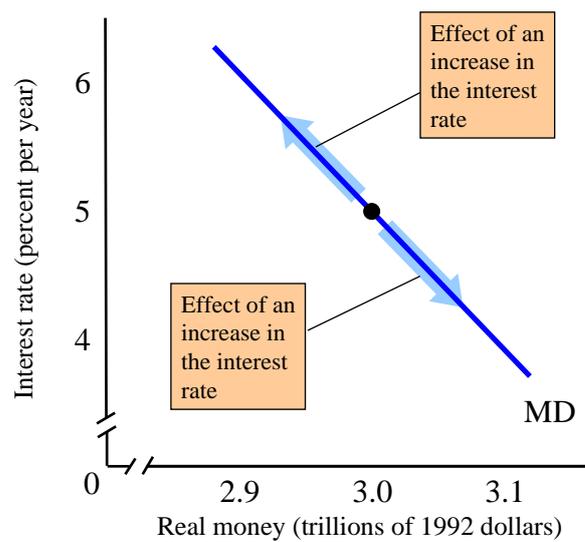
1. Demand for money

The Demand for Money Curve

The *demand for money* is the relationship between the quantity of real money demanded and the interest rate.

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1. Demand for money



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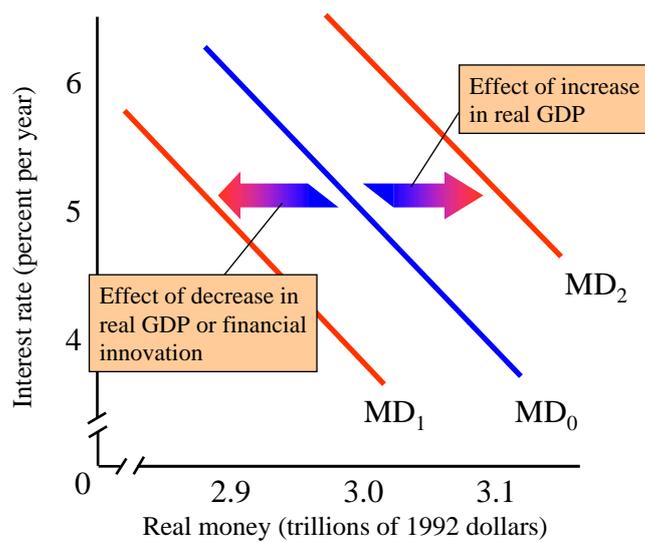
1. Demand for money

Shifts in the Demand Curve for Real Money

Changes in real GDP or financial innovation changes the demand for money and shifts the demand curve for real money.

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1. Demand for money



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1. Demand for money

- The demand for money: the amount of money people wish to hold is determined by three motives:
 - § Transactions demand
 - § Precautionary demand
 - § Asset demand

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1. Demand for money

- **Transactions Demand**
 - § Holding money as a medium of exchange to make payments
 - § The stock of money people hold to pay everyday predictable expenses
 - § The level varies directly with nominal national income.
 - § This view was developed by classical economists and Keynes (1936) followed the classical view in his theory of liquidity preference.

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1. Demand for money

- **Baumol-Tobin Model***: Transaction demand for money is negatively related to interest rates. When interest rates are high, people will minimize their holding of money for transaction purposes since the opportunity of holding money is high.
- However, to minimize money holding will incur higher transaction costs. So the interest rates must be high enough to generate benefits which can outweigh the higher transaction costs.
- * Baumol, W. J. (1952), 'The transaction s Demand for Cash: An Inventory Approach,' Quaterly Journal of Economics, No. 66, pp. 545-556; Tobin, J. (1956), 'The Interest Elasticity of the Transactions Demand for Cash,' Review of Economics and Statistics, No. 38, pp. 241-247.

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1. Demand for money

- **Precautionary Demand**
 - Holding money to meet unplanned/ unpredictable expenditures and emergencies
 - Keynes believes that the precautionary money balances people wants to hold are determined primarily by the level of transactions they expect to make in the future. These transactions are proportional to income.
 - When income rises, precautionary balances increases in order to provide the same degree of protection.
 - Precautionay demand for money is negatively related to interest rates (models following the line of argument by Baumol and Tobin).

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1. Demand for money

- **Asset Demand**

- **Keynes's speculative motive:** Keynes argues that people believe that there is a “normal value” of interest rate. If the current interest rate is **low**, people will expect the **interest rate to rise** and **bond price to fall** in the future. If the fall in bond price outweighs the interest gain, people will suffer **capital loss**. Thus, they will **demand more money** because the zero return on money exceeds the negative return on bond.
- If the current interest rate is **high**, people will expect the **interest rate to fall** and **bond price to rise** in the future. If the rise in bond price outweighs the interest fall, people will enjoy **capital gain**. Thus, they will **demand less money** because the capital gain exceeds the zero return on money.
- Asset/Speculative demand for money is **negatively related** to interest rates.

1. Demand for money

Tobin's Further Refinement*

- People not only care about the return on different assets, but also the riskiness of the return.
- The stock of money, with zero risk, people hold to take advantage of **expected future changes in the price** of bonds, stocks, or other financial assets and to **hedge against assets price fluctuation**.
- The level of asset demand varies with the interest rate.
- As the interest rate falls, the opportunity cost of holding money falls, and people increase their speculative balances.

*Tobin, J. (1958), 'Liquidity Preference as Behavior Towards Risk,' *Review of Economic Studies*, No. 25, pp. 65-86.

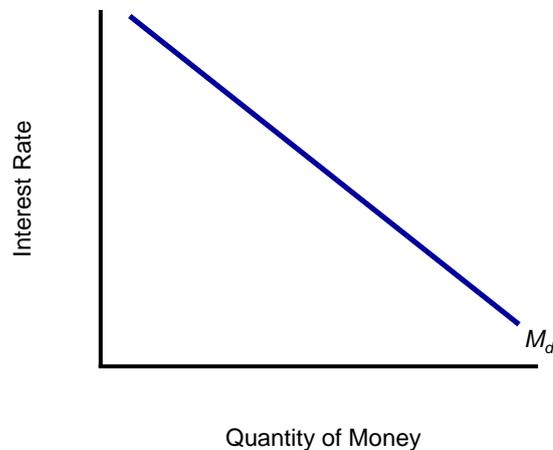
1. Demand for money

- The demand for money curve
 - The amount of money demanded for transactions purposes is fixed given the level of income.
 - Precautionary and asset demand are determined by the opportunity cost of holding money (the interest rate).

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1. Demand for money

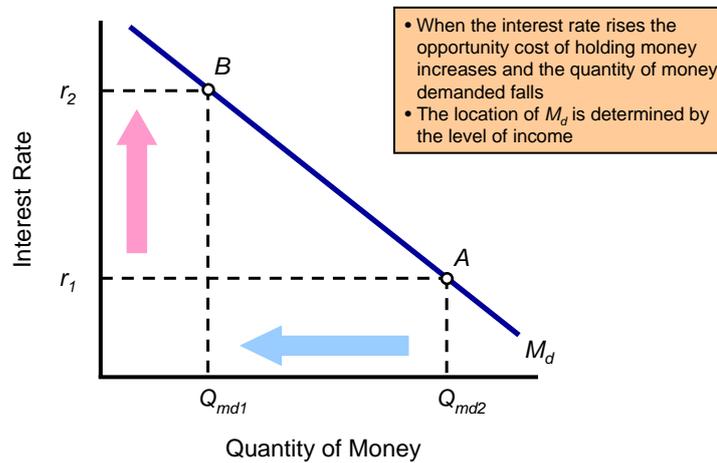
The Demand for Money Curve



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1. Demand for money

The Demand for Money Curve



Lecture Outline

1. Demand for money
2. Determination of interest rate in the money market
3. Quantity Theory of Money

2. Determination of interest rate in the money market

- Interaction of money supply and money demand
- **Theory of liquidity preference:** Keynes's theory that the interest rate adjusts to bring money supply and demand into balance.

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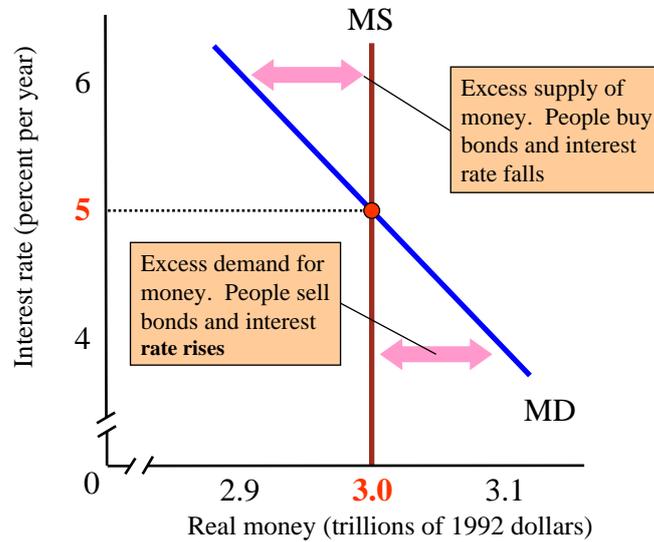
2. Determination of interest rate in the money market

Money Market Equilibrium

- The interest rate is determined by the supply of and demand for money.
- At any given moment in time, the quantity of real money supplied is a fixed amount since the Fed can influence the supply of money.

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2. Determination of interest rate in the money market



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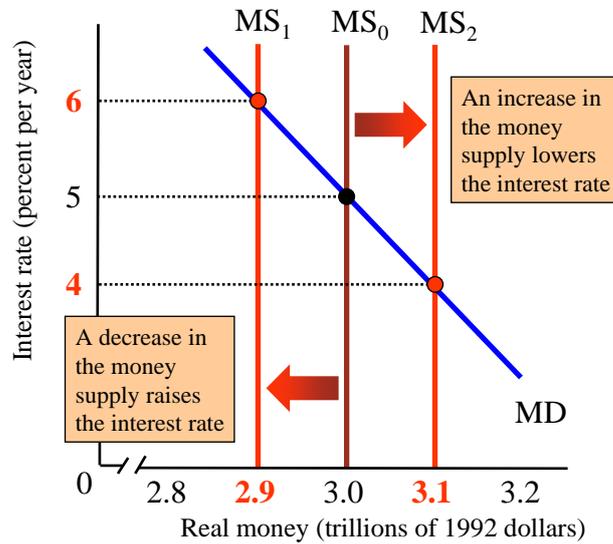
2. Determination of interest rate in the money market

Changing the Interest Rate

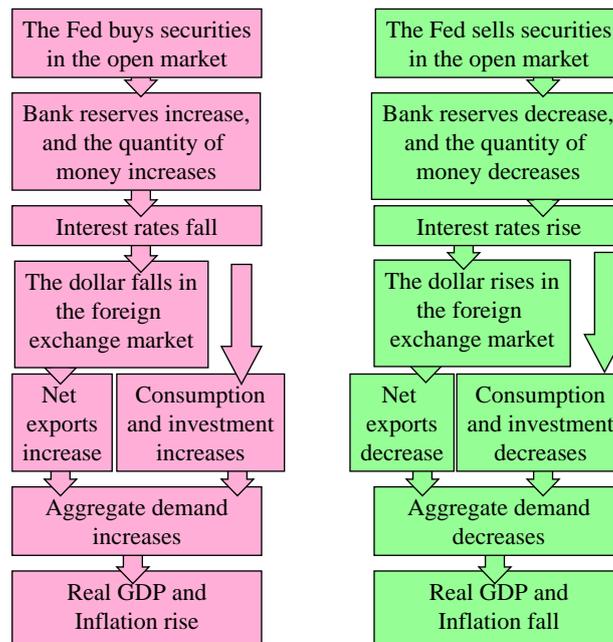
- Suppose the Fed begins to fear inflation.
- It decides to raise interest rates to discourage borrowing and the purchase of goods and services.
- To do so, the Fed sells securities in the open market.
- Bank reserves decline.
- Less new loans are made.
- The money supply decreases.

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2. Determination of interest rate in the money market



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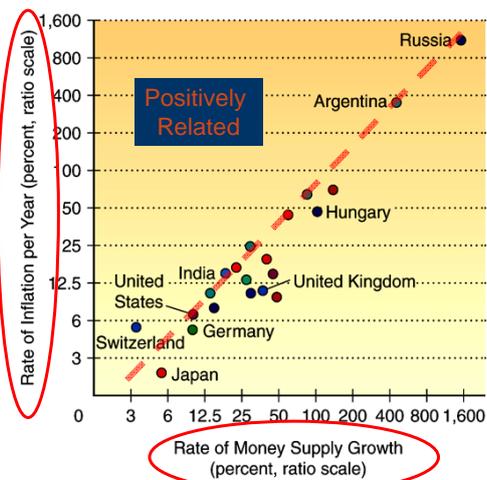
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3. Quantity Theory of Money

- The Effects of a Monetary Injection (MS ↑)
- Definition of **quantity theory of money**: a theory asserting that the quantity of money available determines the price level and that the growth rate in the quantity of money available determines the inflation rate.



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3. Quantity Theory of Money

Milton Friedman

“Inflation is
always
and everywhere
a monetary
phenomenon”

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3. Quantity Theory of Money

A Brief Look at the **Adjustment Process**

- The immediate effect of an increase in the money supply is to create an excess supply of money. (Once again, please be reminded that increase in money supply does not mean that it automatically increases the money holding by the people. It must go through the process that interest rates lower and money demand increases.)
- People try to **get rid of this excess supply** in a variety of ways.
 - They may buy goods and services with the funds.
 - They may use these excess funds to make loans to others. These loans are then likely used to buy goods and services.
 - In either case, the increase in the money supply leads to an increase in the demand for goods and services.
 - Because the supply of goods and services has not changed, the result of an increase in the demand for goods and services will be higher prices.

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3. Quantity Theory of Money

Another perspective of Quantity Theory of Money

- How many times per year is the typical dollar bill used to pay for a newly produced good or service?
- **Velocity** and the **Quantity Equation**
 - Definition of **velocity of money (V): the rate at which money changes hands.**
 - To calculate velocity, we **divide nominal GDP by the quantity of money.**

$$\text{velocity} = \text{nominal GDP} / \text{money supply}$$

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3. Quantity Theory of Money

Velocity and the Quantity Equation

- If P is the price level, Y is real GDP, and M is the quantity of money:

$$\text{velocity} = \frac{P \times Y}{M}$$

- Rearranging the terms, we get the **quantity equation**.

$$M \times V = P \times Y$$

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3. Quantity Theory of Money

Velocity and the Quantity Equation

Suppose that:

- Real GDP = \$5,000
- Velocity = 5
- Money supply = \$2,000
- Price level = \$2
 - We can show that:
 - $M \times V = P \times Y$
 - $\$2,000 \times 5 = \$2 \times \$5,000$
 - $\$10,000 = \$10,000$

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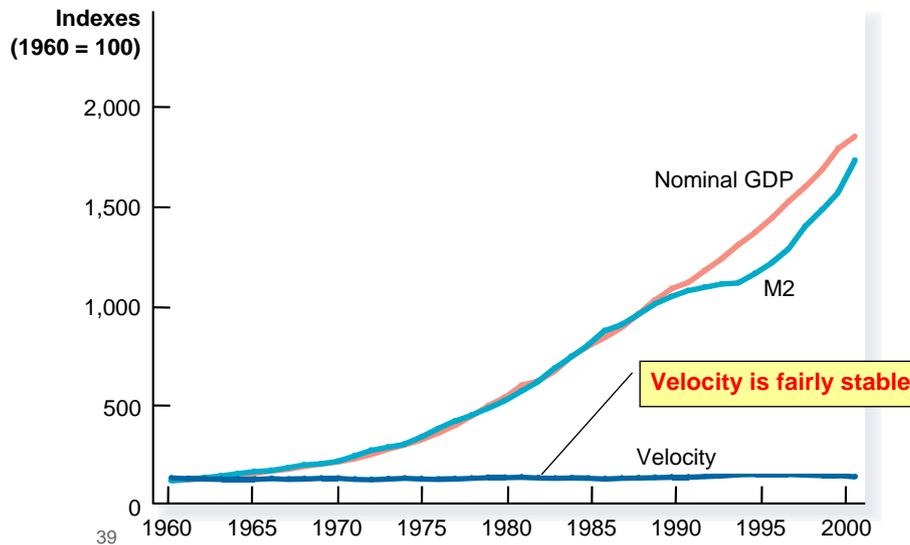
3. Quantity Theory of Money

Velocity and the Quantity Equation

- Definition of **quantity equation: the equation $M \times V = P \times Y$, which relates the quantity of money (M), the velocity of money (V), and the dollar value of the economy's output of goods and services (PY).**
- The quantity equation shows that an increase in the quantity of money (M) must be reflected in one of the other three variables.
- Specifically, the price level (P) must rise, output (Y) must rise, or velocity (V) must fall.
- Figure 3 shows nominal GDP, the quantity of money (as measured by M2) and the velocity of money for the United States since 1960. It appears that ***velocity is fairly stable***, while GDP and the money supply have grown dramatically.

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Nominal GDP, the Quantity of Money, and the Velocity of Money



3. Quantity Theory of Money

Velocity and the Quantity Equation

- We can now explain how an increase in the quantity of money affects the price level using the quantity equation.
 - The velocity of money is relatively stable over time.
 - When the central bank changes the quantity of money (M), it will proportionately change the nominal value of output ($P \times Y$).
 - The economy's output of goods and services (Y) is determined primarily by available resources and technology. Because **money is neutral, changes in the money supply do not affect output**. This must mean that **P increases proportionately with the change in M** .
 - **Monetary neutrality is a long-run view. Money supply can affect the real sector (real output) through transmission mechanism (i.e. the impact of interest rates on consumption and investment).** (See slide 30)

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