


Chapter 14

Money, Interest Rates, and Exchange Rates



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To Accompany
International Economics: Theory and Policy, Sixth Edition
by **Paul R. Krugman and Maurice Obstfeld**

Chapter Organization

- Introduction
- Money Defined: A Brief Review
- The Demand for Money by Individuals
- Aggregate Money Demand
- The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

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Chapter Organization

- The Money Supply and the Exchange Rate in the Short Run
- Money, the Price Level, and the Exchange Rate in the Long Run
- Inflation and Exchange Rate Dynamics
- Summary

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Introduction

- Factors that affect a country's money supply or demand are among the most powerful determinants of its currency's exchange rate against foreign currencies.
- This chapter combines the foreign-exchange market with the money market to determine the exchange rate in the short run.
 - It analyzes the long-term effects of monetary changes on output prices and expected future exchange rates.

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Money Defined: A Brief Review

- **Money as a Medium of Exchange**
 - A generally accepted means of payment
- **Money as a Unit of Account**
 - A widely recognized measure of value
- **Money as a Store of Value**
 - A transfer of purchasing power from the present into the future

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Money Defined: A Brief Review

- **What Is Money?**
 - Assets widely used and accepted as a means of payment.
 - Money is very liquid, but pays little or no return.
 - All other assets are less liquid but pay higher return.
 - **Money Supply (M^s)**

$$M^s = \text{Currency} + \text{Checkable Deposits}$$

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Money Defined: A Brief Review

- **How the Money Supply Is Determined**
 - An economy's money supply is controlled by its central bank.
 - The central bank:
 - Directly regulates the amount of currency in existence
 - Indirectly controls the amount of checking deposits issued by private banks

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The Demand for Money by Individuals

- Three factors influence money demand:
 - Expected return
 - Risk
 - Liquidity
- **Expected Return**
 - The interest rate measures the opportunity cost of holding money rather than interest-bearing bonds.
 - A rise in the interest rate raises the cost of holding money and causes money demand to fall.

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The Demand for Money by Individuals

- **Risk**
 - Holding money is risky.
 - An unexpected increase in the prices of goods and services could reduce the value of money in terms of the commodities consumed.
 - Changes in the risk of holding money need not cause individuals to reduce their demand for money.
 - Any change in the riskiness of money causes an equal change in the riskiness of bonds.

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The Demand for Money by Individuals

- **Liquidity**
 - The main benefit of holding money comes from its liquidity.
 - Households and firms hold money because it is the easiest way of financing their everyday purchases.
 - A rise in the average value of transactions carried out by a household or firm causes its demand for money to rise.

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Aggregate Money Demand

- **Aggregate money demand**
 - The total demand for money by all households and firms in the economy.
 - It is determined by three main factors:
 - Interest rate
 - It reduces the demand for money.
 - Price level
 - It raises the demand for money.
 - Real national income
 - It raises the demand for money.

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Aggregate Money Demand

- The aggregate demand for money can be expressed by:

$$M^d = P \times L(R, Y) \quad (14-1)$$

where:

P is the price level

Y is real national income

$L(R, Y)$ is the aggregate real money demand

- Equation (14-1) can also be written as:

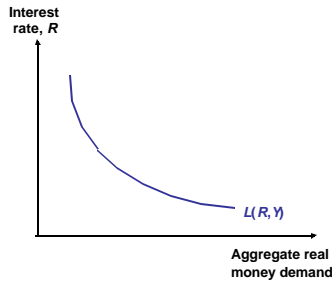
$$M^d/P = L(R, Y) \quad (14-2)$$

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Aggregate Money Demand

Figure 14-1: Aggregate Real Money Demand and the Interest Rate

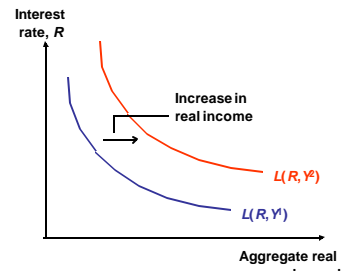


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Aggregate Money Demand

Figure 14-2: Effect on the Aggregate Real Money Demand Schedule of a Rise in Real Income



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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Equilibrium in the Money Market

- The condition for equilibrium in the money market is:

$$M^s = M^d \quad (14-3)$$

- The money market equilibrium condition can be expressed in terms of aggregate real money demand as:

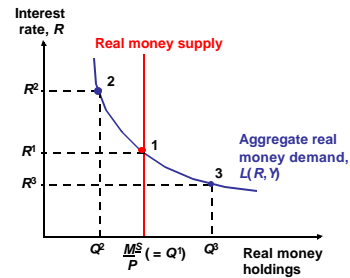
$$M^s/P = L(R, Y) \quad (14-4)$$

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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Figure 14-3: Determination of the Equilibrium Interest Rate



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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Interest Rates and the Money Supply

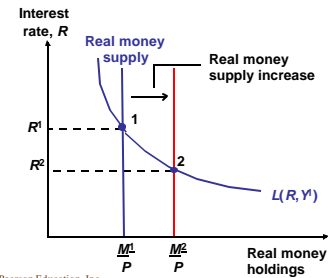
- An increase (fall) in the money supply lowers (raises) the interest rate, given the price level and output.
 - The effect of increasing the money supply at a given price level is illustrated in Figure 14-4.

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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Figure 14-4: Effect of an Increase in the Money Supply on the Interest Rate



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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Output and the Interest Rate

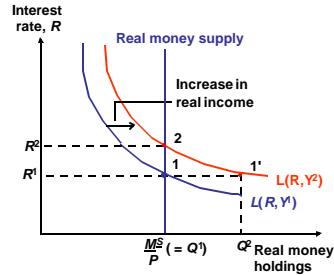
- An increase (fall) in real output raises (lowers) the interest rate, given the price level and the money supply.
- Figure 14-5 shows the effect on the interest rate of a rise in the level of output, given the money supply and the price level.

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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Figure 14-5: Effect on the Interest Rate of a Rise in Real Income



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The Money Supply and the Exchange Rate in the Short Run

Short run analysis

- The price level and the real output are given.

Long run analysis

- The price level is perfectly flexible and always adjusted immediately to preserve full employment.

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The Money Supply and the Exchange Rate in the Short Run

Linking Money, the Interest Rate, and the Exchange Rate

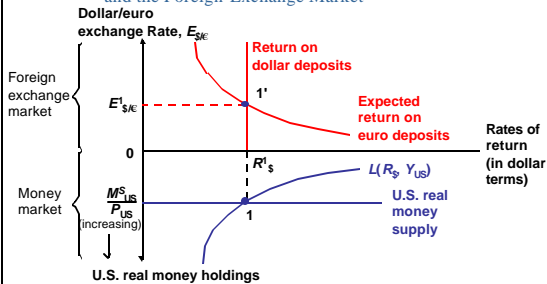
- The U.S. money market determines the dollar interest rate, which in turn affects the exchange rate that maintains the interest parity.
- Figure 14-6 links the U.S. money market (bottom) and the foreign exchange market (top).

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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Figure 14-6: Simultaneous Equilibrium in the U.S. Money Market and the Foreign-Exchange Market

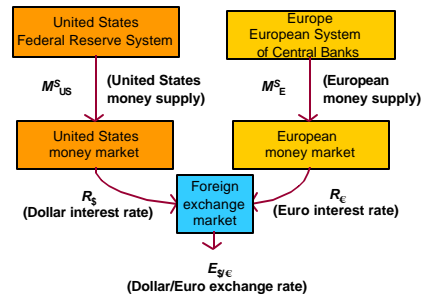


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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Figure 14-7: Money-Market/Exchange Rate Linkages



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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

U.S. Money Supply and the Dollar/Euro Exchange Rate

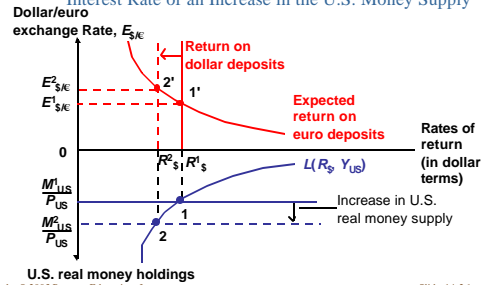
- What happens when the Federal Reserve changes the U.S. money supply?
 - An increase (decrease) in a country's money supply causes its currency to depreciate (appreciate) in the foreign exchange market.

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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Figure 14-8: Effect on the Dollar/Euro Exchange Rate and Dollar Interest Rate of an Increase in the U.S. Money Supply



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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Europe's Money Supply and the Dollar/Euro Exchange Rate

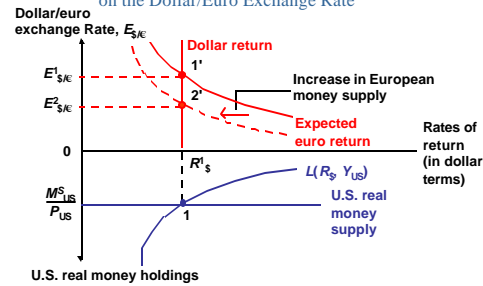
- An increase in Europe's money supply causes a depreciation of the euro (i.e., appreciation of the dollar).
- A reduction in Europe's money supply causes an appreciation of the euro (i.e., a depreciation of the dollar).
- The change in the European money supply does not disturb the U.S. money market equilibrium.

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The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Figure 14-9: Effect of an Increase in the European Money Supply on the Dollar/Euro Exchange Rate



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Money, the Price Level, and the Exchange Rate in the Long Run

Long-run equilibrium

- Prices are perfectly flexible and always adjusted immediately to preserve full employment.
- Money and Money Prices**
 - The money market equilibrium (Equation 14-4) can be rearranged to give the long-run equilibrium price level:

$$P = M^s / L(R, Y) \quad (14-5)$$
 - An increase in a country's money supply causes a proportional increase in its price level.

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Money, the Price Level, and the Exchange Rate in the Long Run

The Long-Run Effects of Money Supply Changes

- A change in the supply of money has no effect on the long-run values of the interest rate or real output.
- A permanent increase in the money supply causes a proportional increase in the price level's long-run value.
 - This prediction is based on the money market equilibrium condition: $M^s/P = L$ or $P = M^s/L$.
 - This condition implies that $\Delta P/P = \Delta M^s/M^s - \Delta L/L$.
 - The inflation rate equals the monetary growth rate less the growth rate for money demand.

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Money, the Price Level, and the Exchange Rate in the Long Run

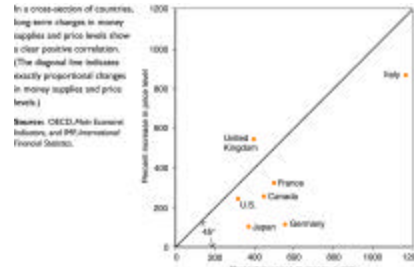
- Empirical Evidence on Money Supplies and Price Levels**
 - In a cross-section of countries, long-term changes in money supplies and price levels show a clear positive correlation.

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Money, the Price Level, and the Exchange Rate in the Long Run

Figure 14-10: Monetary Growth and Price-Level Change in the Seven Main Industrial Countries, 1973-1997



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Money, the Price Level, and the Exchange Rate in the Long Run

- Money and the Exchange Rate in the Long Run**
 - A permanent increase (decrease) in a country's money supply causes a proportional long-run depreciation (appreciation) of its currency against foreign currencies.

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Inflation and Exchange Rate Dynamics

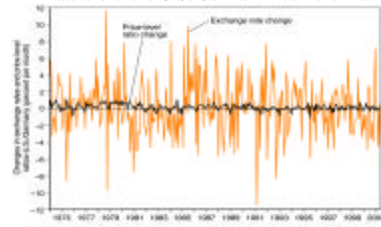
- Inflation**
 - A situation where an economy's price level rises.
- Deflation**
 - A situation where an economy's price level falls.
- Short-Run Price Rigidity versus Long-Run Price Flexibility**
 - The short-run "stickiness" of price levels is illustrated in Figure 14-11.

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Inflation and Exchange Rate Dynamics

Figure 14-11: Month-to-Month Variability of the Dollar/DM Exchange Rate and of the U.S./German Price-Level Ratio, 1974-2001



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Inflation and Exchange Rate Dynamics

- A change in the money supply creates demand and cost pressures that lead to future increases in the price level from three main sources:
 - Excess demand for output and labor
 - Inflationary expectations
 - Raw materials prices

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Inflation and Exchange Rate Dynamics

■ Permanent Money Supply Changes and the Exchange Rate

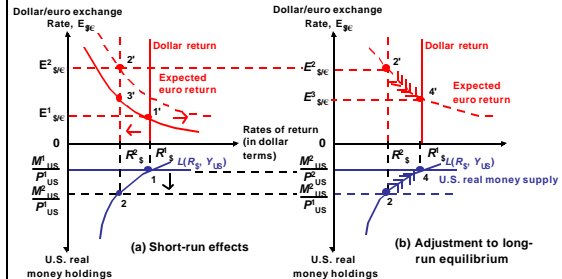
- How does the dollar/euro exchange rate adjust to a permanent increase in the U.S. money supply?
 - Figure 14-12 shows both the short-run and long-run effects of the increase in the U.S. money supply.

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Inflation and Exchange Rate Dynamics

Figure 14-12: Effects of an Increase in the U.S. Money Supply

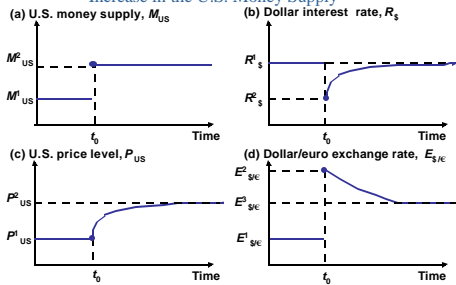


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Inflation and Exchange Rate Dynamics

Figure 14-13: Time Paths of U.S. Economic Variables After a Permanent Increase in the U.S. Money Supply



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Inflation and Exchange Rate Dynamics

■ Exchange Rate Overshooting

- The exchange rate is said to overshoot when its immediate response to a disturbance is greater than its long-run response.
- It helps explain why exchange rates move so sharply from day to day.
- It is a direct result of sluggish short-run price level adjustment and the interest parity condition.

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Summary

- Money is held because of its liquidity.
- Aggregate real money demand depends negatively on the opportunity cost of holding money and positively on the volume of transactions in the economy.
- The money market is in equilibrium when the real money supply equals aggregate real money demand.
- By lowering the domestic interest rate, an increase in the money supply causes the domestic currency to depreciate in the foreign exchange market.

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Summary

- Permanent changes in the money supply push the long-run equilibrium price level proportionally in the same direction.
 - These changes do not influence the long-run values of output, the interest rate, or any relative prices.
- An increase in the money supply can cause the exchange rate to overshoot its long-run level in the short run.

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