

## Lecture 5: Foreign Exchange Market Intervention and Money Supply Reading: Notes, Chap22

1

## FX Market Intervention and MS

- **Foreign-exchange market intervention** refers to deliberate actions by a central bank to influence the exchange rate.
- Central banks and governments seek to minimize changes in exchange rates.
- Such interventions alter a central bank's holdings of **international reserves**, assets that are denominated in a foreign currency and used in international transactions.
- A purchase or sale of foreign assets by a central bank has the same effect on MB as an open market purchase or sale of government bonds.

2

## The Federal Reserve's Balance Sheet

The Federal Reserve's Balance Sheet (\$ billions)			
Assets		Liabilities	
Securities (U.S. Treasury, government agency, and bankers' acceptances)	684.8	Currency outstanding	655.2
Discount loans	0.04	U.S. Treasury deposits	10.6
Items in the process of collection	8.2	Foreign and other deposits	0.6
Other Federal Reserve assets	40.0	Deferred availability credit items	8.1
Gold and SDR certificate accounts	13.2	Other Federal Reserve liabilities and capital accounts	40.8
Coin	1.0	Deposits by depository institutions	31.9
	<u>\$747.2</u>		<u>\$747.2</u>

Source: Data are for April 30, 2003, and are taken from Federal Reserve Bulletin, July 2003, p. A10.

3

## Unsterilized FX Intervention

- When a central bank allows MB to respond to the FX market intervention, the transaction is called an **unsterilized foreign-exchange intervention**.
- An unsterilized sale of foreign assets to purchase domestic currency leads to a decrease in international reserves and in the money supply and an appreciation of the domestic currency.
- An unsterilized purchase of foreign assets and sells domestic currency leads to an increase in international reserves and the money supply and a depreciation of the domestic currency.

4

## Sterilized FX Intervention

- When a central bank does not allow MB to respond to the FX market intervention, the transaction is called an **sterilized foreign-exchange intervention**.
- If domestic and foreign assets are perfect substitutes, a sterilized foreign-exchange intervention doesn't affect the money supply, domestic interest rates, or the exchange rate.
- Most studies by economists have concluded, a sterilized intervention has virtually no effect on the exchange rate.

5

## How FX Market and Money Market are Related?: Part 1

- The Role of Exchange Rates in International Transactions
- The Foreign Exchange Market
- How Exchange Rates are Determined (The Asset Approach)

6

## Exchange Rate (ER)

- Def of ER: the price of one currency in terms of another.
- Direct quote vs. indirect quote
- Depreciation vs. appreciation

7

## Prices are Determined in the Market

- **foreign exchange (FX) market.**
  - The market in which international currency trades take place
- **The Players:**
  - Commercial banks
  - International corporations
  - Nonbank financial institutions
  - Central banks
- The integration of financial centers implies that there can be no significant **arbitrage**.
  - The process of buying a currency cheap and selling it dear.

8

## The Demand in the FX Market

- Determined by
  - **The Real Rate of Return relative to other assets**
  - **Risk**
    - The variability it contributes to savers' wealth
  - **Liquidity**
    - The ease with which it can be sold or exchanged for goods

9

## How to Calculate the Rate of Return on Foreign Deposits

- You need to know:
  1. How the money values of the deposits will change (nominal interest rate change)
  2. How exchange rates will change

The returns on deposits traded in the FX market depend on **interest rates and expected exchange rate changes**.

10

## How to Calculate the Rate of Return on Foreign Deposits

- **A Simple Rule**
  - The dollar rate of return on euro deposits is approximately the euro interest rate plus the **rate of depreciation** of the dollar against the euro.
    - The rate of depreciation of the dollar against the euro is the percentage increase in the dollar/euro exchange rate over a year.

11

## The expected rate of return difference between dollar and euro deposits

$$R_{\$} - [R_{\epsilon} + (E_{\$/\epsilon}^e - E_{\$/\epsilon})/E_{\$/\epsilon}] = R_{\$} - R_{\epsilon} - (E_{\$/\epsilon}^e - E_{\$/\epsilon})/E_{\$/\epsilon}$$

where:

$R_{\$}$  = interest rate on one-year dollar deposits

$R_{\epsilon}$  = today's interest rate on one-year euro deposits

$E_{\$/\epsilon}$  = today's dollar/euro exchange rate (number of dollars per euro)

$E_{\$/\epsilon}^e$  = dollar/euro exchange rate (number of dollars per euro) expected to prevail a year from today

12

## ER Determination: FX Market Equilibrium

- **Interest Parity: The Basic Equilibrium Condition**
  - The foreign exchange market is in equilibrium when deposits of all currencies offer the same expected rate of return.
  - **Interest parity condition**
    - The expected rates of return are equal when:

$$R_{\$} = R_{\text{€}} + (E_{\$/\text{€}}^e - E_{\$/\text{€}}) / E_{\$/\text{€}}$$

13

## Example 1

- Calculate the dollar rate of return on the following asset: a euro deposit in a London bank in a year when the interest rate offered by the London bank is 15 percent and the dollar/euro exchange rate moves from \$1.2 per euro to \$1.5 per euro during the year. If the U.S. interest rate is 18 percent a year. Would you invest on euro deposits or U.S. dollar deposits?

14

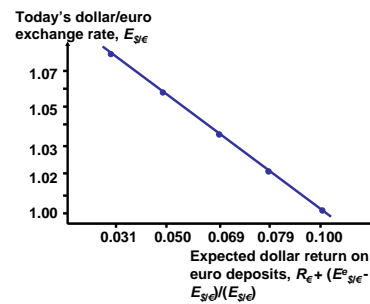
## Example 2

- If the annual euro interest rate is 10 percent, and the annual dollar interest rate is 12 percent, and the expected exchange rate is \$1.25 per euro in a year, what is the equilibrium current dollar/euro exchange rate suggested by the interest rate parity?

15

## Modeling FX Market

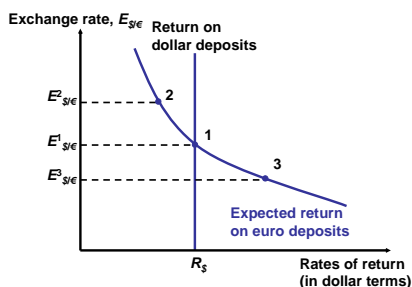
The Relation Between the Current Dollar/Euro Exchange Rate and the Expected Dollar Return on Euro Deposits



16

## Equilibrium in the Foreign Exchange Market

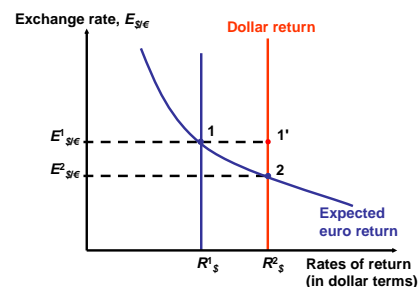
Determination of the Equilibrium Dollar/Euro Exchange Rate



17

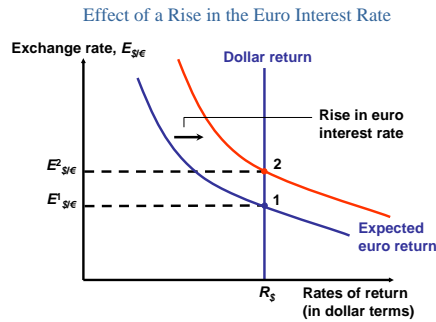
## Interest Rates, Expectations, and Equilibrium

Effect of a Rise in the Dollar Interest Rate



18

## Interest Rates, Expectations, and Equilibrium



19

## How FX Market and Money Market are Related?: Part 2

- How Monetary Factors Affect
  - The determination of interest rates
  - The expectations of future exchange rates
- The Equilibrium Interest Rate: The Interaction of Money Supply and Demand
- The Money Supply and the ER in the Short Run
- Money, the Price Level, and the ER in the Long Run
- The Transition from SR to LR: Inflation and ER Dynamics

20

## 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
    - Price level
    - Real national income

$$M^d/P = L(R, Y)$$

21

## The Equilibrium Interest Rate

- **Money Market Equilibrium**

$$M^s = M^d$$

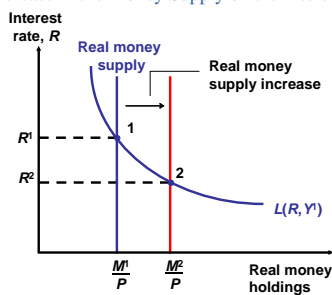
- The money market equilibrium condition can be expressed in terms of aggregate real money demand as:

$$M^s/P = L(R, Y)$$

22

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

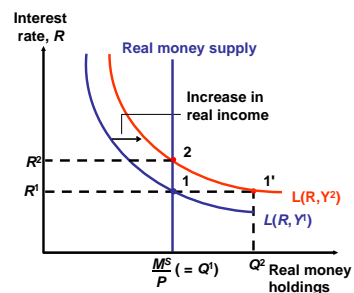
Effect of an Increase in the Money Supply on the Interest Rate



23

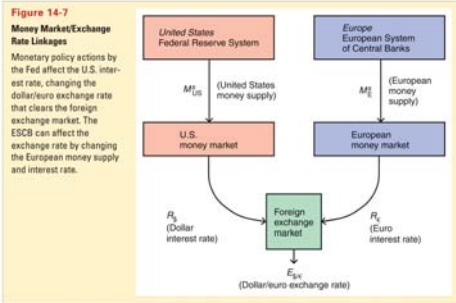
## The Equilibrium Interest Rate: The Interaction of Money Supply and Demand

Effect on the Interest Rate of a Rise in Real Income



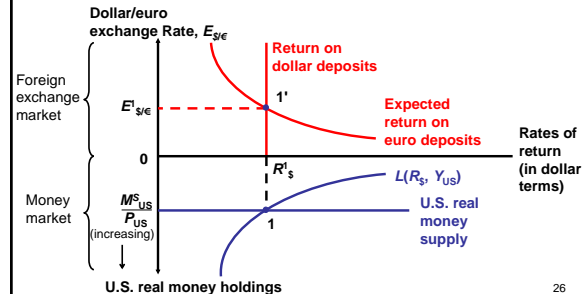
24

## Linking the Money Market to the Foreign Exchange Market



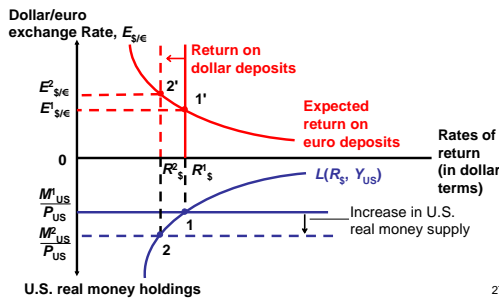
45

## Simultaneous Equilibrium in the U.S. Money Market and the Foreign-Exchange Market



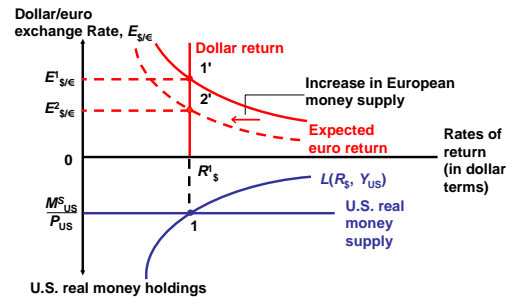
26

## Effect on the Dollar/Euro Exchange Rate and Dollar Interest Rate of an Increase in the U.S. Money Supply



27

## Effect of an Increase in the European Money Supply on the Dollar/Euro Exchange Rate



28

## Long Run and Short Run

- In the *short run*, the price level is fixed at some level.
  - the analysis heretofore has been a short run analysis.
- In the *long run*, prices are allowed to adjust to demand and supply in their respective markets.
  - The interest rate depends on the supply of saving and the demand for saving and the inflation, independent of the money supply level.

29

## Long Run and Short Run (cont.)

- Long run equilibrium:  $M^s/P = L(R, Y)$
- $M^s = P \times L(R, Y)$
- increases in the money supply are matched by proportional increases in the price level.
- In the long run,  $\Delta P/P = \Delta M^s/M^s - \Delta L/L$
- The inflation rate equals growth rate in money supply minus the growth rate for money demand.

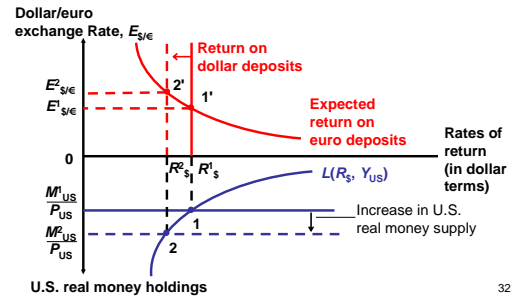
30

## Money, Prices and the Exchange Rates and Expectations

- When we consider price changes in the long run, **inflationary expectations will have an effect in the foreign exchange market.**
- The Money Supply Change Affects Exchange Rate Expectations.
  - A permanent increase in the money supply causes a proportional increase in all dollar prices, including the dollar price of foreign currencies like euros.

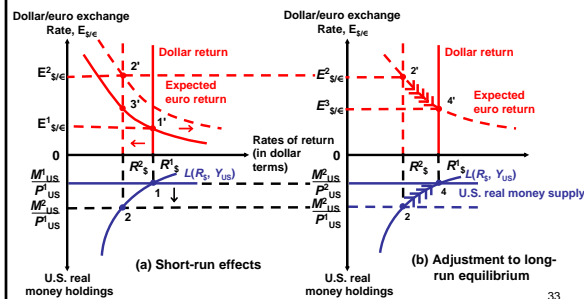
31

## Effect on the Dollar/Euro Exchange Rate and Dollar Interest Rate of an Increase in the U.S. Money Supply



32

## Transition from SR to LR Equilibrium: Effects of an Increase in the U.S. Money Supply



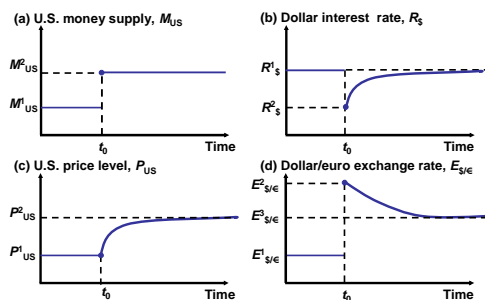
33

## Money, Prices and the Exchange Rates in the Long Run (cont.)

- A permanent increase in a country's money supply causes a proportional long run depreciation of its currency.
  - However, the dynamics of the model predict a large depreciation first and a smaller *subsequent appreciation*.
- A permanent decrease in a country's money supply causes a proportional long run appreciation of its currency.
  - However, the dynamics of the model predict a large appreciation first and a smaller *subsequent depreciation*.

34

## Time Paths of U.S. Economic Variables After a Permanent Increase in the U.S. Money Supply



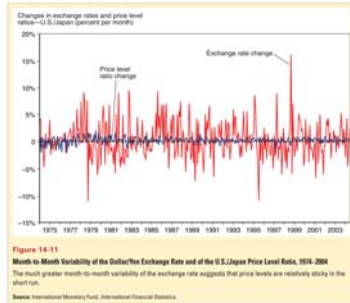
35

## 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.

36

## Exchange Rate Volatility



Changes in price levels are less volatile, suggesting that price levels change slowly.

Exchange rates are influenced by interest rates and expectations, which may change rapidly, making exchange rates volatile.

37

## Table 22.1 Comparison of Exchange Rate Regimes

### Comparison of Exchange Rate Regimes

	Classical Gold Standard	Bretton Woods System
Promise anchoring the system	Currencies convertible into gold at fixed rates.	Currencies convertible into U.S. dollars at fixed rates; dollars convertible into gold at fixed rate.
Exchange rate adjustments	Not permitted.	Devaluation or revaluation permitted in response to fundamental disequilibrium.
Adjustment of economies	Money supply adjustments create inflation or deflation until the fixed exchange rate is restored.	IMF lending could smooth adjustment to short-term overvaluation of exchange rates.
Principal problems	Balance-of-payments deficits lead to deflation and recessions, with no gradual adjustment for short-term problems. Countries with balance-of-payments deficits have an incentive to abandon the promise of convertibility.	Difficult to devalue the U.S. dollar in response to U.S. balance-of-payments deficits.

38

## Summary

- 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.

43

## 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.

44