# Topics for Today

1. Long-Run Price Level Adjustment
   - The "Quantity Theory" of Money
2. Exchange Rate "Overshooting"

# Long-Run Price Adjustment

**Definition of the "Long-Run"**: Prices of goods & services fully adjust to clear the market

According to Keynes, the most important rigid price is the price of labor (i.e., wages), due to nominal contracts.

**Key Proposition**: In the long-run, a permanent change in the $M^s$ is neutral. That is, it does not alter real output or the relative prices of goods & services. It only causes a proportionate increase in the price level.

$$M/P = L(Y,R) \Rightarrow P = \frac{M}{L(Y,R)}$$

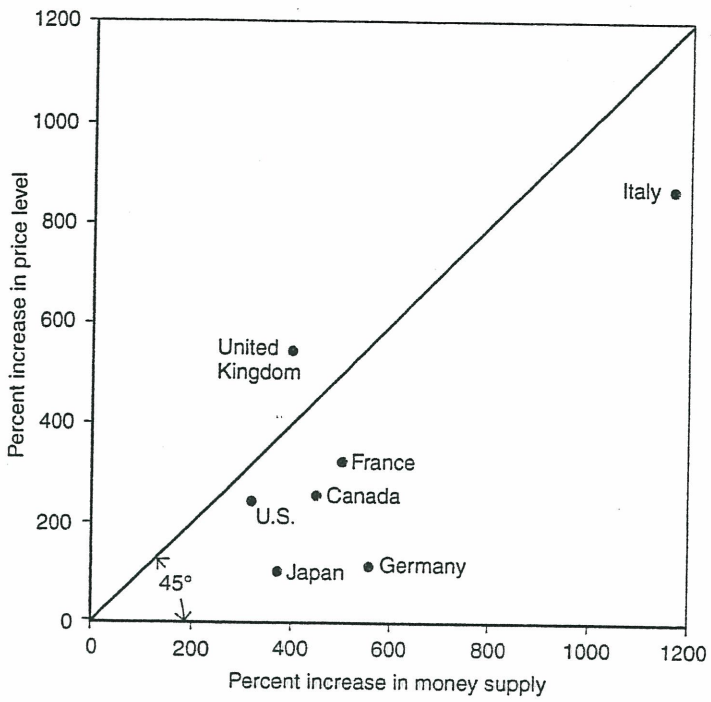
$\Rightarrow$ with $Y, R$ constant, $M^s \uparrow$ by $X\%$ then $P \uparrow$ by $X\%$

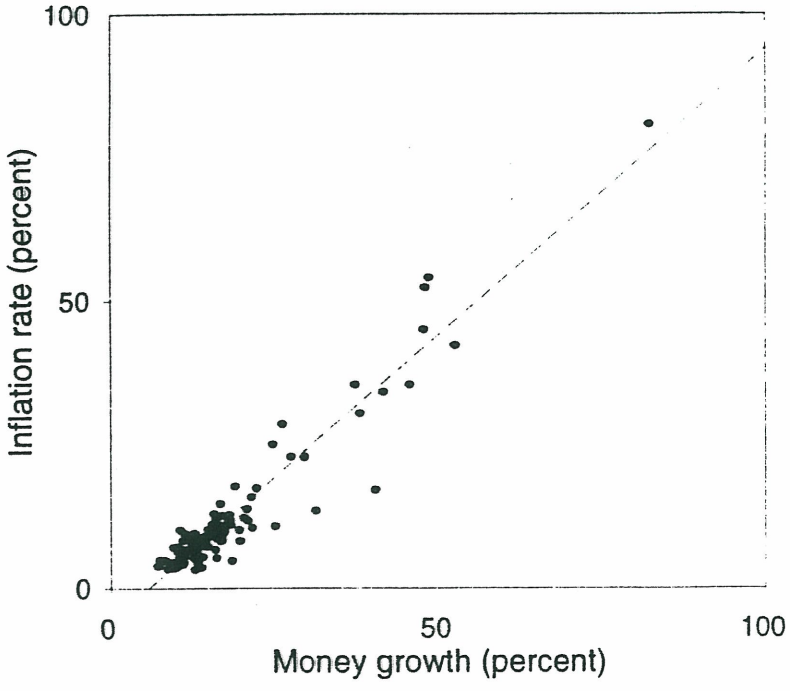
This proposition is based on both economic reasoning and empirical evidence.

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

In a cross-section of countries, long-term changes in money supplies and price levels show a clear positive correlation. (The diagonal line indicates exactly proportional changes in money supplies and price levels.)

**Source:** OECD, *Main Economic Indicators*, and IMF, *International Financial Statistics*.



# Exchange Rate Volatility

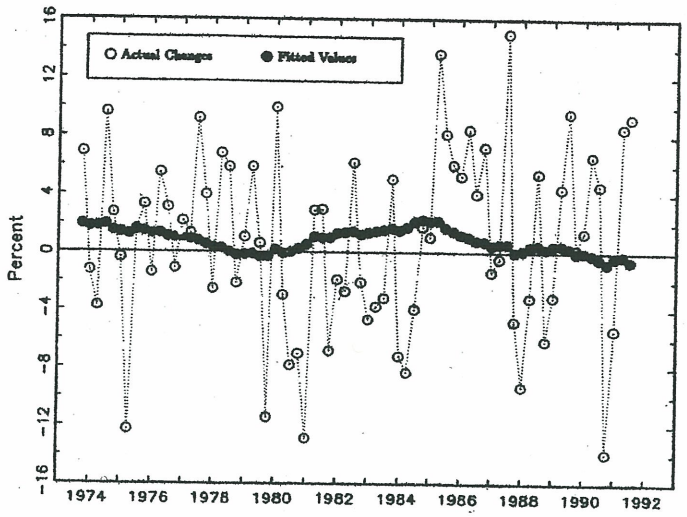



FIGURE 1. ONE-QUARTER CHANGES IN THE LOG DOLLAR/DEUTSCHE-MARK EXCHANGE RATE

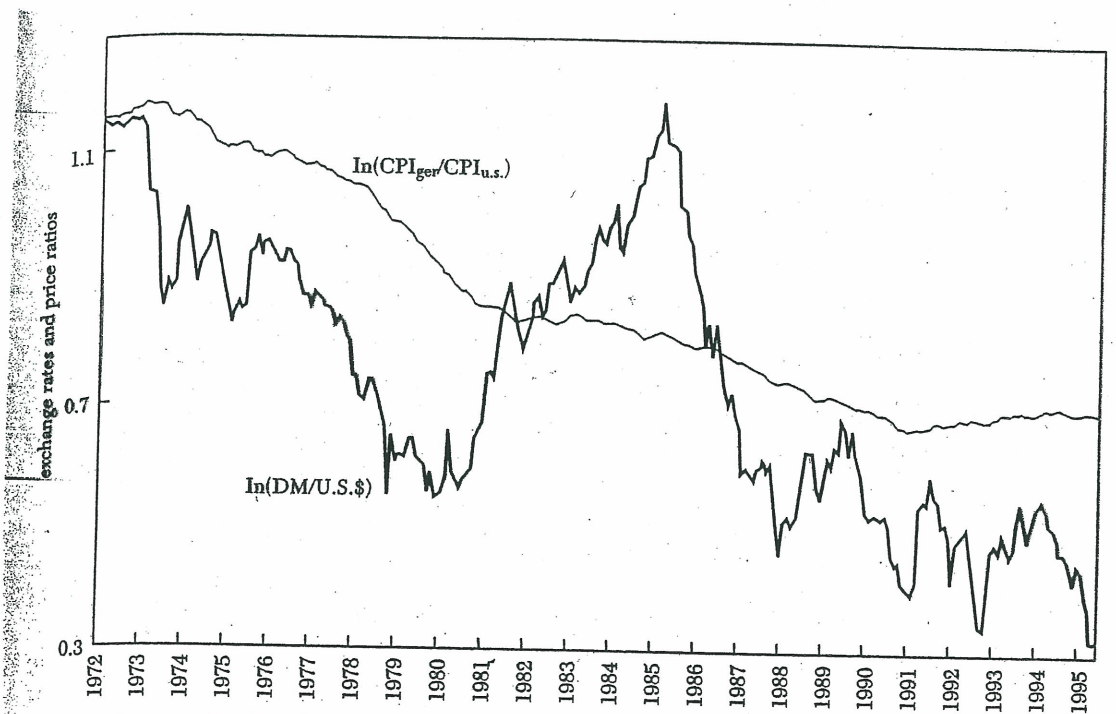



*Figure* 2. DM/U.S.$ exchange rate and ratio of German to U.S. CPIs, Jan. 1972–May 1995

*Source*: International Financial Statistics

# Why Overshooting?

3 key assumptions are responsible for over shooting:

1.) Goods markets are slow to adjust (i.e., sticky prices)

2.) Asset Markets Adjust Instantly

3.) Investors have "Rational Expectations"
- They anticipate future price level changes, and recognize their effects on future exchange rates.

Overshooting = Sticky Prices + UIP + Rational Expectations

# Basic Logic Behind Overshooting

Assume initially $\frac{E^e - E}{E} = 0$ and $R = R^*$

1.) $M^s \uparrow \Rightarrow \frac{M^s}{P} \uparrow$ (due to sticky prices)

$\Rightarrow R \downarrow$ (to clear money mkt. Y constant)

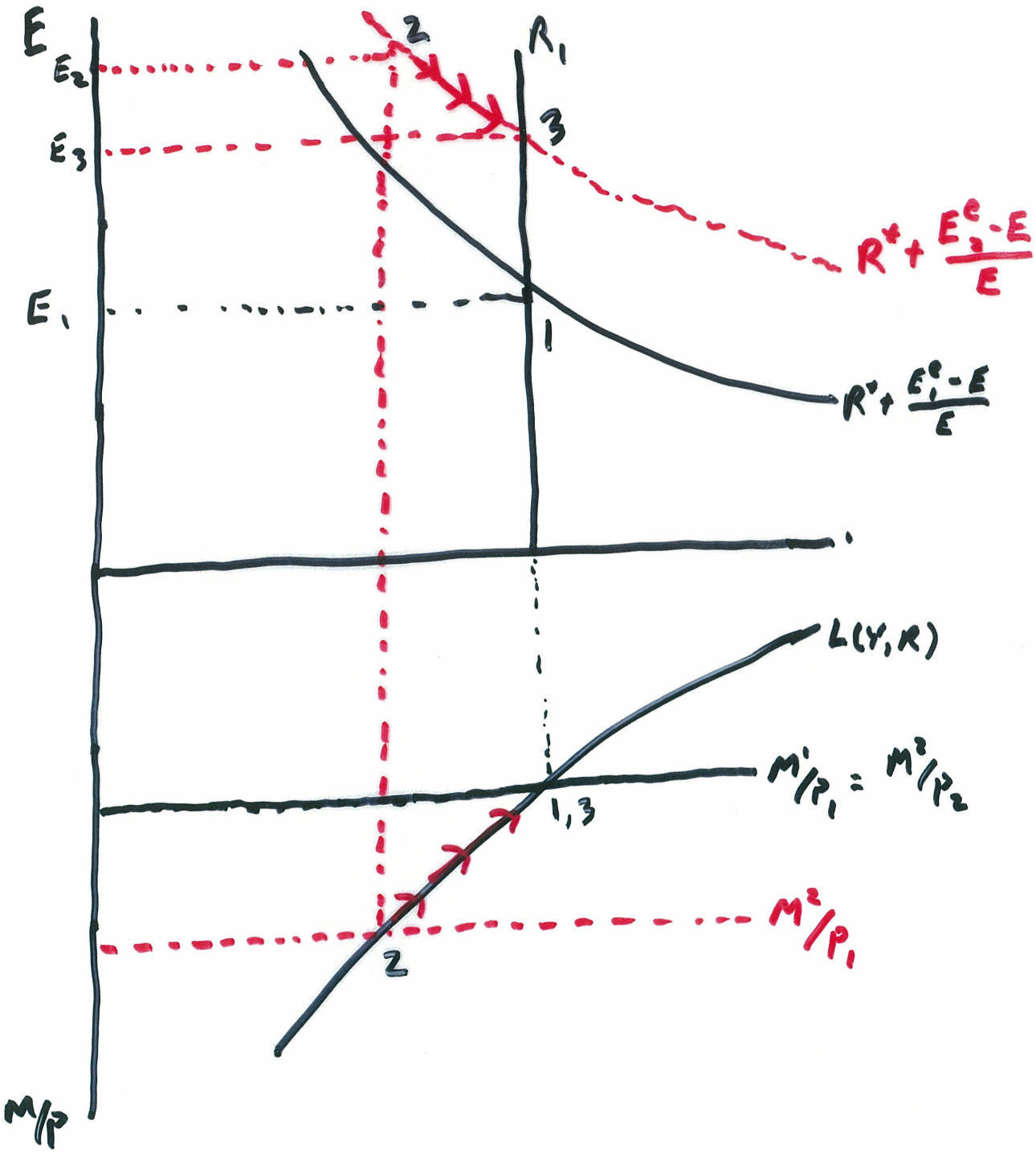
2.) From UIP, the only way $R \downarrow$ is if investors expect the domestic currency to appreciate.

3.) However, investors know that the permanent $M^s \uparrow$ will eventually lead to a higher price level and a depreciated currency

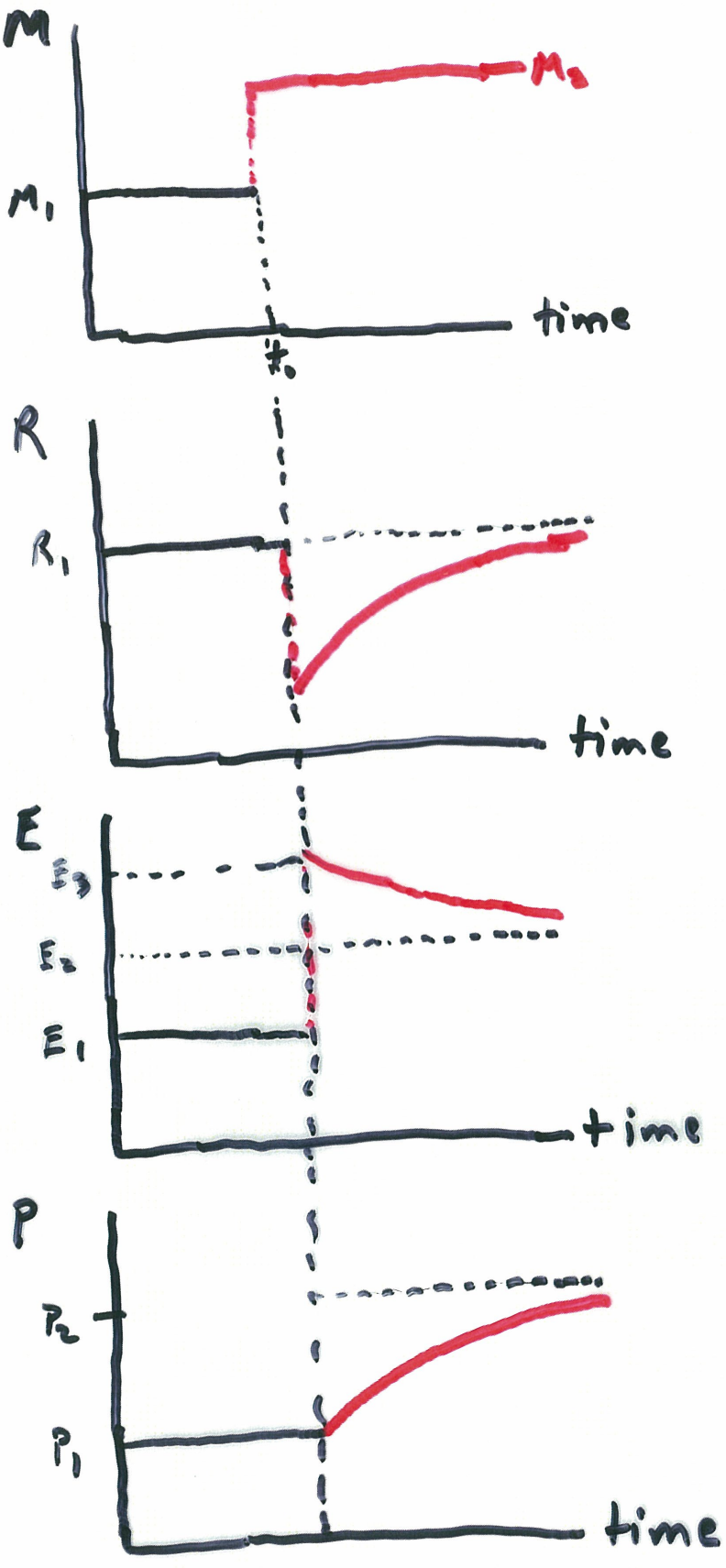
4.) How can the currency both be expected to appreciate and eventually be depreciated in the long-run?

Answer: It must initially jump above its LR equil. value. It must "overshoot".

# Dynamic Response to a Permanent $M^s \uparrow$



# Dynamic Responses to a Permanent $M^S \uparrow$




Money Supply increases permanently by $\frac{M_2 - M_1}{M_1}$ %.

Interest Rate initially falls, and then gradually returns to initial level

Exchange rate initially depreciates by more than its long-run amount. Eventually depreciates by same percentage amount as $M^S \uparrow$

Price level gradually rises by same % amount as money supply increase

$$\frac{P_2 - P_1}{P_1} = \frac{M_2 - M_1}{M_1}$$