Money growth and inflation

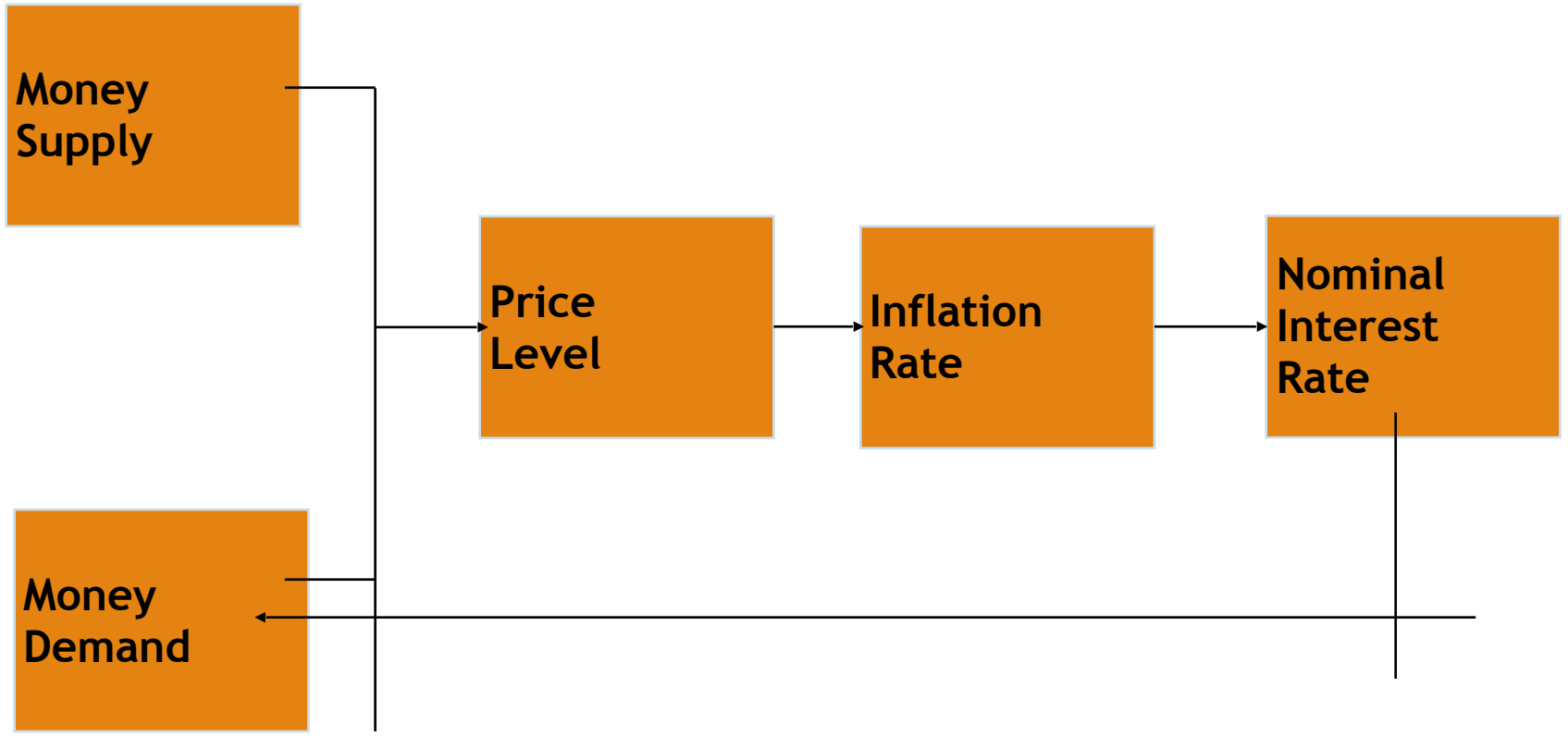
LECTURE: 9

What is inflation?

Today, if you want to buy an ice-cream cone, you need at least a couple of dollars, but that has not always been the case. In the 1930s, my grandmother ran a sweet shop, where she bought ice-cream cones in two sizes. A cone with a small scoop of ice cream cost three cents. Hungry customers could buy a large scoop for a nickel. You may not be surprised at the increase in the price of ice cream. In our economy, most prices tend to rise over time. This increase in the overall level of prices is called ***inflation***.

Hyperinflation is an extraordinarily high rate of inflation.

Linkage Among Money, Prices, and Interest Rates



The classical theory of inflation

When the overall price level rises, the value of money falls.

Suppose the price of a gallon of ice-cream is $5. Then, the value of a dollar—that is, its purchasing is 1/5 gallons of ice-cream.

In general, let P be the price level.
Specifically, P could be the Consumer Price Index or the GDP Deflator.

Then, $1/P$ is the value of money measured in units of goods and services

When the overall price level rises, the value of money falls

Money Supply, Money Demand, and Monetary Equilibrium

The **money supply** is a policy variable that is controlled by the Fed.

- Through instruments such as open-market operations, the Fed directly controls the quantity of money supplied.

Although **money demand** has several determinants, including interest rates, the most important factor is the average level of prices in the economy.

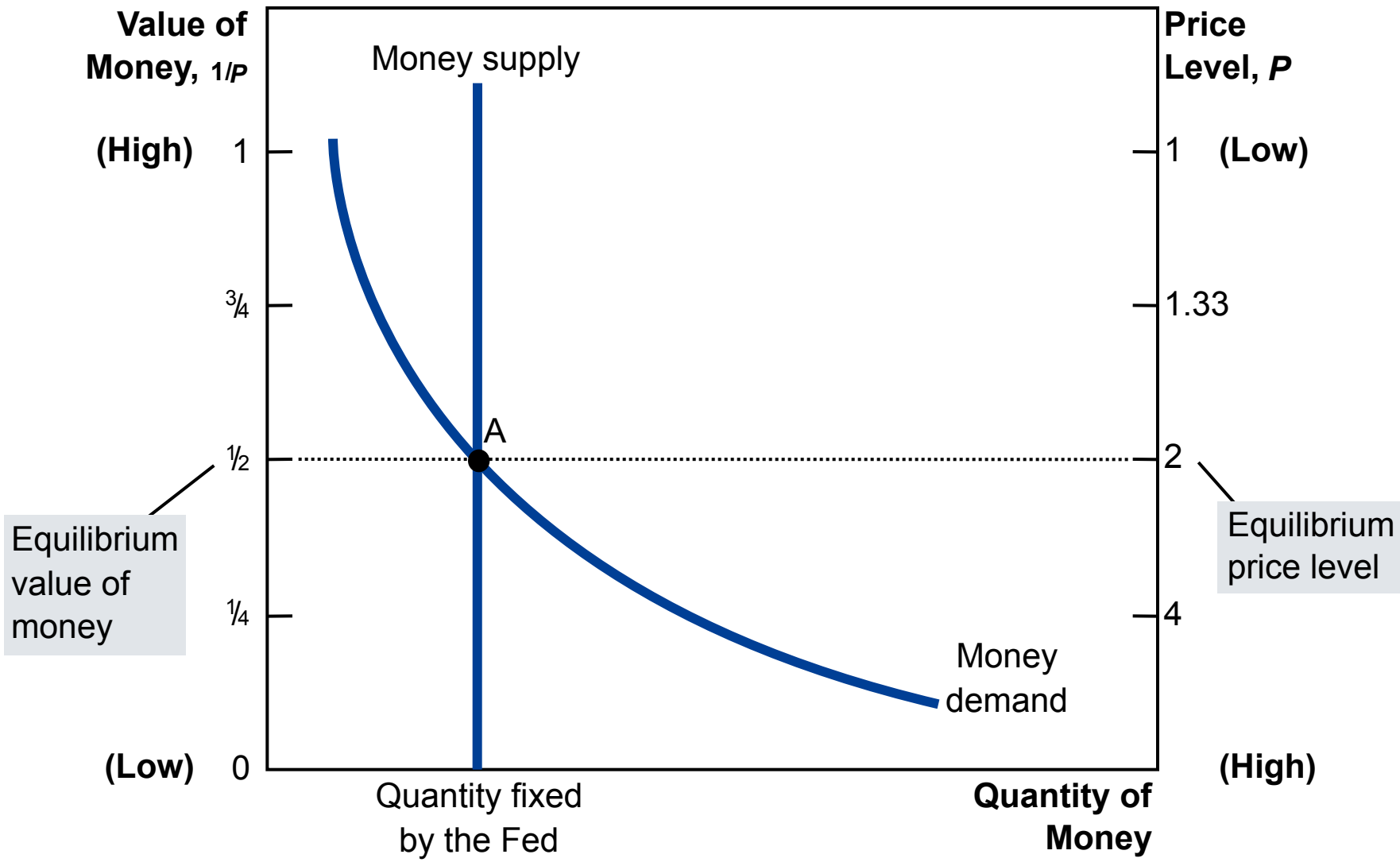
People hold money because it is the medium of exchange.

- The amount of money people choose to hold depends on the prices of goods and services.
- The higher prices are, the more money the typical transaction requires, and the more money people will choose to hold in their wallets and in their checking accounts.

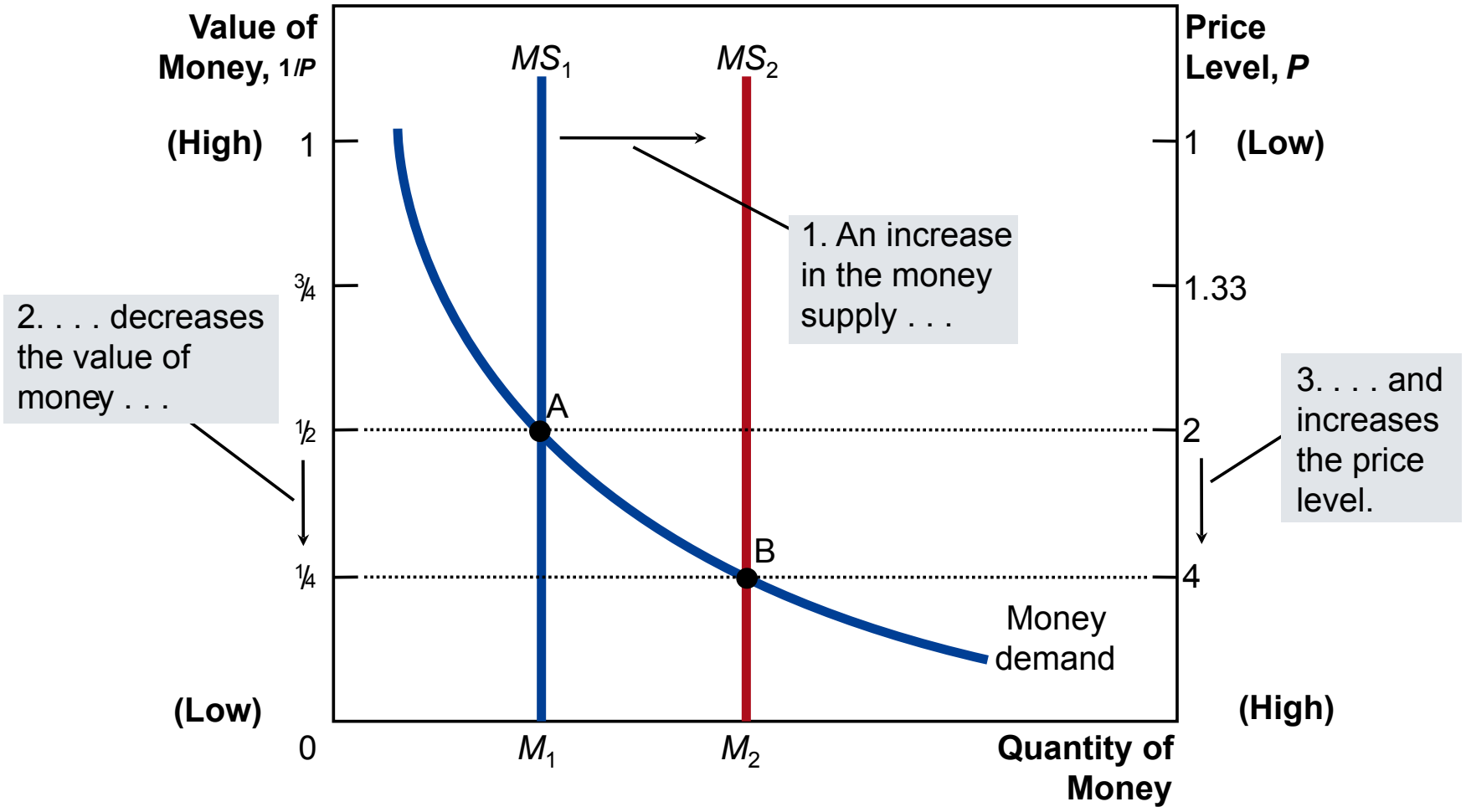
In the long run, the overall level of prices adjusts to the level at which the demand for money equals the supply.

This is **monetary equilibrium**.

Money Supply, Money Demand, and the Equilibrium Price Level



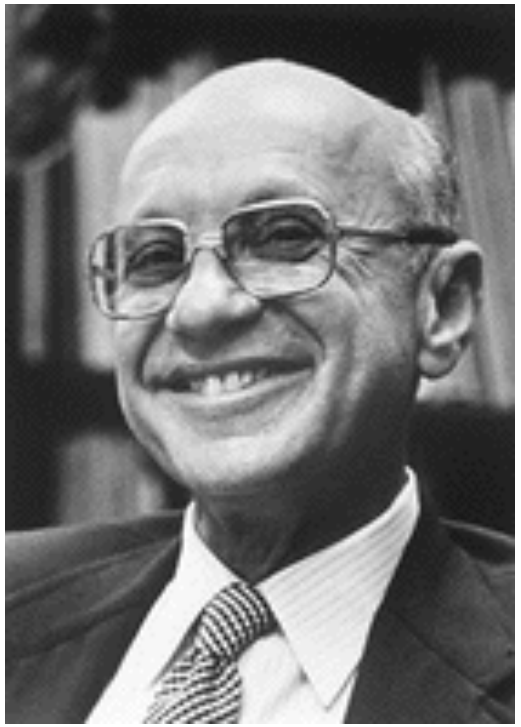
The Effects of Monetary Injection



The Quantity Theory of Money

"Inflation is always and everywhere a monetary phenomenon"

Milton Friedman (1912- 2006).



The Quantity Theory in 5 Steps

Start with quantity equation: $M \times V = P \times Y$

1. V is stable.

2. So, a change in M causes nominal GDP ($P \times Y$) to change by the same percentage.

3. A change in M does not affect Y:
money is neutral,
Y is determined by technology & resources

4. So, P changes by same percentage as $P \times Y$ and M.

5. Rapid money supply growth causes rapid inflation.

The Neutrality of Money

Monetary neutrality: the proposition that changes in the money supply do not affect real variables

Doubling money supply causes all nominal prices to double; what happens to relative prices?

Initially, relative price of cd in terms of pizza is

$$\frac{\text{price of cd}}{\text{price of pizza}} = \frac{\$15/\text{cd}}{\$10/\text{pizza}} = 1.5 \text{ pizzas per cd}$$

- After nominal prices double,

$$\frac{\text{price of cd}}{\text{price of pizza}} = \frac{\$30/\text{cd}}{\$20/\text{pizza}} = 1.5 \text{ pizzas per cd}$$

The relative price is unchanged.

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 formula:

$$V = \frac{P \times Y}{M}$$

The Velocity of Money

Velocity formula: $$V = \frac{P \times Y}{M}$$

Example with one good: pizza.
In 2008,

Y = real GDP = 3000 pizzas

P = price level = price of pizza = \$10

$P \times Y$ = nominal GDP = value of pizzas = \$30,000

M = money supply = \$10,000

V = velocity = \$30,000/\$10,000 = 3

The average dollar was used in 3 transactions.

CASE STUDY: Money and Prices during Four Hyperinflations

Hyperinflation is inflation that exceeds 50 percent per *month*.

Hyperinflation occurs in some countries because the government prints too much money to pay for its spending.

Money and Prices During Four Hyperinflations

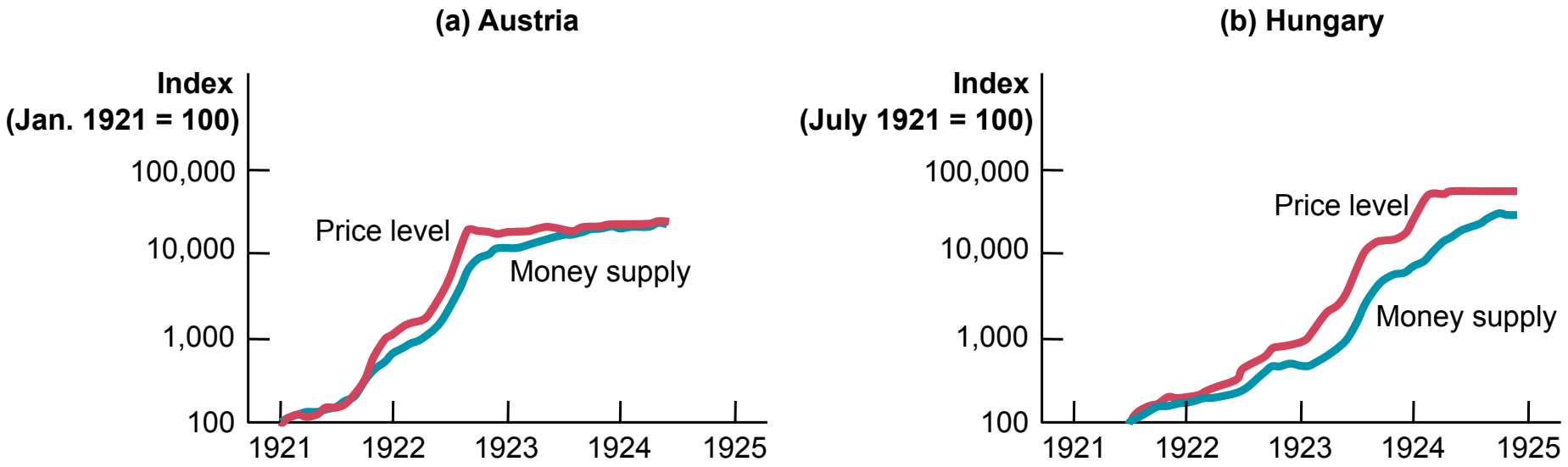
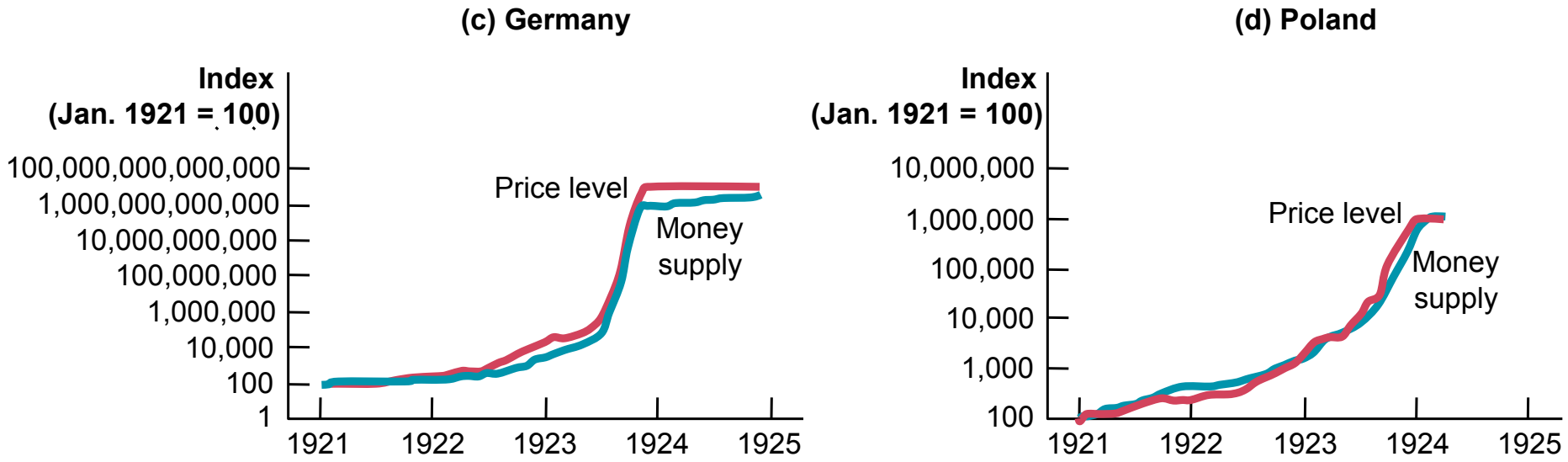


Figure 3 Money and Prices During Four Hyperinflations



The Inflation Tax

Why do governments print so much money?

- To pay for government spending when taxation is not an option.

When the government raises revenue by printing money, it is said to levy an *inflation tax*.

An inflation tax is like a tax on everyone who holds money.

The inflation ends when the government institutes fiscal reforms—such as cuts in government spending—that ends the need to print money

Hyperinflation in Zimbabwe

- During the 2000s, the Zimbabwe government was unable to cut spending enough or raise tax revenues enough to close its budget deficit
- And it could not borrow, as nobody would lend it money
- So, it printed money to cover its budget deficit
- The result was rampant inflation
- Before the hyperinflation began, the Zimbabwe dollar was worth a bit more than the US dollar
- In January 2008, however, the Reserve Bank of Zimbabwe, the central bank, issued a note worth 10 million Zimbabwe dollars, which was then equivalent to about four (4) US dollars
- A year later, a note worth 10 trillion Zimbabwe dollars, equivalent to three (3) US dollars, was issued

Hyperinflation in Zimbabwe

Hyperinflation in Zimbabwe

Sign in a restroom in South Africa

- Source: http://www.freakonomics.com/2008/12/18/freak-shots-when-money-goes-down-the-toilet/ which estimated that the cost of *one sheet* of toilet paper had reached 3,600 Zimbabwe dollars

The Fisher Effect

Real interest rate = nominal interest rate - inflation

Real interest rate + inflation = nominal interest rate

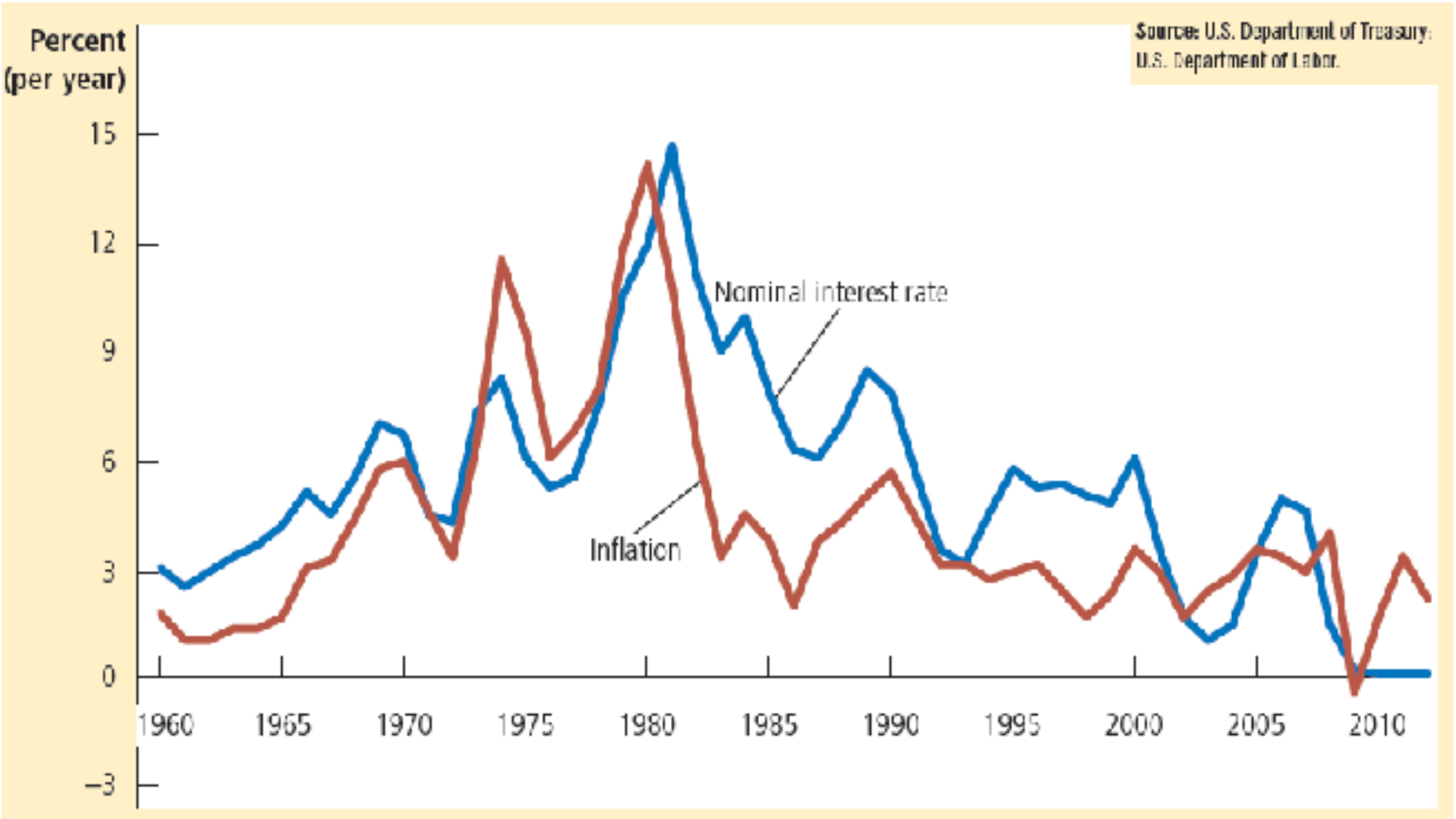
An increase in inflation is caused by an increase in money growth (This chapter)

An increase in money growth has no effect on the real interest rate, which is determined in the market for loanable funds.

Therefore, any change in inflation must be accompanied by an *equal* change in the nominal interest rate.

- This is called the *Fisher effect*, after economist Irving Fisher (1867 – 1947).

Figure 4: The Nominal Interest Rate and the Inflation Rate



A Special Cost of *Unexpected* Inflation: Arbitrary Redistribution of Wealth

When there's unexpected inflation, lenders lose and borrowers gain

When there's unexpected deflation, lenders gain and borrowers lose

These redistributions occur because many loans in the economy are specified in terms of the unit of account—money.

Unexpected inflation redistributes wealth among the population in a way that has nothing to do with either merit or need.

If Inflation is Bad, is Deflation Good?

Deflation is negative inflation (or falling prices)

The following costs of inflation, are also true for deflation:

- Menu costs
- Relative-price variability and the misallocation of resources
- Confusion and inconvenience
- Arbitrary redistributions of wealth (unexpected deflation)

If Inflation is Bad, is Deflation Good?

Recall that nominal interest rate = real interest rate + inflation

The Friedman Rule argues that, to keep shoeleather costs low, we should set nominal interest rate = 0.

- Therefore, real interest rate + inflation = 0.
- Therefore, inflation = – real interest rate < 0

This applies in the long run. In the short-run, deflation may be the symptom of a sick economy

Who wins and who loses with unexpected inflation??

Inflation benefits borrowers who borrow at fixed rates.

Borrowers PAY the nominal rate, but pay off the loan in "cheaper" dollars in the future.

Example: Borrow at nominal 6%, inflation = 10%, the borrowers effective real rate = -4%

Inflation hurts lenders if they lend at lower interest rates and then get paid off in money that has lost its value.

Example: LEND at nominal 6%, inflation = 10%, the lenders effective real rate of return = -4%!!

So, if you think inflation will increase where do you want to store your wealth ?

- In your piggy bank?
  - NO
- In gold or silver?
  - YES
- In corn, wheat or other agricultural futures?
  - YES
- In real estate?
  - YES, but be careful
- In Stocks?
  - Think about it… What does stock ownership represent?
  - How about stocks of oil companies??
- In Bonds?
  - Definitely not long-term at fixed rates!
- In a New Car?
  - Sure
- In artwork or other collectibles?
  - O.K.

What Lessons Can be Learned by all this?

If you expect inflation to be higher you don't want to hold money, because it will lose value.

You want to have your money in assets that will increase if prices of everything goes higher.

Like what?

- Mineral Resources, like oil, copper, gold, silver
- Real Estate
- Commodities like farm products (rice, corn, wheat, soybeans)
- Stocks of companies with good products

Does Inflation Hurt Everybody?

No.
Workers often will get paid more money to compensate for inflation.

If workers wages increase at the same rate as inflation there is no loss to them

What about your savings?
Your savings lose value if they don't earn a rate of interest that matches inflation.

CONCLUSION

The overall level of prices in an economy adjusts to bring money supply and money demand into balance.

When the central bank increases the supply of money, it causes the price level to rise.

Persistent growth in the quantity of money supplied leads to continuing inflation.

The principle of money neutrality asserts that changes in the quantity of money influence nominal variables but not real variables.

A government can pay for its spending simply by printing more money.

This can result in an “inflation tax” and hyperinflation.

According to the Fisher effect, when the inflation rate rises, the nominal interest rate rises by the same amount, and the real interest rate stays the same.

Many people think that inflation makes them poorer because it raises the cost of what they buy.

This view is a fallacy because inflation also raises nominal incomes.

When banks loan out their deposits, they increase the quantity of money in the economy.

THANKS FOR YOUR ATTENTION!