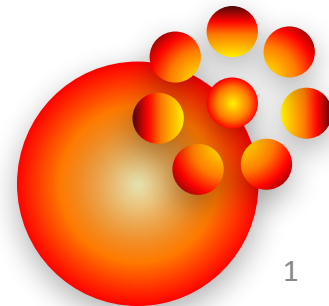Prepared by:

Dr. P.Sh. Sagandykova

MACROECONOMICS

LECTURE 5

INFLATION:
ITS CAUSES, EFFECTS, AND SOCIAL COSTS

Outline

*Lenin is said to have declared that the best way to destroy the Capitalist System was to **debauch** the currency . . . Lenin was certainly right.*
— John Maynard Keynes

5-1 The Quantity Theory of Money
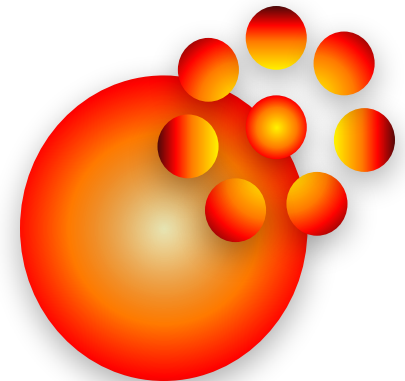
5-2 Seigniorage: The Revenue From Printing Money

5-3 Inflation and Interest Rates

5-4 The Nominal Interest Rate and the Demand for Money

5-5 The Social Costs of Inflation

5-6 Hyperinflation

5-7 Conclusion: The Classical Dichotomy

5-1 The Quantity Theory of Money

- Overall increase in prices is called **inflation.**
- **The rate of inflation** - the percentage change in the overall level of prices - varies greatly over time and across countries.

Hyperinflation:

A classic example is Germany in 1923, when

prices increased an average of 500 percent *per month.*

- **The revenue that governments can raise by printing money, called the inflation tax.**

- **Money** is the stock of assets that can be readily used to make transactions.
  - Roughly speaking, the $s in the hands of the public make up the nation's stock of money.

5-1 The Quantity Theory of Money

- **Money * Velocity = Price * Transactions**

- *M * V = P * T.*

- *T* is the number of **times** in a <u>**year**</u> that G&S services are exchanged for money.

- *P* is the number of *$s* exchanged.

- *PT* is the number of *$s* exchanged in a year.

- *MV* - the money used to make the transactions.

- *M* is the quantity of money.

- *V,* called the **transactions velocity** of money, measures the rate at which money circulates in the economy.
  - The number of times a $ bill changes hands in a given period of time.

5-1 The Quantity Theory of Money

- **For example**,

- *T = 60 loaves per year, and P = $0.50 per loaf.*

  - *The* total number of $ s exchanged is
    PT = $0.50/loaf * 60 loaves/year = $30/year.

- the quantity of **M**oney in the economy is $10.

  - *V = PT/M = ($30/year)/($10) = 3 times per year.*

5-1 The Quantity Theory of Money

Money * Velocity = Price * Output

*M * V = P * Y.*

- *Y* is *real GDP*;

- *P, the GDP deflator;*

- *PY, nominal GDP.*

- Because *Y is also total income,*

- *V in this version of the quantity equation is called*

  the **income** velocity of money.

  It tells us

  the **number of times**

  a $ bill

  enters someone's income

  in a given period of time.

- This version of the quantity equation is the most common.

5-1 The Quantity Theory of Money

▷ *M/P,* is called **real money balances.** $M * V = P * Y.$

For example,

- economy that produces only bread.
- If the **M** is $10, the **P** of a loaf is $0.50, then
- **real money balances** are 20 loaves of bread

➢ A **money demand function** is an equation that shows the determinants **o**f the quantity of real money balances people wish to hold.

$$(M/P)^d = kY,$$

- **k** is a constant that tells us
- **how much money people want to hold for every dollar of income**

➢ DEMAND for (*M/P*)d **must equal** the SUPPLY *M/P.*

→ **M/P = kY** → **M(1/k) = PY** → **MV = PY**, where *V = 1/k.*

- **When people want to hold**
  - a lot of M (*k is large),* (**V** *is small).*
  - a little M (*k is small), (V is large).*

5-1 The Quantity Theory of Money

➤ Yet if we make the additional assumption

that the velocity of money is constant,

then the quantity equation becomes a useful theory

about the effects of money, called the

quantity theory of money.

➤ The quantity equation can be seen as a theory of **what determines nominal GDP**.

$$M \bar{V} = P\,Y,$$

➤ => change in the quantity of money (M) must cause a proportionate change in nominal GDP (PY).

➤ That is, if velocity is fixed, the **quantity of money determines the dollar value of the economy's output**.
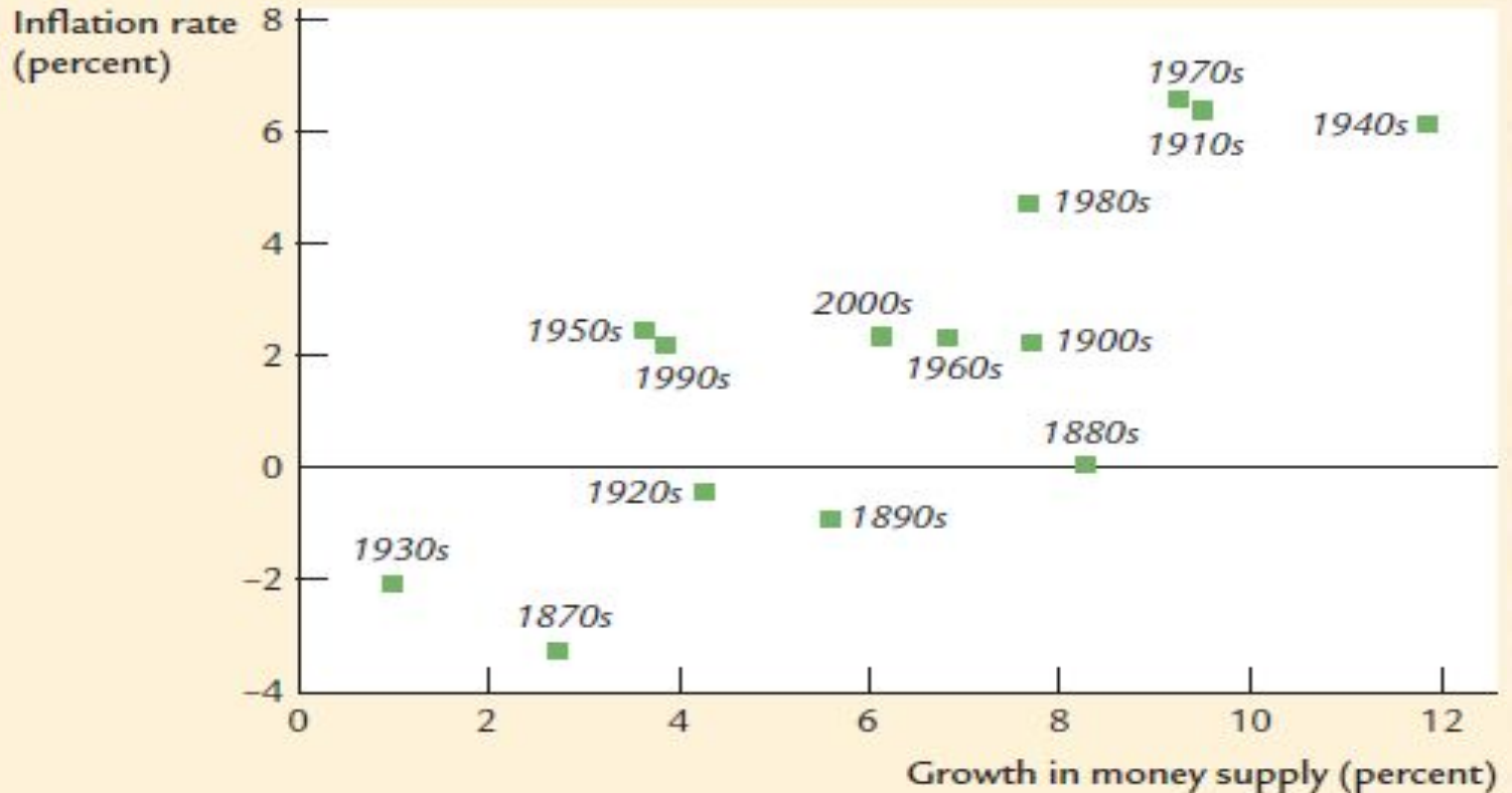
5-1 The Quantity Theory of Money

% Change in *M* + % Change in *V* = % Change in *P* + % Change in Y.

1. **% Change in *M*** *is under the control of the CB.*

2. ***% Change in V*** *reflects shifts in M demand;* V is constant, so ***% Change in V = 0***.

3. ***% Change in P*** *is the rate of inflation; this is the variable* that we would like to explain.

4. ***% Change in Y*** *~on growth in the factors of production and on technological* progress.

    1. **This analysis tells us that the growth in the M supply determines the rate of inflation**.

☐ *Thus**, the quantity theory of money states** that the CB, which controls the M supply, has ultimate control over the rate of inflation.*

  • *If the CB keeps the M supply stable, the price level will be stable.*

  • *If the CB increases the M supply rapidly, the price level will rise rapidly.*

Inflation and Money Growth

FIGURE 5-1

Historical Data on U.S. Inflation and Money Growth In this scatterplot of money growth and inflation, each point represents a decade. The horizontal axis shows the average growth in the money supply (as measured by M2) over the decade, and the vertical axis shows the average rate of inflation (as measured by the GDP deflator). The positive correlation between money growth and inflation is evidence for the quantity theory's prediction that high money growth leads to high inflation.

Inflation and Money Growth

FIGURE 5-2
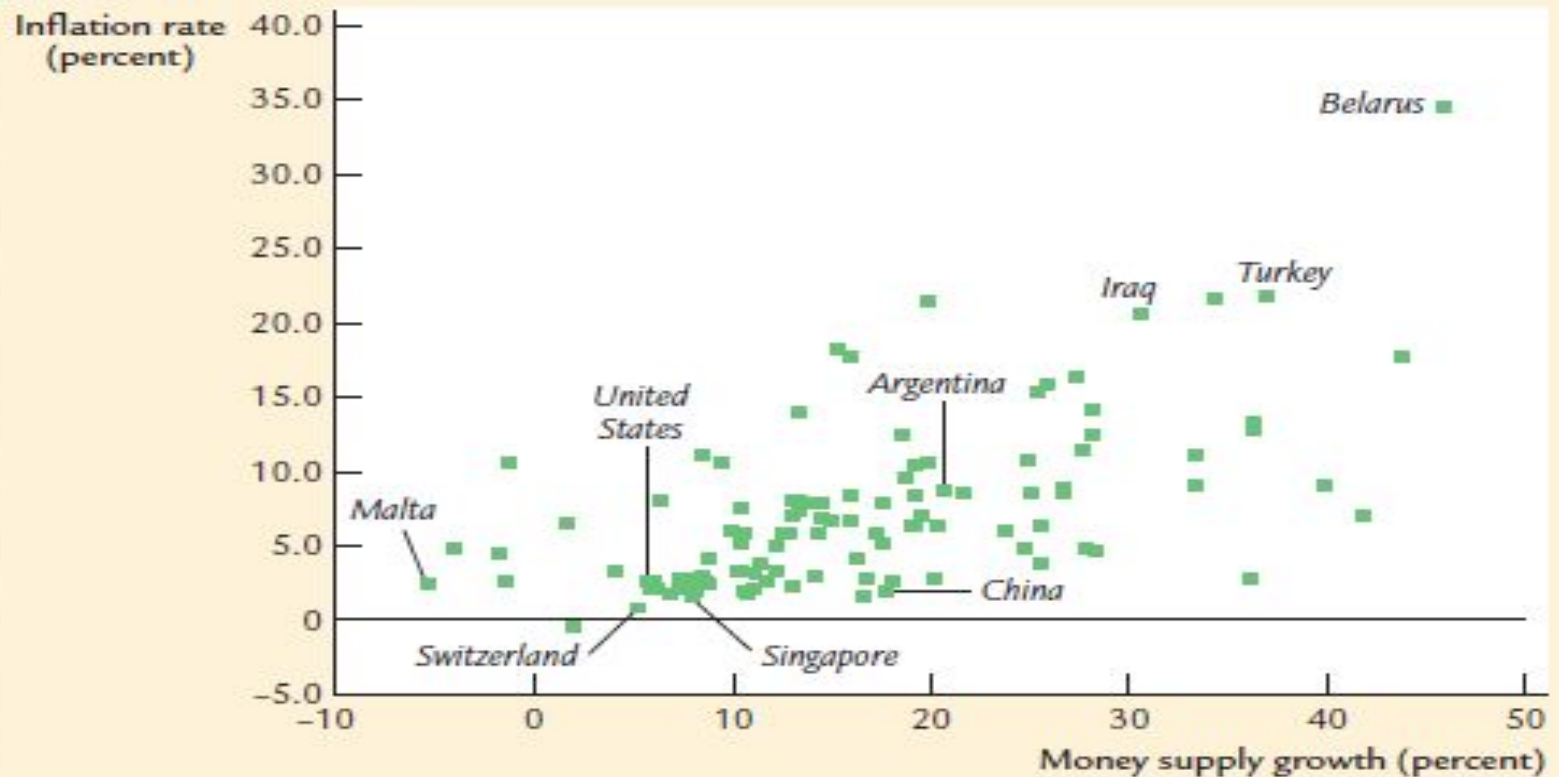
International Data on Inflation and Money Growth
In this scatterplot, each point represents a country. The horizontal axis shows the average growth in the money supply (as measured by currency plus demand deposits) during the period 2000 to 2010, and the vertical axis shows the average rate of inflation (as measured by the CPI). Once again, the positive correlation is evidence for the quantity theory's prediction that high money growth leads to high inflation.

5-2 Seigniorage: The Revenue From Printing Money

1. The revenue raised by the printing of money is called **SEIGNIORAGE**.

2. Today this right belongs to the **central government,** and it is one source of revenue.

3. When the government prints money to finance expenditure, **it increases the money supply.**

4. The increase in the money supply, in turn, **causes inflation.**

5. Printing money to raise revenue is like imposing **an inflation tax.**

   a. when the government prints new money for its use, it makes the old money in the hands of the public less valuable.

6. In the United States, the amount has been small: seigniorage has usually accounted for less **than 3** % of government revenue.

Paying for the American Revolution

- Although seigniorage has not been a major source of revenue for the U.S. Government in recent history, the situation was very different two centuries ago.

- Beginning in 1775, the Continental Congress needed to find **a way to finance the Revolution,** but it had limited ability to raise revenue through taxation.

- It therefore relied on the printing **of fiat money** to help pay for the war.

- When the new nation won its independence, there was a natural skepticism about fiat money.

- Congress passed the Mint Act of 1792, which established **gold and silver** as the basis for a new system of commodity money.

5-3 Inflation and Interest Rates

- The interest rate that the **bank pays** is called the **nominal interest rate,**

- and the i**ncrease in your purchasing power** is called the **real interest rate.**

- If

- *i* denotes the nominal interest rate,

- *r* the real interest rate, and

- π the rate of inflation,

- then the relationship among these three variables can be written as

- $r = i - \pi$.

☐ Rearranging terms in our equation for the *r* , we can show that the *i* is the sum of the *r* and the inflation rate π :

$$i = r + \pi.$$

➢ The equation written in this way is called the **Fisher equation, after economist** Irving Fisher (1867–1947).

1. According to the *quantity theory,*
   - an increase in **the rate of money growth** of 1 percent causes
   - a 1 percent increase in **the rate of inflation.**
2. According to the *Fisher equation,*
   - a 1 percent increase **in the rate of inflation** in turn causes
   - a 1 percent increase in **the nominal interest rate.**

➢ **The one-for-one relation between the** <u>inflation rate</u> **and the** <u>nominal interest rate</u> **is called the Fisher effect.**

$$1\% \ \pi \ \uparrow \ => \ 1\% \ i \ \uparrow$$

Inflation and Nominal Interest Rates

FIGURE 5-3
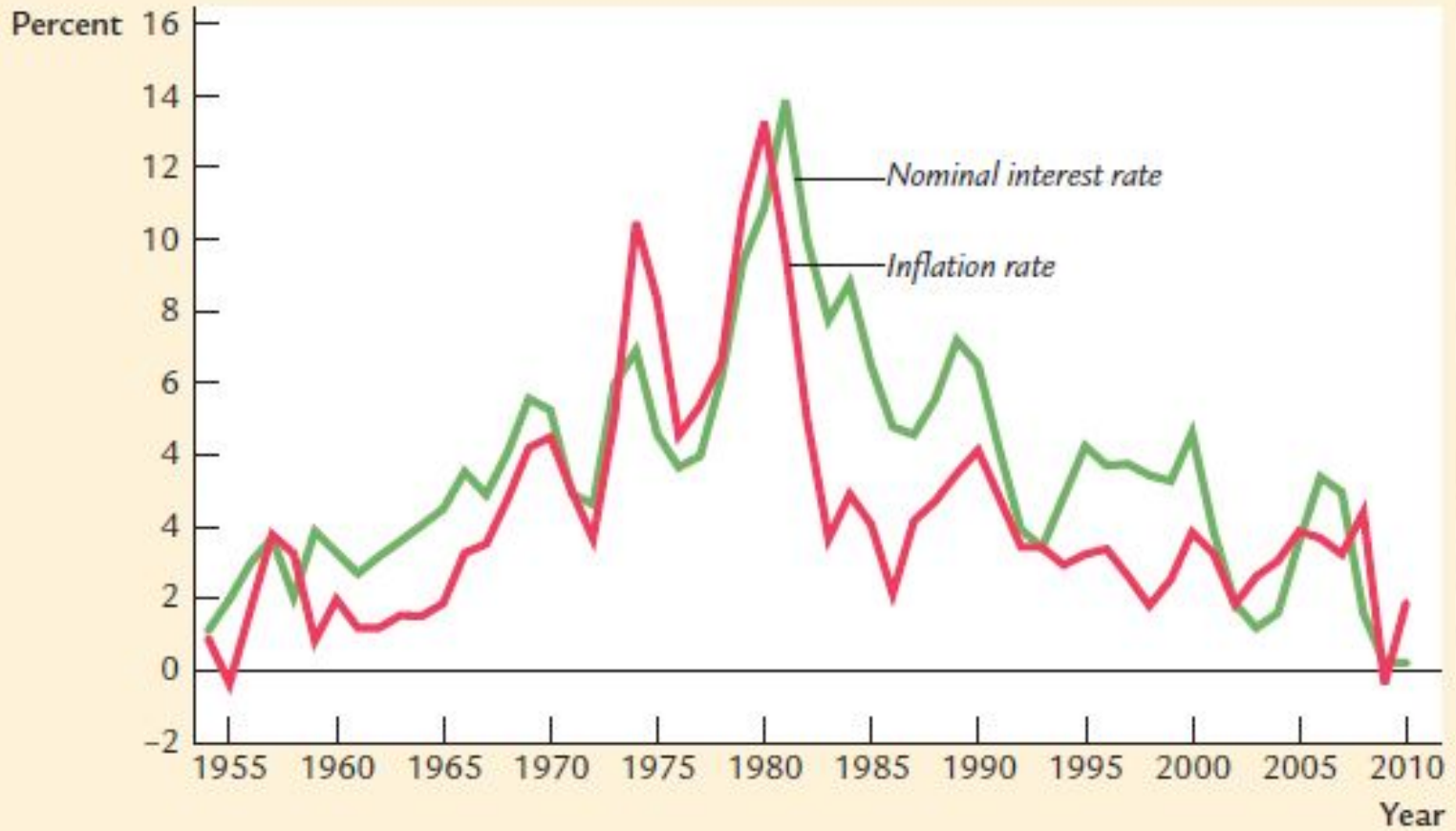
Inflation and Nominal Interest Rates Over Time This figure plots the nominal interest rate (on three-month Treasury bills) and the inflation rate (as measured by the CPI) in the United States since 1954. It shows the Fisher effect: higher inflation leads to a higher nominal interest rate.

Case Study

Inflation and Nominal Interest Rates

FIGURE 5-4
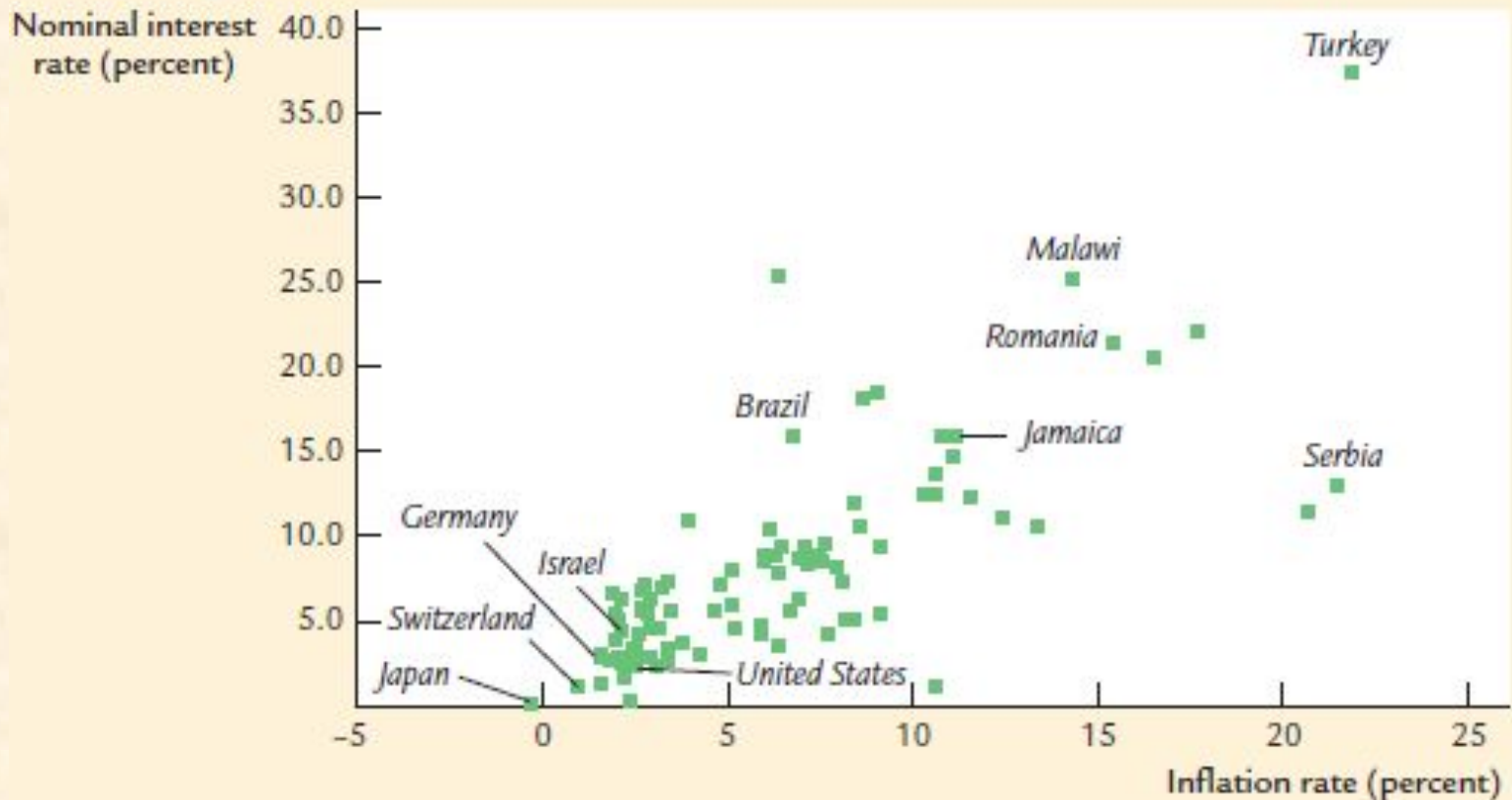
Inflation and Nominal Interest Rates Across Countries
This scatterplot shows the average nominal interest rate on short-term Treasury bills and the average inflation rate in almost 100 countries during the period 2000 to 2010. The positive correlation between the inflation rate and the nominal interest rate is evidence for the Fisher effect.

5-3 Inflation and Interest Rates

1. The *r* that the borrower and lender **expect** when the loan is made, called the **ex ante r** ,

2. the *r* that is **actually realized,** called the **ex post r** .

☐ Let denote **actual future inflation π** and ***Eπ* the expectation of future inflation***.*

The ex ante r   is i – Eπ,

the ex post r   is i –π .

❑ **How does this distinction between actual and expected inflation modify the Fisher effect?**

▯ ***The   i* cannot adjust to actual inflation, because**

actual inflation is not known when the   i is set.

▯ **The *i* can adjust only to expected inflation**.

The Fisher effect is more precisely written **as *i = r + Eπ :***

• The ***ex ante r*** is determined **by equilibrium in the market for G&S.**

• The   *i* moves one-for-one with changes in expected inflation *E.*

18

Nominal Interest Rates in the Nineteenth Century

- Although recent data show a positive relationship between nominal interest rates and inflation rates, this finding is not universal.

- In data from the late nineteenth and early twentieth centuries, high nominal interest rates did not accompany high inflation.

- The apparent absence of any Fisher effect during this time puzzled Irving Fisher.

  - He suggested that inflation "caught merchants napping."

Case Study

5-4 The Nominal Interest Rate and the Demand for Money

The Cost of Holding Money
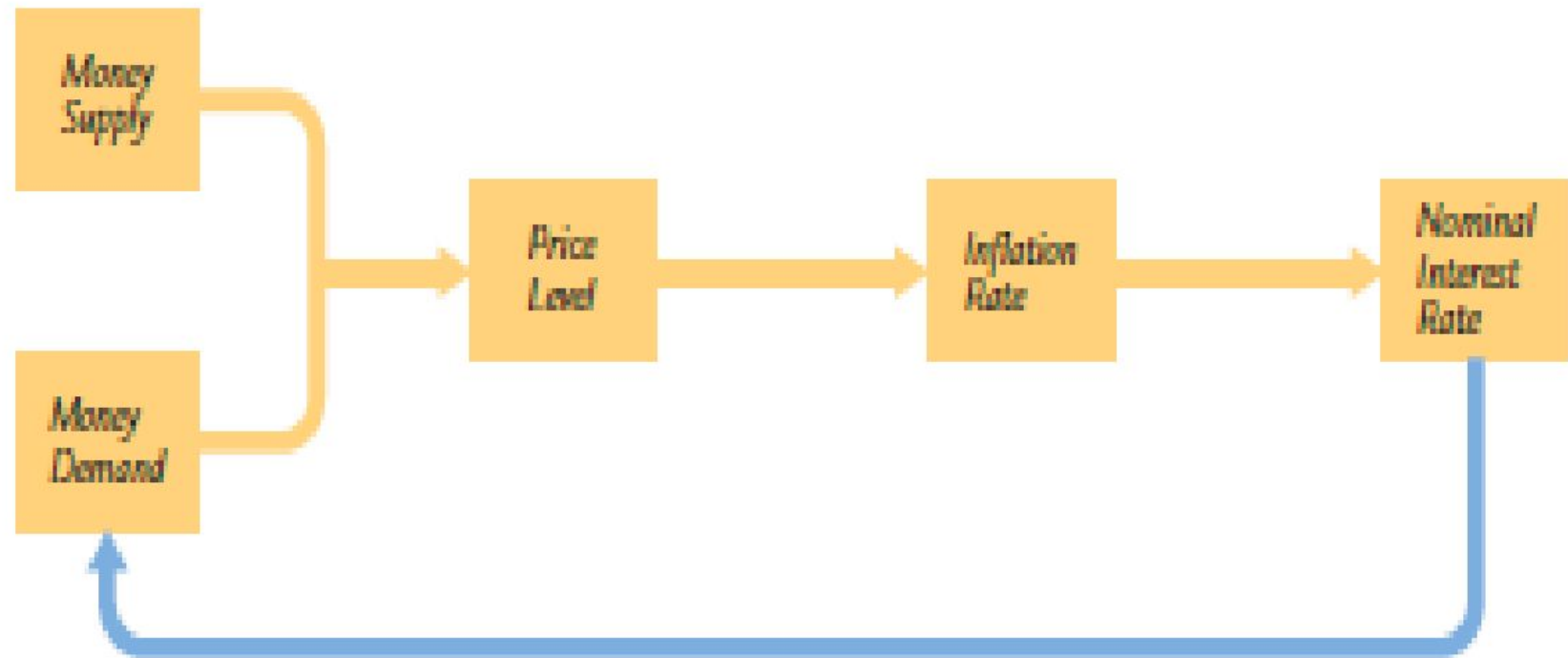
Future Money and Current Prices

- ☐ **The money you hold in your wallet does not earn interest.**

- ☐ If you deposited it in a savings account, you would earn the nominal interest rate.

- ☐ Therefore, **the nominal interest rate is the opportunity cost of holding money**.

- ☐ You will or you will not.

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

- ☐ The letter *L* is used to denote **money demand** because money is the economy's most *L*iquid asset.

- ☐ This equation states that **the demand for the liquidity of real money balances** is a function of income and the nominal interest rate.
  1. **The higher the level** of income *Y*, **the greater the demand** for real money balances.
  2. **The higher the nominal** interest rate *i*, **the lower the demand** for real money balances.

5-4 The Nominal Interest Rate and the Demand for Money

The Cost of Holding Money

Future Money and Current Prices

FIGURE **5-5**

The Linkages Among Money, Prices, and Interest Rates This figure illustrates the relationships among money, prices, and interest rates. Money supply and money demand determine the price level. Changes in the price level determine the inflation rate. The inflation rate influences the nominal interest rate. Because the nominal interest rate is the cost of holding money, it may affect money demand. This last link (shown as a blue line) is omitted from the basic quantity theory of money.

The Cost of Holding Money

Future Money and Current Prices

- Consider how the introduction of this last link affects our theory of the price level.
- First, equate the supply of real money balances M/P to the demand $L(i, Y)$:

2. $M/P = L(i, Y)$.

- Next, use the Fisher equation to write the nominal interest rate as the sum of the real interest rate and expected inflation:

3. $M/P = L(r + \text{E}\pi, Y)$.

- This equation states that the level of real money balances depends on the expected rate of inflation.

☐ **$P \sim M$, if i and Y constant**

☐ If i = r+ **Eπ, Eπ** $\sim$ on **M**

☐ **Expectations of higher money growth in the future lead to a higher price level today.**

5-5 The Social Costs of Inflation

- **If you ask the average person why inflation is a social problem, he will probably answer that inflation makes him poorer.**

- **"Each year my boss gives me a raise, but prices go up and that takes some of my raise away from me."**

- **The implicit assumption in this statement is that if there were no inflation, he would get the same raise and be able to buy more goods.**

- To the surprise of many **laymen**,

some economists argue that the **costs of inflation are small.**

What Economists and the Public Say About Inflation

- As we have been discussing, laymen and economists hold very different views about the costs of inflation. In 1996, economist Robert Shiller documented this difference of opinion in a survey of the two groups.

- The survey results are striking, for they show how the study of economics changes a person's attitudes.

- In one question, Shiller asked people whether their "biggest gripe about inflation" was that "inflation hurts my real buying power, it makes me poorer."

- **Of the general public, 77 percent agreed with this statement, compared to only 12 percent of economists.**

5-5 The Social Costs of Inflation

Suppose that every month the price level rose by 1 percent. What would be the social costs of such a steady and predictable 12 percent annual inflation?

1. One cost is the distorting effect of the inflation tax on the amount of money people hold. &50+&50 instead &100. **Shoe leather cost**

2. A second cost of inflation arises because high inflation induces firms to change their posted prices more often. **Menu costs**

3. A third cost of inflation arises because firms facing menu costs change prices infrequently; therefore, the higher the rate of inflation, the greater the variability in relative prices.

4. A fourth cost of inflation results from the **tax laws**. Many provisions of the tax code do not take into account the effects of inflation.

    Examp.: 2015 =$100 i=12%, 2016=$112, $12 –is not Profit for tax

5. A fifth cost of inflation is the inconvenience of living in a world with a **changing price level.**

    • the dollar is a less useful measure when its value is always changing.

☐ ☐ ☐ ☐

5-5 The Social Costs of Inflation

- ☐ Unexpected inflation arbitrarily redistributes wealth among individuals.

  - • You can see how this works by examining **long-term loans**.

- ☐ On the one hand, **if inflation turns out to be higher than expected, the debtor wins and the creditor loses** because the debtor repays the loan with less valuable dollars.

- ☐ On the other hand, **if inflation turns out to be lower than expected, the creditor wins and the debtor loses** because the repayment is worth more than the two parties anticipated.

- ☐ Unanticipated inflation also hurts individuals on **fixed pensions**.

- ☐ The unpredictability caused by highly variable inflation hurts almost everyone.

- ☐ A Widely documented but little understood fact: high inflation is variable inflation

The Free Silver Movement, the Election of 1896, and The Wizard of Oz

- The redistributions of wealth caused by unexpected changes in the price level are often a source of political turmoil, as evidenced by the Free Silver movement in the late nineteenth century.

- From 1880 to 1896 the price level in the United States fell 23 percent.

- This deflation was good for creditors, primarily the bankers of the Northeast, but it was bad for debtors, primarily the farmers of the South and West.

- One proposed solution to this problem was to replace the gold standard with a bimetallic standard, under which both gold and silver could be minted into coin.

- The move to a bimetallic standard would increase the money supply and stop the deflation.

Case Study

5-5 The Social Costs of Inflation

☐ So far, we have discussed the many costs of inflation. These costs lead many economists to conclude that monetary policymakers should aim for zero inflation.

☐ Yet there is another side to the story. Some economists believe that a little bit of inflation—say, 2 or 3 percent per year—can be a good thing.

☐ **Without inflation, the real wage will be stuck above the equilibrium level, resulting in higher unemployment.**

☐ An inflation rate of 2 percent lets real wages fall by 2 percent per year, or 20 percent per decade, without cuts in nominal wages.

☐ Such automatic reductions in real wages are impossible with zero inflation.

5-6 Hyperinflation

☐ Hyperinflation is often defined as inflation that exceeds **50** percent per month, which is just over 1 percent per day.

☐ Compounded over many months, this rate of inflation leads to very large increases in the price level. An inflation rate of 50 percent per month implies a more than 100-fold increase in the price level over a year.

1. The **shoe leather costs** associated with **reduced money holding**, are serious under hyperinflation.

2. **Menu costs** also become larger under hyperinflation.

3. **Relative Prices** do not do a good job of reflecting true scarcity during hyperinflations.

4. **Tax systems** are also distorted by hyperinflation

☐ **The government** tries to overcome this problem by adding more and more zeros to the paper currency.

☐ **Money loses its role as a store of value, unit of account, and medium of exchange. Barter becomes more common.**

5-6 Hyperinflation

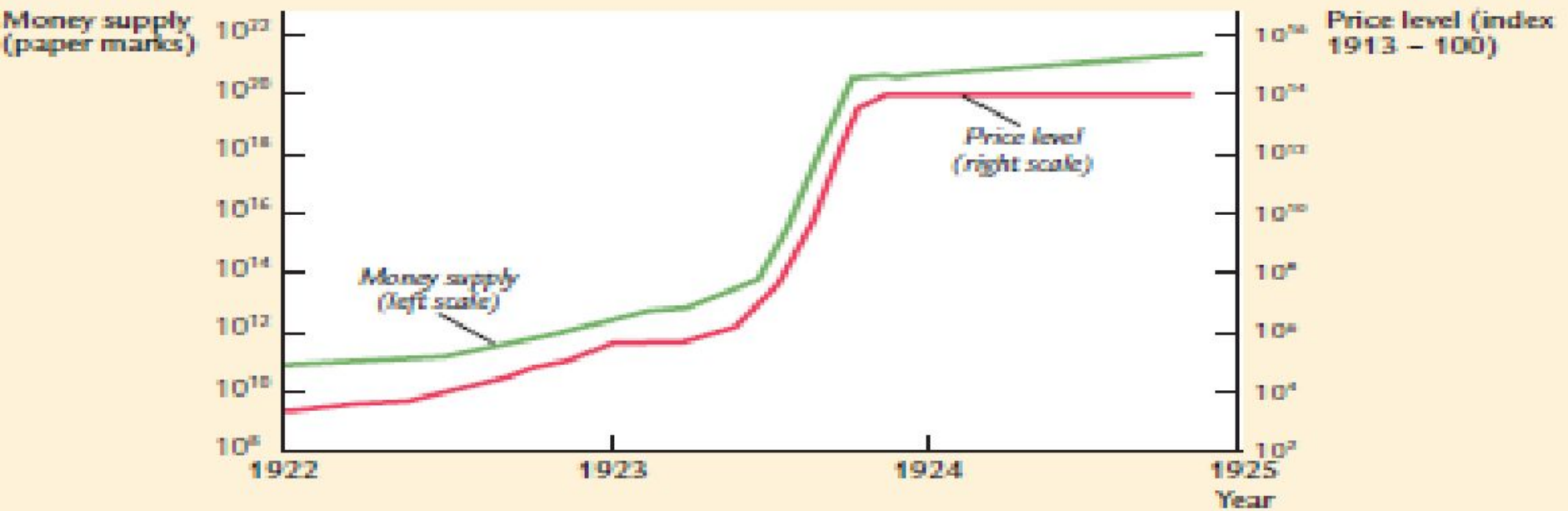The Costs of Hyperinflation

The Causes of Hyperinflation

☐ The start of hyperinflations is **monetary issue**

☐ The end is **fiscal** phenomenon.

☐ Hyperinflations are due to excessive growth in the supply of money.

☐ When the central bank prints money, the price level rises.

☐ To stop the hyperinflation, the central bank **must reduce the rate of money growth.**

☐ Most hyperinflations **begin** when the government has inadequate tax revenue to pay for its spending.

☐ The **ends of hyperinfl**ations almost always coincide with fiscal reforms:

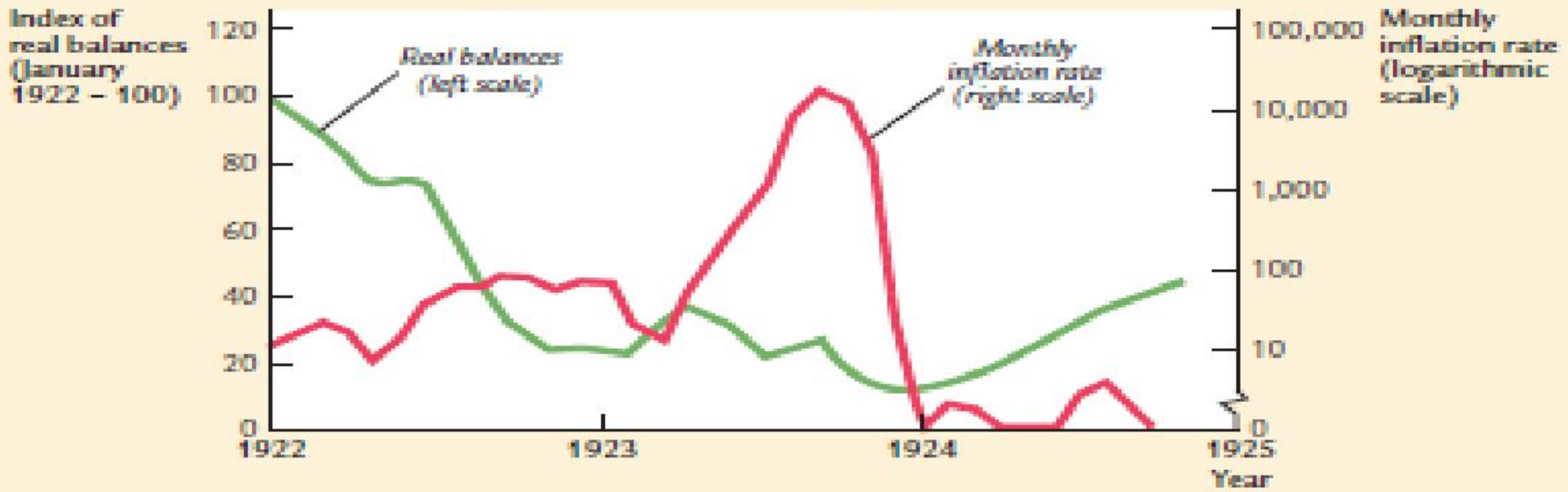- Gnt must to **reduce government spending and increase taxes**.

FIGURE 5-6

Hyperinflation in Interwar Germany

(a) Money and Prices

Money supply (paper marks)

Price level (index 1913 – 100)

Price level (right scale)

Money supply (left scale)

(b) Inflation and Real Money Balances

Index of real balances (January 1922 – 100)

Monthly inflation rate (logarithmic scale)

Real balances (left scale)

Monthly inflation rate (right scale)

Hyperinflation in Zimbabwe

☐ In 1980, after years of colonial rule, the old British colony of Rhodesia became the new African nation of Zimbabwe.

☐ In2009 The decline in the economy's output led to a fall in the government's tax revenue.

☐ The government responded to this revenue shortfall by printing money to pay the salaries of government employees. As textbook economic theory predicts, the monetary expansion led to higher inflation.

☐ In July 2008, the officially reported inflation rate was 231 million percent.

☐ The Zimbabwe hyperinflation finally ended in March 2009, when the government abandoned its own money. The U.S. dollar became the nation's official currency. Inflation quickly stabilized.

5-7 Conclusion: The Classical Dichotomy

1. All variables measured in physical units, such as quantities and relative prices, are called **real variables**.

2. In this chapter we examined **nominal variables** — variables expressed in terms of money.

3. Economists call this theoretical separation of real and nominal variables the **classical dichotomy.**

4. The classical dichotomy arises because, in classical economic theory,

   - *changes in the money supply do not influence real variables.*

5. This irrelevance of money for real variables is called **monetary neutrality.**

THANKS !