

Inflation

— Week 5 —

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Summary

- 1 Inflation
- 2 The Quantity Theory of Money
- 3 Real and Nominal Interest Rates
- 4 Costs of Inflation
- 5 The Fiscal Causes of High Inflation
- 6 The Great Inflation of the 1970s
- 7 Required reading

I – Inflation

What is inflation?

- 1 The percentage change in an economy's overall price level

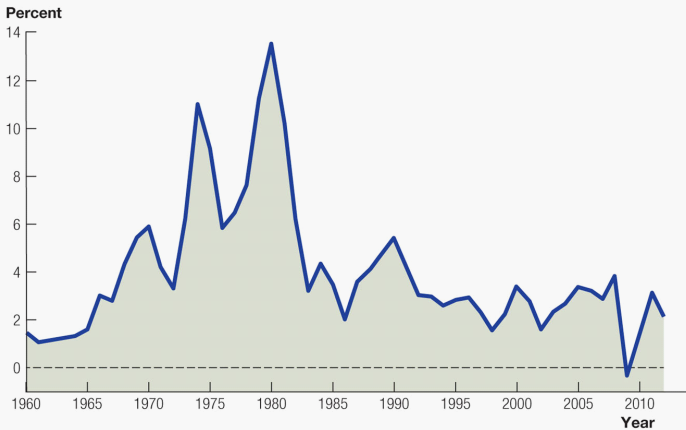
$$\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

- 2 Hyperinflation: an episode of extremely high inflation
 - 1 Greater than 500 percent per year
 - 2 Example: Post World War I Germany

Inflation in the US

FIGURE 8.1

The Inflation Rate in the United States, 1960–2012



CPI for the US

TABLE 8.1

The Consumer Price Index, 1900–2012 (2012 = 100)

Year	CPI	Year	CPI
1900	3.56	1980	36.00
1930	7.30	1990	57.11
1950	10.52	2000	75.25
1960	12.94	2005	85.34
1970	16.97	2012	100.00

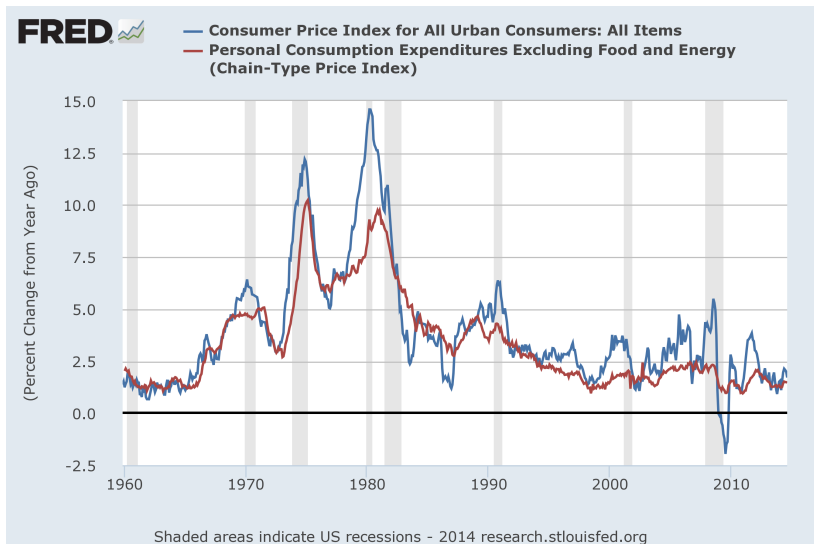
How Much Is That?

- 1 In 1950, a gallon of gasoline cost 27 cents, while in 2012 it cost around \$4 in the US and even more in Europe. How do we compare these numbers? Was 27 cents in 1950 worth more or less than \$4 in 2012?
- 2 We can use the CPI to evaluate the value of a good in 1950 in today's dollars.
- 3 Multiply the price of the good in 1950 times the ratio of the CPI in today's dollars to the CPI in 1950 dollars.

$$x = \frac{\$0.27 \times 100}{10.52} = \$2.57$$

- 4 Answer: the price of gasoline increased more than the price of average consumption goods

Headline inflation vs Core inflation



II – The Quantity Theory of Money

Money ...

- 1 Historically: money was backed by gold or silver
- 2 Not now anymore
- 3 Currency is “fiat money.”
- 4 Money has value because we expect others will value it.

Measures of the Money Supply

1 Monetary base (MB)

$$MB = C + \text{Reserves}$$

- 1 (C) currency in circulation outside the monetary sector
- 2 ($Reserves$): bank reserves deposited (or accounts) in the Central bank by commercial banks

2 M1

$$M1 = C + \text{demand deposits}$$

3 M2

$$M2 = M1 + \text{savings accounts} + \text{money market accounts}$$

Monetary aggregates in the US

TABLE 8.2

Different Measures of the Money Supply in January 2013 (billions of dollars)

C	Currency
MB	Monetary base = currency plus reserves
M1	Currency plus demand deposits (e.g., checking accounts)
M2	M1 plus savings deposits and individual money market accounts

The Quantity Equation

- 1 The quantity theory of money allows us to make the connection between money supply and inflation.

$$M_t V_t = P_t Y_t$$

Money supply Velocity of money Price level Real GDP

Velocity of money: the average number of times per year that each piece of paper currency is used in a transaction. The equation implies that the amount of money used in purchases is equal to nominal GDP.

4 equations, 4 unknowns

TABLE 8.3

The Quantity Theory of Money: 4 Equations and 4 Unknowns

Endogenous variables: M_t, V_t, P_t, Y_t

The quantity equation

$$M_t V_t = P_t Y_t$$

Real GDP from growth model (classical dichotomy)

$$Y_t = \bar{Y}_t$$

Exogenous and constant velocity

$$V_t = \bar{V}$$

Exogenous money supply

$$M_t = \bar{M}_t$$

Exogenous variables/parameters: $\bar{M}_t, \bar{V}, \bar{Y}_t$

3.

Inflation ... by the quantity theory

- 1 Solve for the price level

$$P_t^* = \frac{\overline{M}_t \overline{V}}{\overline{Y}_t}$$

- 1 Prices will rise as a result of
 - 1 Increases in the money supply
 - 2 Decreases in real GDP
- 2 In the long run, the key determinant of the price level is the money supply.

Using growth rates

- 1 We can express the quantity equation in terms of growth rates.
- 2 Using \bar{g} as growth rate

- 1 Assuming

$$\bar{g}_V = 0$$

$$\pi^* = \bar{g}_M - \bar{g}_Y$$



Rate of
inflation

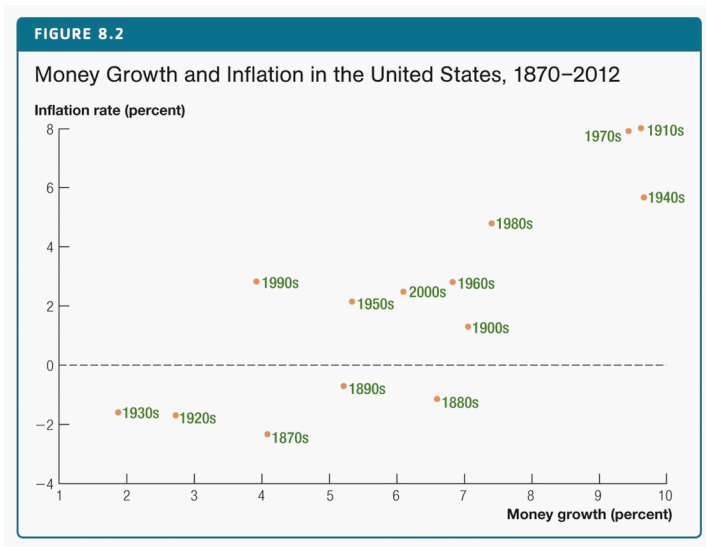


Growth
rate in
money
supply



Growth
rate in
GDP

Decades of high money growth are decades of high inflation

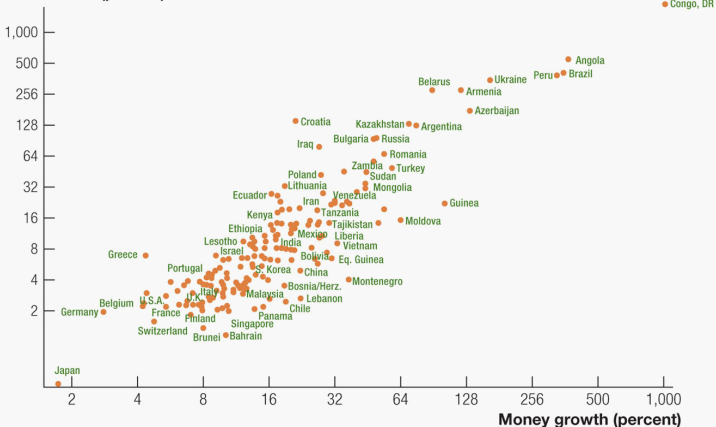


Money growth and inflation around the world

FIGURE 8.3

Money Growth and Inflation around the World, 1990–2011

Inflation rate (percent)



Revisiting the Classical Dichotomy

- 1 The neutrality of money: changes in the money supply have no **real** effects on the economy
- 2 Only affect prices altogether
- 3 When all prices in the economy double, relative prices are unchanged.
- 4 When the relative prices of goods are unchanged, **nothing real is affected.**
- 5 Empirically it holds in the long run
- 6 Does not hold in the short run: nominal prices do not respond immediately to changes in the money supply

III – Real and Nominal Interest Rates

The Fisher equation

- 1 The Fisher equation is not a theory, it is an **identity equation**
- 2 It links real and nominal interest rates

$$i = R + \pi$$

\uparrow
 Nominal
interest
rate

\uparrow
 Real
interest
rate

\uparrow
 Rate of
inflation

- 1 It can be written in a more useful way

$$R = i - \pi$$

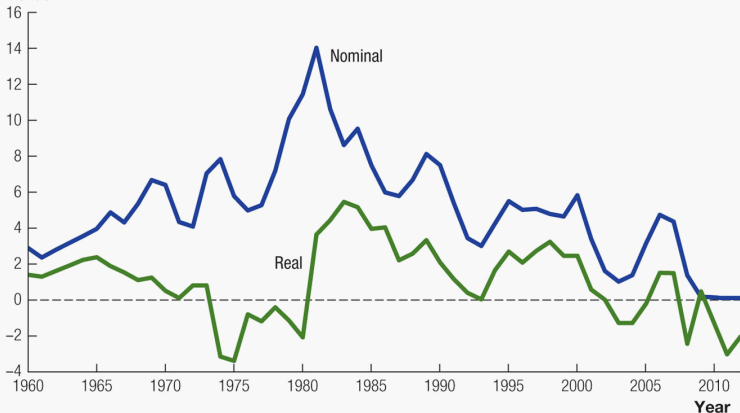
- 2 There is a theory that tell us that

$$R = MPK$$

Nominal and real interest rates for the United States since 1960

FIGURE 8.4
Real and Nominal Interest Rates in the United States, 1960–2012

Percent



IV – Costs of Inflation

Who are hurt during inflation?

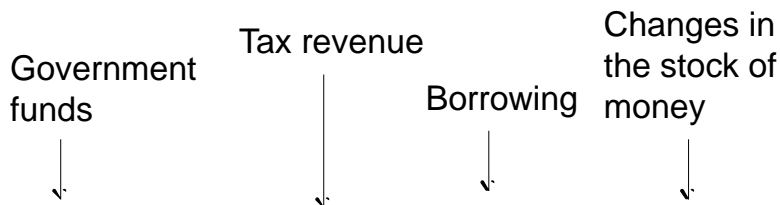
- 1 An individual who has a pension that is not indexed to inflation
- 2 A bank that issues loans at fixed rates but that pays interest rates that move with the market
- 3 Large surprise inflations can lead to large distributions in wealth:
 - 1 People with debts can pay back their loans with new cheaper dollars.
 - 2 Creditors wind up losers.

Who are hurt during inflation?

- ① Inflation also distorts relative prices.
 - ① Some prices are faster at adjusting to inflation than other prices are.
- ② Shoe leather costs of inflation
 - ① People want to hold less money when inflation is high.
- ③ Menu costs
 - ① The costs to firms of changing prices frequently.

V – The Fiscal Causes of High Inflation

The government budget constraint



$$\underbrace{G}_{\text{uses}} = \underbrace{T + \Delta B + \Delta M}_{\text{sources of funds}}.$$

The Inflation Tax

- 1 Seignorage and the inflation tax
 - 1 It is the revenue that the government obtains from printing more money (ΔM)
- 2 The inflation tax
 - 1 Is paid by people holding currency
- 3 If a government runs large budget deficits, as debt rises
 - 1 Lenders may worry the government will have trouble paying back loans
 - 2 They may stop lending to the government altogether.
- 4 Debt solution: Raising taxes? May not be politically feasible
- 5 The government may resort to printing currency to finance its budget.

Central Bank Independence

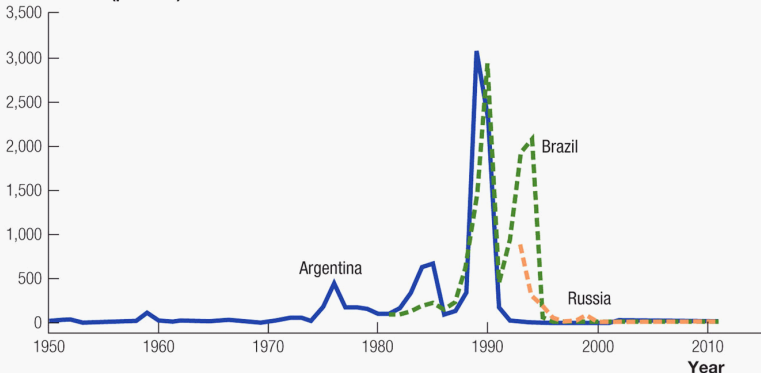
- 1 Monetary Policy
 - 1 Conducted by Federal Reserve
- 2 Fiscal Policy
 - 1 President and Congress
- 3 Central Bank Independence
 - 1 An attempt to prevent fiscal considerations from leading to excessive inflation
- 4 Countries experiencing hyperinflation typically raise about 5 percent of GDP from the inflation tax.
 - 1 Argentina raised 10 percent of GDP this way.

Hyperinflations: some cases

FIGURE 8.5

Hyperinflations in Argentina, Brazil, and Russia, 1950–2011

Inflation rate (percent)

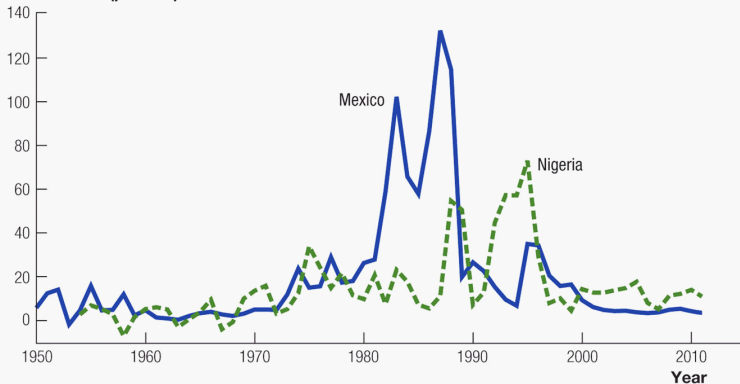


Hyperinflations: some cases

FIGURE 8.6

High Inflation in Mexico and Nigeria, 1950–2011

Inflation rate (percent)



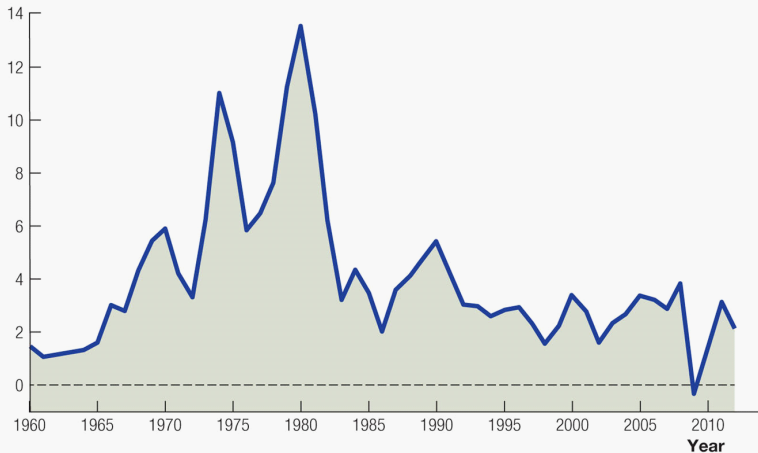
VI – The Great Inflation of the 1970s

The Great Inflation of the 1970s

FIGURE 8.1

The Inflation Rate in the United States, 1960–2012

Percent

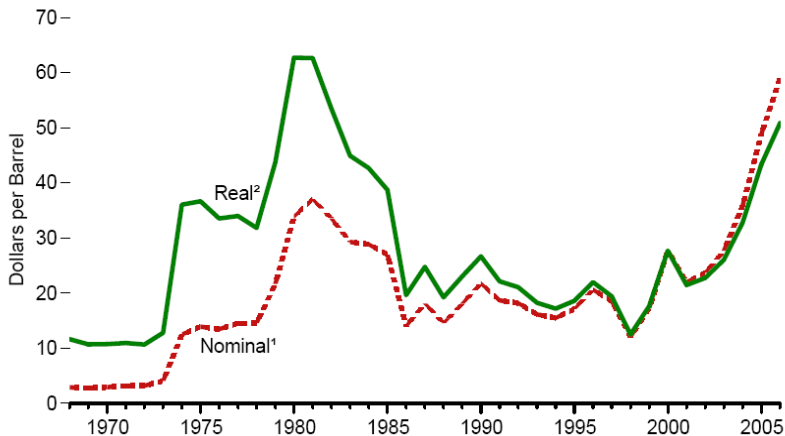


The Great Inflation of the 1970s (cont.)

- 1 The rate peaked below 15 percent
- 2 Yet the inflation tax was a small fraction of government spending
- 3 Inflation rose in the 1970s for the following reasons:
 - 1 OPEC coordinated increases in oil prices that spurred inflation.
 - 2 The Federal Reserve grew the money supply too rapidly.
 - 3 Policymakers pursued such a policy because of the productivity slowdown.

Oil prices in the 1970's

Imported Costs



VII – Required readings

Required reading

For this week you are required to read **Read Chapter 8** of our adopted textbook.



Charles I. Jones (2014). *Macroeconomics, Third Edition*, W. W. Norton & Company.