22. Money Growth and Inflation

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Questions in this chapter

- In this chapter, we will look at how the money supply affects inflation and nominal interest rates.
- Does the money supply affect real variables like real GDP or the real interest rate?
- How is inflation like a tax?
- What are the costs of inflation? How serious are they?

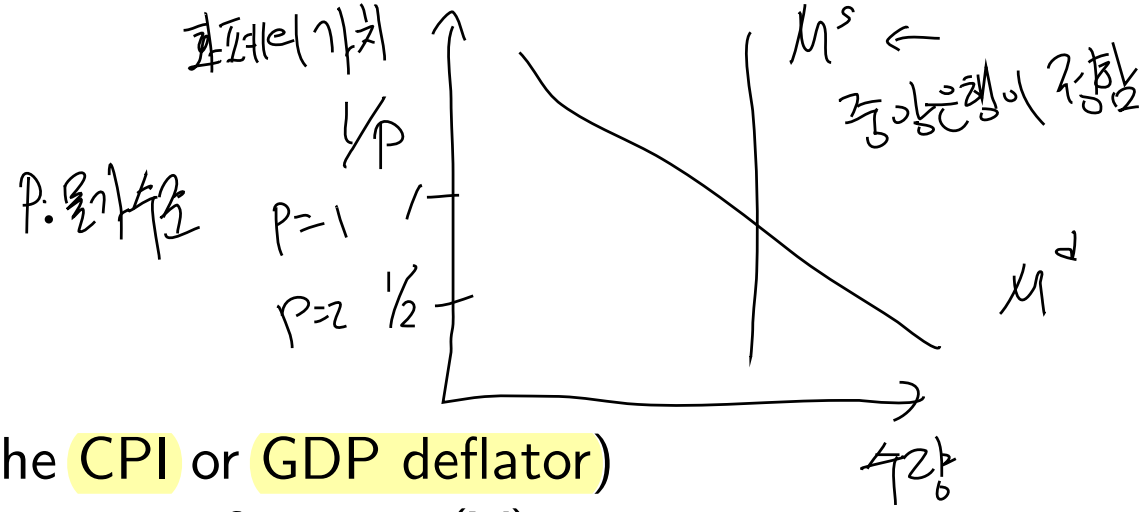
Introduction

- This chapter introduces the quantity theory of money to explain one of the Ten Principles of Economics from Chapter 1:
  "*Prices rise when the govt prints too much money.*"

- Most economists believe the quantity theory is a good explanation of the long run behavior of inflation.

- The Quantity Theory of Money
  - Developed by 18th century philosopher David Hume and the classical economists
  - Advocated more recently by Nobel Prize Laureate Milton Friedman
  - Asserts that the quantity of money determines the value of money

The Value of Money



- P = the price level (e.g., the CPI or GDP deflator)
  = the dollar cost of one unit of output (Y)
  = amount of money required to buy one unit of good
- $1/P$ is the value of \$1, measured in goods.

- Inflation drives up prices and drives down the value of money.

Money Supply and Money Demand

Money Supply (MS)

- In real world, determined by Federal Reserve, the banking system, consumers.
- In this model, we assume the Fed precisely controls MS and sets it at some fixed amount.

Money Demand (MD)

- Refers to how much wealth people want to hold in liquid form.
- Depends on P: An increase in P reduces the value of money, so more money is required to buy goods & services.
- Thus, quantity of money demanded is negatively related to the value of money and positively related to P, other things equal. (These "other things" include real income, interest rates, availability of ATMs.)

A Brief Look at the Adjustment Process

An Equilibrium graphically: MS = MD (on $1/P$ and M space)

Increasing MS causes P to rise.

$M^s \uparrow \rightarrow$ spending $\uparrow \rightarrow$ 수요 $\uparrow \rightarrow$ 가격 $\uparrow$

How does this work? Short version:

- At the initial P, an increase in MS causes excess supply of money.
- People get rid of their excess money by spending it on goods & services or by loaning it to others, who spend it.
  Result: increased demand for goods.
- But supply of goods does not increase, so prices must rise.

(Other things happen in the short run, which we will study in later chapters.)

Real vs. Nominal Variables

- Nominal variables are measured in monetary units.
  Examples: nominal GDP,
  nominal interest rate (rate of return measured in \$),
  nominal wage (\$ per hour worked)

- Real variables are measured in physical units.
  Examples: real GDP,
  real interest rate (measured in output),
  real wage (measured in output)

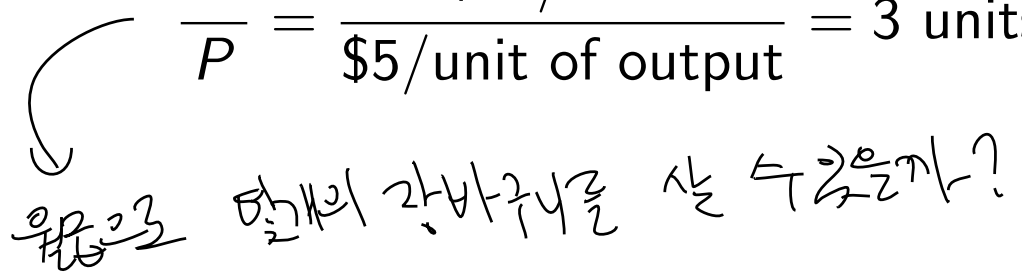
Real vs. Nominal Variables

- An important relative price is the real wage:

- W = nominal wage = price of labor, e.g., \$15/hour
- P = price level = price of goods & services, e.g., \$5/unit of output

- Real wage is the price of labor relative to the price of output:

$$\frac{W}{P} = \frac{\$15/\text{hour}}{\$5/\text{unit of output}} = 3 \text{ units of output per hour}$$



The Classical Dichotomy

- Classical dichotomy: the theoretical separation of nominal and real variables

- The classical economists suggested that monetary developments affect nominal variables but not real variables.

- If central bank doubles the money supply,
  - all nominal variables–including prices–will double.
  - all real variables–including relative prices–will remain unchanged.

The Neutrality of Money 화폐의 중립성

- 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?
- The real wage W/P remains unchanged, so
  - quantity of labor supplied does not change
  - quantity of labor demanded does not change
  - total employment of labor does not change
- The same applies to employment of capital and other resources.
- Since employment of all resources is unchanged, total output is also unchanged by the money supply.
- Most economists believe the classical dichotomy and neutrality of money describe the economy in the long run.
- In later chapters, we will see that monetary changes can have important short-run effects on real variables.

Hyperinflation

- Hyperinflation is generally defined as inflation exceeding 50% per month.
- Recall one of the Ten Principles from Chapter 1: Prices rise when the government prints too much money.
- Excessive growth in the money supply always causes hyperinflation.

Hyperinflation in Zimbabwe: Large govt budget deficits led to the creation of large quantities of money and high inflation rates.

The Inflation Tax

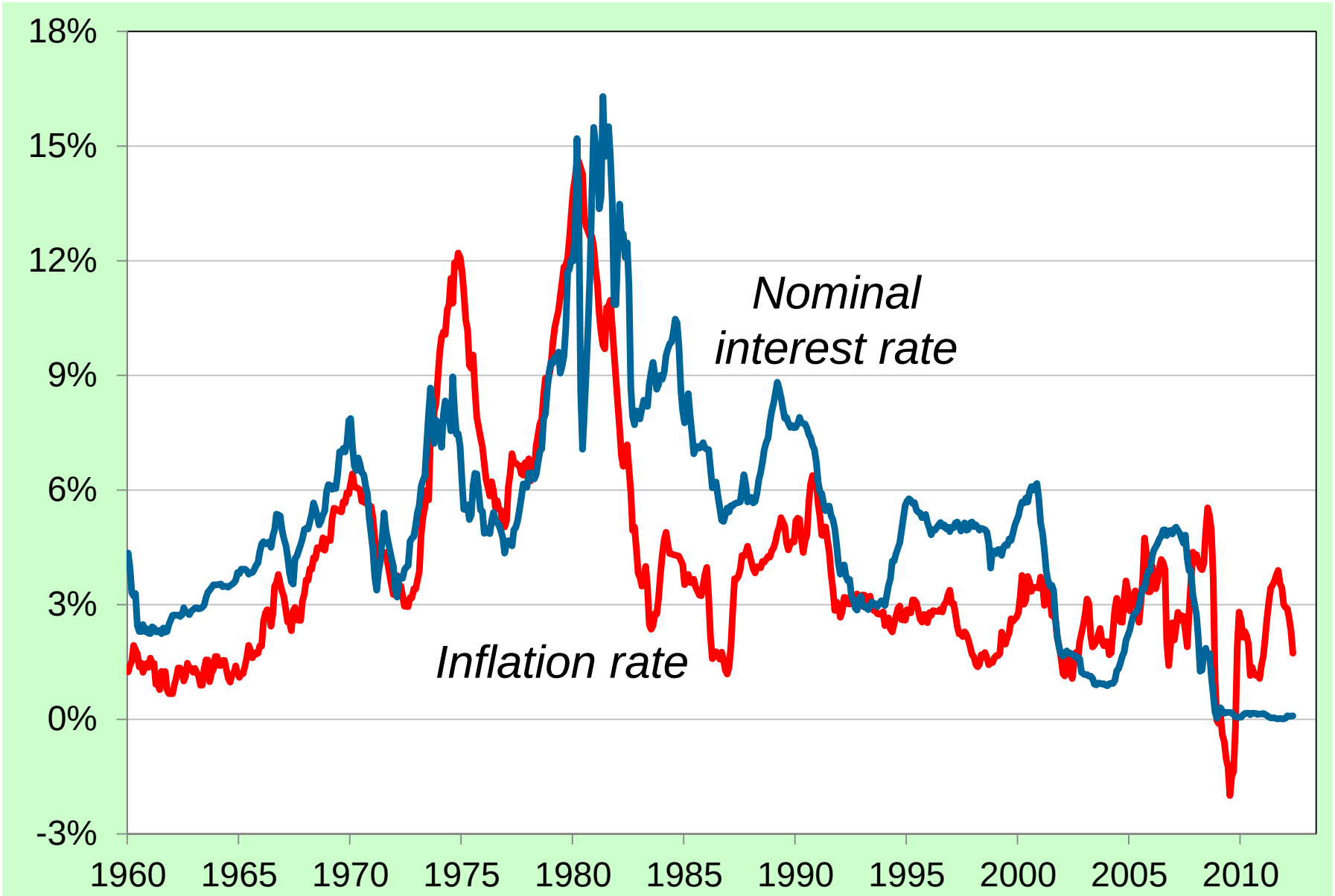
- When tax revenue is inadequate and ability to borrow is limited, govt may print money to pay for its spending.
- Almost all hyperinflations start this way.
- The revenue from printing money is the inflation tax: printing money causes inflation, which is like a tax on everyone who holds money.
- In the U.S., the inflation tax today accounts for less than 3% of total revenue.

The Fisher Effect

$$\boxed{\text{Nominal int rate} = \text{Inflation rate} + \text{Real int rate}}$$

- The real interest rate is determined by S=I in the funds market.
- Money supply growth determines inflation rate.
- So, this equation shows how the nominal interest rate is determined.
- In the long run, money is neutral, so a change in the money growth rate affects the inflation rate but not the real interest rate.
- So, the nominal interest rate adjusts one-for-one with changes in the inflation rate.
- This relationship is called the Fisher effect after Irving Fisher.
- The inflation tax applies to people's holdings of money, not their holdings of wealth.
- The Fisher effect: an increase in inflation causes an equal increase in the nominal interest rate, so the real interest rate (on wealth) is unchanged.

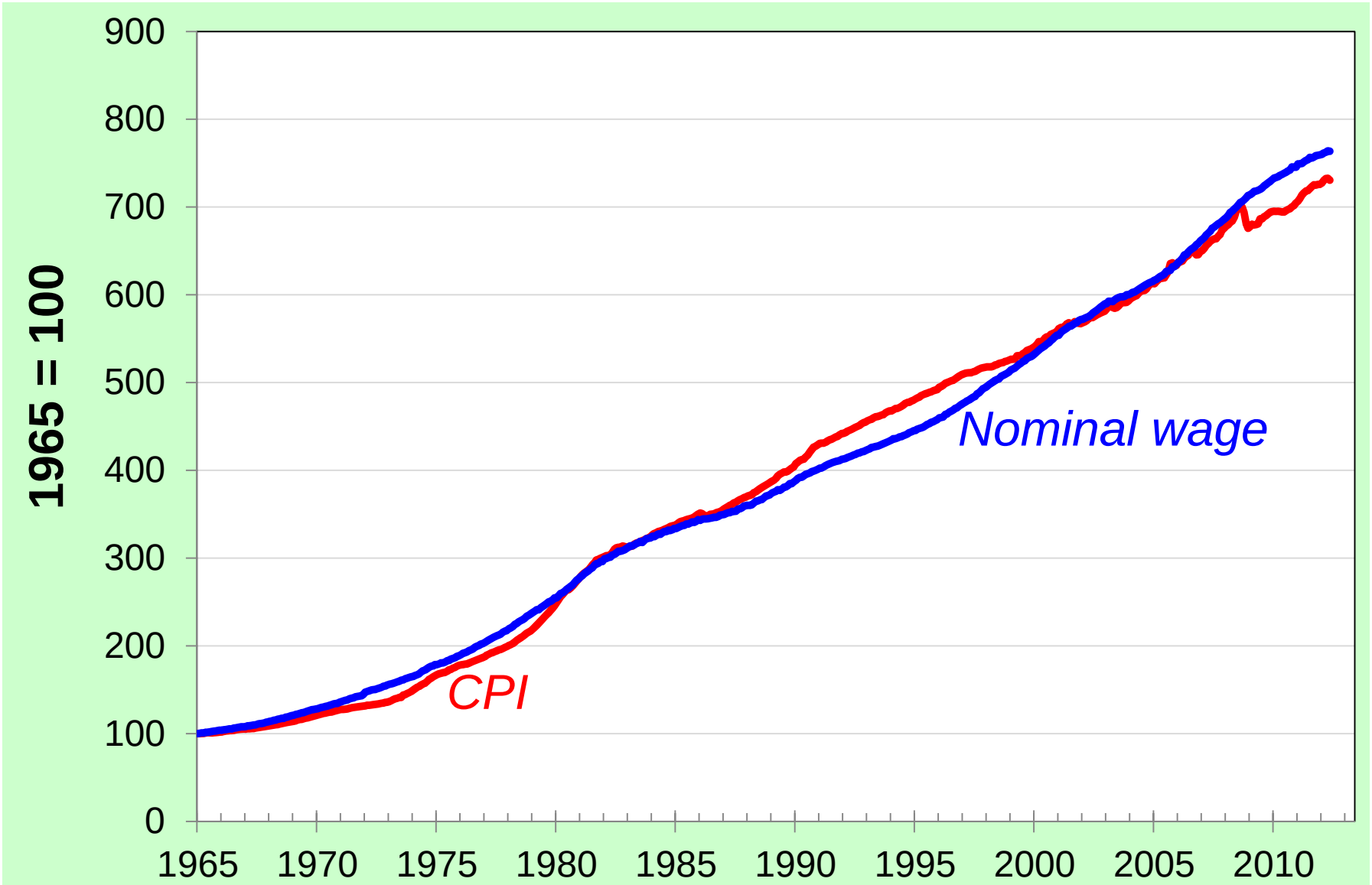
U.S. Nominal Interest & Inflation Rates, 1960–2012



The Costs of Inflation

- The inflation fallacy: most people think inflation erodes real incomes.
- But inflation is a general increase in prices of the things people buy and the things they sell (e.g., their labor).
- In the long run, real incomes are determined by real variables, not the inflation rate.

U.S. Average Hourly Earnings & the CPI



The Costs of Inflation

- Shoeleather costs: the resources wasted when inflation encourages people to reduce their money holdings
- Menu costs: the costs of changing prices
- Misallocation of resources from relative-price variability: Firms don't all raise prices at the same time, so relative prices can vary... which distorts the allocation of resources.
- Confusion & inconvenience: Inflation changes the yardstick we use to measure transactions.
- Tax distortions: Inflation makes nominal income grow faster than real income. Taxes are based on nominal income, and some are not adjusted for inflation.

A Special Cost of Unexpected Inflation

부의 재분배 — 빚진사람이 이득을 본다.

- Arbitrary redistributions of wealth
  - Higher-than-expected inflation transfers purchasing power from creditors to debtors
  - Debtors get to repay their debt with dollars that aren't worth as much.
  - Lower-than-expected inflation transfers purchasing power from debtors to creditors.
  - High inflation is more variable and less predictable than low inflation.
- So, these arbitrary redistributions are frequent when inflation is high.

CONCLUSION

- This chapter explains one of the Ten Principles of economics: Prices rise when the govt prints too much money.
- We saw that money is neutral in the long run, affecting only nominal variables.
- In later chapters, we will see that money has important effects in the short run on real variables like output and employment.

SUMMARY

- To explain inflation in the long run, economists use the quantity theory of money. According to this theory, the price level depends on the quantity of money, and the inflation rate depends on the money growth rate.
- The classical dichotomy is the division of variables into real and nominal. The neutrality of money is the idea that changes in the money supply affect nominal variables but not real ones. Most economists believe these ideas describe the economy in the long run.
- The inflation tax is the loss in the real value of people's money holdings when the government causes inflation by printing money.
- The Fisher effect is the one-for-one relation between changes in the inflation rate and changes in the nominal interest rate.
- The costs of inflation include menu costs, shoeleather costs, confusion and inconvenience, distortions in relative prices and the allocation of resources, tax distortions, and arbitrary redistributions of wealth.