

30

Money Growth and Inflation

PRINCIPLES OF
ECONOMICS
FOURTH EDITION

N. GREGORY MANKIW

Premium PowerPoint® Slides
by Ron Cronovich
2008 update

© 2008 South-Western, a part of Cengage Learning, all rights reserved

In this chapter, look for the answers to these questions:

- § How does the money supply affect 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?

CHAPTER 30 MONEY GROWTH AND INFLATION

1

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

CHAPTER 30 MONEY GROWTH AND INFLATION

2

The Value of Money

§ P = the price level
(e.g., the CPI or GDP deflator)
 P is

§ $1/P$ is

§ Example: basket contains one candy bar.

- If $P = \$2$, value of \$1 is
- If $P = \$3$, value of \$1 is

§ Inflation drives up prices, and

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.

§

§ We study this theory using two approaches:

1. a supply-demand diagram
2. an equation

Money Supply (MS)

§ In real world, determined by Federal Reserve, the banking system, consumers.

§ In this model, we assume

Money Demand (MD)

§

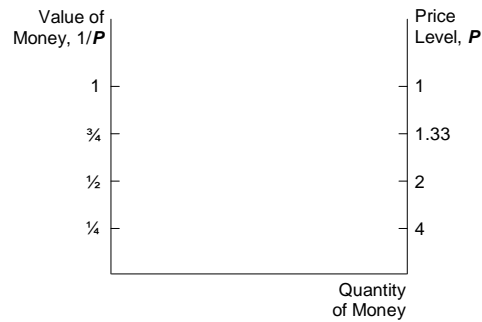
§ Depends on

§ Thus, quantity of money demanded is _____ related to the value of money and _____ related to P , other things equal. (These “other things” include real income, interest rates, availability of ATMs.)

CHAPTER 30 MONEY GROWTH AND INFLATION

6

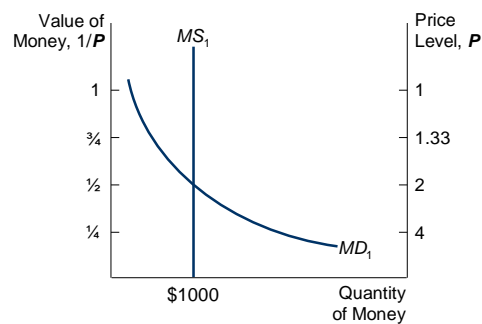
The Money Supply-Money Demand Diagram



CHAPTER 30 MONEY GROWTH AND INFLATION

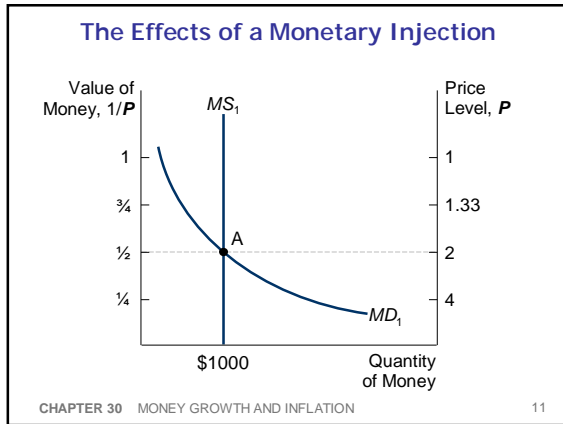
7

The Money Supply-Demand Diagram



CHAPTER 30 MONEY GROWTH AND INFLATION

10



A Brief Look at the Adjustment Process

Result from graph:

How does this work? Short version:

- At the initial P , an increase in MS causes
- People get rid of their excess money by spending it on g&s or by loaning it to others, who spend it.

Result:

- But supply of goods does

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

CHAPTER 30 MONEY GROWTH AND INFLATION 12

Real vs. Nominal Variables

§ **Nominal variables**

examples: nominal GDP,
nominal interest rate (rate of return measured in \$)
nominal wage (\$ per hour worked)

§ **Real variables**

examples: real GDP,
real interest rate (measured in output)
real wage (measured in output)

CHAPTER 30 MONEY GROWTH AND INFLATION 13

Real vs. Nominal Variables

Prices are normally measured in terms of money.

- Price of a compact disc: \$15/cd
- Price of a pepperoni pizza: \$10/pizza

A **relative price**

- Relative price of CDs in terms of pizza:

Relative prices are measured in _____,
so they are real variables.

CHAPTER 30 MONEY GROWTH AND INFLATION

14

Real vs. Nominal Wage

An important relative price is the real wage:

W = nominal wage = price of labor, e.g., \$15/hour

P = price level = price of g&s, e.g., \$5/unit of output

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

CHAPTER 30 MONEY GROWTH AND INFLATION

15

The Classical Dichotomy

§ **Classical dichotomy:**

§ Hume and the classical economists
suggested that

§ If central bank doubles the money supply,
Hume & classical thinkers contend

- all nominal variables
- all real variables

CHAPTER 30 MONEY GROWTH AND INFLATION

16

The Neutrality of Money

§ **Monetary neutrality:** the proposition that

§ 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,

$$\frac{\text{price of cd}}{\text{price of pizza}} = \frac{\text{___}/\text{cd}}{\text{___}/\text{pizza}} = \text{___} \text{ pizzas per cd}$$

CHAPTER 30 MONEY GROWTH AND INFLATION

17

The Neutrality of Money

§ Similarly, the real wage W/P

- quantity of labor supplied
- quantity of labor demanded
- total employment of labor

§ The same applies to employment of capital and other resources.

§ Since employment of all resources is _____ total output is

CHAPTER 30 MONEY GROWTH AND INFLATION

18

The Neutrality of Money

§ 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.

CHAPTER 30 MONEY GROWTH AND INFLATION

19

The Velocity of Money

§ Velocity of money:

§ Notation:

$P \times Y$ = nominal GDP
= (price level) \times (real GDP)

M = money supply

V = velocity

§ Velocity formula:

The Velocity of Money

Example with one good: pizza.

In 2006,

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 =

ACTIVE LEARNING 1: Exercise

One good: corn.

The economy has enough labor, capital, and land to produce $Y = 800$ bushels of corn.

V is constant.

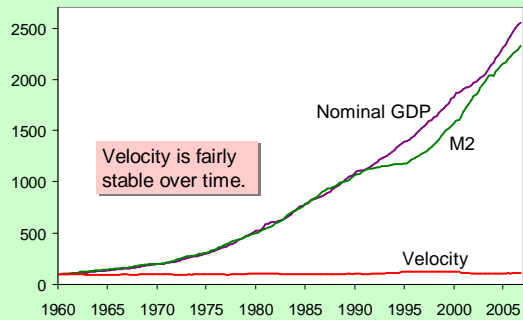
In 2005, $MS = \$2000$, $P = \$5/\text{bushel}$.

Compute nominal GDP and velocity in 2005.

ACTIVE LEARNING 1: Answers

23

U.S. Nominal GDP, M2, and Velocity (1960=100)
1960-2006



The Quantity Equation

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

§ Multiply both sides of formula by M :

§ Called the **Quantity Equation**

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
3. A change in M
money is neutral,
 Y is determined by
4. So, P changes by
5. Rapid money supply growth causes rapid inflation.

CHAPTER 30 MONEY GROWTH AND INFLATION

26

ACTIVE LEARNING 2: Exercise

One good: corn. The economy has enough labor, capital, and land to produce $Y = 800$ bushels of corn. V is constant. In 2005, $MS = \$2000$, $P = \$5/\text{bushel}$.

For 2006, the Fed increases MS by 5%, to \$2100.

- a. Compute the 2006 values of nominal GDP and P . Compute the inflation rate for 2005-2006.
- b. Suppose tech. progress causes Y to increase to 824 in 2006. Compute 2005-2006 inflation rate.

27

ACTIVE LEARNING 2: Answers

28

Hyperinflation

§ Hyperinflation is generally defined as

§ Recall one of the Ten Principles from Chapter 1:
Prices rise when the government prints too much money.



§

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.

§ **inflation tax:**

§ In the U.S., the inflation tax today accounts for less than 3% of total revenue.

The Fisher Effect

§ Rearrange the definition of the real interest rate:

§ The real interest rate is determined by saving & investment in the loanable funds market.

§

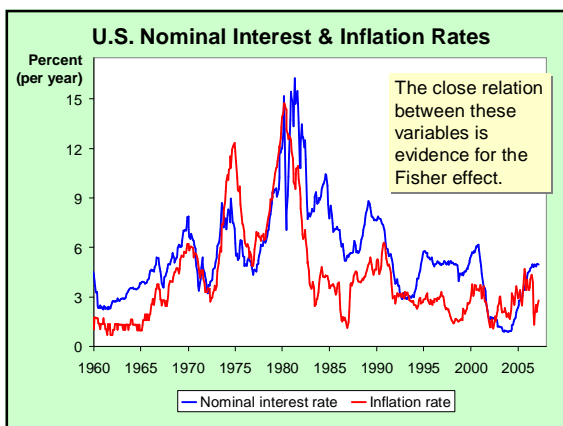
§ So, this equation shows how the nominal interest rate is determined.

The Fisher Effect

§ 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

§ This relationship is called the **Fisher effect** after Irving Fisher, who studied it.



The Fisher Effect & the Inflation Tax

$$\text{nominal interest rate} = \text{inflation rate} + \text{real interest rate}$$

§ 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.

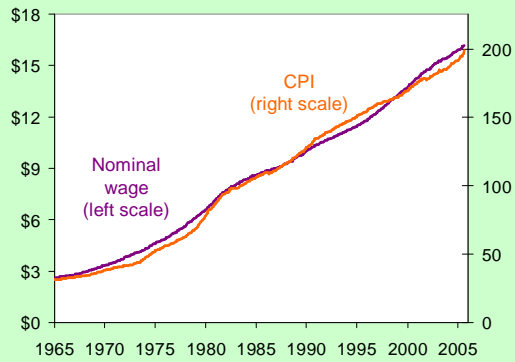
The Costs of Inflation

§ The inflation fallacy:

§ But inflation is a general increase in prices, of the things people buy and

§ In the long run,

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 Inflation

§ 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.

Complicates long-range planning and the comparison of dollar amounts over time.

The Costs of Inflation

§ Tax distortions:

ACTIVE LEARNING 3: Tax distortions

You deposit \$1000 in the bank for one year.

CASE 1: inflation = 0%, nom. interest rate = 10%

CASE 2: inflation = 10%, nom. interest rate = 20%

- a. In which case does the real value of your deposit grow the most?

Assume the tax rate is 25%.

- b. In which case do you pay the most taxes?
- c. Compute the after-tax nominal interest rate, then subtract off inflation to get the after-tax real interest rate for both cases.

ACTIVE LEARNING 3: Answers

43

A Special Cost of Unexpected Inflation

§ Arbitrary redistributions of wealth

Higher-than-expected inflation

Debtors get to repay their debt with dollars that aren't worth as much.

Lower-than-expected inflation

High inflation

So, these arbitrary redistributions are frequent when inflation is high.

CHAPTER 30 MONEY GROWTH AND INFLATION

47

The Costs of Inflation

§ All these costs are quite high for economies experiencing hyperinflation.

§ For economies with low inflation (< 10% per year), these costs are probably much smaller, though their exact size is open to debate.

CHAPTER 30 MONEY GROWTH AND INFLATION

48

CONCLUSION

§ This chapter explains one of the Ten Principles of economics:

Prices rise when the govt prints too much money.



§

§ In later chapters, we will see that money has important effects in the short run on real variables like output and employment.
