

Macroeconomics

Topic 7: “Know the equation of exchange and the connection between money and inflation.”

Reference: Gregory Mankiw’s *Principles of Macroeconomics*, 2nd edition, Chapter 16.

The Equation of Exchange

The equation of exchange (also called the quantity equation) is commonly used to express the classical theory of inflation. The equation of exchange is often derived from the definition of velocity of money. Velocity is the average rate at which money changes hands in the economy. More specifically, if we let V be velocity, M be a statistic measuring the money supply, P be the price level as measured by the GDP deflator, and Y be real GDP, then:

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

or

$$MV = PY$$

Classical economists used this equation to argue that an increase in the money supply was likely to cause a proportionate increase in the cost of living (i.e., the price level). To get this conclusion they typically would make the following observations:

1. Over a short period of time the velocity of money changes little.
2. Because velocity is relatively stable, increases in M are likely to change nominal GDP ($P \times Y$).
3. Real GDP (Y) is typically determined by the amount of labor, capital, and natural resources used in the economy as well as by the level of technology. Since none of these items change when money is printed, it is not likely that changing the money supply will change real GDP.
4. Given that V and Y are constant, increasing M causes a proportionate increase in P .

This conclusion is often illustrated using a money demand and supply diagram that emphasizes the relationship between money demand and the value of money. The value of money refers to the buying power of a piece of currency. When prices are high, people can’t afford to buy as much. Hence, the value of money is inversely related to the price of goods.

Figure 1 shows the effect of an increase in the money supply in this diagram. When the Money Supply is increased the corresponding curve shifts from MS_1 to MS_2 . The price level rises from 2 to 4 and the value of money drops from $\frac{1}{2}$ to $\frac{1}{4}$. The reasons why prices rise (and the value of money falls) are called the adjustment process. This process is most easily envisioned by imagining the effect of helicopters dropping large sums of

money on the US. People would pick up that money and have two choices: use the money to buy goods and services, or put the money in the bank. If the money is used to buy goods and services, the demand for those goods and services increase, causing prices to rise. If the money is put in the bank, then the banks have more money to lend. This causes the banks to reduce interest rates to attract new borrowers. The new borrowers use the money to buy durable items such as cars and houses. This increases demand for those products, causing prices to rise. Thus, whether money from the helicopter drop is spent on goods and services or put in the bank, the price level will tend to rise when the money supply is increased.

The Classical Dichotomy

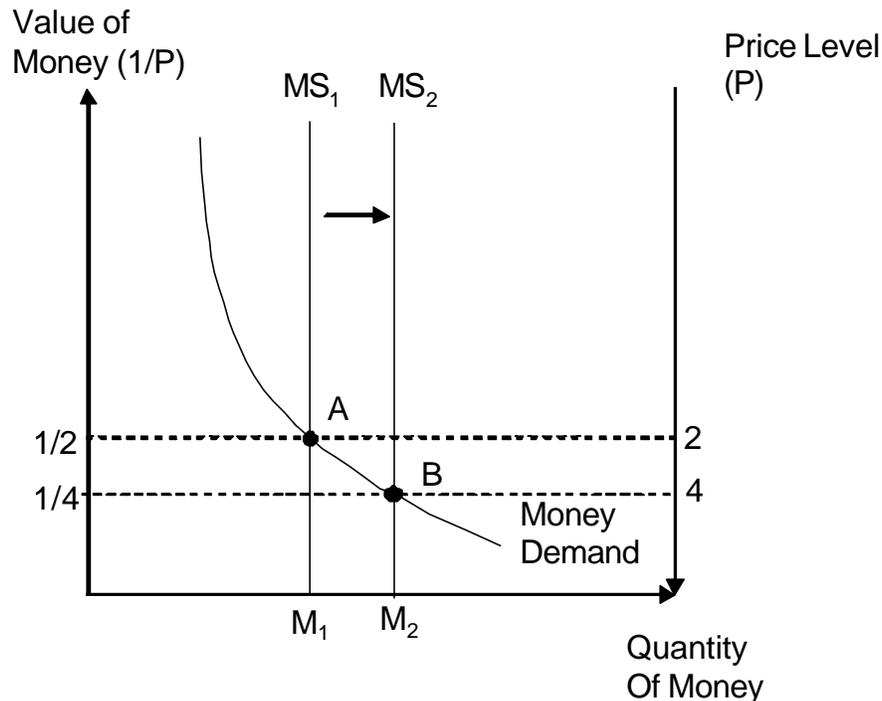


Figure 1
(Corresponds to Figure 16-2 in the Mankiw Text)

Classical economists make a strong distinction between variables measured in dollar terms (called nominal variables) and variables measured in physical terms (called real variables). This separation between nominal and real variables is called the classical dichotomy. This distinction is useful because different things affect nominal and real variables. In particular, the theory of money neutrality maintained that increasing the money supply would only change nominal variables, but would not affect real variables. These days most economists accept the notion of money neutrality in the long run, but it is highly questionable during briefer periods of time.

The Fisher Effect

One example of the classical dichotomy occurs in the discussion of the Fisher Effect. According to the Fisher Effect, increasing the growth rate of the money supply does not affect the real interest rate, but because inflation will eventually occur, people begin to expect inflation, causing the nominal interest rate to rise. The nominal interest rate measures the percentage increase in money loaned over the course of a year. The real interest rate measures the percentage increased in the buying power of the money loaned over the course of the year. As a consequence:

$$\text{the Real Interest Rate} \approx \text{the Nominal Interest Rate} - \text{the Inflation Rate}$$

The Fisher Effect uses the definition of the real interest rate given above and the proposition of money neutrality. Increasing the rate of growth in the money supply raises the inflation rate and leaves the real interest rate the same. The nominal interest rate will rise by the same amount as the increase in inflation.

Costs of Inflation

Inflation is costly, but not for the reasons typically identified by the non-economist. Most people believe that inflation reduces the earning power of their wages. Actually, when money is printed, all prices rise – including most wage rates. In the end, everything is more expensive, but incomes are greater too. Most economists believe that the real costs of inflation are the items in the list below.

Shoelather costs

People try to avoid keeping money in their pockets when inflation is high. One can, for example, keep most of your assets in interest earning accounts by making tiny withdrawals of cash for each purchase that is made. This requires many trips to the bank (presumably wearing out your shoes). These extra trips to the bank are costly, but they do reduce your exposure to inflation.

Menu Costs:

Firms must reprint catalogs and menus much more frequently during inflationary times.

Tax Rate Distortions

Taxes will always reduce economic efficiency, but many taxes become bigger problems in inflationary times. For example, suppose that you buy some stock in 1990 for \$100 and sell it in the year 2000 for \$200. According to US tax law you had a \$100 capital gain that will be taxed. If there was a lot of inflation, you might actually be able to buy less with \$200 in 2000 than \$100 bought in 1990. Thus a real loss would be taxed as a large nominal gain. This means that inflation is increasing the disincentive to buy stock implicit in the capital gains tax.

Confusion and Inconvenience

Inflation doesn't tend to be steady. In countries that experience hyperinflation, for example, inflation rates may vary from 30% to 50% on a month-to-month basis. This much uncertainty about how much value money will lose makes planning difficult.

Redistribution of wealth

When inflation is a surprise, there is a large shift in wealth between borrowers and lenders. This means that uncertainty about inflation causes uncertainty about the profitability of borrowing and lending.