

enjoyment of a can of soda has remained the same, but, over time, the money they use to buy soda has become less valuable. In other words, inflation is more about changes in the value of money than about the value of goods.

When the economy's overall price level rises, it takes more money to purchase a fixed basket of goods. Or, looking at the matter differently, we can say that the value of money relative to goods and services has declined. It may be helpful to state this observation more formally. Suppose  $P$  is the price level—measured by the CPI or GDP deflator—then  $P$  measures the cost in dollars of a basket of goods. The quantity of goods and services that can be bought with \$1 is  $1/P$ . If  $P$  is the price of goods and services measured in money, then  $1/P$  is the value of money measured in terms of goods and services.

In the long run, the value of money is determined in the same way as the value of any other item in an economy: by the interaction of supply and demand. We have just seen how the supply of money depends on the Federal Reserve and the banking system. When the Federal Reserve uses a higher interest on reserves to encourage banks to hold more money, the supply of money contracts; when the Federal Reserve decreases the interest on reserves, the supply of money expands. Because of fractional reserves, the effects of these actions are magnified. But, the key point is that through its policy actions the Federal Reserve can choose the supply of money.

The demand for money depends on how much of their wealth people wish to hold as money, instead of in the form of other less liquid assets. The chief reason that people choose to hold money rather than other assets is because of the usefulness of money as a medium of exchange. The greater use of digital payments (for example, using Apple Pay on an iPhone) will reduce the need to use money. A desire for contactless payment, whether for convenience or to avoid possible disease transmission, as was a concern early in the COVID-19 pandemic, may speed up this transition in the coming years. But, the most important determinants of how much money people demand are the volume of transactions they engage in and the prices at which these transactions take place. Holding constant the real level of activity in the economy, we would expect that a doubling of all prices would cause the demand for money to double.

How does the economy balance people's demand for money with the level of money that the Fed chooses to supply? The answer depends on the time horizon that we are considering. For the moment, we will focus on the long run, by which we mean a time period over which the price level adjusts to equate the demand for money with the available supply.

The injection of more money into the economy thus causes an increase in the demand for goods and services. But, the economy's supply of goods and services has not changed. We have seen that the ability of an economy to produce goods and services depends on the available technology and on the quantities of labor, capital, and natural resources available. None of these has been changed by the additional money, so the supply of goods and services should not change.

The combination of higher demand with a fixed supply will cause the price of goods and services to rise. And, this increase in prices will continue until prices have risen enough to cause the demand for money to once again equal the supply. At this point, the value of money has fallen by half (or equivalently the price level has doubled). In the long run, assuming nothing else changes, the increase in prices will be exactly proportional to the change in the supply of money.

This result—that in the long run, an increase in the supply of money leads to a proportional increase in the price level—reflects the long-run **neutrality of money**. The neutrality of money means that changes in the quantity of money have no effect on real quantities in the economy. Monetary changes only affect nominal quantities. *Real* quantities are things that are measured in physical units; for example, a bushel of wheat and a ton of steel are real quantities. Nominal quantities are things that are measured in monetary units; examples would include the price of a bushel of wheat or GDP in current prices.

Notice that the relative prices of different goods and services are real quantities. For example, if a bushel of wheat costs \$6, and a ton of steel costs \$600, then the cost of steel relative to wheat is

$$\frac{\$600}{\text{ton}} \div \frac{\$6}{\text{bushel}} = 100 \frac{\text{bushels}}{\text{ton}} .$$