

7.14: Money Supply and Long-Run Prices

Learning Objective

1. Understand the conditions under which changes in the money supply will have a long-run impact on the price level and hence the inflation rate in a country.

In previous sections we assumed that price levels were given exogenously and were unaffected by changes in other variables. In this section, we will argue that money supply increases tend to have a positive effect on the price level and thus the rate of inflation in an economy. This effect is unlikely to occur quickly, instead arising over several months or years. For this reason, we will say the effect occurs in the *long run*. The magnitude of the price level effect is also greatly influenced by the level of unemployment in the economy. Unemployment affects the degree to which the money increase affects prices and the degree to which it affects output.

The easiest way to see the linkage between money supply and prices is to simplify the story by assuming output cannot change. We tell that in story 1. This assumption allows us to isolate the impact of money on prices alone. In the subsequent adjustment stories, we'll relax the fixed output assumption to show how money increases can also affect the level of output in an economy.

Story 1: Money Supply Increase with Extreme Full Employment

Here we'll consider the effects of a money supply increase assuming what I'll call "extreme full employment." Extreme full employment means that every person who wishes to work within the economy is employed. In addition, each working person is working the maximum number of hours that he or she is willing to work. In terms of capital usage, this too is assumed to be maximally employed. All machinery, equipment, office space, land, and so on that can be employed in production is currently being used. Extreme full employment describes a situation where it is physically impossible to produce any more output with the resources currently available.

Next, let's imagine the central bank increases the money supply by purchasing U.S. government Treasury bills (T-bills) in the open market. Suppose the transaction is made with a commercial bank that decides to sell some of its portfolio of Treasury bills to free reserves to make loans to businesses. The transaction transfers the T-bill certificate to the central bank in exchange for an accounting notation the central bank makes in the bank's reserve account. Since the transaction increases bank reserves without affecting bank deposits, the bank will now exceed its reserve requirement. Thus these new reserves are available for the bank to lend out.

Let's suppose the value of the T-bills transacted is \$10 million. Suppose the bank decides to lend the \$10 million to Ford Motor Corporation, which is planning to build a new corporate office building. When the loan is made, the bank will create a demand deposit account in Ford's name, which the company can use to pay its building expenses. Only after the creation of the \$10 million demand deposit account is there an actual increase in the money supply.

With money in the bank, Ford will now begin the process of spending to construct the office building. This will involve hiring a construction company. However, Ford will now run into a problem given our assumption of extreme full employment. There are no construction companies available to begin construction on their building. All the construction workers and the construction equipment are already being used at their maximum capacity. There is no leeway.

Nonetheless, Ford has \$10 million sitting in the bank ready to be spent and it wants its building started. So what can it do?

In this situation, the demand for construction services in the economy exceeds the supply. Profit-seeking construction companies that learn that Ford is seeking to begin building as soon as possible, can offer the following deal: "Pay us more than we are earning on our other construction projects and we'll stop working there and come over to build your building." Other construction companies may offer a similar deal. Once the companies, whose construction projects have already started, learn that their construction companies are considering abandoning them for a better offer from Ford, they will likely respond by increasing their payments to their construction crews to prevent them from fleeing to Ford. Companies that cannot afford to raise their payments will be the ones that must cease their construction, and their construction company will flee to Ford. Note that another assumption we must make for this story to work is that there are no enforceable contracts between the construction company and its client. If there were, a company that flees to Ford will find itself being sued for breach of contract. Indeed, this is one of the reasons why contracts are necessary. If all works out perfectly, the least productive construction projects will cease operations since these companies are the ones that are unwilling to raise their wages to keep the construction firm from fleeing.

Once Ford begins construction with its newly hired construction company, several effects are noteworthy. First, Ford's construction company will be working the same amount of time and producing the same amount of output, though for a different client. However, Ford's payments to the construction company are higher now. This means some workers or owners in the construction company are going home with a fatter paycheck. Other construction companies are also receiving higher payments so wages and rents will likely be higher for them as well.

Other companies that have hired the construction firms now face a dilemma, however. Higher payments have to come from somewhere. These firms may respond by increasing the prices of their products for their customers. For example, if this other firm is Coca-Cola, which must now pay higher prices to complete its construction project, it most probably will raise the price of Coke to pay for its higher overall production costs. Hence increases in wages and rents to construction companies will begin to cause increases in market prices of other products, such as Coke, televisions, computers, and so on.

At the same time, workers and owners of the construction companies with higher wages will undoubtedly spend more. Thus they will go out and demand more restaurant meals, cameras, and dance lessons and a whole host of other products. The restaurants, camera makers, and dance companies will experience a slight increase in demand for their products. However, due to the assumption of extreme full employment, they have no ability to increase their supply in response to the increase in demand. Thus these companies will do what the profit-seeking construction companies did before...they will raise their prices.

Thus price increases will begin to ripple through the economy as the extra money enters the circular flow, resulting in demand increases. As prices for final products begin to rise, workers may begin to demand higher wages to keep up with the rising cost of living. These wage increases will in turn lead firms to raise the prices of their outputs, leading to another round of increases in wages and prices. This process is known as the **wage-price spiral**.

Nowhere in this process can there ever be more production or output. That's because of our assumption of extreme full employment. We have assumed it is physically impossible to produce any more. For this reason, the only way for the market to reach a new equilibrium with aggregate supply equal to aggregate demand is for prices for most inputs and outputs to rise. In other words, the money supply increase *must* result in an increase in average prices (i.e., the price level) in the economy. Another way of saying this is that money supply increases are inflationary.

The increase in prices will not occur immediately. It will take time for the construction companies to work out their new payment scheme. It will take more time for them to receive their extra wages and rents and begin spending them. It will take more time, still, for the restaurants and camera makers and others to respond to higher demands. And it will take even more time for workers to respond to the increases in prices and to demand higher wages. The total time may be several years before an economy can get back to equilibrium. For this reason, we think about this money supply effect on the price level as a long-run effect. In other words, we say an increase in the money supply will lead to an increase in the price level in the long run.

Inflation arises whenever there is too much money chasing too few goods. This effect is easy to recognize in this example since output does not change when the money supply increases. So, in this example, there is more money chasing the same quantity of output. Inflation can also arise if there is less output given a fixed amount of money. This is an effect seen in the transition economies of the former Soviet Union. After the breakdown of the political system in the early 1990s, output dropped precipitously, while money in circulation remained much the same. The outcome was a very rapid inflation. In these cases, it was the same amount of money chasing fewer goods.

Story 2: Money Supply Increase with High Unemployment

In this story, we relax the assumption of extreme full employment and assume instead that there is a very high rate of unemployment in the economy. This example will show how money supply increases can affect national output as well as prices.

Suppose there is a money supply increase as in the previous story. When Ford Motor Company goes out looking for a construction company to hire, there is now an important new possibility. Since unemployment is very high, it is likely that most construction companies are not operating at their full capacity. Some companies may have laid off workers in the recent past due to a lack of demand. The construction company that wins the Ford contract will not have to give up other construction projects. Instead, it can simply expand output by hiring unemployed workers and capital. Because there is a ready and waiting source of inputs, even at the original wage and rental rates, there is no need for the construction company to charge Ford more than current prices for its services. Thus there is no pressure to increase wages or the prices of construction services.

It is true, there is more money being paid out in wages by this company, and the new workers will go out and spend that money, leading to an increase in demand for restaurant services, cameras, dance lessons, and other products. These companies are also

likely to respond by hiring more workers and idle equipment to provide more restaurant meals, cameras, and dance lessons. Here too, with a ready and willing source of new inputs from the ranks of the unemployed, these companies will not have an incentive to raise wages, rents, or prices. Instead, they will provide more output of goods and services.

Thus as the increase in money ripples through the economy, it will stimulate demand for a wide variety of products. However, because of high unemployment, the money supply increase need not result in higher prices. Instead, national output increases and the unemployment rate falls.

A comparison of stories 1 and 2 highlights the importance of the unemployment rate in determining the extent to which a money supply increase will be inflationary. In general, we can conclude that an increase in the money supply will raise the domestic price level to a larger degree in the long run, thus lowering the unemployment rate of labor and capital.

Natural Rate of Unemployment

Economists typically say that an economy is at **full employment output** when the unemployment rate is at the **natural rate**. The natural rate is defined as the rate that does not cause inflationary pressures in the economy. It is a rate that allows for common transitions that characterize labor markets. For example, some people are currently unemployed because they have recently finished school and are looking for their first job. Some are unemployed because they have quit one job and are in search of another. Some people have decided to move to another city, and are unemployed during the transition. Finally, some people may have lost a job in a company that has closed or downsized and may spend a few weeks or months in search of their next job.

These types of transitions are always occurring in the labor market and are known as *frictional* (or transitional) *unemployment*. When employment surveys are conducted each month, they will always identify a group of people unemployed for these reasons. They count as unemployed, since they are all actively seeking work. However, they all will need some time to find a job. As one group of unemployed workers find employment, others will enter the unemployment ranks. Thus there is a constant turnover of people in this group and thus a *natural unemployment rate*. This type of unemployment is also called frictional, or transitional, unemployment. It is distinguished from a second type called structural unemployment. Structural unemployment occurs when there is a change in the structure of production in an economy. For example, if the textile and apparel industry closes down and moves abroad, the workers with skills specific to the industry and the capital equipment designed for use in the industry will not be employable in other sectors. These workers and capital may remain unemployed for a longer period of time, or may never find alternative employment.

There is no simple way to measure the natural rate of unemployment. It will likely vary with economic conditions and the fluidity of the labor market. Nonetheless, economists estimate the natural rate of unemployment to be around 5 percent in the United States today.

When economists talk about the inflationary effect of money supply increases, they typically refer to the natural rate of unemployment. A money supply increase will likely be inflationary when the unemployment rate is below the natural rate. In contrast, inflationary effects of money supply increases are reduced if the economy has unemployment above the natural rate. Here's how the story would work.

Story 3: Money Supply Increase above and below the Natural Unemployment Rate

Suppose there is a money supply increase as in the previous story, but now let's assume the economy is operating above full employment, meaning that unemployment is below its natural rate.

As the money supply increase ripples through the economy causing excess demand, as described above, businesses have some leeway to expand output. Since unemployment is not zero, they can look to hire unemployed workers and expand output. However, as frictional unemployment decreases, the labor market will pick up speed. Graduating students looking for their first job will find one quickly. Workers moving to another job will also find one quickly. In an effort to get the best workers, firms may begin to raise their wage offers. Workers in transition may quickly find themselves entertaining several job offers, rather than just one. These workers will begin to demand higher wages. Ultimately, higher wages and rents will result in higher output prices, which in turn will inspire demands for higher wages. Thus despite the existence of some unemployment, the money supply increase may increase output slightly but it is also likely to be inflationary.

In contrast, suppose the economy were operating with unemployment above the natural rate. In this case, the increase in demand caused by a money supply increase is likely to have a more significant effect upon output. As firms try to expand output, they will face a much larger pool of potential employees. Competition by several workers for one new job will put power back in the hands

of the company, allowing it to hire the best quality worker without having to raise its wage offer to do so. Thus, in general, output will increase more and prices will increase less, if at all. Thus the money supply increase is less likely to be inflationary in the long run when the economy is operating above the natural rate of unemployment.

Key Takeaways

- Inflation arises whenever there is too much money chasing too few goods.
- A money supply increase will lead to increases in aggregate demand for goods and services.
- A money supply increase will tend to raise the price level in the long run.
- A money supply increase may also increase national output.
- A money supply increase will raise the price level more and national output less the lower the unemployment rate of labor and capital is.
- A money supply increase will raise national output more and the price level less the higher the unemployment rate of labor and capital is.
- The natural rate of unemployment is the rate that accounts for frictional unemployment. It is also defined as the rate at which there are no aggregate inflationary pressures.
- If a money supply increase drives an economy below the natural rate of unemployment, price level increases will tend to be large while output increases will tend to be small.
- If a money supply increase occurs while an economy is above the natural rate of unemployment, price level increases will tend to be small while output increases will tend to be large.

exercise

1. **Jeopardy Questions.** As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
 - The term coined in this text for the situation when everybody who wishes to work is employed.
 - The term used to describe how increases in output prices lead to increases in wages, which further cause output prices to rise ad infinitum.
 - The term for the unemployment rate at which there is no inflationary or deflationary pressure on average prices.
 - The term for the level of GDP in an economy when the unemployment rate is at its natural level.
 - The term used to describe the type of unemployment that arises because of the typical adjustments of workers into, out of, and between jobs in an economy.
 - The likely larger long-run effect of a money supply increase when an economy has unemployment below the natural rate.
 - The likely larger long-run effect of a money supply increase when an economy has unemployment above the natural rate.

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