

Things you should know about inflation

February 23, 2015

Inflation is a general increase in prices.

Equivalently, it is a fall in the purchasing power of money. The opposite of inflation is *deflation* – a general fall in prices, or a rise in the purchasing power of money.

People sometimes talk about inflation as an increase in the quantity of money circulating the economy, but this is not part of the definition of inflation and is not an especially helpful way of thinking about it. In modern economies, most money takes the form of bank deposits and similar assets, and the amount of bank deposits changes whenever someone takes out or pays back a loan. So there is not really any such thing as a fixed quantity of money. Rather than saying inflation occurs when there is an increase in the money circulating in the economy, it would be more accurate to say that the amount of money in circulation changes based on the level of inflation.

Inflation is defined as the percentage change in the *price index* over a year. The price index itself is an *index number* that is arbitrarily defined as equal to 100 for a certain year. The price index then increases for each subsequent year by the rate of inflation.

There are a number of different measures of inflation.

Inflation is defined as a general rise in prices, but that immediately raises the question: Which prices? Different prices change at different rates, so to construct an *index* of inflation we must decide which prices we will include and how we will weight them.

In the US, the most important measures of inflation are:

The consumer price index, or CPI. This measures the change in prices of the average basket of goods and services consumed by urban households in the US. The mix of goods in the basket is updated every few years.

The personal consumption expenditure deflator, or PCE. An alternative measure of the price of consumption goods purchased by US households. The main difference between the PCE and the CPI is that the weight of goods in the CPI basket is based on surveys of households, while the PCE basket is based on sales reported by businesses. The PCE also includes purchases on households behalf by third parties, such as medical spending paid for by public and private insurance; the CPI includes only direct spending by households.

The GDP deflator. This measures the price of final goods produced in the US – the same set of goods that are included in GDP. So it differs from the CPI and PCE in that it includes investment goods purchased by businesses, and does not include any imported goods.

The producer price index, or PPI. This measures the price received for all goods produced by US companies, including intermediate as well as final goods.

There are also a number of less widely used indexes.

The CPI is often also computed as a "core" measure, which excludes the most volatile prices – typically food and energy – to give a better sense of underlying trends.

All of these measures can be useful, but none of them is the "true" value of inflation. In fact, there is reason to doubt whether the long run change in the price level is something we can measure at all.

Construction of price indexes is complicated by changes in the types of goods produced in the economy.

When we are comparing the "average" price level in two widely separated periods, or two countries with very different economies, it is hard to know what to do about the many goods that are produced in one but not in the other.

Another problem is the change in the characteristics of the "same" goods over time. The government agencies that construct price indexes try to adjust for quality changes in goods – for better or worse – since paying the same price for a better good is considered equivalent to paying a lower price to the same good. There is no consensus on how to make these adjustments, and they can be quite large, especially for computers and related goods. If these quality improvements are overestimated, that will tend to reduce the reported rate of inflation.

One reason these issues matter is that many government benefits and taxes are adjusted for inflation, including Social Security. If the government adopts a lower estimate of inflation, that means that Social Security benefits will increase at a slower rate over time.

Economists call numbers expressed in dollars "nominal"; when they are adjusted for inflation, economists call them "real".

Any time we are comparing prices of money quantities from two different years, or the discussing the rate of change of a price or

quantity of money, we should consider correcting it for inflation. An annual income of \$25,000 meant something very different in 1975 than it does today, because most goods and services were much cheaper then.

Correcting for inflation means different things depending on what we are correcting. First, we have to choose a measure of inflation. (If an article doesn't say what measure is being used, it is usually the CPI.) Then:

- To correct a rate of change or an interest rate, we simply subtract inflation from the nominal rate. For instance, if GDP is 5% higher than it was last year, and inflation was 2% over the past year, then the "real" rate of GDP growth was 3%.
- To correct a price or a quantity of money for inflation, we first have to set some year as the *base year*. Then we divide nominal values for years other than the base year by the price level relative to the base year. For example, if we are using 2000 as our base year and prices are 25% higher today than they were in 2000, then the "real" value of a price or a quantity of money today would be the nominal value divided by 1.25. Another way of expressing this is that we are converting the nominal figures to "2000 dollars." You can pick whatever base year you want, but it's important to clearly state what base year you are using.
- To correct an exchange rate for inflation, we have to take into account inflation rates in both of the countries involved. We will discuss this more when we get to exchange rates.

Today, inflation is almost always positive, but before World War II, deflation was common.

Despite the differences between the various measures of inflation, some general patterns are clear.

Along with interest rates, inflation is probably the macroeconomic variable with the longest recorded history. From the middle ages up until World War II, periods of rising prices alternated with periods of falling prices; over the long run, the average rate of inflation was close to zero. Over the past 70 years, however, the United States and most other countries have experienced only positive inflation; other than Japan, no major country has experienced a significant period of falling prices.

Since the 1990s, 2 percent inflation has been generally defined as "price stability" and macroeconomic policy in most rich countries has tried, generally successfully, to keep it around that level. (Inflation is

usually higher in poor countries.) Between the late 1960s and early 1980s, most of the world saw inflation well above this level, with most countries experiencing at least brief periods of inflation rates above 10 percent. A significant number of countries have experienced episodes of *hyperinflation*, with inflation rates reaching the hundreds, thousands of or even millions of percent.

Rapid output growth and low unemployment are generally associated with high or rising inflation. Recessions, stagnant or falling output, and high unemployment are generally associated with low or falling inflation. For smaller countries, there is also a strong link between inflation and the exchange rate. An appreciation (strengthening) of the nominal exchange rate is usually associated with low inflation, while a depreciation (weakening) of the exchange rate is generally associated with higher inflation.

Controlling inflation is a central goal of macroeconomic policy....

Historically, price stability has been the most important goal of macroeconomic policy. Up to about 25 years ago, "price stability" was understood to mean no change in the overall price level – that is, zero inflation on average. Prior to World War II, most rich countries did have average inflation around zero over long periods, though they often experienced rising or falling prices over several years at a time. For most of this period, under the *gold standard*, stability of domestic prices was a secondary goal; the overriding priority was maintaining the purchasing power of domestic currency in terms of gold. From World War II to the 1980s, there was a general agreement that while zero inflation was the ideal, higher inflation might be a necessary cost of achieving other goals of policy, especially low unemployment. In practice, inflation in the single digits or even low double digits was often considered acceptable.

Since the 1990s, there has been a general consensus that "price stability" means inflation around 2 percent. In other words, 2 percent inflation is one of the main **targets** of macroeconomic policy. By law the Federal Reserve (the US central bank) must balance the goal of price stability against the goal of low unemployment. For central banks in most other countries, price stability is the only goal that central banks are supposed to pursue. For an *inflation-targeting* central bank, unemployment, output growth, and other macroeconomic variables matter only insofar as they affect inflation.

Why 2%? In fact, there is no good reason. Orthodox economic theory suggests that any rate of inflation is as good as any other, as long as it is constant over time (and in particular, as long as it does not change unpredictably.) Statistical studies suggest that high levels

of inflation are harmful for economic growth, but only at rates well above 2 percent – most studies do not find a detectable negative effect of inflation on growth unless inflation is over 10 percent. In practice, the 2 percent target was agreed on as a compromise between economists and policymakers who believed that inflation ought to be zero on average, and others who thought that substantially higher rates could be acceptable or even beneficial. The 2 percent target was also adopted because it happened to be near the actual rate of inflation in a number of countries at the time that they adopted inflation targets in the 1990s. In any case, however it was arrived at, the 2 percent inflation target is now taken very seriously by central banks and other policymakers in most rich countries. (Developing countries usually tolerate higher levels of inflation, and may still may more attention to the exchange rate than to the domestic price level.)

More recently, there has been a renewed discussion of whether higher inflation – either temporary or permanent – might be desirable. (See the section on benefits of inflation below.) A number of economists have suggested that central banks should change their inflation targets to 3, 4 or 5 percent, and/or should be more prepared to tolerate temporary periods of inflation above their target. There is also a difference between those who think that the goal should be inflation as close to 2 percent as possible, with rates both above and below that to be avoided, and those who think of 2 percent as a ceiling, with lower rates also acceptable. The Federal Reserve takes the first view, the European Central Bank takes the second.

The most important thing for you to know is that price stability is a central goal of macroeconomic policy and the only goal that many central banks are supposed to pursue; and that in practice price stability means inflation of 2%.

... but there is no agreement about what the costs of inflation actually are.

Despite the broad agreement that preventing high inflation is one of the most important goals of macroeconomic policy, there is surprisingly little agreement on why inflation matters. Orthodox economic theory holds that money is *neutral* in the long run, meaning that the long-run path of "real" variables like employment and output should be the same no matter what happens to the price level. This means that if we want to predict, say, the level of real GDP 20 years from now, we should make the same prediction whether we expect inflation to average 0%, 2%, 10% or -5% over the decade. Even in the short run, the only way inflation can have any real effects is if it unexpected. If people expect inflation, they will simply adjust money

contracts for inflation with no other effects. For example, if inflation was formerly 2% but everyone knows it will be 3% in the future, then lenders will demand interest rates one point higher, and borrowers will be willing to pay interest rates one point higher, so exactly the same loans will be made.

The orthodox view, again, is that inflation itself does not matter. However, unexpected changes in inflation do matter, because they mean that people enter into contracts that, after the fact, turn out to be mistakes. Uncertainty about future inflation also matters, since it may prevent people from making contracts that would have been mutually beneficial, or may trick people into making contracts that turn out to leave one party worse off. So while the level of inflation doesn't matter, it does matter that people feel confident about it, whatever it is. And since many important economic decisions are forward-looking, it is important that people also feel confident about the inflation rate in the future. For example, if you sign a 30-year mortgage loan, the "real" interest rate on the mortgage depends not just on inflation today, but on inflation over the next 30 years. So if we think that long-term loans serve an important economic function, we need people to be confident that inflation rates will not change unexpectedly. This means that no matter how the current inflation target – today, 2% – was arrived at, central banks need to stick to it. What's more, they need to demonstrate their commitment to the target, for instance by accepting a higher rate of unemployment than is otherwise socially desirable.