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## 1. Learning Outcomes

After studying this module, you shall be able to

- Know the concept of inflation
- Learn the different types of inflation
- Identify the mathematical formula for calculating inflation
- Get the information about the history of inflation
- Understand various causes and effects of inflation

## 2. Introduction

Economists use the term "inflation" to describe the ongoing increase in the general price level in the economy over a period of time. The rate at which the general price level of goods and services increases in an economy over a period of time is called the inflation rate. A rise in the price level or inflation reduces the amount of goods and services that a person can buy with one unit of money and hence, reduces the purchasing power of the consumers and therefore, reduce their standard of living. A special type of inflation is called hyperinflation when price level rises to an extreme high level, more than 50 percent per month. The opposite of inflation is deflation, a situation where the general price level falls over a period of time.

In this module, we will study different types of inflation, how to measure inflation, what are different economic theories for inflation, and what are the causes and effects of inflation.

## 3. Types of Inflation

Essentially, there are four types of inflation. However, over the years, many economists have come up with other types of inflation as well. We will study these different types of inflation briefly below:

(a) Moderate Inflation

A slow rise in the price level is referred to as moderate inflation. Generally, moderate inflation is good for the economy as it boosts demand, and does not interfere with the balance of payments in the foreign exchange market and with the expectations. Moderate inflation is further sub-divided into Creeping Inflation and Walking Inflation.

(i) Creeping Inflation

Creeping inflation is sometimes called mild inflation. It occurs when the general price level rises by 2-3 percent per year. It is actually beneficial for the economy in the short-run. People are expecting that prices will rise in the future, and so, they increase their

demand today, providing a boost to the economy. Thus, mild inflation is helpful for the expansion of the economy in the short-run.

(ii) Walking Inflation

When the general price level rises at a rate of 3-10 percent per year, it is referred to as walking inflation. Up to 10 percent, it is sometimes considered as manageable by the economy, but it is also considered as a warning signal of higher levels of inflation to come up in the future. If prices rise at a rate of 10 percent per year, in expectations of further increases in the price level, people start demanding more today. They demand more than what they actually need. On the other hand, producers are unable to meet this demand. As a result, prices rise even further. Thus, walking inflation sometimes, is not considered good for the economy.

(b) Running Inflation

When the general price level rises at a rate of 10-20 percent per year, it is referred to as running inflation. It is not a good sign for an economy. Money loses its value. People have expectations about future rise in the price level. Foreign investors start losing their faith in the economy, leading to a decrease in the foreign investment in the country.

(c) Galloping Inflation

Economist Samuelson predicted that if the general price level rises at a rate of greater than 20 percent per year, it is referred to as galloping inflation. It is a starting point where the economy may enter into a stage of hyperinflation. Controlling galloping inflation is important and a challenging task for the policymakers.

(d) Hyperinflation

When the general price level rises by more than 50 percent per month, it is referred to as hyperinflation. The prices rise every minute, causing difficulty in measuring the inflation. It has serious economic consequences. Prices become unstable, wages decreases, money loses its value, purchasing power becomes weak, and inequality increases. We will study hyperinflation in details in the later sections in this module.

Figure 1 below graphically explains these different types of inflation in one diagram.

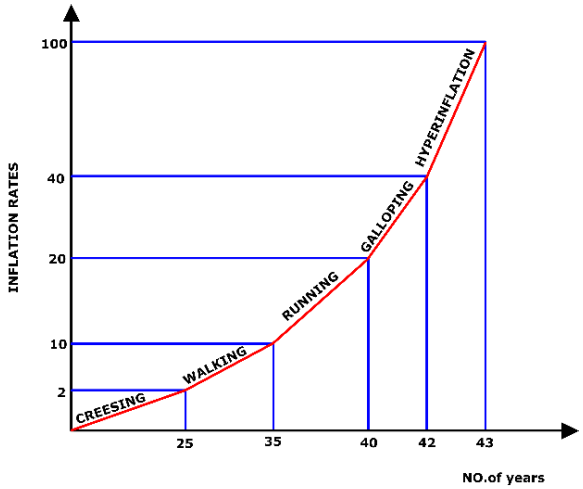


Figure 1: Types of inflation

Though there are these four main types of inflation, some economists consider other types of inflation as well. We have just listed them down below:

(1) Stagflation: A situation of falling output level and rising general price level is called stagflation. Basically, it is a combination of stagnation and inflation.
(2) Core Inflation: A situation where price level rises for every other commodity except for food and energy is called food inflation
(3) Food Inflation: A rise in the price level of food items is called food inflation.
(4) Wage Inflation: A situation where the wages of the workers rise more than the cost of their living, due to shortage of workers in the economy, is called wage inflation.
(5) Asset Inflation: A situation where the price level for one asset class rises over a period of time, like housing, gold, oil, etc, while overall inflation rate is low, is called asset inflation. The subprime crisis of 2008 is an example of asset inflation in the mortgage housing market.

## 4. Measurement of Inflation

A rise is the general price level over a period of time is measured by inflation rate. Inflation rate is measured as a percentage change in the general price index per year. Usually, consumer price index (CPI) or wholesale price index (WPI) is used to measure the inflation rate. In Unites States, inflation is measured by consumer price index, while in India; it is measured by wholesale price index.

Inflation rate measures the change in the prices of the basket of goods and services that are included in the price index over a year. Thus, inflation rate is calculated on year-on-year basis. The simple formula to calculate inflation is as follows:

$$Inflation\ Rate = \left(\frac{WPI\ in\ the\ month\ of current\ year - WPI\ in\ the\ same\ month\ of\ the\ last\ year}{WPI\ in\ the\ same\ month\ of\ the\ last\ year}\right)100 \quad (1)$$

An inflation rate of 5 percent means that if the basket of goods and services were purchased at rupees 100 last year, now it costs rupees 105. So, either the consumer will buy less or will increase his consumption expenditure to make his consumption in the current period same as his consumption in the previous period. Note that the basket of goods and services has to remain the same to measure inflation rate from one year to another.

## 5. History of Inflation

Inflation occurs when there is a rise in the price level. This rise in the price level could happen due to increase in the money stock. To know the history of inflation, one needs to know the history of money. Initially, money was used in terms of commodity which has some intrinsic value. This sort of money was called commodity money. The best example that history provides us is the Gold Standard System.

Under the Gold Standard System, money was measured in terms of gold. Gold was used as a medium of transaction. To control for a rise in the price level, government used to melt down the gold coins, and dilute it with silver or copper. As a result, the government could issue more money without actually increasing the amount of gold in circulation. This increases the price of goods and services. Under Gold Standard System, the inflation rate was determined by the supply of gold relative to the total output. Some economists argued that the money supply would essentially be guided by the amount of gold mining that is done in a country, and hence, there will be arbitrary fluctuations in the inflation rates.

Thus, the Gold Standard System was abandoned with the adoption of an international system called Bretton Woods System, where all major currencies were tied to to the US dollar at a fixed rate. However, in the year 1971, Bretton Woods System broke down, and most of the countries switched to “Fiat Money”. Fiat Money is the money which has no intrinsic value of its own, but it is used as money for doing transactions. The supply of money is controlled by the central bank, and hence the fiat money is now governed by each country’s own rule of law.

## 6. Causes of Inflation

There are different theories predicting the causes for inflation, the major ones are the Keynesian theory of inflation, monetarist view of inflation, rational expectation theory behind inflation, and the Austrian view of inflation. The causes for inflation and hyperinflation are the same, and we will explain them below:

(a) Keynesian View on the causes of inflation

Keynesian economists held the view that price level rises or there is inflation not because of rise in the money stock, but because there are some factors within the economy itself, that causes inflation. They discuss three reasons for why inflation occurs. These are as follows:

(i) Demand Pull Inflation

Demand pull inflation is caused by an increase in the aggregate demand in the economy, due to increase in investment demand or consumption demand or the government demand. This type of inflation actually boosts the economic growth as it will stimulate further investment in the economy in the short-run, until the economy is below full-employment level. If aggregate demand rises beyond the potential output of the economy, it becomes harmful. The following diagram explains demand pull inflation. In figure 2, aggregate demand in the economy increases from $AD_0$ to $AD_1$, increase in the price level actually provide a boost to the economy, raising the output to $Y_1$. However, if aggregate demand increase by a large amount, say to $AD_2$, the economy reaches it potential output, and price level rises by a very large amount to $P_2$. This type of inflation is called demand pull inflation.

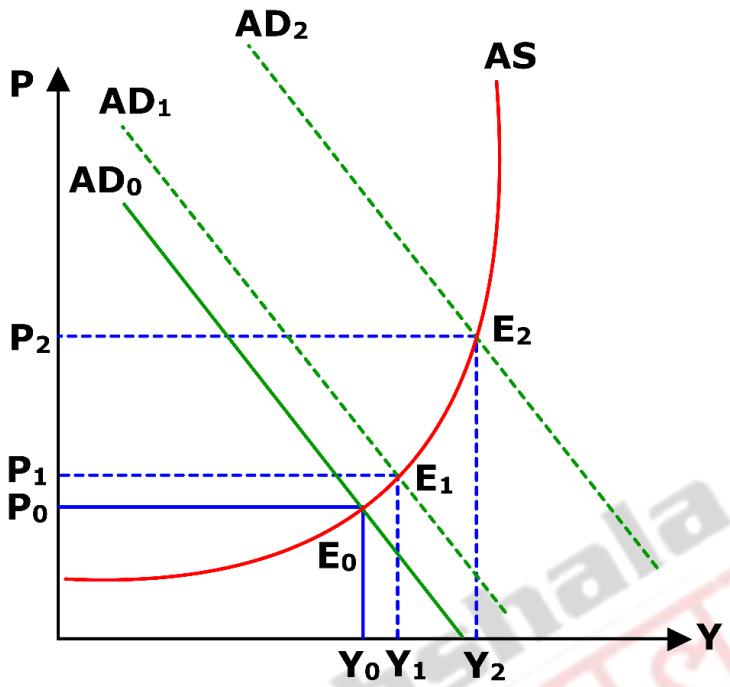
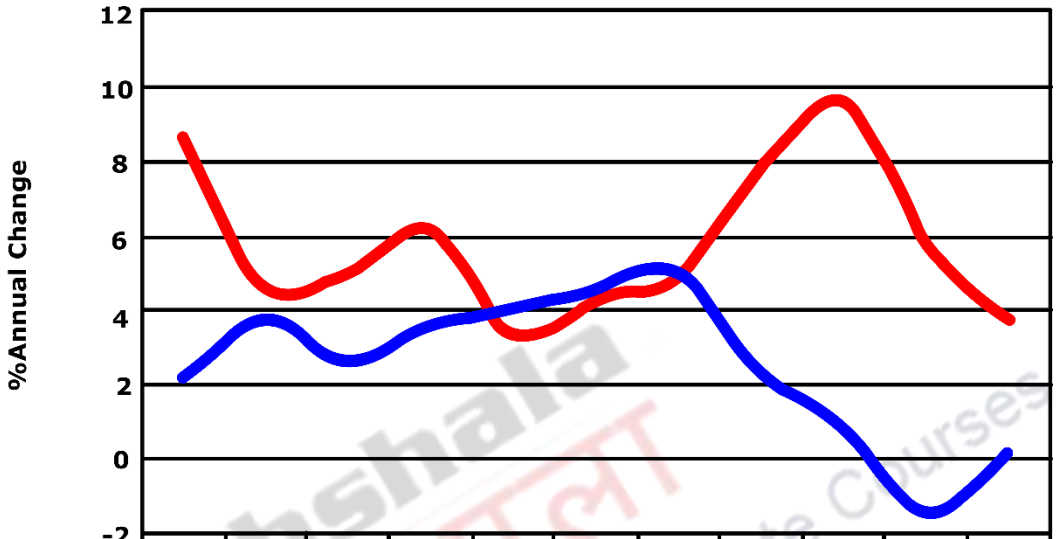


Figure 2: Demand pull inflation occurs due to large increases in aggregate demand

To give an example, consider the demand pull inflation in UK during the Lawson Boom in the late 1980s. Due to increasing housing prices, tax cuts, and high consumer confidence, the economy grew at a 5 percent. But the economy was unable to meet this increased demand, and hence prices rose by nearly 8 percent. It was only when the economy went into recession in 1990 and 1991, that there was a fall in the inflation rate.

Figure 3 shows growth rate and inflation rate of UK during this period.




| | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP Grawth | 2.2 | 3.7 | 2.7 | 3.6 | 4 | 4.6 | 5 | 2.3 | 0.8 | -1.4 | 0.1 |
| Inflation | 8.6 | 4.6 | 5 | 6.1 | 3.4 | 4.2 | 4.9 | 7.8 | 9.5 | 5.9 | 3.7 |

Figure 3: Growth Rate and inflation rate in UK during 1982 to 1992
Source: http://www.economicshelp.org/blog/2656/inflation/different-types-of-inflation/ (accessed on May 23, 2015)

(ii) Cost Push Inflation

Cost push inflation, also called "Supply Shock Inflation" occurs due to negative supply shock to an economy. This supply shock can happen due to rise in energy prices, oil prices, or due to some natural disaster that reduces the inputs available for production. Thus, supply shock inflation occurs due to a rise in the cost of production. Central bank can hardly do anything to control of this type of inflation. Consider figure 4 below. Due to a negative supply shock, aggregate supply curve shifts upwards to the left, from $AS_0$ to $AS_1$, decreasing the output level in the economy to $Y_1$, and raising the price level from $P_0$ to $P_1$.

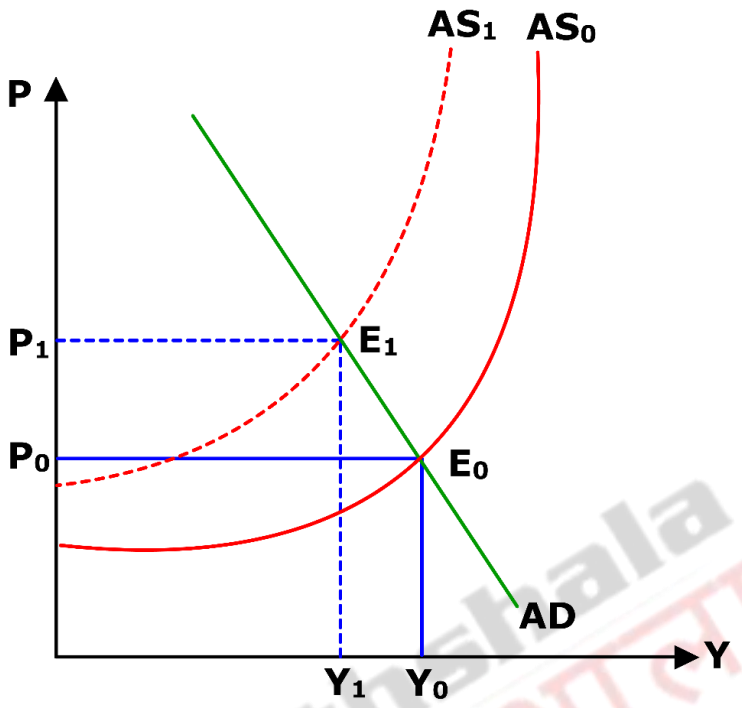



Figure 4: Cost-push inflation, caused by a shift in aggregate supply curve

To give an example, consider the case of UK during 2007-2011, where due to rise in oil prices, rise in tax rates, and rise in import prices, inflation rate increased to nearly 5 percent, well above the target of 2 percent. By 2013, when the influence of cost-push factors has almost disappeared, inflation rate had fallen back to the target of 2 percent.

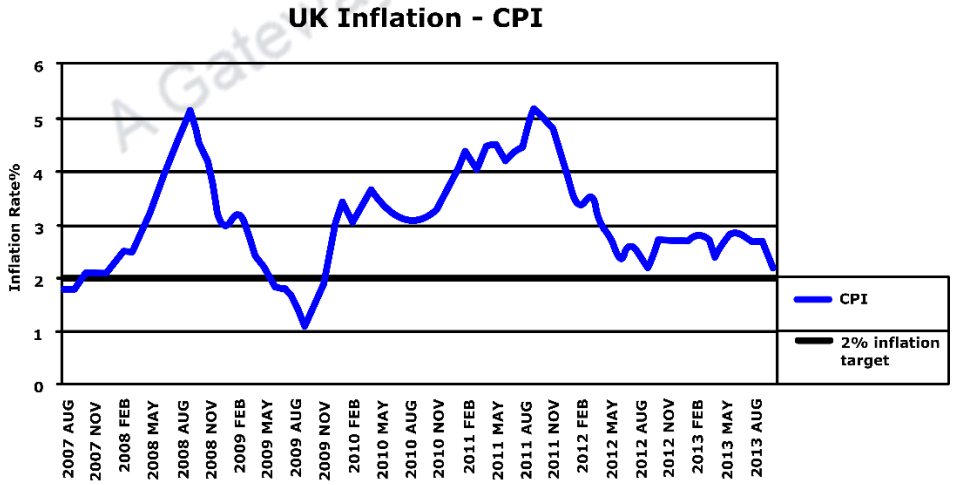



Figure 5: Actual versus targeted inflation rates in UK during the periods of cost-push inflation

Source: http://www.economicshelp.org/blog/2656/inflation/different-types-of-inflation/ (accessed on May 23, 2015)

(iii) Inflation due to Wage-Price Spiral

The third cause of inflation is related adaptive expectations. If workers revise their expectations for the price level in the current period on the basis of the difference between actual and expected price level in the last period, it is said that workers have adaptive expectations about the price level. The workers try to match their nominal wages with the increase in the price level, to ensure that their real wages are the same. As a result, they ask for higher wages, the cost of which firms pass on to the consumers in the form of higher prices. This leads to a spiral between wages and prices. This type of inflation is sometimes called "built-in inflation", or "hangover inflation". To give and empirical example, in UK, during 1970s, trade unions forced the firms to increase their wages, leading to higher price level in general, and hence inflation.

(b) Keynesian View on the causes of Hyperinflation

The three causes of inflation, discussed above under the Keynesian view, can be extended to interpret as the causes of hyperinflation. If the demand pull inflation happens not due to increase in private or government spending, but due to an increase in the money supply in the economy, it leads to a situation of hyperinflation. If the central bank prints in more money, and throw in in the market, money supply will increase, leading to an increase in aggregate demand, and hence hyperinflation. For instance, The Yuan Dynasty, in China, during 1948-49, printed huge amounts of fiat paper money to fund their wars, resulting hyperinflation. During this period, the inflation rate was nearly 5070%, an example of hyperinflation.

If there is an extreme supply shock situation, it may lead to hyperinflation due to cost push inflation. For instance, in Poland, during 1989 and 1990, there were excessive subsidies to the state sector production. The government marketized the agricultural production, resulting in the liberalization of retail food prices. This led to an immediate jump in the food prices by nearly 40 percent. Thus, due to high food prices, and due to wage-price indexation, inflation rate in Poland was around 77 percent during January, 1990.

(c) Monetarist View of Inflation

According to monetarists, inflation occurs due to an increase in the money stock in the economy. Milton Freidman, after whom the monetarist school of thought begins, stated, "*Inflation is always and everywhere a monetary phenomenon.*" To understand this theory, refer to the quantity equation of money, given as follows:

$$MV = PY \tag{2}$$

Where, M=Stock of money in the economy

V=Velocity of circulation, i.e. the number of times money changes hands
P=Average Price level
Y=Aggregate Output in the economy

Monetarists assume that the velocity of money (V) is unaffected by the money supply in the economy. Output (Y) is determined by the real factors, like factors of production in the economy. Thus, the only thing that can change the price level is the level of money stock in the economy. Higher the money stock, higher is the price level, leading to inflation in the economy.
Hyperinflation, according to monetarists, occurs due to rise in money stock in the economy, which they called as "monetary model of hyperinflation". However, given the money stock, if there is an increase in the velocity of money, it leads to hyperinflation in the economy. This model is called "Crisis of Confidence model of hyperinflation". This occurs when due to some external event, like a defeat in a war, people of the country do not want to hold the paper currency. They want to trade away their paper currency for bonds or commodities, increasing the velocity of money, and hence the price level, causing hyperinflation in the economy.

(d) Rational Expectations Theory as a cause of Inflation

According to this theory, while forming their expectations, individuals will take into account all available information. Individuals will act rationally and predict the behavior of central bank regarding inflation. For instance, if a central bank has a reputation of being "soft" on inflation, when it announces a new policy for fighting inflation with restrictive monetary growth, economic agents will not believe it, and their inflationary expectations will remain high, and so will inflation.

(e) Austrian View on the causes of inflation

Austrian economists view that inflation occurs when an increase in the quantity of money is not offset by a corresponding increase in the need for money.

## 7. Effects of Inflation

An increase in the general price level reduces the purchasing power of the currency by reducing its real money value. There are many effects of inflation, which could be negative or positive for the economy as a whole. Let's discuss them briefly:

(a) Social costs of inflation: The effect of inflation is not evenly distributed to all the the sections of the society. For instance, those who own fixed assets like property, etc experience a gain in the value of their physical assets. While those who earn a fixed salary experience a fall in their real wages, as adjustment to wages always lag behind the adjustment to the price level. Moreover, there will be redistribution of income from those who have fixed income like pensioners to those whose

income get adjusted to the changes in the inflation rates. Thus, inflation causes inequality in the society.

Not only this, inflation can also lead to social unrest, and sometimes even to revolts. For example, food inflation is considered as one of the main reasons behind the 2010–2011 Tunisian revolution.

(b) Costs to lenders and investors: According to the Fisher's equation, real interest rate is nominal interest rate less inflation or ($r = i - \pi$). Thus, when price level rises, debtors will experience a fall in the real interest that they have to pay, while lenders will experience a fall in the real interest that they receive. The value of savings gets reduced. In case of hyperinflation, it merely means a transfer of funds from the hands of the public to the government.

(c) Hidden tax costs: If the wages or incomes are adjusted to the rise in the price level, to make the purchasing power same, the people enter into a high tax bracket, unknowingly increasing their tax burden.

(d) Effects on international markets: On the international front, an increase in the price level, under fixed exchange rate, will make the exports from the country more expensive than the imports, worsening the trade balance. On the capital account as well, foreign investors lose their trust in the economy, leading to withdrawal of already invested capital and fall in the new investments.

(e) Hoarding: Due to rise in the price level, and due to expectations for further rise in the price level, people durable goods in bulk, and hoard them as wealth. They do so to avoid the losses from the declining purchasing power and to avoid any shortages of these commodities.

(f) Other costs: High inflation increases the opportunity cost of holding money, and hence people want to hold assets. But to make payments for these assets they have to make frequent visits to the banks to withdraw cash. These costs are called shoe-leather costs. Another type of cost is the menu cost. With the change in the price level, firms have to change the prices they set for their commodities, which require extra time, effort and money. These costs are called menu costs.

(g) Business Cycle: Austrian economists believe that the most devastating effect of inflation is the starting up of business cycle. According to Austrian Business Cycle Theory, due to inflation, real interest rates get lowered, money supply is increased to keep the real interest rates same. This leads to speculative borrowings, and the money is invested in bad investment projects, eventually making the economy unsustainable.

## 8. Summary

- A rise in the general price level is called inflation.
- Low or moderate rate of inflation is good for the economic expansion, but galloping and hyperinflation are harmful for the economy.
- Extreme rise in the price level, more than 50 percent per year is called hyperinflation.
- Inflation is measured as a ratio of change in current year price level from previous year price level to the previous year price level.
- According to Keynesian view, inflation is caused by the mismatch between demand and supply of goods and services in the economy. Excessive demand leads to demand pull inflation, while negative supply shock leads to cost push inflation.
- According to Monetarists, inflation is caused by the increase in the money supply by the central bank.
- Effects of inflation are: reduction in purchasing power, increase in tax costs, increase in social inequality, and sometimes leading to social unrest in the society, decline in the confidence of foreign investors, worsening the trade balance, excessive hoarding in durable goods, and setting up a business cycle in the economy.