



Course: Economics I (macroeconomics)

## Study text

9th Chapter

Inflation and Anti-inflationary Policy

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## 9 Inflation and anti-inflationary policy

In this chapter we will deal with inflation, another macroeconomic instability. Inflation is a macroeconomic phenomenon that attracts a lot of attention and touches all of us, because money loses its purchase power during inflation. Beside it, deflation is not desirable, too. Within the text, we will discuss ways of measuring inflation, inflation forms; we will discuss the implications of inflation on the economy and take into account the possibilities of macroeconomic policy trying to reduce the inflation rate.

What happens when inflation in the real economy, we were able to observe in the past. In 1923 prices increased up to a billion times in Germany, compared to the pre-war situation. Prices rose at a pace that workers had official breaks, to spend their wages paid several times a day, because purchasing power of money fell the incredibly rapidly during the day. Prices for food and drink in restaurants increased as people have not even finished eating. Savings were completely degraded, as well as outstanding loans. People needed bags for money to buy bread and butter. At prices rose, nobody could afford to save, invest, lend money or make long-term plans. In an environment of rising prices the production of goods and services virtually halted, unemployment increased quickly and German economy was on the brink of collapse. Hungary experienced a similar case in 1946, as well as Japan. Quite recently prices have undergone at least a tenfold increase in Russia, Brazil, Zaire, Yugoslavia, Argentina, and Uruguay. The Czech Republic experienced higher inflation at the beginning of the 90s.

### 9.1 Inflation and its typology

Most people understand inflation as an increase in prices for some goods or services. But the economy does not necessarily suffer from inflation every time when the price of several goods rises. We have to distinguish between the inflation and price increases of specific goods. **Inflation is an increase in the average price level**, not just the increase in prices of specific goods.

Imagine our task is to determine the average price of fruit at a supermarket. We need to know the price of apples, oranges, bananas, peaches etc. If we know the price of each fruit, we will be able to calculate the average cost of fruit. The final figure will not apply to any particular product, but it will tell you how much a typical shopping basket of fruit probably costs. If we repeat this calculation each day, we will be able to determine how much the prices of fruit vary. Sometimes we find that while the price of bananas is growing, oranges price is falling, so the average price of fruit remains unchanged.

The same principle will be applied in calculating the inflation for the economy as a whole. First, we find the average price of all output or average level of prices and then we observe the changes of the average price level.

The average price level can increase, decrease, or may remain unchanged. **Deflation** occurs when prices drops for some goods and services outweigh the prices increases of other goods and services. This situation occurred e.g. in Japan in 1995 and again in 2000.

The process of reducing inflation over time will be referred to as **disinflation** (inflation rate decreases over time (e.g. from 5% to 4%, then 3%). The opposite phenomenon is **the acceleration of inflation** (inflation rate increases over time - its growth is accelerating).

Inflation or deflation is measured in terms of average price levels. Increases or decreases in individual prices affect the average price level. We have already stated that e.g. the price of bananas can grow without increasing the average price of fruit, unless the price of some other fruit e.g. oranges is falling. Under these circumstances, **the relative prices** are changing. Increasing relative price of bananas means that bananas are more expensive compared with other fruit more expensive. Changes in relative prices can occur in a period of stable average prices, in periods of inflation or deflation. Changes in relative prices are a fundamental part of the market mechanism. Change in the relative price of specific goods is important market signal.

Inflation that does not change the relative (relative) prices of goods and services is called **balanced**. **Unbalanced inflation** means that the relative prices of goods and services alter. Unbalanced inflation changes the equilibrium situation at the markets. Manufacturers will have to change the volume of production.

If the price average level grows and price index is changing, we are talking about an **open inflation**. In the case of certain price regulation due to the economic policy of the country, we talk about **blocked inflation**, which has implications in terms of the existence of scarce goods, characterized by the growth of forced savings and expansion of the shadow economy. After the removal of barriers blocked inflation will turn into open inflation.

Inflation not captured in the price index is referred to as **hidden**. It arises even if there is deteriorating quality of products and services, while their prices are constant.

Inflation can be distinguished by **quantitative perspective**:

- **mild (creeping) inflation** - is up to 10%. The growth rate of the price level does not exceed the rate of output growth of the economy. Nominal and real product are rising. Economic operators are willing to keep the money;
- **galloping inflation** - has a value from 10 % to 1000 %, it is the rapid or very rapid growth in the price level. The purchasing power of money decreases and economic operators reduce holdings of money, up to a minimum, depending on the seriousness of inflation. In the case of high inflation the escape from

money (from the domestic currency) may occur. People usually prefer other currencies;

- **hyperinflation** - reaching a value of over 1000 %. This is an extreme situation. Money no longer performs its functions, the escape from money occurs and people usually prefer barter or use a different currency. A monetary reform is needed in the economy.

Economic agents perceive inflation and take it into account during their decision-making processes. They expect a certain level of inflation in the next period. We speak the **expected (anticipated) inflation**. Inflation is projected to commercial contracts, unions are clamoring for adjustment of wages to the price level growth, as well as recipients of fixed incomes - transfers. If inflation occurs at the same level as in the previous period and remains so in an economy without any cause, it is called **inertial inflation**. Thus, we can have inflation if we expect it. When actual inflation exceeds expected inflation, we are talking about **unexpected inflation**.

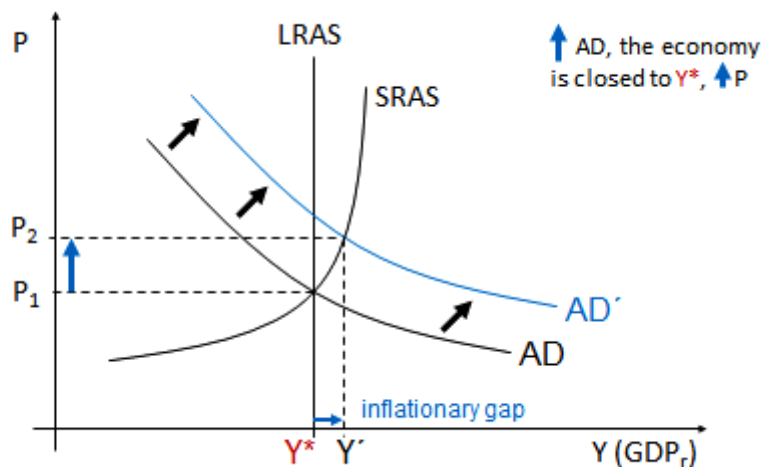
## 9.2 Causes of inflation

Changes in inflation rates require explanation. All market transactions involve two converging forces - supply and demand. Any explanation of the changing price levels must be rooted in one of these two basic market forces. Causes of inflation will be distinguished according to whether they arise on the side of aggregate supply or aggregate demand.

### **A) Demand-pull inflation**

A frequent cause of inflation is excessive pressure on the demand side of the economy. Suppose that the economy is already producing under conditions of full utilization of resources, but that consumers are willing and able to buy even more goods. With the accumulated savings or easy access to credit to consumers as a result try to buy more output than the economy produces. As consumers try to get more goods stores and stocks are beginning to empty. Manufacturers begin to raise prices. The result will be an increase in average prices caused by demand or demand-pull inflation. Demand-pull inflation is illustrated in Fig. 9.1. When aggregate demand grows from AD to AD', real output will increase but is accompanied by greater rise in average price level in the short run. The difference between actual and potential output denotes inflation gap. In this context, economists talk about the *overheating of the economy*. In the long run there is only increase the price level and the new macroeconomic equilibrium is formed on the basis of intersection LRAS with AD'.

Fig. 9.1 Demand-pull inflation

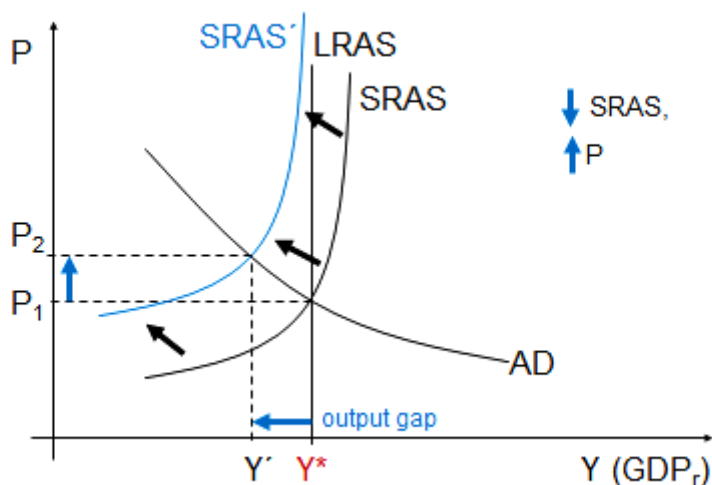


### B) Cost-push inflation

Pressure on prices may also arise on the supply side. When oil prices rise sharply, costs will increase suddenly in a wide range of industries. Producers have to increase prices to cover the higher costs. When there is a natural disaster (flood, fire), a part of the production capacity is destroyed, including agricultural production. Market participants begin to focus on the remaining production and price rise may extend across country boundaries. Inflationary pressures may originate at higher wages. If the unions are able to enforce significant wage increase, business costs will increase and that will cause an increase in prices of goods and services. Cost-push inflation is illustrated in Fig. 9.2. A decrease in the short-run aggregate supply SRAS level  $SRAS'$  causes a fall real output in the economy and rise in the aggregate price level. The difference between the actual real and potential product indicates a production gap. Compared to the demand-pull inflation the economy may not be located at the level of potential output.

If the economy is experiencing a fall in real output, while increasing the overall price level, we are talking about **slumpflation**. **Stagflation** is something else, when we mean zero output growth and inflation. To stagflation may occur because of inflation expectations.

Fig. 9.2 Cost-push inflation



### 9.3 Measurement of inflation

Measuring inflation serves two purposes: to quantify the degree and examine its negative impacts. Price indexes are used for measuring the changes in aggregate price level. The most common price indexes are consumer price index (CPI), the Producer Price Index (PPI) and the implicit price deflator (GDP deflator).

#### A) CPI – Consumer Price Index

This price index is a means for measuring changes in the average price of consumer goods and services. If we know the average price of consumer goods, we will be able to see if this average increases.

Calculation process begins by identifying a market basket of goods and services that the typical consumer buys. The number of items in the consumer basket is changing over time, to express as accurately as possible the structure of the consumer basket of households. The weight of goods and services (price representatives) corresponds to the share of consumption on total household consumption.

Once we know what the typical consumer buys, it is easy to calculate the average cost of the basket. Measuring inflation using the CPI is done by comparing the prices of the consumer basket, **in the current and the base period**. The price level in the base period is usually set at 100. Suppose, last year was a market basket cost of CZK 10,000 and the same basket of goods and services cost CZK 11,000 this year. We can derive that consumer prices increased by 10 %.

Various figures are published while expressing inflation, even if they are different, they are correct. It depends on period. The condition is accurate factual, spatial and temporal definition. This means we must state the period for which inflation rate is indicated and the basis for measurement.

Now look at the formulas for calculating the rate of inflation. First, we calculate the CPI, at time  $t$  and  $(t - 1)$  and then we calculate the inflation rate as the growth rate of CPI. The CPI captures the dual costing a representative consumer basket, in which  $i = 1, 2, 3, \dots n$  are different types of goods. The numerator represents valued basket at current prices (denoted by the subscript  $t$ ) and the denominator represents basket at constant prices of the base period (denoted by the subscript  $0$ ). The letter  $p$  denotes the price of the goods and  $q$  denotes a share good weight in the consumer basket.

- The calculation of the rate of inflation using the CPI: the proportion of the cost of a representative basket of consumer at time  $t$  cost of acquisition of the basket in the base period.

$$\bullet \text{ CPI} = \frac{\sum p_t^i \cdot q_0^i}{\sum p_0^i \cdot q_0^i} \cdot 100 [\%]$$

$i = \text{goods or services}$

→ double pricing in the consumer basket

- Inflation rate ( $\pi$ ): growth rate of the CPI:

$$\pi = \frac{\text{CPI}_t - \text{CPI}_{t-1}}{\text{CPI}_{t-1}} \cdot 100 [\%]$$

### **B) PPI – Producer Price Index**

PPI monitors average prices relating to producers. There are three PPI indexes. One index includes the prices of raw materials, the second covers intermediate goods prices and the third includes final products. These three PPI indexes do not include all prices, but focus mainly on producer prices of heavy industry, manufacturing industry and agriculture. In the long term, CPI and PPI reflect the same rate of inflation. In the short term, PPI increases earlier than CPI, because it takes some time before the increase in producer prices will be reflected in the prices paid by consumers. For this reason, the PPI is carefully monitored, since PPI indexes act as a signal of potential changes in consumer prices.

### **C) IPD – Implicit Price Deflator**

The widest price index is the implicit price deflator or the GDP deflator. This price index covers all output. Unlike the CPI and PPI, GDP deflator is not based on a fixed basket of goods and services. GDP deflator enables a change of basket varied according to the patterns of consumption and investment. GDP deflator is therefore not a pure measure of price changes. Its value reflects both price changes and market response to these price changes, reflected the new model costs. As a result, the GDP deflator will typically experience a lower rate of inflation than the CPI index. GDP deflator is used to adjust the nominal value of output (GDP) to change price

levels. It is calculated as the ratio of nominal and real gross domestic product of the economy:

$$IPD = \frac{\text{nominal GDP}}{\text{real GDP}} \cdot 100 (\%)$$

## 9.4 The impact of inflation on the economy

### ***Redistributive effects***

Inflation means worsening economic situation for some people and for other improvements. Macroeconomic effects of inflation are reflected in the redistribution of income and wealth, not in the general decline of one of the indicators of economic welfare. The redistribution occurs because people buy different combinations of goods and services; they own distinct properties and sell different goods or services (including labor). The impact of inflation on individuals will therefore depend on how prices of goods and services are changing that each person actually sells or buys.

Inflation works like **a tax** – inflation takes income or property from one group of people and gives income or property forwards from them to another group of people.

### ***Price effects***

Price changes are the most visible effects of inflation. We can afford to buy a smaller quantity of goods and services. While purchasing power of the monetary unit is falling during inflation, we will need a larger amount of money. Nominal incomes usually rise in an environment of increasing price level. Nominal income is the amount of money we get for a certain period of time and is measured in monetary units. On the contrary, the real income reflects the purchasing power of the money and is measured by the amount of goods and services that monetary unit can buy. We have to take into account that:

- *not all prices increase at the same time during inflation*, usually, some prices are increasing rapidly, others only slightly, and some actually falling,
- *not everyone suffers from the effects of inflation as well*, those who consume goods and services whose prices grow faster, are more affected; their real incomes fall more.

### ***Income effects***

Redistribution effects do not originate only in spending, but also in incomes. In fact, some people's incomes can rise faster than inflation, while other incomes can grow slowly. Some people have fixed incomes not changing during inflation. Also, banks that lent money at a fixed interest rate may have losses. However, not all market participants suffer a decline in real income when inflation.



### ***Wealth effects***

Inflation reduces the real value of any savings. It reduces the real value of wealth. Money in an inflationary environment kept a lower value for the future.

### ***Social tensions***

Social and economic tensions increase because of the redistributive effects during inflation. There is tension between labor force and management, between government and citizens (consumers).

### ***Psychological factors***

Consumers whose nominal income is growing at the same rate as inflation, they often feel harmed by rising prices. These people feel that they deserve any increase in wages. When they find out they are not able to buy additional goods or services, they feel cheated. They feel that they are worse off, when in fact they did not suffer any real loss of income. Constantly they will compare how much bread or milk cost a few years earlier and today.

### ***Makroeconomic consequences***

When inflation is balanced and anticipated, it does not affect the size of the product and its distribution. If not, it can change **the size and composition of output**, through changes in consumption, work effort, savings, investments and behavior of firms.

One of the most immediate effects of inflation is **uncertainty**. When the price level is changing appreciably, it is difficult to make economic decisions. The company planning to build a new factory, it may ultimately decide that it do not allow the construction due to the escalating costs of construction.

In an inflationary environment, people are facing inflation **uncertainty and shorten their time horizons**. If consumers and manufacturers begin to postpone or cancel their spending plans, demand for goods and services will decrease. As a consequence, production of goods and services falls.

**Speculative activities** are generated during inflation. When prices are rising rapidly, some people may even earn when buying houses, precious metals, commodities that are traded through the stock exchange or they can buy other assets to sell them later. If the profits from speculation are very easy, it can affect the production process negatively and it can increase the unemployment.

A decline in savings, investment and labor can be caused by rising taxes. If there is a progressive taxation in the economy, higher nominal wages move into higher tax brackets and people have to pay higher taxes. Such a phenomenon is called **taxflation**.

It should be noted that the **declining price levels - deflation** - also has a negative impact on the economy. Falling prices can cause serious damage as well as rising prices. Deflation causes reverse redistribution. Decreasing price level has negative macroeconomic consequences. First, consumers and investors begin postponing their purchases due to the expectation of further price declines. Producers cut production due to falling prices. This will result in a decrease of the product and in an increase of the unemployment rate.

### 9.5 Anti-inflationary policy

The price level growth has a negative impact on the economy, so methods that would suppress inflation are seeking. We can mention **restrictive fiscal and monetary policy** triggering a decline in aggregate demand and thus a decrease in the price level and the decline in production. Another option is to use the tools of other macroeconomic policy - income policy.

**Income policy** focuses on negotiations between employers, unions and the government (i.e. tripartism), in order to minimize the unemployment rate, without increasing the rate of inflation. Tools comprise a wage freeze, wage growth restricting or voluntary restriction of wages and prices.

#### **Determination of the inflation target**

Czech Republic sets price stability (maintaining the quality of the currency) as a fundamental objective of macroeconomic policy. The Czech National Bank has been targeting inflation since 1998. As can be seen in Fig. 9.4, there are target intervals or point targets set by the Czech National Bank. The inflation target of 2 % has been valid from January 2010.

*Fig. 9.4 Inflation targets of the Czech National Bank*



Source: [http://www.cnb.cz/en/monetary\\_policy/inflation\\_targeting.html](http://www.cnb.cz/en/monetary_policy/inflation_targeting.html).

## 9.6 Mechanisms fighting inflation

### ***Valorisation of fixed incomes***

Indexation (revaluation) of transfers and other fixed income is a tool how to fight inflation. When inflation rate exceeds a certain limit, social security benefits and other fixed incomes are increased. Indexation, based on changes in the cost of living, ensures that the nominal benefits keep pace with the growth in prices. Indexation protects all fixed income against inflation.

### ***Wage indexation***

Wage indexation is a mechanism when wages increase according rising average price level. In reality wages are rising at a slower pace than the prices of goods and services that the economy does not end up in the *inflationary spiral*. Wage growth might lead to an increase in costs for companies and it might lead to further inflation.

### ***Interest rate adjustments***

Adjustments are also promoted in the loan agreements. When the price level increases, debtors are better off. Suppose a loan that requires the payment of interest of 5 % of the amount borrowed. If the inflation is 10 %, and prices rise faster than the rate of interest, then **the real interest rate** (adjusted for inflation) will be negative (- 5 %). Approximately we can say:

$$i_r = i_n - \pi^e$$

$i_r$  denotes the real interest rate,  $i_n$  denotes the nominal interest rate and  $\pi^e$  denotes expected inflation. The nominal interest rate is the sum of the real interest rate and expected inflation rate:

$$i_n = i_r + \pi^e$$

Differentiating between real and nominal interest rates is crucial for long-term loans, e.g. for a mortgage on a house. In an inflationary environment, lenders lose, thus banks offer mortgage loans, for which the rate of interest can vary. Mortgages with adjustable interest mean the interest rates that may vary over the duration of the loan.

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