

Unit 7: Interest and inflation

1. Interest

1.1 Interest rate

The **interest rate is the price of money**. When a person values his future consumption more, he decides not to spend all his money today and, therefore, lends it with the intention of recovering the loan in the future, together with some returns. These returns are called interest. When we express these as a **percentage** of the lent money, we talk about the **interest rate**.

Martin decides to save 600 euros. To do this, you can choose between different options: keep them in the house piggy bank, enter them into a savings account that promises 1% per year, invest in an investment fund that has an average return of 2.25% per year or lend them to her cousin Lucia, who will return 615 euros within a year.

- In the first option, the annual interest rate is 0%, and the yield (interest) is null. In fact, Martin does not pay any money, but he keeps it guarded at home.
- In the second scenario, the annual interest rate is 1%. Therefore, at the end of a year, Martin would have the initial 600 euros plus 1% of these (6 euros). In total, €606. The interest amounts, therefore, to 6 euros.
- The third option has an uncertain outcome. The only thing we know is that, in the past, this type of investment generated a 2.25%. If these conditions are maintained, the annual interest rate would be 2.25%, and therefore interests would amount to 13.5 euros.
- The fourth option involves paying money to a family member, which promises us interest rates after a year of 15 euros. What is the interest rate?

$$615 = 600 + 600 \cdot i$$

$$i = 0.025 = 2.5 \%$$

The interest rate is usually expressed in yearly terms, as we have seen in the examples, and gives quick information about the performance of any investment (savings), as a percentage of the initial capital invested or saved. In this way, any investor can easily deduce how many interests he would get for every 100 euros spent or saved.

Why an interest rate?

One of the reasons why we demand a return on our savings rests on the fact that money loses value over time.

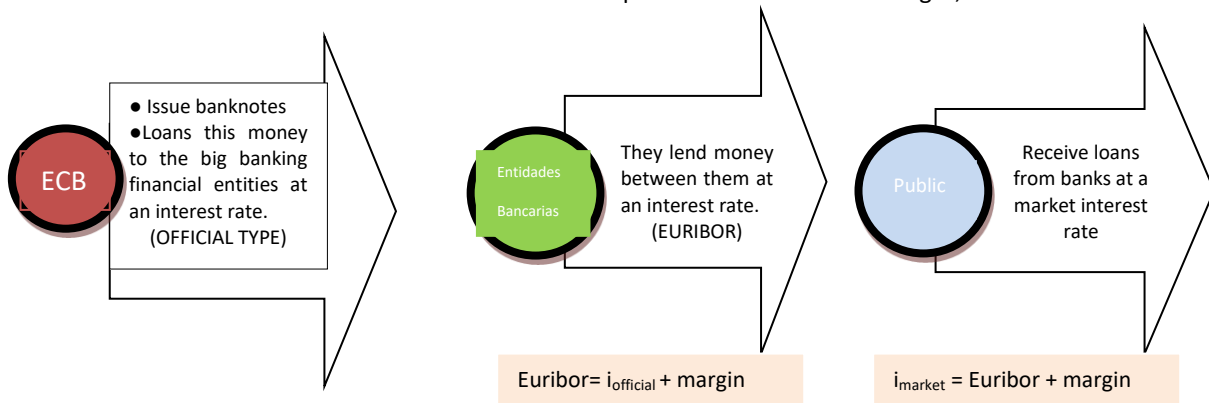
Indeed, the prices of goods and services go up, so one can't buy the same things with this money. Your purchasing power decreases. Therefore, if we lend 100 euros today and do not demand anything for it, within a year we won't be able to buy with those 100 euros everything that we can buy today, since prices will have gone up. So, for example, if prices rise by 1% in one year, we would need to demand at least 1% to keep our purchasing power constant.

1.2. Who determines the interest rate?

If the interest rate is the price of money, it could well happen that this is determined freely in the money market. That is, savers and non-savers would negotiate the interest rate in each case for any amount and term.

However, in reality this is not exactly so, because of the special nature of the asset that is exchanged (the money). Starting from the fact that money is not a free property, but it is part of a regulated and monopolized market (legal tender: money issued by a single institution, the ECB), the interest rate will be, therefore, a regulated price.

Let's see in the following diagram how the **official interest rate** of money is determined and how this price undergoes **modifications** until it becomes the interest rate that the public handles in its exchanges, the **market interest rate**.



Activities

1. Calculate the interest generated and the total obtained in each case:

- Capital is invested from 1,200 euros to 5% per year for 1 year.
- The total capital that has been obtained in the previous section is reinvested again at 5% per year for another year.
- If the interest generated in section a) is withdrawn for consumption and we invest another year plus 1,200 euros at 5% per annum, what difference would there be between this result and the result of the previous section? Why do you think this difference exists?

Ask your teacher about the laws of simple and compound capitalization.

2. Calculate the annual interest rate that Elena will pay for a mortgage loan offered by a bank that is known to apply a margin of 1.50% on the Euribor. Note: Euribor at 12 months, 0.11%.

2. The interest rate and monetary policy

We have seen in the previous section that the market interest rate is conditioned by the official or legal interest rate of the money. In the euro area, the highest authority on monetary policy is the European System of Central Banks (ESCB), composed of the European Central Bank (ECB) and the national central banks of the states belonging to the euro zone, although it is the ECB the nucleus of the whole system, better known as the Eurosystem.

2.1 The mission of the ECB

The ECB's main mission is to "define and implement the monetary policy of the euro zone", with the key objective of maintaining price stability, preventing prices from rising more than 2% per year.

The fundamental variables of the monetary policy are two:

- The quantity of money.
- The interest rate (the price of money).

As we saw in Unit 5 of this book, the ECB controls the total amount of money in the euro zone through absolute control over high-powered money (notes and coins). The ECB behaves in this way as a monopolist, since it is the only body that can issue coins and banknotes.

What power does a monopolist have in any market?

A lot. Think of a locality where, for whatever reasons, there is only one butcher's, and many more are not likely to appear. In that case, what will the person who runs this business do?

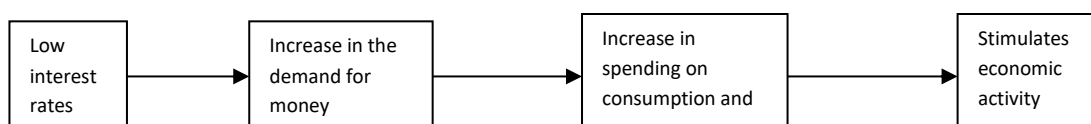
- He will decide how much meat he sells to the public, and, therefore, he will be conditioning the market price.
- He will decide the price at which the meat will be sold, and, therefore, he will be conditioning the amount that can be purchased.

The same goes for high-powered money. The ECB may either determine the amount of money it wishes for the eurozone, or may set its price (interest rates) and expect the demand for money at that price from the large financial institutions.

The injection of money into the eurozone is mainly carried out through market operations with large banking financial institutions, through which the ECB lends amounts of money to these at a certain interest rate.

Whatever the operation, the final result is that the ECB establishes the official price of money (the official interest rate), and this, as we have seen in the previous section, will finally determine the market interest rate.

In addition to the above, low interest rates also encourage investment. If companies can obtain cheap loans, it will be easier to invest and therefore contribute to the growth of economic activity.



On the contrary, high interest rates will cause an increase in the loans, so the public will refrain from overspending. In addition, savings will be encouraged, because if interest rates are high, higher yields can be obtained. In conclusion, consumer spending will not grow, and it will even decrease.

In addition, companies will paralyze or decrease their rate of investment, since financing them through loans will now be more expensive. All this will help the economy "cool down", slowing down its growth rate.

The monetary policy:

With the name of monetary policy, we recognize all those decisions about interest rates and amount of money that seek to influence economic activity.

In the euro area, the ECB is responsible for the monetary policy, and aims to contain the growth of prices below 2% per year.

To do this, it controls the amount of money or its price (interest rates), because it is demonstrated that there is a direct connection between growth in the amount of money and growth in prices.

The temperature of the economy:

When an economy grows intensely and the public spends its income on consumption, it is said that the economy warms up, causing tensions in the prices that cause these to rise. In these cases, the monetary policy acts by raising interest rates (reducing the amount of money) to cool the economy, reducing spending on goods and services and managing to contain the growth of prices.

On the contrary, when the economy does not grow and prices do not either, the monetary policy will try to stimulate the economy by reducing interest rates.

3. Taking into account what you have learned in this section, answer the following questions by reasoning your answer:

a) The global crisis that started in 2008 brought negative or very low growth rates in the economies of the affected countries, especially in the euro area. Do you think that interest rates went up or down thereafter?

b) According to the answer of the previous section, if the economies of the euro zone began to grow intensely, causing growth in prices above 3%, what monetary policy measures do you think the ECB would take?

c) From October 2014 to October 2015, prices in the euro zone did not increase or decrease and economic activity in the euro zone grew at a rate close to 0%. What do you think happened to interest rates?

3. Inflation

In the previous section we have introduced the concept of inflation without needing to name it. In fact, as we will see next, inflation is present in the economy when the prices of goods and services grow.

Next, we will try to address this concept in greater detail, indicating its causes and how it is possible to measure it.

3.1 Inflation

From a strictly technical point of view, there is inflation when the general level of prices increases. We do not talk about the prices of some goods and services, but we must look at the set of prices, so that, if the prices of most of the goods and services that exist in the market increase, we can say that we are in the presence of inflation.

If we follow the line marked by the ECB, it is considered that there is a situation of price stability if the set of these does not grow above 2% per year.

Therefore, the ECB considers a level of inflation in which prices, as a whole, grow above 2% per annum important.

Why is there inflation?

The reason for the growth of prices must be sought in several reasons, which are not exclusive, and can be given simultaneously:

- Demand inflation: the general level of prices increases because the public wants to acquire more goods and services than can be offered. Faced with the general increase in demand and the impossibility of producing a greater quantity of goods and services, prices end up rising.
- Cost inflation: in this case, the generalized increase in goods and services is related to the increase in production costs, such as raw materials, energy or wages. If this cost increase ends up being transferred to the sale prices, it is clear that cost inflation will be generated.

How to fight inflation?

Demand inflation is relatively simple to fight. For this, the monetary authority (in our case, the ECB) will raise interest rates, thereby reducing the growth of the amount of money and encouraging savings, so that the expense will be contained.

The same does not happen with cost inflation, caused by imbalances in commodity markets that are due to various causes (geopolitical, climatic, structural factors, etc.), in which the monetary policy is of little use.

Behind the CPI:

The CPI is calculated by the National Institute of Statistics (INE), which collects about 220,000 prices of 489 items classified by categories, based on information from more than 30,000 establishments distributed in 177 municipalities throughout the national territory.

3.2. How inflation is measured

If we want to find out if there is inflation and in what amount, we will have to compare the general price level in two moments of time.

Now, taking into account the enormous amount of goods and services that exist in an economy, is it possible to synthesize in one single figure the prices of all of them? The answer is affirmative, and that figure is known as the Consumer Price Index (CPI). The CPI collects, in a single figure, the information related to the prices of goods and services representative of household consumption in an economy.

So, we can calculate:

Inflation	Represents the	Formula for calculation
Monthly	Growth of prices in a month	$\left(\frac{IPC \text{ current month}}{IPC \text{ last month}} - 1\right) \cdot 100$
Annual	Growth of prices in a calendar year	$\left(\frac{IPC \text{ current year}}{IPC \text{ last year}} - 1\right) \cdot 100$
Yearly	Growth in prices in the last 12 months	$\left(\frac{IPC \text{ current month current year}}{IPC \text{ current month last year}} - 1\right) \cdot 100$
Accumulated	Growth in prices so far this year	$\left(\frac{IPC \text{ current month current year}}{IPC \text{ december month last year}} - 1\right) \cdot 100$

4. Below, we offer data related to the CPI for the Spanish economy as a whole:

December 2014: 103 472.

September 2015: 102 758.

What inflation data could you calculate? Discuss the result

5. The following table shows the inflation data for the eurozone (IE) and the average official interest rates (IT) for the period 2009-2014. Can you find any connections between them? Explain your answer.

	2009	2010	2011	2012	2013
IE	0,80%	2,21%	2,75%	2,22%	0,85%
TI	1,00%	1,00%	1,25%	0,875%	0,542%

4. Consequences of inflation

Inflation is never good news, although for some actors in the economy it can be. Thus, what for some is a manifest threat, for others it will become an opportunity to take advantage of their opportunities. Let's look at some of the consequences of inflation.

4.1 Inflation and purchasing power

When prices go up, our money buys less and less quantities of goods and services. Inflation decreases purchasing power. The capacity of money as a deposit of value suffers. Let's ask our relatives or friends what they could acquire fifteen years ago with a twenty-euro note. They do not probably remember, but they will know how to tell us that with that amount of money they could acquire many more goods than they can buy today. With the same note, the same amount, now you can buy less.

Income updated with the general CPI (base CPI system 2011) between September 2000 and September 2015.

Initial income	Rent updated	Rate of change
20,00€	27,90€	39,5%

Acquiring in September 2015 what we could buy in September 2000 with 20 euros would cost 27.90 euros. Source: INE. «Do you want to update an income?».

4.2 Inflation and savings

Inflation penalizes savings. In the presence of high inflation, saving is a bad business. Let's see why with an example:

Martin decides to save 3,000 euros. He goes to a financial institution that guarantees a return of 1.25% per year. After twelve months, Martín withdrew his deposit, receiving 3,037.50 euros ($3,000 \times 1,0125$). If, for example, during those twelve months, the general level of prices increased by 2%, Martín would need to have 3,060 euros to be able to acquire the same goods and services as 12 months before with 3,000 euros. As he has only received 3,037.50 euros, it is clear that he has lost 22.50 euros, that is, 0.75%. Obviously, if there is a loser, there is also a winner. In this case, the financial institution has won, in real terms, 0.75%.

The presence of inflation in the economy clearly harms the people who save, discouraging them, since they must always try to manage their savings in such a way to protect their money. In the previous example, Martin must look for investment formulas that report more than 2%, and this will inevitably lead him to select investments with higher returns, but also with higher risk.

Maximum financial: Higher yield, higher risk. There are no miracle financial products.

Real interest rate: People who save should look at the real interest rate, and not at the nominal interest rate. In the example discussed on this page, the nominal interest rate is positive, 1.25%. However, the real interest rate, in terms of purchasing power, is negative, -0.75%. Actually, Martin has not saved instead, he has lost part of his money.

4.3 Inflation and taxes

In the economies with inflation there is a tendency to raise salaries in order to maintain the purchasing power of these or, at least, prevent it from falling too much. Think, for example, of the case of Elena, with an annual salary income of 35,000 euros. Let's suppose that the inflation affecting the economy is 3.5% and that their collective agreement establishes a wage increase of 2%, so that during the following year her salary income would be 35,700 euros. It is evident that Elena will have lost 1.5% of her purchasing capacity, since the cost of living increases by 3.5% and her income by only 2%; but there is another drawback, which we will see below: the fiscal effect.

According to the table on the right, Elena would contribute to her taxes in the following way: the first 12,450 euros of income, with 19%; the following, up to 20,200 euros, with 24%, and the following, up to 35,000 euros, with 30%, which yields an average tax rate of 24.76% (Elena dedicates 24.76% of her income to pay taxes). With the rise in salary due to inflation, Elena should also pay for a later instalment, the 37% one. In that case, the average rate would be 25.67% (Elena now dedicates 25.67% of her income to pay taxes). In conclusion, Elena, in real terms, enters less and contributes more.

Annual income	Tax rate
0 – 12.450	19 %
12.451 – 20.200	24 %
20.201 – 35.200	30 %
35.201 – 60.000	37 %
60.001 en adelante	45 %

With the increase in salary, Elena must pay, in addition, to 30% the amount of 200 euros and to 37% the amount of 700 euros, which finally makes her disburse some 289 euros more, when in reality her real income, her capacity of purchase, has decreased.

6. Martín, at 25, decides to start saving 100 euros per month.

a) Calculate how much your savings will rise when you turn 65, after 40 years.

b) If Martin has been saving this money monthly in a piggy bank, do you think he will have gained purchasing power, or that he will have lost it after this time? Why?

c) In case you have lost purchasing power, what should Martin have done to avoid it?

d) Comment this data calculated from the utility «Do you want to update an income?» available on the website www.ine.es.

Year 1975: 1,200 euros.

Year 2015 (40 years later): 13,629.60 euros.

Variation rate: 1,035.8%.

5. Special cases of inflation. Deflation.

Through their monetary policies, modern economies try to control the growth of prices and keep it below 2%. To do this, they control the amount of money and interest rates, and try to do so consistently and systematically, following a very simple rule. In other words, the monetary authorities announce that, when prices grow above 2%, they will take measures limiting the growth of the amount of money or raising interest rates, and vice versa.

5.1 Hyperinflation

The above has not always happened. In fact, the behaviour of the monetary authorities is currently due to the events that have been occurring over the years.

There have been times in history when inflation has soared so much that the public no longer wanted money. It may seem surprising; But, when prices rise in an economy every five minutes, money serves little.

Imagine an economy in which prices double once a day. In this way, a soft drink that initially costs 1.80 euros, at the end of the day would have a price of 3.60 euros; the next day, 7.20 euros, and a few hours later, 14.40 euros. In the face of such a situation, what does the public do? It spends all its money quickly, because it loses its value at a very high speed. This increases prices further, and the economy enters a spiral of price increases very difficult to tackle.

Episodes like the previous ones have existed throughout history. In the 1920s, Germany suffered a hyperinflation that, in just two years, led to a 30,000% rise in the rate of price growth, as the Government dramatically increased the amount of money in order to be able to face the payments of the First World War. The solution to these processes is to drastically reduce the amount of money, create a new currency or found a new central bank.

5.2 Galloping inflation

We can speak of galloping inflation when growth rates of two or three digits are reached, thus not reaching the extreme case of hyperinflation.

The consequences for society are dramatic. At these rates of growth in prices, money also loses value very quickly, and the public is forced to spend it as soon as it is obtained.

People queuing appears in supermarkets to buy basic goods whose prices go up constantly, causing shortages and uncertainty. In the economies in which this occurs, the public tends to try to protect itself with the possession of another currency that is considered strong, as far as possible. These inflation processes have appeared at different times in economies of South America.

Inflation and the amount of money: For Milton Friedman, inflation is a monetary phenomenon, produced by a growth in the amount of money faster than production.

In the case of hyperinflations, such as the German one, the amount of money increased to unimaginable figures today and exorbitant face value notes were printed (1 million marks were printed).

5.3 Deflation

Deflation occurs in an economy when there is a general decline in the price level. It constitutes, therefore, the opposite case to inflation.

Far from appearing to be good news, deflation is a process that hurts economies. For example, in the presence of deflation, the public expects that prices will be lower in the future. This can lead to postpone consumption decisions and cause a fall in economic activity, as companies would see how their stocks increase and sales decrease, causing tensions in the labour market.

The action of the monetary authorities, in this case, will consist of increasing the amount of money in circulation, lowering interest rates in order to motivate consumer spending.

7. Using the above example of hyperinflation, calculate the price of the soft drink one month later (thirty days later). Ask your teacher how you could perform this calculation in a quick way.

8. Imagine that an economy suffers a 10% annual deflation. Imagine that on January 1, a family makes the decision to replace their car with a new one that costs 24,000 euros. How much would the car cost approximately at the end of that same year? What decision do you think this family would take? Why?