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INTEREST AND COMPOUND INTEREST PROBLEMS

Abstract. It would not be wrong to say that working with interest is the main work tool of financial enterprises or all areas where there is a finance-accounting field. This is why understanding interest is important. In this article, interest and compound interest are discussed in detail.

Key words: interest, complex numbers, polynomials, financial stability, periodic value of money, compound interest, etc.

When making a financial decision, it is necessary to take into account expenses and income distributed over a certain period of time. People who make financial decisions in firms and households need to think about how well the money invested today will be justified by the benefits seen tomorrow. This requires a proper understanding of the concepts of time value of money (TVM) and discounted cash flow (DCF). The concept of time value of money (periodic value of money) (TVM) can be explained as follows: money (dollar, euro, yen, ruble or soum) is worth more today than what you expect to receive in the future. There are at least three reasons why this opinion is correct. The first reason: You can invest this money in something, get a profit, and as a result, your money will increase. The second reason: over time, the purchasing power of money may decrease due to inflation. The third reason: the inevitability of receiving money in the future cannot always be fully trusted.

We begin our study of time value of money (periodic value of money) and discounted cash flow analysis with the concept of compound interest. Using the calculation of compound interest, the process of transferring money from the present value (PV) to the future value (FV) is carried out. The future value is the amount that the invested money will be equal to, taking into account inflation, by a certain date, taking into account the writing (calculation) of compound interest. For example, you put $1,000 (PV) into your bank account at a rate of 10% per year. Assuming you don't withdraw a cent before maturity, at a rate of 10% per year and an investment term of five years, the amount you will receive after five years is called the future value of $1,000. Let's clarify the terms: PV - presented (current) value, or initial amount; i - interest rate, usually interest rates are calculated per year. Here 10% (or 0.10 in decimal form); t - number of years for which interest is calculated; FV is the future value after t years. Now let's calculate the future value in this example step by step. First, how much money will you have after the first year? You will receive interest in the amount of $1,000 at the beginning of this financial transaction and an additional $100 (10% of $1,000 or 0.1 x $1,000). The future value of your money will be 1100 dollars

$$FV = PV \, x \, (1+i)^t$$

Interest rates on loans and deposits are usually calculated in the form of an annual percentage rate (APR) with a certain frequency, for example, every month. The calculation frequency can be different, so it is very important to know how to compare interest rates. This is done by calculating the effective annual rate (EAR), equivalent to the interest rate when the interest is calculated once a year. Let's assume

that your money earns monthly interest at an annual percentage rate (APR) of 6%. This means that interest will be charged to your account monthly at 1/12th of the fixed APR rate. Thus, the real interest rate is 0.5 percent per month (or 0.005 percent in decimal).

Thus, we can conclude as follows regarding the choice of risky options: if the value of $ expressed in yen decreases by more than 3.71% during the year, bonds in yen will be the best investment option. In order to make the right financial decision regarding different currencies, the following rule should be used: in all calculations related to the time value of money, cash flows and interest rates should be expressed in the same currency. In our example, to calculate the presented (present) value of these yen-denominated cash flows, we must discount them using the ¥ interest rate for yen-denominated investments. The interest rate of $ is used to calculate the presented (current) value of cash flows expressed in $. Using the $ interest rate to calculate the quoted (present) value of payments expressed in yen will lead to erroneous results.

Let's consider an example of optimal placement of capital. We have the option to place 10000$ in USA or Japan. The Japanese project will generate income of 500,000 yen per year for 5 years, and the income from the American project will be 5200 dollars for five years. The interest rate in $ is 6% per annum, the interest rate in yen is 4% per annum, and the current exchange rate is $1 = ¥100.

Percentage in general terms is considered as a part, portion or share in a whole proportion. The use of percentage first occurred in the mid-1600s, where it was developed by the ancient Roman and Italian mathematicians. In Italy, various abbreviations are used for percentage such as ‘per 100’, ‘p 100’, ‘p cento’ and so on. Additionally, the Latin phrase word ‘per centum’ means ‘for each hundred’ where it was used as ‘o o’ and later on, in modern days it evolved into a ‘%’ symbol. This can be simplified as 1 per cent tells that 1 per 100 or cent. This can be written as 1%, where the concept of numerator and denominator comes first.

The percentage is considered an important part of arithmetic as well as statistics. The percentage is defined as a portion or number which is mentioned as a quantity out of a hundred. For Instance, it can be said that 1% means, 1 out of 100 or 1/100, but in this regard, 1% per cent of something, for say 1000; means 1/100 of 1000. This turned out as (1/100*1000) =10 per cent. Similarly, 15% of 200, is considered as the (15/100*200) = 30, therefore 15% out of 200 is 30. The percentage also can be written as in terms of decimal, fraction and ratio. ercentage helps to measure a difference from one component to another or to state a fact of a portion by benchmarking an initial value, which is used as 100. For instance, stating a fact that the price of petrol increased 2%, where the benchmark value is the country’s initial price, e.g 100, this means the price increased up to 102.

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