Advanced Financial Management

Exercise Set: Time Value of Money – Interest rates and CFs

Interest rates

1) A lender offers a loan with 5.76% stated annual rate with monthly installments. What is the effective annual rate of this loan?

2) Consider an annual interest rate of 6%. If this is the stated annual interest rate, the proportional rate per month is _____. If this is the effective annual rate, the equivalent rate per month is _____. (fill in the blanks)

3) Which one do you prefer for your deposited money?

   a. 6.0% APR with monthly interest payments or 6.1% APR with quarterly interest payments

   b. 10.0% APR with weekly interest payments or 11.0% APR with annual interest payments

   c. 4.0% APR with monthly interest payments or 4.4% APR with daily interest payments

Annuities (applied to savings plans and loans)

4) With the success of his businesses, Mr. Forbes Coast expects to have steady dividends and will be able to save for his retirement. Three years from now, Mr. Forbes Coast will deposit 2,000€ in a bank account that pays an effective annual interest rate of 5%. From then on, he will do the same thing at the end of every year, accumulating the deposits and interest in the same account until 40 years from now.

   a. How much will he have in his bank account 40 years from now?

   b. What happens to his saved amount 40 years from now if he decides to save 1,000€ per semester instead, starting two and a half years from now, ending at the same time and paying the same effective annual interest rate? Find out whether it will be higher or lower and justify – no need for calculations.

5) Mr. Paulinho Curtofinancas just turned 39 years old and plans to travel to Croatia on his 40th birthday. He works for Cimentodobom where he earns 2,000€ per month. To have money for his trip, he plans to save 10% of his monthly salary every month until his birthday. Mr. Paulinho works with Bank Gamamosguita that offers a savings account with a 5% annual percentage rate (stated annual rate) compounded monthly.

   a. How much money will Mr. Paulinho have in his bank account on his 40th birthday if he starts saving in one month from now?

   b. How much money will he have on his 40th birthday if he only starts saving in two months from now?

   c. Now, assume that his salary is expected to grow at the rate of 0.2% per month, and his salary today is 2,000€. How much money will he have for the trip if he starts saving today?

   d. Mr. Diogo Seitudo, a friend of Mr. Paulinho, tells him that his bank offers an APR of 5.02% with semi-annual compounding on his savings account. Do you think Mr. Paulinho should switch banks? Explain your answer.

6) Mr. Alface Medo wants to build a savings plan to get 1,000,000€ fifty years from now. He is going to save every year a constant amount and deposit that amount in a bank deposit that yields 3% interest rate per year. He will start to save and deposit for the first time in 5

years, without any other deposit until then and do this for the last time in the 50th year, counting from now.

    a. What is the exact constant annual deposit Mr. Alface Medo must make to reach the 1,000,000€ in due time?

    b. Instead of using this savings plan, you could make a single deposit right now. What would be the amount that guarantees the same goal, under the same deposit conditions?

7) MJ Silver wants to buy a car immediately, but she has no money for it and thus she is considering asking for a loan. Given her current salary and other expenses, she wants to spend exactly 150€ per month in the installment for the car loan. She is willing to do so for the next 5 years, starting next month.

    a. Knowing that the stated annual interest rate of the loan is 3.6% with monthly compounding, what is the amount she can get with the loan?

    b. What is the effective annual interest rate of the loan for a stated annual rate of 3.6%?

8) You will deposit $1,000 in a pension plan every year for 50 years and starting 1 year from now. The plan pays 5% stated annual interest rate with annual compounding. Assuming that you will start receiving a pension every year for 20 years and starting 51 years from now, how much do you expect your annual pension to be?

9) How much would Philippa have to save and deposit per month (starting one month from now) if she wanted to have 5,000€ in her bank account in 2 years? The stated annual interest rate on the deposit is 3%, with monthly interest payments.