Chapter 2 How to Calculate Present Values

- This chapter introduces the concept of present value and shows why a firm should maximise the market value of the stockholders' stake in it.

- It describes the mechanics of calculating present values of lump sum amounts, perpetuities, annuities, growing perpetuities, growing annuities and unequal cash flows. Other related topics like simple interest, frequent compounding, continuous compounding, and nominal and effective interest rates were discussed.

- The net present value rule and the rate of return rule were explained in great detail.

LEARNING OBJECTIVES

After studying this chapter, you must have:
- learnt how to calculate present value of lump sum cash flows;
- understood and used the formulae associated with the present value of perpetuities; growth perpetuities; annuities; and growing annuities;
- understood more frequent compounding including continuous compounding;
- understood the important difference between nominal and effective interest rates;
- understood the value-additive property and the concept of arbitrage; and
- understood the net present value rule and the rate of return rule.

IMPORTANT POINTS

Future values and present values
- The concepts of future value, present value, net present value (NPV) and the opportunity cost of capital (hurdle rate) were introduced.

- It was showed in the lecture, using several numerical examples, that simple projects with rates of return exceeding the opportunity cost of capital have positive net present values. The "Net present value rule" and the "Rate of return rule" were stated here.

- The concept of discounting to assets, which produce a series of cash flows, was discussed.

- The possibility of arbitrage restricts the relative values of discount factors DF_1, DF_2,…. DF_t –.The main point is that money machines cannot exist in well-functioning financial markets.

- Using numerical examples, we showed how to calculate PV and NPV of a series of cash flows over a number of periods (years).

Perpetuities and annuities
- We developed formulae for perpetuities and annuities. The difference between an ordinary annuity and an annuity due was explained.

- The calculation of the future value of an annuity was illustrated. The present value of an annuity can be thought of as the difference between two perpetuities beginning at different times. Using this simple idea, the formula for the present value of an annuity was derived.

- The future value of an annuity formula was also derived. These have numerous applications in pension funds, mortgages and valuation of financial assets.

Growing perpetuities and annuities
- Some applications need the present value of a perpetual cash flow growing at a constant rate, as well as annuities that grow at a constant rate. The formula for the present value of a growing perpetuity was derived.

- The present value of a growing annuity can be thought of as the difference between two growing perpetuities starting at different times. Using this simple idea, the formula for the present value of a growing annuity can be derived in a straightforward manner. These formulae have many applications in the valuation of assets.

How Interest Is Paid and Quoted
- The differences between compound interest and simple interest, as well as the differences between effective annual rates and annual percentage rates were explained.

- The lecture demonstrated how each interest rate is used in the market place and the maths necessary to move between the two kinds of interest rates (EAR and APR).