Mathematical Finance
Master in L&M 4E 2024/2025

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Introduction

In this course on Mathematical Finance, I will present the basic mathematical tools for making financial decisions, namely the most critical principle in finance and in management: valuation. Managing is about making decisions and making decisions is about creating value. In a very simple manner, creating value is about becoming or making shareholders wealthier. Of course, this goal is to be achieved in a context. A context that includes strong ethical, environmental, and social responsibility principles, among others. Principles that are dynamic and time variant. Of course, it is not my intention to discussion all these in this course. I just want to give you the necessary mathematical tools to think about it, but always aware that are limits and boundaries not to be crossed. Creating value yes, but not at all cost. Interestingly, several research shows that being ethical pay offs more than not being ethical. Another thing that is also interesting: all these mathematical tools are useful in our personal life, almost at a daily basis.

Goals

1. Understand the rules of Time Value of Money
2. Assess the effect of interest rates on today's value of future cash flows
3. Calculate the value of distant cash flows in the present and of current cash flows in the future
4. Value a series of many cash flows
5. Value a perpetual series of regular cash flows called a perpetuity
6. Value a common set of regular cash flows called an annuity
7. Value both perpetuities and annuities when the cash flows grow at a constant rate
8. Compute the number of periods, cash flow, or rate of return of a loan or investment
9. Value cash flow streams with non-annual payments
10. Understand the different ways interest rates are quoted
11. Use quoted rated to calculate loan payments and balances

Methods

Classes are theoretical-practical, and a case study methodology will be applied. Case studies are framed by brief theoretical explanations and complemented by the resolution of several exercises.
Given the nature of this course, there is no valuation process.

Lecturer

Assistant Professor of Finance in the Management Department of ISEG, University of Lisbon, PhD in Management, Finance, University of Lisbon. He is a member of the Advanced Research Center and the

Portuguese Association of Financial Analysts (APAF). He taught at all levels of education at ISEG and at several universities in Angola and Mozambique. He also teaches at Military Academy, Air Force Academy and Military University Institute on an ad hoc basis. Published several research papers in highly ranked journals. Participated in international training and consulting projects, namely recovery and management of companies and project valuation.

Course Contents

1. The Time Value of Money and Interest Rates
2. Valuing Cash Flows at Different Points in Time
3. Valuing a Stream of Cash Flows
4. Perpetuities
5. Annuities
6. Growing Cash Flows
7. Solving for other Variables
8. Non-annual cash flows
9. Interest Rate Quotes and Adjustments
10. Discount Rates and Loans

Assessment

Not Applicable

References

- Berk, DeMarzo and Harford (2019) Fundamentals of Corporate Finance – 4th Global Edition, Pearson – Prentice Hall
- Berk, DeMarzo and Harford (2015) Fundamentals of Corporate Finance – 3rd Global Edition, Pearson – Prentice Hall
- Berk and DeMarzo (2020) Corporate Finance 5th Global Edition, Pearson