

FINANCIAL MARKETS AND INSTRUMENTS



LISBON
SCHOOL OF
ECONOMICS &
MANAGEMENT
UNIVERSIDADE DE LISBOA

MASTER IN MATHEMATICAL FINANCE
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SYLLABUS

PART I – FINANCIAL MARKET STRUCTURE AND INSTRUMENTS

1. Market Organization and Structure
 - 1.1. Functions of the financial system
 - 1.2. Market Classification
 - 1.3. Financial assets Classification
 - 1.4. Trading in financial markets
 - 1.5. Security Market Indices
2. Equity Markets
3. Fixed-income Markets
 - 3.1. Defining elements
 - 3.2. Issuance, Trading and Funding
 - 3.3. Asset-backed Securities
4. Derivatives
 - 4.1. Basic Elements
 - 4.2. Forwards and Futures
 - 4.3. Option Contracts
 - 4.4. Swaps
5. Pooled Investments
 - 5.1. Investment Funds
 - 5.2. The process of portfolio management

PART II – THEORY OF PORTFOLIO MANAGEMENT

1. Portfolio Concepts
 - 1.1. Definitions of risk and return
 - 1.2. Emergence of portfolio theory

2. Mean – Variance Theory (MVT)
 - 2.1. Efficient Portfolios: the two-asset case
 - 2.2. Portfolios with a risk-free asset
 - 2.3. Finding the efficient Frontier
 - 2.4. Safety restrictions
 - 2.5. Internationally diversified portfolios
3. Return Generating Models
 - 3.1. Single-factor models
 - 3.2. Multi-factor Models
 - 3.3. Estimation risk versus model risk

PART III – SELECTING OF OPTIMAL PORTFOLIOS

1. Expected Utility Theory (EUT)
 - 1.1. Introducing utility
 - 1.2. Utility and risk aversion
 - 1.3. Foundations of utility theory
2. Alternatives to Utility
 - 2.1. Maximizing long-term growth
 - 2.2. Stochastic Dominance
 - 2.3. Safety Criteria
 - 2.4. Value-at-Risk
 - 2.5. Conditional expected shortfall

PART IV – MODELS OF EQUILIBRUM IN CAPITAL MARKETS

1. The Capital Asset Pricing Model (CAPM)
 - 1.1. Assumptions of standard CAPM
 - 1.2. Using CAPM
 - 1.3. Empirically testing CAPM
2. The Arbitrage Pricing Theory (APT)
 - 2.1. Assumptions of APT
 - 2.2. Estimating and testing APT
 - 2.3. APT versus CAPM
3. Market Efficiency
 - 3.1. Forms of efficiency
 - 3.2. Testing market's efficiency
 - 3.3. Weak versus strong arbitrage
 - 3.4. Anomalies in financial markets

BIBLIOGRAPHY

Mandatory

Textbooks

Joshi, M. S., and J. M. Paterson (2013). *Introduction to mathematical portfolio theory*. Cambridge University Press.

Additional mandatory readings

Carhart, M. M. (1997), On persistence in mutual fund performance. *The Journal of finance*, 52(1), 57-82.

Fama, E. F., and K. R. French (1996), Multifactor explanations of asset pricing anomalies. *The journal of finance*, 51(1), 55-84.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263-291.

Levy, H. (1992), Stochastic dominance and expected utility: survey and analysis. *Management science*, 38(4), 555-593.

Linciano, N., and P. Soccorso, P. (2012). Assessing investors' risk tolerance through a questionnaire, available at SSRN.

Markowitz, H. (1952), Portfolio selection, *The Journal of Finance*, 7(1), 77-91.

Roll, R. (1977). A critique of the asset pricing theory's tests Part I: On past and potential testability of the theory. *Journal of financial economics*, 4(2), 129-176.

Roll, R., & Ross, S. A. (1980). An empirical investigation of the arbitrage pricing theory. *The Journal of Finance*, 35(5), 1073-1103.

Rubinstein, M. (2002), Markowitz's "Portfolio Selection": A Fifty-Year Retrospective, *The Journal of Finance*, 57(3), 1041-1045.

Related ISEG – Master Final Works (MFW)

Arriaga Cunha, A. (2012), Cumulative Prospect Theory: A Parametric Analysis of the Functional Forms and Applications, ISEG MFW in Finance.

Cardoso, J. (2015), Robust Mean-Variance. ISEG MFW in Finance.

Frade, A. (2017), Model risk in MVT return generating models. ISEG MFWs in Finance.

Silva, R. (2012), Risk profiling and the DOSPERT scale: an approach using Prospect Theory, ISEG MFW in Finance.

Rocha, E. (2016), Security selection in post-modern portfolio theory: an application to the European stock market, ISEG MFW in Finance.

Optional (recommended) readings

Textbooks

Elton E.J., M. J. Gruber, S. J. Brown and W. N. Goetzmann (2014), Modern Portfolio Theory and Investment Analysis, 9th Edition, Wiley.

ASSESSMENT

Students are evaluated based upon:

- Online Quizzes - QQ (20%)
- First Final Exam – 1st FE (80%)

The first season final grade (1st Grade) is computed as

$$\mathbf{1^{st} Grade = \max (0.2*QQ + 0.8 FE^*; FE)}$$

* it is, nonetheless, still required a minimum of 8 points (out of 20) at the final exam.

The second season final grade (2nd Grade) is computed:

$$\mathbf{2^{nd} Grade = 2^{nd} FE}$$