Course unit: Theory of financial markets

- Title in French: Théorie des marchés financiers
- Course code: tba
- ECTS credits: 2
- Teaching hours: 50h
- Type: ground course
- Language of instruction: English
- Coordinator: Dominique Henriet
- Instructor(s): Marielle de Jong (Amundi), Dominique Henriet

Brief description

This course is a ground course for anyone interested in finance. It aims at providing the students with the general concepts that ground the main models of finance. This to better understand the jungle of financial products and the functioning of markets. The practical application of these models will alos be presented through portfolio optimizations. The course is split into two parts. The first part named “Models of finance” introduces the main financial products as well as the corresponding models. The second part is devoted to portfolio management.

Learning outcomes

- Understand the functioning of financial markets
- Know how to model financial asset value
- know how to organize an investment process

Course content

Models of finance

1. Introduction
    - First questions
    - Assets
    - Functioning of trading
    - Two first models : risk neutral valuation
2. Static model: arbitrage free condition
    - Mathematical preamble
    - No arbitrage condition in a static model
3. Dynamics (finite discrete models)
    - The tree of states of nature
    - Stochastic process on a tree
    - No arbitrage condition on a dynamic model
    - Risk neutral probability
4. Microstructure and behaviour models
    - The market efficiency hypothesis
    - The Competitive Rational Expectation Equilibrium
    - Bid ask spread
    - Information and High frequency trading
    - The capital asset pricing model
5. Continuous models
    - Deterministic continuous model : the differential equation

- Brownian motion and Stochastic integral
- Arbitrage free equation
- Continuous asset valuation

Portfolio management

1. Introduction
   - On the basis of the investment example designed by Elton et al., concepts such as portfolio risk, risk decomposition, the efficient frontier, the Sharpe ratio will be revisitted The students will do elementary exercises (e.g. estimate market betas), estimate a one-factor risk model and carry out a mean-variance optimization in Excel.
2. Currency investing
   - On the basis of a ten-currency investment example, the students will familiarize with concepts such as carry trading, the interest rate parity, purchasing power parity, the Siegel paradox and currency hedging. They will estimate a two-factor risk model from a dollar perspective which can then be converted into other perspectives.
3. Sovereign bonds
   - On the basis of a fifteen-country investment example, the students will familiarize with inflation-linked- and nominal government bonds. A global bond investment process will be explored by which risk is decomposed into the two Fisher components: inflation and economic growth, as well as in global- versus country-specific risk.
4. Corporate bonds
   - It is discussed how corporate bond portfolios tend to be constructed. Rather than doing a Markowitz optimization, they are built by means of stratified sampling. We look at Investment Grade and High Yield bonds. The implications of using the duration times spread (DTS) measure will be highlighted.
5. Portfolio and index construction
   - The standing market indices based on market shares are becoming obsolete. More cunning smart indices are being developed. We look into this issue.
6. Green and socially responsible investment
   - The standing narrow definition of investment utility is being widened to include broader stakeholder values.

Bibliography

- Demange & Rochet (2005) “Méthodes mathématiques de la finance”, Economica
- Dynkin et al. (2007) “Quantitative Management of Bond Portfolios”. Princeton University Press.
- Elton et al. (2014) “Modern Portfolio Theory and Investment Analysis”. Wiley
- Grinold & Kahn (1999) “Active portfolio management: a quantitative approach for providing superior returns and controlling risk”. Mc Graw-Hill.

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