Term structures : theory, models and empirical tests

ECTS : 6

Description du contenu de l'enseignement :

The term structure is defined as the relationship between the spot price and the futures prices of a derivative instrument, for any delivery date. It provides useful information for hedging, arbitrage, investment and evaluation: it indeed synthesizes the information available in the market and the operators' expectations concerning the future price of the underlying asset.

In many derivative markets, especially in interest rates and in commodity markets, the concept of term structure is very important, because the contract's maturity increases as the markets come to fruition. In the US 3-months interest rate futures market, for example, the maturities reach 10 years. In this course, the commodity markets will be often taken as an example, to help understanding. Extensions to other assets will be done, as much as possible.

Chapter 1 presents a general introduction to derivatives today.

Chapter 2 examines the traditional theories of commodity prices and the explanation of the relationships between spot and futures prices. It proposes an empirical review of the results obtained through these frameworks and explains why these theories are still investigated today. It finally shows how to apply these theories to other assets: exchange rates and interest rates.

The traditional theories are however a bit limited when the whole term structure is considered. As a result, there is a need for a long-term extension of the analysis, which is the very subject of the Chapter 3. We first present a dynamic analysis of the term structure. Then the focus turns towards term structure models. The examples rely on the case commodity prices but can be extended to interest rates. Simulations highlight the influence of the assumptions concerning the stochastic process retained for the state variables and the number of state variables. We then explain the econometric method usually employed for the estimation of the parameters. In the presence of non-observable variables, there is a need for filtering techniques. We present the method of the Kalman filters. Finally, we study two main applications, i.e. dynamic hedging and investment valuation.

Chapter 4 is devoted to the study of structural models, ie micro-founded equilibrium models that also examine the interactions between the physical and the derivative markets. In this situation the spot price becomes endogenous. The interactions between prices are studied thanks to rational expectations equilibriums.

Compétence à acquérir :

At the end of this course, the students must have a broad knowledge about the term structures of derivative prices: the theories, the valuation methods, the econometric techniques, the empirical tests as well as the applications.

They will also be trained to use their knowledge on this topic in order to develop a critical view on recent research articles.

This course is mandatory for all students enrolled in the cursus PhD Qualifying Year. It is optional for all other students of the M2 104.

Mode de contrôle des connaissances :

Ongoing assessment, 20% One final exam, 80%.

Bibliographie, lectures recommandées :

- Danthine J.P., Donaldson J.B., Intermediate Financial Theory, 2d Ed., Elsevier, 2005. - Hull J., Options, futures and other derivatives, 9th Ed. - Kolb R.W. , Overdahl J.A. , Futures, options, and swaps, 5th Ed., Blackwell, 2007. - Williams J., The economic function of futures markets, Cambridge University Press, 1986 - Wilmott P., Paul Wilmott on Quantitative Finance, 3-volume set, 2nd Ed., Wiley, 2006. Adresse du site de l'enseignant : https://sites.google.com/site/delphinelautierpageweb/