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Risk management of some financial derivatives

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We shall review from a trading point of view the basics of derivative pricing and risk management.

After some fast theoretical reminders (in terms of arbitrage paradigm and stochastic modelling) we shall focus on two main axes: first the forward trading (from toy example to real dividend proportionality and repo term structures issues) and second the option management (from the true meaning of the PDE pricing through the gamma/theta analysis to the fundamental issues of forward volatility modelling with precise exotic products examples).

In each case, we shall start from the market situation/product to illustrate the need of accurate modelling in order to improve the hedging performance and yield.

Summed up Agenda

1. Modelling tools: Replication pricing and Mathematical tools
 - a. Definition of derivative and arbitrage pricing
 - b. Basics of martingales and Replication price
 - c. Basics of stochastic calculus: Ito, Tanaka and Kolmogorov

2. Forward contracts
 - a. Intuition of the forward contract replication
 - b. Cash issues: price of liquidity and multi-currency positions
 - c. Repo and collateral: monetizing the balance sheet
 - d. Dividend dynamics: curve positions and delta proportionality
 - e. Quanto issues: introduction to cross gamma

3. Convexity : from gamma management to volatility dynamics
 - a. Intuition of option pricing
 - b. Cost of carrying the option: Gamma/Theta analysis
 - c. Volatility risks: Vega Risk and ATM volatility
 - d. Volatility risks: Smile and Local volatility model
 - e. Volatility risks: The forward smile and Stochastic volatility models
 - f. Multi-underlyings: one word about correlations smile