

MASTER Economics Big data and finance

Contact	Description	Information
Yoann BOURGEOIS yoann.bourgeois@univ-amu.fr	Part of course. Code: PA-ME5BEC-BECCV23A Domain: Law, Economics, Management	http://formations.univ-amu.fr Department: Faculty of Economics and Management <i>Last modification: 19/07/2018</i>

CONTENT

The course presents the last developments around the use of big data technics in finance. The first part offers an overview of the various recent applications to corporate finance and financial regulation. The second concentrates on the use of big data and associated models in market finance. The third and last part highlights the role of these methods in insurance and reinsurance market.

Course outline :

Part 1 Overview of the applications of Big data in finance (6h, Pierre Bittner)

- 1- The interest of big data in finance
 - 1.1 – Reminder on Big data
 - 1.2 – Big data and decision
 - 1.3 – Big data and market supervision
- 2- Case study in finance
 - 2.1 – Applications to corporate and investment banking
 - 2.2 – Regulatory challenges
- Part 2 : Big data and market finance (12h, Yoann Bourgeois)
 - 1- Realized Volatility
 - 1.1- Continuous time pricing fundamentals
 - 1.1.1 Brownian motion and random walk
 - 1.1.2 Stochastic Differential Equation/ Stochastic Integrals
 - 1.1.3 Quadratic Variation
 - 1.1.4 Implied volatility in Black Scholes
 - 1.2- Realized Volatility
 - 1.2.1 Unbiased estimators
 - 1.2.3 Confidence intervals
 - 1.2.3 Application FX market
 - 1.3-RV and integrated variance
 - 1.3.1 Seasonality
 - 1.3.2 The impact of periodic events on the RV.
 - 1.3.3 Application FX market
 - 2- Bonds portfolio automatic engine
 - 2.1 Definitions (Yields, Bond, Duration, P&L of a bond etc.)
 - 2.2 Bonds clustering (PCA+KMeans)
 - 2.3 The reference curve construction
 - 2.3.1 Regression
 - 2.3.2 Cubic Splines
 - 2.4 Z-Score and momentum to sort bonds
 - 2.5 Reference bonds replication
 - 2.6 Application France 10Y reference bond.
 - 3- Intraday hedging of FX options
 - 3.1 SABR model
 - 3.2 Gatheral parametric local volatility model

- 3.3 Intraday model calibrations
 - 3.4 Tichonov Regularization
 - 3.5 The use of risk neutral distribution quantiles and moments
 - 3.6 Application FX vanilla options
 - Part 3 : Big data and insurance (6h, Serdar Coskun)
- This part presents, via recent cases, the utility of big data and insurance and reinsurance markets. It also presents the most recent progress in the « insurtech » market.

PROFESSIONAL SKILLS

- Understand how Big data methods are used in finance and insurance markets to value data
- Understand the issue it creates for market regulation
- Understand how Big data methods can be used for hedging purpose in market finance

BIBLIOGRAPHY

- Brigo, D. and Mercurio, F., 'Interest Rate Models - Theory and Practice', 1998, 981p, Springer.
- Cont, R., 'Frontiers in Quantitative Finance', 2008, 295p, Wiley.
- Wang, T.H. and Gatheral, J., 'Implied Volatility from Local Volatility : A Path Integral Approach' in, Large Deviations and Asymptotic Methods in Finance', Peter K. Friz and alii, 2015, Wiley.

ORGANISATION

Twenty-four hours of lecturers including practical training in class.

FUNDAMENTAL PREREQUISITES

Basic knowledge in financial econometrics.

RECOMMENDED PREREQUISITES

Basic knowledge in quantitative finance and financial market.

VOLUME OF TEACHINGS

- Lectures: 24 hours

TRAININGS

Master's degree: Economics

- Econometrics, big data, statistics
- Quantitative finance and insurance

