McGill University
Department of Economics
Econ 763: Time Series and Financial Econometrics / Séries chronologiques et économétrie de la finance
Fall / Automne 2017
Course outline
(Preliminary)

Professor / Professeur: Jean-Marie Dufour

September-December 2017 / Septembre-décembre 2017
Version: September 18, 2017

Documents and other material relevant to the course will be available from my web page:

`http://www.jeanmariedufour.com`
`http://www.jeanmariedufour.org`

- **Lecture hours**: Tuesday 18:05 - 20:55
- Beginning: 5 September 2017. End: 5 December 2017.
- Exams end on Thursday, 21 December 2017.
- **Room**: Leacock 517
- **Office hours**: by appointment
- **Teaching assistants**:

  Masaya Takano [masaya.takano@mail.mcgill.ca]

- **TA sessions**: to be determined
- **e-mail**: `jean-marie.dufour@mcgill.ca`

The evaluation will be based on three elements (percentage refer to the entire year's grade):

1. a mid-term exam: 30%;
2. assignments (and possibly a term paper): 30%;
3. a final exam: 40%.

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/) for more information).
L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/students/srr/honest/).

Class schedule

Week	Day	Time (18:05-20:55)	
1	Tuesday	5 September 2017	
2	Tuesday	12 September 2017	
3	Tuesday	19 September 2017	
4	Tuesday	26 September 2017	
5	Tuesday	3 October 2017	
6	Tuesday	10 October 2017	
7	Tuesday	17 October 2017	Mid-term exam
8	Tuesday	24 October 2017	
9	Tuesday	31 October 2017	
10	Tuesday	7 November 2017	
11	Tuesday	14 November 2017	
12	Tuesday	21 November 2017	
13	Tuesday	28 November 2017	
14	Tuesday	5 December 2017	
14	Friday	8 December 2017	Final exam (time to set)

The following textbooks will be used in this course.

Brockwell, D. and Davis, R. A. (1991). Time Series: Theory and Methods, Second Edition. Springer-Verlag, New York. (BD)

Hamilton, J. (1994). Time Series Analysis. Princeton University Press, Princeton, NJ. (H)

Ait-Sahalia, Y., and Hansen, L. P. (2010). Handbook of Financial Econometrics, Volumes 1 and 2. Horth-Holland, Amsterdam.

Arratia, A. (2014). Computational Finance: An Introductory Course with R. Atlantis Press, Paris, and Springer, Berlin.

Bossaerts, Peter (2002) The Paradox of Asset Pricing. Princeton University Press.

Campbell, J.Y, Lo, A. W., and MacKinlay, A. C. (1997). The Econometrics of Financial Markets. Princeton University Press.

Cochrane, J. (2001). Asset Pricing. Princeton University Press.

Gouriéroux, C., and Jasiak, J. (2001). Financial Econometrics: Problems, Models and Methods. Princeton University Press.

McNeil, A. J., R. Frey, and P. Embrechts (2015): Quantitative Risk Management: Concepts, Techniques and Tools. Princeton University Press, Princeton, NJ, revised edn.

Ruppert, D. (2004). Statistics and Finance. Springer.

Singleton, K. J. (2006) Empirical Dynamic Asset Pricing: Model Specification and Econometric Assessment. Princeton University Press.

Course outline

1. Mathematical preliminaries
    (a) Distribution and quantile functions
    (b) Moments
    (c) Covariances and correlations
    (d) Asymptotic theory
    (e) Hilbert spaces
    (f) Difference equations
    (g) Complex analysis and power series
2. Time series analysis
    (a) Introduction
    (b) Stochastic processes
        i. Basic theory
        ii. Spectral analysis
    (c) Prediction and efficient markets
    (d) Continuous time models
    (e) Testing random walk and predictability
    (f) Nonstationarity
    (g) Building univariate time series models
    (h) Multivariate time series models
    (i) Long memory
3. Financial econometrics
    (a) Introduction: the problems of financial econometrics
    (b) Portfolio theory and the Capital asset pricing model (CAPM)
    (c) Volatility modelling
        i. The role of volatility modelling
        ii. Conditional heteroskedasticity: GARCH and stochastic volatility
        iii. Realized volatility
    (d) Heavy tails: theory and inference
    (e) Factor models
    (f) Dynamic optimization models and GMM
    (g) Quantile methods and value at risk
    (h) Options pricing