1 Résumés des interventions

1.1 Lundi 5 Mai

Risk-parameter estimation in volatility models

Auteurs : Christian Francq[1] et Jean-Michel Zakoïan[2]
Affiliations :
[1] Université Lille 3 et CREST
[2]Université Lille 3 et CREST
Heure : 9h15 - 10h15

Résumé : This paper introduces the concept of risk parameter in conditional volatility models of the form $\epsilon_t = \sigma_t(\theta_0)\eta_t$ and develops statistical procedures to estimate this parameter. For a given risk measure r, the risk parameter is expressed as a function of the volatility coefficients θ_0 and the risk, $r(\eta_t)$, of the innovation process. A two-step method is proposed to successively estimate these quantities. An alternative one-step approach, relying on a reparameterization of the model and the use of a non Gaussian QML, is proposed. Asymptotic results are established for smooth risk measures, as well as for the Value-at-Risk (VaR). Asymptotic comparisons of the two approaches for VaR estimation suggest a superiority of the one-step method when the innovations are heavy-tailed. For standard GARCH models, the comparison only depends on characteristics of the innovations distribution, not on the volatility parameters. Monte-Carlo experiments and an empirical study illustrate the superiority of the one-step approach for financial series.

Option pricing and hedging with heteroscedastic underlying price processes. Discrete and continuous time approaches

Auteur : Juan-Pablo Ortega
Affiliation : Laboratoire de Mathématiques de Besançon, UMR CNRS 6623.
Heure : 10h15 - 11h00

Résumé : In this talk we propose different schemes for option hedging when asset returns are modeled using several discrete time heteroscedastic models, namely GARCH and ARSV. More specifically, we will implement local risk minimization and a minimum variance hedge approximation based on an extended Girsanov principle that generalizes Duan's delta hedge. Since the minimal martingale measure fails to produce a probability measure in this setting, we construct local risk minimization hedging strategies with respect to a pricing kernel. These approaches are investigated in the context of non-Gaussian driven models. Furthermore, we analyze these methods for non-Gaussian GARCH diffusion limit processes and link them to the corresponding discrete time counterparts. A detailed numerical analysis based on S&P 500 European Call options will be provided to assess the empirical performance of the proposed schemes. We will also test the sensitivity of the hedging strategies with respect to the risk neutral measure used by recomputing some of our results with an exponential affine pricing kernel.

Positive Semidenite Integrated Covariance Estimation, Factorizations and Asynchronicity

Auteur : Sébastien Laurent[1], Kris Boudt[2], Asger Lunde[3] et Rogier Quaedvlieg[4]
Affiliation : [1]Aix-Marseille Université (Aix-Marseille School of Economics), CNRS & EHESS, France.
[2]Department of Business, Vrije Universiteit Brussel, Belgium and VU University Amsterdam, Netherlands.
[3]CREATES, University of Aarhus, Denmark and School of Economics and Management, Aarhus University, Denmark
[4]Department of Finance, Maastricht University, Netherlands
Heure : 11h30 - 12h30

Résumé : An estimator of the ex-post covariation of log-prices under asynchronicity and microstructure noise is proposed. It uses the Cholesky factorization on the correlation matrix in order to exploit the heterogeneity in trading intensity to estimate the dierent parameters sequentially with as many observations as possible. The estimator is guaranteed positive semidenite. Monte Carlo simulations conrm good nite sample properties. In the application we forecast portfolio Value-at-Risk and sector risk exposures for a portfolio of 52 stocks. We nd that forecasts obtained from dynamic models utilizing the proposed high-frequency estimator provide statistically and economically superior forecasts to models using daily returns.

Détection de ruptures offline et online pour des processus causaux

Auteur : Jean-Marc Bardet[1], William Kengne[2] et Olivier Wintenberger [3]
Affiliation : [1]Laboratoire SAMOS&Laboratoire Marin Mersenne pour les Mathématiques, l'Informatique et l'interdisciplinarité ; Université Paris 1 - Panthéon-Sorbonne.
[2]Université de Cergy-Pontoise.
[3]Université Paris 6.
Heure : 14h00 - 15h00

Résumé : On considère des séries chronologiques appartenant à une classe très large de modèles causaux incluant les processus AR(∞), ARCH(∞), TARCH(∞),... Dans un premier temps, on suppose que certains paramètres d'un modèle changent à chaque rupture et qu'il y a un nombre K, inconnu, de ruptures. On notera que comme il peut dépendre d'une infinité de valeurs passées, le modèle est en général non-stationnaire entre chaque instant de rupture. Les différents paramètres inconnus (nombre de ruptures, instant de rupture et paramètres successifs du modèle) sont estimés en utilisant un contraste pénalisé construit à partir d'une quasi-vraisemblance. Sous certaines conditions, on montre que l'on obtient les mêmes vitesses de convergence des estimateurs que dans le cas de suites de variables aléatoires indépendantes. Numériquement, l'ajout de la procédure de l'heuristique de la pente permet d'obtenir des résultats très convaincants. Dans un deuxième temps, on travaille de manière séquentielle, c'est-à-dire que l'on suppose que les données arrivent les unes après les autres, initialement toutes issues du même modèle, et on veut détecter lorsqu'un changement de paramètres du modèle advient. On définit une statistique fondé à partir de quasi-vraisemblances et on établit son comportement asymptotique. Des simulations sont également réalisées.

Testing breaks in variance structures with smooth changes

Auteur : Hamdi Raïssi
Affiliation :
[1]INSA Rennes & Institut de Recherche Mathématique de Rennes (IRMAR) CNRS UMR 6625
Heure : 15h00 - 15h45

Résumé : The problem of detecting variance breaks when the variance structure is smoothly time-varying is studied. It is highlighted that the tests based on (piecewise) constant specification of the covariance are not able to distinguish between smooth non constant variance and the case where an abrupt change is present. Consequently a new procedure for detecting variance breaks taking into account for smooth changes of the variance is proposed.

Semi-parametric inference in time-varying ARCH models

Auteur : Lionel Truquet
Affiliation :
[1]Université Rennes 1 & Institut de Recherche Mathématique de Rennes (IRMAR) CNRS UMR 6625
Heure : 15h45 - 16h30

Résumé : We consider the time-varying ARCH(p) model introduced by Dahlhaus and Subba Rao (2006) when some of the lag-coefficients are not time-varying, for example with a time-varying intercept and constant lag coefficients. Using kernel estimation, we will explain how to construct an asymptotically efficient estimator for the parametric part of the model when the noise is Gaussian. Our method can be generalized for semi-parametric inference in linear regression models. The problem of testing whether the lag variables coefficients are constant or not will be also addressed.

Tests statistiques sur le paramètre de longue mémoire d'un processus temporel

Auteur : Anne Philippe[1], Frédéric Lavancier[2], Remigijus Leipus[3] et Donatas Surgailis[4]
Affiliation : [1]Laboratoire de Mathématiques Jean Leray ; Université de Nantes.
[2]Laboratoire de Mathématiques Jean Leray ; Université de Nantes.
[3]Faculty of Mathematics and Informatics, Vilnius University.
[4]Faculty of Mathematics and Informatics, Vilnius University.
Heure : 16h45 - 17h45

Résumé : We deal with detection of non-constant long memory parameter in time series. The null hypothesis presumes stationary or nonstationary time series with constant long memory parameter, typically an $I(d)$ series with $d > 0.5$.

The alternative corresponds to an increase in persistence and includes in particular an abrupt or gradual change from $I(d_1)$ to $I(d_2)$. We discuss several test statistics based on the ratio of forward and backward sample variances of the partial sums. The consistency of the tests is proved under a very general setting. We also study the behavior of these test statistics for some models with changing memory parameter. A simulation study shows that our testing procedures

have good finite sample properties and turn out to be more powerful than the KPSS-based tests considered in some previous works.

Variable Selection in Predictive Mixed-Frequency Models

Auteur : Marsilli Clément
Affiliation :
[1] Laboratoire de Mathématiques de Besançon, UMR CNRS 6623.
Heure : 17h45 - 18h30

Résumé : In short-term forecasting, it is essential to take into account all available information on the current state of the economic activity. Yet, the fact that various time series are sampled at different frequencies prevents an efficient use of available data. In this respect, the Mixed Data Sampling (MIDAS) model has proved to outperform existing tools by combining data series of different frequencies. However, major issues remain regarding the choice of explanatory variables. The paper first addresses this point by developing MIDAS based dimension reduction techniques and by introducing two novel approaches based on either a method of penalized variable selection or Bayesian stochastic search variable selection. These features integrate a cross-validation procedure that allows automatic in-sample selection based on recent forecasting performances. Then the developed techniques are assessed with regards to their forecasting power of US economic growth during the period 2000-2013 using jointly daily and monthly data. Our model succeeds in identifying leading indicators and constructing an objective variable selection with broad applicability.

1.2 Mardi 6 Mai

Long term component dynamic models for realized covariance matrices

Auteur : Luc Bauwens[1], Manuela Braione[2] et Giuseppe Storti[3]
Affiliation : [1]Université catholique de Louvain, CORE.
[2]Université catholique de Louvain, CORE.
[3]Università di Salerno, Department of Economics and Statistics.
Heure : 08h30 - 09h30

Résumé : Dynamic models for realized covariance matrices are proposed, which include a secular component that captures the changing levels of realized variances and correlations. They generalize the realized DCC models of [**?**], where the long term level is assumed to be constant. The long term component is specified either as a nonparametric function or as a MIDAS term. Estimation can be done in steps for large dimensional matrices.

Estimation and empirical performance of non-scalar dynamic conditional correlation models

Auteur : Lyudmila Grigoryeva
Affiliation : Laboratoire de Mathématiques de Besançon, UMR CNRS 6623.
Heure : 09h30 - 10h15

Résumé : This paper presents a method capable of estimating richly parametrized versions of the dynamic conditional correlation (DCC) model that go beyond the standard scalar case. The algorithm is based on the maximization of a Gaussian quasi-likelihood using a Bregman-proximal trust-region method to handle the various non-linear stationarity and positivity constraints that arise in this context. We consider the general matrix Hadamard DCC model with full rank, rank equal to two and, additionally, two different rank one matrix specifications. In the last mentioned case, the elements of the vectors that determine the rank one parameter matrices are either arbitrary or parsimoniously defined using the Almon lag function. We use actual stock returns data in dimensions up to thirty in order to carry out performance comparisons according to several in- and out-of-sample criteria. Our empirical results show that the use of richly parametrized models adds value with respect to the conventional scalar case.

Modified portmanteau tests for ARMA models with dependent errors : a self-normalisation approach

Auteurs : Bruno Saussereau[1] et Yacouba Boubacar Maïnassara[2]
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[2]Laboratoire de Mathématiques de Besançon, UMR CNRS 6623, Université de Franche-Comté.
Heure : 10h30 - 11h15

Résumé : In this paper, we derive the asymptotic distribution of residual empirical autocovariances and autocorrelations under weak assumptions on the noise. We propose new port-

manteau statistics for autoregressive moving-average (ARMA) models with uncorrelated but non-independent innovations by using a self-normalisation approach. We establish the asymptotic distribution of the proposed statistics. This asymptotic distribution is quite different from the usual chi-squared approximation used under the independent and identically distributed assumptions on the noise, or the weighted sum of independent chi-squared random variables obtained under nonindependent innovations. A set of Monte Carlo experiments, and an application to the daily returns of the CAC40 is presented.

Convex relaxation of the model order estimation problem for ARMA time series

Auteurs : Stephane Chretien[1] et Basad Al Sarray[2]
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Heure : 11h15 - 12h00

Résumé : The problem of ARMA model estimation and model selection is a basic question in time series analysis. Interestingly, the likelihood approach is not entirely satisfactory because of the non-concavity of the log-likelihood function. Many authors have proposed a convex criterion for ARMA estimation, based on the state space model representation. The goal of our study is to propose a convex penalization for the problem of simultaneous estimation and model order selection, in the same spirit as the LASSO for linear regression.