# MEDDELELSER

Dansk Selskab for Teoretisk Statistik

Returneres ved varig adresseændring

Næste nummer af "MEDDELELSER" udkommer 1. november 2003.

Bidrag til dette nummer skal være redaktøren i hænde senest

**onsdag den 23. oktober kl. 12.00.**

Bidrag bedes sendt til:

*medlinfo@dsts.dk* skal benyttes ved **indmeldelse** og **adresseændring** i DSTS.

Bidrag i elektronisk form ønskes helst i et af nedenstående formater: Word, PDF, HTML eller ASCII.

Annoncering af stillinger er kr. 500 pr. side. Indstik, der ønskes sendt i konvolut sammen med Meddelelser, kr. 1500 pr. standard A4 side.

## Seminar i matematisk statistik og sandsynlighedsregning

H.C. Ørsted Institute, Auditorie 10

### Richard A. Davis, Colorado State University, Ft. Collins

### Onsdag, 15. October, 16.15 - 17.00:

"Estimation for State-Space Models: an approximate likelihood approach"

ABSTRACT:
Typically, the likelihood function for non-Gaussian state-space models can not be computed explicitly and so simulation based procedures, such as importance sampling or MCMC, are commonly used to estimate model parameters.

In this paper, we consider an alternative estimation procedure which is based on an approximation to the likelihood function. The approximation can be computed and maximized directly, resulting in a quick estimation procedure without resorting to simulation. Moreover, this procedure is competitive with estimates produced using simulation-based procedures. The speed of this approach makes it viable to fit a wide range of potential models to the data and allows for bootstrapping the parameter estimates. This procedure will be illustrated in two examples; fitting a stochastic volatility model to a time series of exchange rates and fitting a Poisson model to a time series of counts.

## TILLYKKE!

Docent Poul Thyregod, IMM, DTU er blevet valgt til formand for the European Network for Business and Industrial Statistics, ENBIS.
Se http://www.enbis.org

# AARHUS UNIVERSITET

## DET SAMFUNDSVIDENSKABELIGE FAKULTET
## Adjunktur/forskningsassistentstilling
## (statistikerstilling)
CENTER FOR REGISTERFORSKNING

Ved Center for Registerforskning, Det Samfundsviden-skabelige Fakultet, Aarhus Universitet er en toårig stilling som adjunkt/forskningsassistent(statistiker) ledig til besættelse snarest.

Ansøgningsfrist: **14. oktober 2003, kl. 12.00.**

Opslaget kan ses på webadressen www.samfundsvidenskab.au.dk/opslag men kan også **fås** ved henvendelse til Kirsten Dybdahl Sørensen, e-post kds@adm.au.dk (eller på tlf. 8942 1531, fax 8942 1540).

Seminar i matematisk statistik og sandsynlighedsregning

Onsdag den 8. oktober 2003: Martin Jacobsen (Københavns Universitet)

Title: "Ruin problems for a class of Markov additive processes"

*Seminaret afholdes kl. 15:15 i auditorium 10 på H.C. Ørsteds Instituttet. Der serveres te i lokale E325 kl. 15:00.*

*Ruin problems for a class of Markov additive processes*

*Summary.* Consider a stochastic process $X$ of the form, for given numbers $\beta_i \in \mathbf{R}$, $\sigma_i \geq 0$,

$$X_t = x_0 + \int_0^t \beta_{J_s}\, ds + \int_0^t \sigma_{J_{s-}}\, dB_s - \sum_{n=1}^{N_t} U_n$$

where $B$ is a standard Brownian motion, $(J, N)$ is a Markov chain on $(E, \mathbf{N}_0)$ where $E$ is a finite set and $N$ is a counting process, and the $U_n$ form an iid sequence of claims $> 0$. The structure of $(J, N)$ is such that $J$ itself is an irreducible Markov chain, while the claims, that occur at the jump times for $N$, arrive according to a (possibly delayed) renewal process. Between the jumps for $(J, N)$, $X$ behaves as a Brownian motion with some drift and variance (allowed $= 0$). Assuming that $x_0 > 0$, $J_0 \equiv i_0$, the problem is to discuss the *time to ruin*

$$T_r = \inf \{t \geq 0 : X_t \leq 0\},$$

the *undershoot*

$$Y_r = -X_{T_r}$$

defined when $T_r < \infty$, and the *ruin probability*

$$p_r = \mathbf{P}^{x_0, i_0}(T_r < \infty).$$

Under mild conditions on the distribution of the claims (rational Laplace transform) and the distribution of the waiting times between claims (phase-type), it is possible to give a mathematically precise description of the joint Laplace transform

$$\mathbf{E}^{x_0, i_0} e^{-\theta T_r - \zeta Y_r} \quad (\theta > 0, \zeta \geq 0)$$

and the partial ruin probabilities

$$\mathbf{P}^{x_0, i_0}(T_r < \infty, Y_r > 0), \quad \mathbf{P}^{x_0, i_0}(T_r < \infty, Y_r = 0)$$

where the first quantity is the probability of ruin caused by a large enough claim, and the second is the probability of ruin by continuity (the diffusion part of $X$ crossing the level 0) which is of course $> 0$ iff either some $\sigma_i > 0$ or some $\beta_i < 0$. To actually find the Laplace transform and the ruin probabilities one must (i) find all the roots $\gamma$ with $\mathrm{Re}(\gamma) < 0$ of a certain polynomium, (ii) solve a system of linear equations. The method used to obtain the results was introduced by MJ (Stoch. Proc. Appl., **107**, 29-51 (2003)). There only the Laplace transform of $T_r$ was found together with $p_r$ for the model where all $\beta_i = \beta$, $\sigma_i^2 = 0$ (in which case $J$ is used exclusively to generate the claims arrival process). But at some stage it dawned upon the author that the same method could be used to handle the rather more general model and results discussed here! In the seminar the main results will be presented and illustrated by a concrete example where the ruin probabilities are calculated numerically. Also there will be some discussion of the techniques required for the proofs: Itô's formula and martingale representations for the Markov process $(X, J)$, partial eigenfunctions for the generator for $(X, J)$, and the results from complex function theory that allows one to count the roots of polynomials within appropriate parts of the complex plane. A special point: from an analytic point of view, the results concerning the ruin probabilities are the most difficult!

# Laboratory of Actuarial Mathematics
# University of Copenhagen

# Colloquia October 2003

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## Jesper Andreasen, Nordea

### H.C. Ørsted Institute, Lecture Hall 10

**Tuesday October 7th, 16.15 - 17.00: "Derivatives -- the View from the Trenches"**

ABSTRACT:  Based on his life as a quant in the derivatives industry Jesper entertains with a sequence of different problems relating to derivatives pricing and trading:

- The first and second fundamental theorems of derivatives trading.
- The difference between P and Q measures.
- Arbitrage and efficiency.
- "Liquidity", "supply and demand" and other empty phrases.
- Models and philosophies: what works and what doesn't?
- The future of derivatives: Are the good or the bad winning?

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## Michael Vogt, University of Karlsruhe

### H.C. Ørsted Institute, Lecture Hall 10

**Tuesday October 21st, 16.15 - 17.00: "Optimal Dynamic Reinsurance"**

ABSTRACT:  We consider a risk process modelled as a compound Poisson process, where optimal dynamic reinsurance is used to minimize infinite time ruin probability. The optimal strategies can be computed using the Hamilton-Jacobi-Bellman equation for most types of reinsurance, especially for proportional, XL- and limited XL-reinsurance, where the retention and the limit are considered as control variables. Using no reinsurance is the optimal strategy for small capital in the case of XL- and proportional reinsurance and the optimal strategies converge to constant strategies for large capital, provided that the adjustment coefficient of the problem exists. Examples with exponential and Pareto claims show the different proceedings in optimal control.

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For further colloquia see http://www.act.ku.dk/colloquium/2003/col2003a.html

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Seminar i matematisk statistik og sandsynlighedsregning

**Onsdag den 15. oktober 2003: Richard A. Davis (Colorado State University, Ft. Collins)**

Title: " Estimation for State-Space Models: an approximate likelihood approach"

*Seminaret afholdes kl. 15:15 i auditorium 10 på H.C. Ørsteds Instituttet. Der serveres te i lokale E325 kl. 15:00.*

Abstract:

Typically, the likelihood function for non-Gaussian state-space models can not be computed explicitly and so simulation based procedures, such as importance sampling or MCMC, are commonly used to estimate model parameters.

In this paper, we consider an alternative estimation procedure which is based on an approximation to the likelihood function. The approximation can be computed and maximized directly, resulting in a quick estimation procedure without resorting to simulation. Moreover, this procedure is competitive with estimates produced using simulation-based procedures. The speed of this approach makes it viable to fit a wide range of potential models to the data and allows for bootstrapping the parameter estimates. This procedure will be illustrated in two examples; fitting a stochastic volatility model to a time series of exchange rates and fitting a Poisson model to a time series of counts.

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Seminar i matematisk statistik og sandsynlighedsregning

Onsdag den 22. oktober 2003: Charles S. Bos, Nuffield College, Oxford

Title: " Inference for adaptive time series models: stochastic volatility and conditionally Gaussian state space form"

*Seminaret afholdes kl. 15:15 i auditorium 10 på H.C. Ørsteds Instituttet. Der serveres te i lokale E325 kl. 15:00.*

Abstract:
In this paper we replace the Gaussian errors in the standard Gaussian, linear state space model with stochastic volatility processes. This is called a GSSF-SV model. We show that conventional MCMC algorithms for this type of model are ineffective, but that this problem can be removed by reparameterising the model. We illustrate our results on an example from financial economics and one from the nonparametric regression model. We also develop an effective particle filter for this model which is useful to assess the fit of the model.

Authors: Charles S. Bos and Neil Shephard, Nuffield College, Oxford

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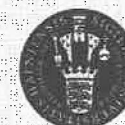
Seminar i matematisk statistik og sandsynlighedsregning

Onsdag den 29. oktober 2003: Gabriel Pons, Marie Curie Fellow, University of Aarhus

Title: " Seasonal cointegration analysis with temporally aggregated time series. A comparison of different approches"

*Seminaret afholdes kl. 15:15 i auditorium 10 på H.C. Ørsteds Instituttet. Der serveres te i lokale E325 kl. 15:00.*

Abstract:
The relationship between seasonal frequencies at different sampling intervals allows to analyze seasonal cointegration at the harmonic frequencies through the Nyquist frequency of temporally aggregated series. This approach, therefore, avoids polynomial cointegrated relationships that complicates the interpretation of the seasonal cointegrated systems. The finite sample properties of this alternative procedure are compared with the available methods, Johansen and Schaumburg (1999), Cubbada (2000; 2003) and Ahn and Cho (2003), which deal with complex unit roots with data measured at only one sampling interval.

# Kalender 2003

(arrangementer annonceret i MEDDELELSER)

| Dato | Med. nr. | Aktivitet |
|------|----------|-----------|
| 7/10 | 7/03 | Colloquial: KU: Jesper Andreasen, Nordea: Derivatives -- the View from the Trenches. |
| 8/10 | 7/03 | Seminar: HCØ: Martin Jacobsen, KU: Ruin problems for a class of Markov additive processes. |
| 15/10 | 7/03 | Seminar: HCØ: Richard A. Davis (Colorado State University, Ft. Collins): Estimation for State-Space Models: an approximate likelihood approach. |
| 21/10 | 7/03 | Colloquial: KU: Michael Vogt, University of Karlsruhe: Optimal Dynamic Reinsurance. |
| 22/10 | 7/03 | Seminar: HCØ: Charles S. Bos, Nuffield College, Oxford: Inference for adaptive time series models: stochastic volatility and conditionally Gaussian state space form. |
| 29/10 | 7/03 | Seminar: HCØ: Gabriel Pons, Marie Curie Fellow (University of Aarhus): Seasonal cointegration analysis with temporally aggregated time series. A comparison of different approaches. |
| 26/10 – 28/10 | 5/03 | Kursus: Biostatistics, Panum Instituttet, København: Practical Statistical Analysis of DNA Microarray Data |
| 14/11 – 19/11 | 6/03 | Kursus: Biostatistics: Andrea De Gaetano (Laboratorio di Biomatematica, CNR IASI "A. Ruberti", Rome, Italy): An introduction to applied physiological modelling |

Husk! Redaktøren har ændret E-mail adresse: Brug red@dsts.dk
Hvis man ikke får respons, så prøv ilja@lundbeck.com Selskabets server har haft nogle problemer.

## Deadlines i år 2003

**Frist for indlevering af bidrag:**      **MEDDELELSER udkommer**

23. oktober      1. november
21. november      1. december

## Nyt om Navne

European Network for Business and Industrial Statistics, ENBIS, har fået en dansk formand, nemlig Poul Thyregod. Se evt. http://www.enbis.org
Det er rigtig flot at blive formand for den succesfulde og hurtigt voksende organisation. Tillykke med det!

Patricia Tan, er ansat som statistiker i Clinical Statistics, Novo Nordisk A/S. Patricia kommer fra Novo Nordisk i Singapore.

Følgende medlemmers Meddelelser kommer retur. Ved du hvor de findes, så meddel venligst adressen pr. E-mail til red@dsts.dk (eller ilja@lundbeck.com)

Bettina Graversgaard tidl. Ålborg Universitet; Knud Juel; Anette Gæde;