

STATISTICS & RISK MODELING

WITH APPLICATIONS IN FINANCE
AND INSURANCE

EDITOR-IN-CHIEF

Robert Stelzer, Germany

CO-EDITORS

Hansjörg Albrecher, Switzerland

Rama Cont, UK

Georg Pflug, Austria

Ludger Rüschendorf, Germany

ADVISORY BOARD

Paul Embrechts, Switzerland

Walter Schachermayer, Austria

Albert Shiryaev, Russia

Helmut Strasser, Austria

ASSOCIATE EDITORS

Nicole Bäuerle, Germany

Wolfgang Härdle, Germany

Johanna Nešlehová, Canada

Ludger Overbeck, Germany

Mark Podolskij, Denmark

Zari Rachev, USA

Mathieu Rosenbaum, France

Peter Tankov, France

Johanna Ziegel, Switzerland

DE GRUYTER

ABSTRACTED/INDEXED IN ABDC Journal Quality List · Baidu Scholar · Cabells Journalytics · CNKI Scholar (China National Knowledge Infrastructure) · CNPIEC: cnpLINKer · Dimensions · EBSCO (relevant databases) · EBSCO Discovery Service · EconBiz · Genamics JournalSeek · Google Scholar · IBR (International Bibliography of Reviews of Scholarly Literature in the Humanities and Social Sciences) · IBZ (International Bibliography of Periodical Literature in the Humanities and Social Sciences) · Japan Science and Technology Agency (JST) · J-Gate · JournalGuide · JournalTOCs · KESLI-NDL (Korean National Discovery for Science Leaders) · Mathematical Reviews (MathSciNet) · MyScienceWork · Naver Academic · Naviga (Softweco) · Norwegian Register for Scientific Journals, Series and Publishers · Primo Central (ExLibris) · ProQuest (relevant databases) · Publons · QOAM (Quality Open Access Market) · ReadCube · RePEc (Research Papers in Economics): IDEAS, EconPapers · SCImago (SJR) · SCOPUS · Semantic Scholar · Sherpa/RoMEO · Summon (ProQuest) · TDNet · Ulrich's Periodicals Directory/ulrichsweb · WanFang Data · Web of Science: Emerging Sources Citation Index · WorldCat (OCLC) · X-MOL · Yewno Discover · zbMATH Open.

The publisher, together with the authors and editors, has taken great pains to ensure that all information presented in this work (programs, applications, amounts, dosages, etc.) reflects the standard of knowledge at the time of publication. Despite careful manuscript preparation and proof correction, errors can nevertheless occur. Authors, editors and publisher disclaim all responsibility for any errors or omissions of liability for the results obtained from use of the information, or parts thereof, contained in this work.

The citation of registered names, trade names, trademarks, etc. in this work does not imply, even in the absence of a specific statement, that such names are exempt from laws and regulations protecting trademarks etc. and therefore free for general use.

ISSN 2193-1402 · e-ISSN 2196-7040

All information regarding notes for contributors, subscriptions, Open access, back volumes and orders is available online at www.degruyter.com/strm.

RESPONSIBLE EDITOR Robert Stelzer, Institut für Finanzmathematik, Universität Ulm, Helmholtzstr. 18, 89081 Ulm, Germany.
Email: Robert.Stelzer@uni-ulm.de

PUBLISHER Walter de Gruyter GmbH, Berlin/Boston, Genthiner Straße 13, 10785 Berlin, Germany

JOURNAL COORDINATOR Birgit Zoglmeier, email: birgit.zoglmeier@degruyter.com

RESPONSIBLE FOR ADVERTISEMENTS Markus Kügel, De Gruyter, Rosenheimer Str. 143, 81671 München, Germany.
Tel.: +49 89 76 902-424
Email: anzeigen@degruyter.com

© 2023 Walter de Gruyter GmbH, Berlin/Boston

TYPESETTING WisSat Publishing + Consulting GmbH, Fürstenwalde

PRINTING Franz X. Stücker Druck und Verlag e.K., Ettenheim



Offenlegung der Inhaber und Beteiligungsverhältnisse gem. § 7a Abs. 1 Ziff. 1, Abs. 2 Ziff. 3 des Berliner Pressegesetzes: Die Gesellschafter der Walter de Gruyter GmbH sind: Cram, Gisela, Rentnerin, Berlin; Cram, Dr. Georg-Martin, Unternehmens-Systemberater, Stadtbergen; Cram, Maike, Wien (Österreich); Cram, Jens, Mannheim; Cram, Ingrid, Betriebsleiterin, Tuxpan/Michoacan (Mexiko); Cram, Sabina, Mexico, DF (Mexiko); Cram, Silke, Wissenschaftlerin, Mexico DF (Mexiko); Cram, Björn, Aachen; Cram, Berit, Hamm; Cram-Gomez, Susana, Mexico DF (Mexiko); Cram-Heydrich, Walter, Mexico DF (Mexiko); Cram-Heydrich, Kurt, Angestellter, Cancún (Mexiko); Duvenbeck, Brigitta, Oberstudienrätin i.R., Bad Homburg; Gädeke, Gudula, M.A., Atemtherapeutin/Lehrerin, Tübingen; Gädeke, Martin, Student, Ingolstadt; Gomez Cram, Arturo, Walter, Global Key Account Manager, Bonn; Gomez Cram, Ingrid Arlene, Studentin, Mexico, DF (Mexiko); Gomez Cram, Roberto, Assistant Professor, London (UK); Lubasch, Dr. Annette, Ärztin, Berlin; Schütz, Dr. Christa, Ärztin, Mannheim; Schütz, Sonja, Diplom.-Betriebswirtin (FH), Berlin; Schütz, Juliane, Berlin; Schütz, Antje, Berlin; Schütz, Valentin, Mannheim; Seils, Dorothee, Apothekerin, Stuttgart; Seils, Gabriele, Journalistin, Berlin; Seils, Christoph, Journalist, Berlin; Siebert, John-Walter, Pfarrer, Oberstenfeld; Anh Vinh Alwin Tran, Student, Zürich (Schweiz), Tran, Renate, Mediatorin, Zürich (Schweiz); Carmen Siebert, Angestellte, Kempten; Duyen Anh Johann Tran, Architekt, Zürich (Schweiz); Lang Lieu Laurin Tran, Lehrperson, Zürich (Schweiz); Duyen Mai Marie Tran, Studentin, Zürich (Schweiz); Anh Huy Merlin Tran, Schüler, Zürich (Schweiz).

Contents

Marlon Moresco, Marcelo Brutti Righi, Eduardo Horta

Minkowski deviation measures — 1

Yichen Feng, Jean-Pierre Fouque, Ruimeng Hu,
Tomoyuki Ichiba

**Systemic risk models for disjoint and overlapping groups
with equilibrium strategies — 21**

