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# CREATES

## ANNUAL REPORT 2011

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The Danish National Research Foundation's  
Center for Research in Econometric Analysis of Times Series, CREATES



Center for Research in Econometric Analysis of Time Series, CREATES, is a research unit at Aarhus University, hosted by the Department of Economics and Business, Business and Social Sciences. Research is conducted within the general fields of time series and financial econometrics. The center is funded as a Center of Excellence by the Danish National Research Foundation via a DKK 80.2m (Euro 10.7m) grant on top of the funding from the host institution. To date CREATES has attracted additionally DKK 38m to support center activities from other external sources. The funding period covers a 10-year period 2007-2017. CREATES' core group of members are affiliated with Aarhus University, University of Copenhagen and University of Southern Denmark. A number of international research fellows of Danish origin, mainly from North America, are associated with CREATES. The research at CREATES is characterized by interdisciplinary collaboration amongst economists, econometricians, and mathematical statisticians.

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# 1. HIGHLIGHTS

## 1.1. Renewal of DG grant

During 2011 CREATES was evaluated regarding the possible prolongation of the grant from the Danish National Research Foundation for additionally five years starting in April 2012. The international review panel consisted of Professor Valentina Corradi, University of Warwick, Professor Oliver Linton, London School of Economics, and Professor Jay Shanken, Emory University. The evaluation was based upon an extensive self evaluation report and a research plan for the new granting period. The review panel made an on-site visit to CREATES in February 2011 and provided a report with its recommendations. In April 2011 the board of the Danish National Research Foundation decided to fund CREATES for yet another five year with a DKK 40m grant. This is similar in magnitude to the first funding period.

## 1.2. Research Output

At CREATES we are very pleased with the outcome of the entire evaluation process and we are proud of the research results that have been achieved so far. Today CREATES is one of the world's leading research centers in econometrics and according to international rankings (RePEc for instance) is placed amongst the leading institutions in the world within the fields of econometrics and time series econometrics. CREATES is doing well along all the parameters that are considered essential for a serious research center. This includes the training of PhD candidates, the organization of high quality seminars, workshops, and conferences, and a regular flow of distinguished visiting scientists. Most importantly, the research output at CREATES is flourishing. In 2011 more than 55 papers were published in peer reviewed journals and books and more than 50% of journal articles appeared in absolute top econometrics and finance journals including *Econometrica*, *Journal of Finance*,

*Journal of Financial Economics*, *Journal of Business and Economic Statistics*, and *Journal of Econometrics*. More than 60 papers are presently forthcoming publications in peer reviewed journals. 53 working papers were published in the CREATES Research Paper series in 2011 and the majority of these are currently under review at journals. After 5 years the research output in terms of both quantity and quality seems to have reached its steady state level but of course the center continues to strive for further improvements where possible.

### About CREATES

*Center for Research in Econometric Analysis of Time Series, CREATES, is a research unit at Aarhus University, hosted by the Department of Economics and Business, Business and Social Sciences. Research is conducted within the general fields of time series and financial econometrics. The center is funded as a Center of Excellence by the Danish National Research Foundation via a DKK 80.2m (Euro 10.7m) grant on top of the funding from the host institution. To date CREATES has attracted additionally DKK 38m to support center activities from other external sources. The funding period covers a 10-year period 2007-2017. CREATES' core group of members are affiliated with Aarhus University, University of Copenhagen and University of Southern Denmark. A number of international research fellows of Danish origin, mainly from North America, are associated with CREATES. The research at CREATES is characterized by interdisciplinary collaboration amongst economists, econometricians, and mathematical statisticians.*

### 1.3. Research Fields

The research conducted at CREATES covers a broad range of sub-fields. One of the most active research areas is within the econometric analysis of high frequency time series data, especially volatility modeling of financial data. The production in this field is flourishing, and CREATES can document one of the strongest research groups worldwide. Building on these competencies the area is going to expand further with focus on the stochastic and econometric modeling of commodity markets including energy markets. This area is one of the focus areas which is considered "high-risk" and includes interdisciplinary research collaboration both within Aarhus University and with international research partners. This area will expand in the coming years assisted by recent international recruitments. Furthermore, CREATES has attracted further funding to strengthen this research field.

Other focused research fields at CREATES include theoretical time series econometrics: the analysis of non-stationary time series, long memory models, and non-linear time series modeling. Also the fields of empirical finance and asset pricing have a dominant priority in CREATES' research plan.

A particular field to emphasize here concerns the construction of statistical algorithms for econometric analysis of high-dimensional data sets. In economics and finance as well as in other research fields, the access to data bases of large dimensions is becoming an increasing challenge for data analysis. This area of the research plan is generally expanding in the profession and through recent employments we will focus further on this field.

### 1.4. Seminars and Conferences

CREATES has very active seminar series and regularly organize international symposia, conferences, and workshops. During 2011 more than 55 regular lunch and invited seminar presentations were given. In addition, CREATES organized and participated in organizing six major conference and workshop activities. These included the 6th Nordic Econometric Meeting at Sandbjerg Manor 27-29 May, and a satellite workshop held at Stanford University 20-22 June on the measuring and modeling of risk with high frequency data. CREATES continued its Distinguished Speaker Lectures with contributions in 2011 from Professor Andrew Harvey, University of Cambridge, and Professor Adrian Pagan, University of Sydney. The lectures are video recorded and are made available through CREATES' podcast archive, [www.creates.au.dk](http://www.creates.au.dk). Domestic and international researchers contributed with a series of specialized PhD courses covering a range of fields in time series and financial econometrics.



## 2. ORGANIZATION

### 2.1. Current Organizational Changes

The current organizational changes at Aarhus University naturally affect CREATES and the transition process will also affect the center significantly the coming year. As part of the merger between Aarhus University and the Aarhus School of Business and the establishment of a new unified host department, Department of Economics and Business, the physical frames for CREATES will change accordingly. During the summer 2012 CREATES is going to move to new locations at Fuglesangs Allé. As agreed in the contract with the Danish National Research Foundation the center is guaranteed a continued joint location within the host department. Also it is our hope that a new environment can be assured with close ties to the finance group of the department where there is considerable overlap with CREATES members and great opportunities for research synergies.

### 2.2. Center Members

The numbers of man-years (årsværk) of personnel affiliated with CREATES in 2011 is reported in Table 1. Section I provides a detailed staff list for 2011 (including funding). In 2011 a total of 40.6 man-years (årsværk) were at CREATES. The contribution of co-funding by the host institution in man-years for the years 2008-2011 were respectively, 9.1, 12.5, 15.8, and 20.6, that is, an increase of more than 100% over the initial funding period. The main increase in man-years is due to an expanding in-take of PhD students within CREATES' research field, but also regarding positions at tenured or non-tenured level there has been a significant increase in host co-funding within the granting period. Co-funding from other external sources remains rather stable around 6-7 man-years.

Table 1 CREATES affiliates and funding sources, "man-years" (årsværk), 2011

	DG/CREATES	Host institution	Other external funding	Other sources	Total
Domestic Research Fellows	3.2	6.4	2.4	2.3	14,3
International Research Fellows	0.5	-	-	-	0,5
Visiting Professors	0.2	-	-	-	0,2
Postdocs	4.2	0.4	2.0	-	6,6
PhD students	1.7	12.8	2.0	-	16,5
Research Assistance	0.5	-	-	-	0,5
Support Staff	1.0	1.0	-	-	2,0
<b>Total</b>	<b>11,3</b>	<b>20,6</b>	<b>6,4</b>	<b>2,3</b>	<b>40,6</b>

Note: "Other external funding" includes research grants from FSE (Danish Social Sciences Research Council) and Faculty grants. "Other Sources" refer to salaries paid by other universities to individuals affiliated with CREATES.

The core group of domestic center members includes time series and financial econometricians as well as mathematical statisticians from Aarhus University (Department of Economics and Business, and Department of Mathematical Sciences) and University of Copenhagen (Department of Economics, and Department of Mathematical Statistics). CREATES has also two fellows based at University of Southern Denmark in Odense (Department of Business and Economics).

Over the years, Aarhus University and University of Copenhagen have produced econometrics candidates who today are among the most cited researchers in the profession and with remarkable academic careers. Also, within the past few years promising PhD candidates in econometrics are now affiliated with some of the best universities internationally. These researchers are affiliated with CREATES as international research fellows and typically spend 1-3 months per year at CREATES thus serving as their Danish research base. Note that as opposed to the annual reports of previous years, the number of man-years for international research fellows are now only recorded in Table 1 when actual funding has been made by CREATES.

In 2011 the group of international research fellows has been extended to include former CREATES affiliates (typically at the postdoctoral or assistant professor level) who have made academic career moves. The idea is to continue keeping close ties to these people in terms of research collaboration. Initially, such affiliations will be for a two-year period and subject to extension when the collaboration becomes especially productive.

As of 31 December 2011, CREATES counts a total of 21 domestic research fellows, 17 international research fellows, and 7 postdoctoral scholars. 16 PhD students are affiliated with CREATES. 3 PhD students defended their theses during 2011.

During the first granting period CREATES experienced difficulties in administrative support at the university level as well as discontinuity on the post as center administrative manager. The past two years have become much more stable in this respect and today CREATES has an efficient, service-minded and well-functioning support headed by Solveig Nygaard Sørensen.

### 2.3. New Recruitments

In 2011 there has been some changes in the staff list of CREATES as a number of junior faculty members at the postdoc or assistant professor level have moved to new jobs as part of their careers. Christos Ntantamis is now at Mount Allison University in Canada, Almut Veraart is assistant professor at Imperial College London, Robinson Kruse is assistant professor at Leibniz Universität Hannover, Isabel Casas is associate professor at University of Southern Denmark, Andreas Schrimpf is at Bank for International Settlements in Basel, and Katarzyna Lasak is assistant professor at Free University in Amsterdam. All these former colleagues are still affiliated with CREATES as (international) research fellows and visit CREATES and participate in research collaboration on a regular basis.

CREATES has also hired a number of new colleagues. Daniela Osterrieder, University of Maastricht, Paolo Santucci Di Magistris, University of Pavia, Stefano Grassi, University of Rome, and Peter Exterkate, Erasmus University Rotterdam, have joined the group as postdoctoral fellows. Amongst former PhD students at CREATES Johannes Tang Kristensen, Anders Bredahl Kock, and Malene Kallestrup Lamb have started as postdocs, all financed by the Danish Council for Independent Research, Social Sciences, FSE. Presently, five postdoctoral fellows are funded by the FSE.

Stig Vinther Møller, Thomas Quistgaard Pedersen, and David Skovmand, all former CREATES PhD students, have become research fellows at CREATES. Starting 1 January 2012 CREATES has also hired Eric Hillebrand as an associate professor. Eric Hillebrand comes from a tenured position at Louisiana State University, Baton Rouge.

In January 2012 CREATES was present at the AEA-ASSA meetings in Chicago to interview and hire new junior members to CREATES. It is expected that five new positions will be filled during 2012 including a 3-year postdoctoral fellowship announced jointly and to be shared with the Oxford Man Institute at Oxford University.

All the recent employments are (or will be) made with strong focus on fulfilling the Research Plan 2012-2017 agreed with the Danish National Research Foundation in the new contract, see chapter 3.

## 3. RESEARCH PLAN AND PUBLICATIONS

### 3.1. Towards the Research Plan 2012-2017

The CREATES Research Plan 2007, the CREATES Self Evaluation Report 2010, and the CREATES Research Proposal 2012-2017 were the basic documents that were evaluated by the international review panel in the 2011 Midterm Evaluation.

In their report the international evaluation panel concluded (extract):

*We find that they (CREATES) have done an excellent job in the past five years in building on a well-known strength of quantitative methods in economics in Denmark and among expatriated Danish scholars.*

*Overall, the research performed at CREATES, has definitely gone beyond the aims outlined in the initial proposal, in terms of both quality and quantity.*

*Overall, the plan for future research is an excellent mix of completely novel, high risk projects and safer projects, well connected with work done by Center members during the first period. There is no doubt that interesting contributions, with potentially high impact will arise from the new proposal.*

*Given the framework in which they operate, it is hard to imagine they could have done any better. We are also very optimistic about their future plans, which we think are both realistic and ambitious. They clearly intend to stay near the cutting edge of research developments across the fields in which they excel.*

In 2011 CREATES was in the transition process between two research plans. In the future CREATES will expand the research of the initial funding period to include new related research areas

such as the econometrics of energy markets and the analysis of high dimensional data. We refer to the new 2012 Research Plan agreed with the Danish National Research Foundation for details regarding the new funding period. Some initiatives have already been made during 2011 to target the goals of the new research plan, both in terms of new employments and in terms of attracting further external funding.

The focused research areas described in the 2012 Research Plan can be categorized as follows:

1. The econometrics of stationary processes and random fields with applications to energy markets
2. Volatility modeling and economic analysis with mixed frequency data
3. Macro-finance DSGE models, modeling and inference
4. High-dimensional data analysis and statistical algorithms for high dimensional variable selection
5. Conditional modeling and forecasting subject to non-linearity and persistence
6. Empirical finance: Asset pricing and volatility.

Like for the 2007 Research Plan many of these general research fields overlap to some extent. For instance, the analysis of high frequency data and volatility are topics that are included in several of the focus areas mentioned and conditional modeling is also the benchmark for many projects across the different themes. Notwithstanding, the categorization is an attempt to structure the research into main areas to better overview the broad range of fields in which CREATES researchers operate.

### 3.2. Increased Focus on “High Risk” Research Areas

In the new research plan CREATES has been very concerned regarding the focus on possible “high-risk” research areas. The center is becoming increasingly aware of the importance of including such projects in the research portfolio. It is our belief that focus area 1 is particularly “high risk” as a completely new methodological field is being developed and also includes a considerable degree of interdisciplinary collaboration with great potential. The research area implies that it will be necessary to develop fundamental new probability tools and with potential for important applications in the empirical analysis of commodity (including energy) markets. In their report, the mid-term evaluation review panel also considered this area “high risk” due to its innovativeness, but they also found the field to be potentially very high return.

The first research papers initiating this focus area have been produced during 2010 and 2011 with excellent prospects. At CREATES we are now putting extra resources and attention into this field. In December 2011 Professor Asger Lunde at CREATES was granted DKK 3m from the AU-Ideas funding initiative and will lead an interdisciplinary research group on “Stochastic and Econometric Analysis of Commodity Markets”. Currently two junior positions with international candidates are being filled to strengthen this area. The research includes collaboration with former postdocs at CREATES, i.e. Almut Veraart, now at Imperial College London, and Mark Podolskij, University of Heidelberg. Moreover, the group has participants from University of Oslo, Centre of Mathematics for Applications, including Professors Fred Espen Benth and Giulia Di Nunno. The main participant from the Department of Mathematical Sciences at Aarhus University is Professor Ole Barndorff-Nielsen who is also affiliated with CREATES. The research collaboration has been termed the AHOI Network (Aarhus, Heidelberg, Oslo, Imperial College).

Table 2. Review of publications 2011

	CREATES members, Denmark	International CREATES members	Total
Articles in refereed journals	36 (14)	20 (18)	51(27)
Notes in refereed journals	-	-	0
Contributions to refereed books	3	1	3
Refereed and edited books	1	1	1
CREATES Research Papers	37	13	53
Forthcoming articles in refereed journals and books	40(20)	23(14)	60 (33)
PhD theses	3	-	3

Note: Number in parenthesis indicates the number of publications appearing on the suggested benchmark list. Note that due to co-authorship the “Total” column is not the sum of the other columns.

Table 3. Review of publications, total for 2007-2011

	CREATES members, Denmark	International CREATES members	Total
Articles in refereed journals	152 (75)	91 (73)	235 (139)
Notes in refereed journals	7 (4)	1 (0)	8 (4)
Contributions to refereed books	28	18	45
Refereed and edited books	6	1	6
CREATES Research Papers	219	89	298
PhD theses	16	-	16

Note: Number in parenthesis indicates the number of publications appearing on the suggested benchmark list. Note that due to co-authorship the “Total” column is not the sum of the other columns.

### 3.3. Research Output and Publications 2011

Details about publications in 2011 are reported in Section H, including a total list of publications during the life time of the center. Publication summaries for 2011 and for the period 2007-2011 are displayed in Tables 2 and 3. Figure 1 displays the development in publications over the years for particular categories of publications. In tables 2 and 3 the publication summaries associated with domestic and international CREATES members are separated with the latter group being defined as those fellows who have had an international main affiliation during the entire funding period.

The production of scientific peer reviewed journal articles in 2011 was similar in quantity to the level of 2010. A total of 51 refereed journal articles were published; 52% of these were published in journals from the CREATES short list of "Top Journals" which is listed in Section H. The productivity of international research fellows in the better journals is slightly higher than for domestic CREATES members.

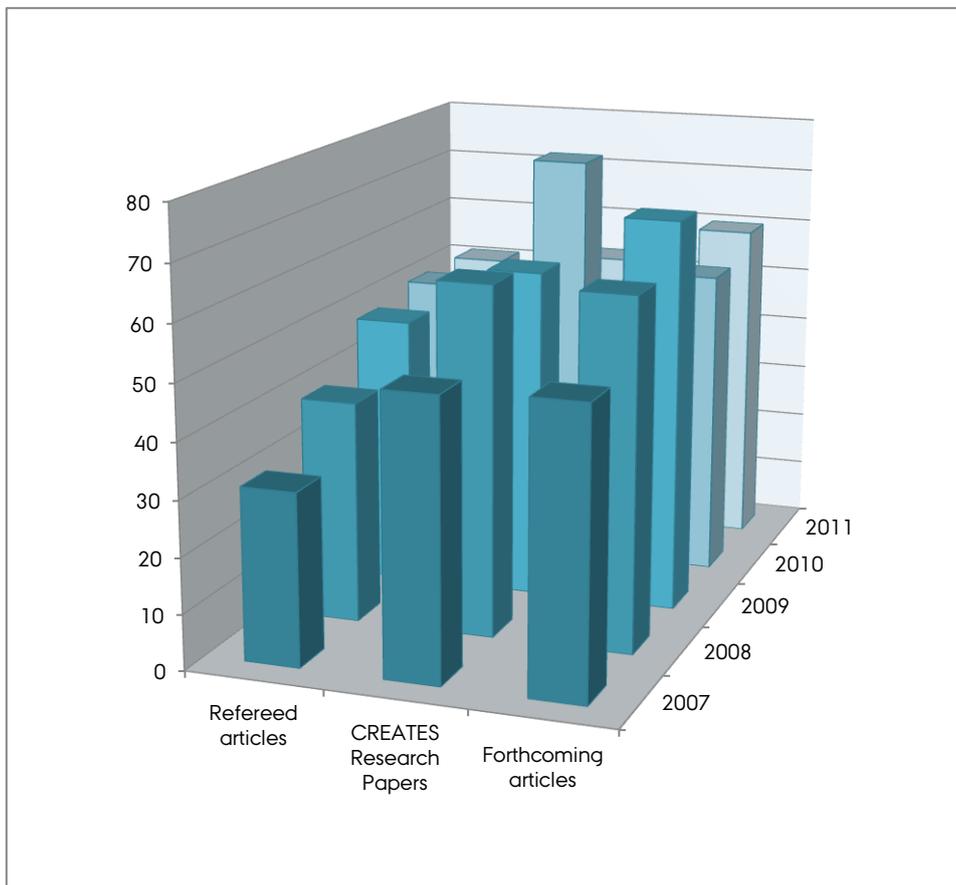
This reflects that CREATES has a remarkably strong group of established international researchers, and that CREATES has a relatively large proportion of junior researchers in the beginning of their careers.

It is encouraging to see that so many of the junior fellows and postdocs publish in good journals and continue the trend from previous years. An impressive number of publications by junior members are in the better journals; some of which of course are co-authored with senior researchers.

To publish in the very top journals like *Econometrica*, *Journal of Finance*, *Annals of Statistics* and similar is considered very diffi-

cult. During 2011 CREATES members have published 2 papers in *Econometrica* and yet another 2 papers have been accepted for forthcoming publication in the journal. This is truly an amazing achievement. Several of these papers are the result of joint research collaboration between domestic and international research fellows. *Journal of Econometrics* is one of the absolutely leading field journals. During 2011 no less than 16 papers have either been published or have been accepted for publication in this journal. Publications have also appeared in top journals like *Journal of Finance*, *Journal of Financial Economics*, *Journal of Business and Economic Statistics*, and *Journal of Applied Econometrics*.

Figure 1. Publications. Summary statistics by type and year



From the perspective of research production since the establishment of CREATES, i.e. for the period 2007-2011, a total of approximately 350 articles have been published (or are accepted for publication) in peer reviewed journals or edited books. In addition, several books have been published at leading publishing houses like Princeton University Press, Oxford University Press, and World Scientific. In the CREATES Research Paper series al-

most 300 papers have been published since 1 April 2007 and of these 53 papers were published in 2011. It is estimated that presently 50-60 papers are at review at peer reviewed journals. Given the length of time upon which calculations can be made, these figures show that the majority of research papers produced at CREATES eventually will become published in refereed journals.

As can be seen from the publication lists, CREATES members generally have extensive collaboration with international researchers and hence emphasizing the strong internationalization of the center.

### 3.4. Bibliometric Benchmarking

There are few research centers internationally which are similar to CREATES in terms of size and organization. Most research groups in econometrics consist of 2-4 senior econometricians plus a few PhD students who are affiliated with an economics department. However, at some economics departments the econometrics groups are somewhat larger, especially at leading economics departments in North America and Europe. In Europe it would be natural to benchmark with research institutions and centers like Oxford-Man (Oxford University), ECARES (Free University, Brussels), CASE (Humboldt-Universität, Berlin), CORE (Université catholique de Louvain), and the Tinbergen Institute in the Netherlands. However, all these research centers and institutions are characterized by covering a broader range of disciplines than at CREATES and hence making comparison difficult. Having talked to researchers worldwide who are external to CREATES, it is the impression though that CREATES is doing at least as well as these leading international research institutions.

The largest bibliographic database dedicated to the economics profession is run by IDEAS at the University of Connecticut and uses the so-called RePEc database as its source. More than 32 different ranking measures (number of publications, citations, impact factor weighted citations, working paper downloads etc.) are used, and the summary rank reports the average rank using the different measures. In the March 2011 ranking, CREATES was listed as number 136 out of 5664 institutions within all fields of economics.

After the department merger, the establishment of the new Department of Economics and Business as CREATES' host institution has implied that the publication recordings of CREATES and the department are being shared when recorded at RePEc. This means that the Department of Economics and Business now appears together with CREATES as two separate institutions at RePEc field rankings. However, the contributions

to the rankings at the department level is mainly due to the publication output of CREATES due to the overlap.

Within the field of "Econometrics", Aarhus University (CREATES) now ranks as 6 (8) (out of 1534 institutions), and within the field of "Time Series Econometrics" Aarhus University (CREATES) ranks 1 (7); see Table 4 for details.

Focusing on individuals, 6 CREATES members appear on the top 5% author ranking including all fields of economics: Torben G. Andersen, Tim Bollerslev, and Allan Timmerman amongst the international research fellows, and Ole Barndorff-Nielsen, Søren Johansen, and Timo Teräsvirta amongst the domestic research fellows. Tom Engsted, Bent Jesper Christensen, Niels Haldrup, Morten Ørregaard Nielsen, Asger Lunde, and Peter Reinhard Hansen appear on the top 10% of the list. Clearly, the overall ranking of CREATES is much dominated by these individuals who are established senior researchers from both the domestic and the international group of researchers. However, this does not change the fact that all-in-all CREATES is a very strong research team that in total places the center in the top on an international scale.

Regarding citations for individuals it is hard to obtain precise figures. In the CREATES Self Evaluation Report 2010 an extract from Google Scholar was reported by listing the number of citations for the five most cited papers amongst the CREATES domestic members who are full professors, plus CREATES' international research fellows. It is clear that Søren Johansen, Timo Teräsvirta, Tim Bollerslev, Torben Andersen and Ole Barndorff-Nielsen are in a league of their own and have contributed with fundamental work which have created many applications and hence citations. However, many others have impressive citation records documenting the impact and strength of CREATES. Several of the younger full professors at CREATES have a relatively large (and rapidly increasing) number of citations which is promising for the future given the generational changes that are likely to take place in the new granting period.

Table 4. RePEc top 10 institutions in the fields of "Econometrics" and "Time Series Econometrics", IDEAS March 2012. Source: [www.repec.org](http://www.repec.org)

Rank	Econometrics	Time Series Econometrics
1	University of Chicago	<b>Aarhus University</b>
2	Yale University	New York University, Stern School
3	University of California, San Diego	Cambridge University
4	Cambridge University	Yale University
5	Harvard University	Harvard University
6	<b>Aarhus University</b>	University of California, San Diego
7	Oxford University	<b>Aarhus University, CREATES</b>
8	<b>Aarhus University, CREATES</b>	Free University Amsterdam
9	New York University, Stern School	Duke University
10	Free University Amsterdam	Columbia University

## 4. PHD ACTIVITIES

### 4.1. PhD Students

By 31 December 2011 CREATES had 16 PhD students enrolled at the Graduate School of Business and Social Sciences. 8 of these are international students. By 1 September 2012 it is expected that 3-4 new PhD students will be enrolled in the PhD program and will be affiliated CREATES. During 2011 3 PhD students defended their theses and another 4 students will defend their theses in the first part of 2012. Yet another 2-3 students will submit their theses during 2012. Details about the theses defended are listed in Section H.7. See also Section I with a complete staff list including PhD students.

#### PhD students' external relations

It is an integral part of the PhD program that PhD students visit international research environments during their studies. The typical duration of a visit abroad is 4-6 months. During 2011 PhD students affiliated with CREATES had status as visiting PhD students at the following universities: Princeton University, Cornell University, and University of California at Berkeley.

At CREATES foreign graduate students are also invited as visiting students. In 2011 CREATES hosted visiting PhD students from China, Italy, and Sweden.

PhD students are active in presenting their works at international conferences, seminars, symposia and workshops. Also, CREATES has a weekly lunch seminar series where PhD students, postdocs, and visiting PhD students have priority in presenting and discussing their works.

#### PhD courses organized by CREATES

In collaboration with the Danish Graduate Program in Economics (DGPE), CREATES organizes and funds specialized PhD courses in econometrics that typically last from 2-3 days up to a week. The courses are taught by leading international researchers as well as internal faculty. During 2011 CREATES organized 6 such courses and summer schools. See Section B.5 for details.

In addition to the "short" PhD courses, CREATES faculty members contribute significantly with full 10 and 5 ECTS PhD level courses at the Department of Economics and Business, see Section C.

## 5. EXTERNAL RELATIONS AND COLLABORATIONS

### 5.1. International Collaboration

CREATES participates in numerous collaborations with institutions as well as individuals (see Section A for a full list). Members participate in individual research projects with more than 100 individuals from other institutions worldwide as documented in Section H.

Besides from the PhD students visiting abroad domestic research fellows also went on longer sabbatical leaves abroad, Section A.2.

In 2011 CREATES had more than 60 visitors staying for longer or shorter periods. Most visitors presented papers in CREATES' weekly seminar series, gave PhD courses and/or participated in research collaboration, see Section A.3. In addition, CREATES had visitors participating in symposia, workshops and conferences organized at the center (see Section B.1-B.5).

CREATES also collaborates with a number of international research institutions and centers, including (see Section A.1):

1. Oxford-Man Institute of Quantitative Finance, Oxford University
2. Erasmus University, Rotterdam
3. The Society for Financial Econometrics, SoFiE
4. Stanford University
5. AHOI Network.

In addition to collaboration on research projects, the form of these collaborations concern exchange of PhD students and postdocs and collaboration on the organization of PhD courses, workshops, and conferences.

The collaboration with Oxford-Man Institute (OMI) has become especially important and constructive. During 2012 and 2013 the OMI and CREATES will have two joint job openings at the postdoctoral level. The positions will be 3 years with 18 months to be spent respectively in Oxford and Aarhus. OMI and CREATES jointly interviewed candidates at the AEA-ASSA meetings in Chicago in January 2012. The first position will be filled in September 2012. In the new funding period it is also planned to organize joint conferences with the OMI.

In the past CREATES has organized a workshop jointly with the Stanford Institute for Theoretical Economics (SITE) at Stanford University. A similar workshop on the modeling of high frequency financial data took place 20-21 June 2011. The workshop was organized by Tim Bollerslev, Duke University, and Peter R. Hansen, Stanford University, who are both international research fellows at CREATES.

In 2009 CREATES became one of 7 institutional members of SoFiE, The Society for Financial Econometrics. 6 CREATES members serve in the Council Board which has 27 members. We are happy that CREATES can support the creation of a new and important scientific society within our profession. 15-16 October 2010, SoFiE and CREATES organized a joint conference on "Measuring and Predicting Risk with Financial High Frequency Data", which was held in Aarhus. A similar event is planned in the future.

CREATES and the Erasmus University in Rotterdam (and the Tinbergen Institute) have plans for extending their collaboration across a number of dimensions including conference organization and exchanges of junior researchers.

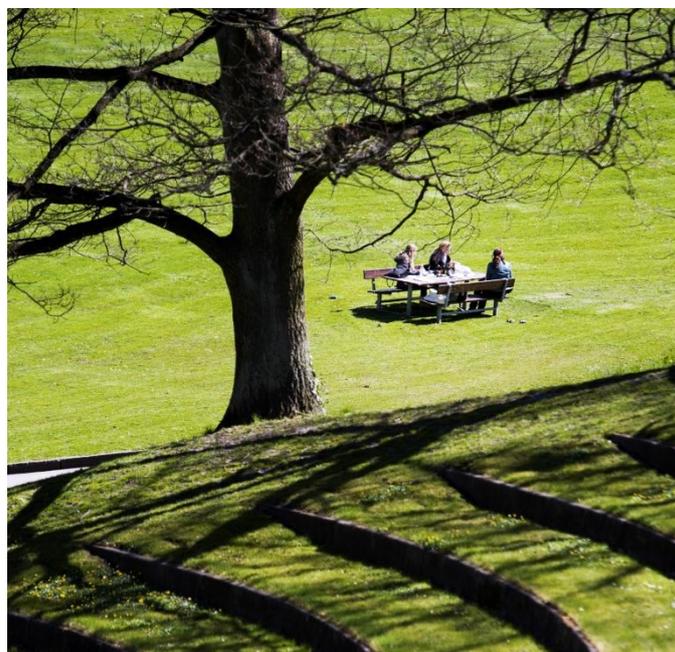
During 2011 the AHOI Network was established. The purpose of the network is to foster basic research in the theory and ap-

plications of so-called ambit stochastics and is related to the focus area "Stochastic and Econometric Analysis of Commodity Markets" described in Section 3. The research group includes researchers from the mentioned universities in a formalized collaboration.

## 5.2. National Relations

CREATES has five research fellow members from University of Copenhagen, and the University of Southern Denmark. PhD students from these institutions can participate free of charge to participate in courses organized by CREATES.

CREATES also collaborates with two national research centers: D-CAF, Danish Center for Accounting and Finance, and the Thiele Center for Applied Mathematics in Natural Science. The collaboration includes organization of joint seminars and symposia. Also, a data-base infrastructure has been established in collaboration with D-CAF to facilitate easy access to financial data for students and researchers.



## 6. CONFERENCES, SYMPOSIA, AND SEMINAR ACTIVITIES

### 6.1. Conference Activities

Conference activities, internally and externally, are specified in Section B. CREATES members are active in presenting their work internationally at conferences, symposia, etc. In 2011 CREATES members participated in and gave invited paper presentations at more than 50 international conferences. Also, CREATES members appear in the program committees of many leading international conferences.

#### International Conferences

13-14 May 2011 the 2nd Humboldt-Copenhagen Conference on Financial Econometrics was held at the University of Copenhagen. The conference was organized by Professor Anders Rahbek, University of Copenhagen and CREATES. The conference had more than 100 participants.

On 27-29 May 2011 CREATES hosted the 6th Nordic Econometric Meeting with particular emphasis on time series econometrics. The conference was held at Sandbjerg Manor and had more than 60 participants and approximately 40 paper presentations. The conference was organized by Associate Professor Henning Bunzel and Professor Niels Haldrup, CREATES. Prior to the conference, CREATES held its annual residential meeting.

#### Symposia and Workshops

An important activity at CREATES is to organize focused symposia and workshops. The purpose of the CREATES symposia is to gather CREATES members with interests within a specific area and to invite 6-8 prominent international specialists. These meetings have been extremely well received by both internal and external participants. These activities often last for several days and the external participants are offered office space and

interact with the local people at CREATES. The following symposia and workshops were arranged during 2011:

- Symposium on "Long Memory", 27-29 June, 2011. Organizers: Niels Haldrup (CREATES), Søren Johansen (University of Copenhagen and CREATES), Katarzyna Lasak (CREATES), Morten Nielsen (Queens University and CREATES).
- Symposium "Ambit Stochastics", (Joint with Thiele Center), 11-14 September, 2011. Organizers: Ole Barndorff-Nielsen and Almut Veraart, CREATES.

In addition, the joint SITE-CREATES workshop on "Measuring and Modeling Risk with High Frequency Data" was held at Stanford University 20-22 June 2011. The workshop was organized by Tim Bollerslev, Duke University and CREATES, and Peter R. Hansen, Stanford University and CREATES.

#### Seminars

CREATES schedules a series of weekly seminars. During 2011 the CREATES seminars were organized by Assistant Professor Valeri Voev and Professor Niels Haldrup. In 2011 a total of 24 paper presentations were given in the series (Section B.2). In the lunch seminar series, 29 paper presentations were given (Section B.3). The lunch seminars were organized by postdocs Daniela Osterrieder and Stefano Grassi.

### Distinguished Speakers

The distinguished speaker seminar series has a number of contributors each year and includes scientists of the econometrics community who have had a major impact on the development of the discipline. The lectures are announced jointly with the Department of Economics and Business. All distinguished speaker lectures are video recorded and made available to a broader audience via the CREATES podcast archive:

<http://www.creates.au.dk>.

The web-counter shows a great interest worldwide in viewing these lectures. Distinguished speakers in 2011 were:



**Professor Andrew C. Harvey**

University of Cambridge

3 March 2011

*Signal Extraction*



**Professor Adrian Pagan**

University of Sydney

21 June 2011

*Econometric Analysis and Prediction  
of Recurrent Events*

## 7. EXTERNAL FUNDING

### 7.1. External Funding

In April 2011 the Board of the Danish National Research Foundation decided to fund CREATES for yet another five year, 2012-2017, with a DKK 40m grant. The grant is similar in magnitude to the first funding period. However, CREATES has also been successful in attracting external funding in addition to the grant from the Danish National Research Foundation. A review of external funding is given in Section D.



*Anders Bredahl Kock, Sapere Aude Grant holder, 2011*

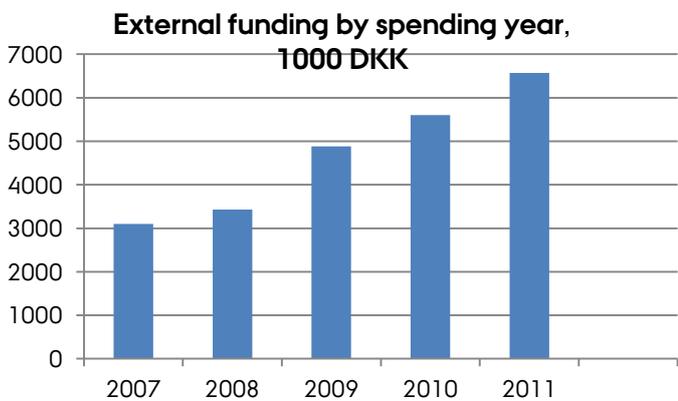
In 2011 Professor Asger Lunde received a grant worth DKK 3.0m from the AU-Ideas initiative at Aarhus University. Moreover, the Council for Independent Research, Social Sciences, (FSE), provided postdoctoral scholarships to Paolo Santucci Di Magistris, Malene Kallestrup-Lamb, Johannes Tang Kristensen, and Anders B. Kock. Anders B. Kock also received a Sapere Aude Grant. In total the funding to support postdocs amounts to approximately DKK 7m including overhead.

To date CREATES has managed to attract almost DKK 38.0m in additional external funding of which DKK 6.6m was spent during 2011. Most of the external funding is provided by the FSE. A limited number of grants have been provided via international funds including the Stevanovich Center for Mathematical Finance at University of Chicago, and the European Central Bank.

In 2009 CREATES participated in a data base application jointly with the Danish Center for Accounting and Finance, D-CAF, headed by Professor Peter Ove Christensen, Aarhus University, to the National Programme for Research Infrastructure under the Danish Ministry of Science, Technology and Innovation. The proposal was granted DKK 10m to support access to financial data. The grant supplements yet another grant worth DKK 4m from the Danish Council for Independent Research, Social Sciences. These amounts are not included in the figures reported above because it can be difficult to estimate exactly how much accrues to the individual participants in the grant.

Figure 2 displays the external funding accruing to each year 2007-2011. As seen there has been a steady trend in the attraction of external funding. Note that these amounts do not include the support provided via the grants to D-CAF because these have a broader national focus even though CREATES benefits from the grants.

Figure 2. External funding of CREATES activities accruing to each year. Note the grant from the Danish National Research Foundation, and the 14m DKK grant to support national data infrastructure are excluded in the figures.



## 8. SIGNATURE

### 8.1. Director's Signature

(Ved underskriften bekræftes det, at beretning og regnskab med tilhørende noter og oversigter indeholder alle relevante oplysninger, som vedrører årets primære aktiviteter i Danmarks Grundforskningsfonds Center for Tidsrækkeøkonometri.)

To my knowledge, this report and accounts including notes and entry files comprise all the information concerning CREATES (The Danish National Research Foundation's Centre for Research in Econometric Analysis of Time Series).

23 March 2012



Niels Haldrup  
Danish National Research Foundation's  
Center for Research in Econometric Analysis of Time Series, CREATES

# APPENDICES

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## Section A: External Relations

### A.1 Research Institutions

		Collaboration with universities, research groups and institutions		
	Collaborator	Collaboration subject and/or title	Danish	Foreign
1	Danish Center for Accounting and Finance, D-CAF, Aarhus University & CREATES, DK	Seminar and research collaboration, Joint PhD courses, applied seminars, research collaboration. Also D-CAF and CREATES collaborate on data access via the D-CAF - CREATES Data Office Joint Grant, worth 10 mill. DKK, from the National Programme for Research Infrastructure under the Danish Ministry of Science, Technology and Innovation. Granted fall 2009. Also, CREATES participates in a joint grant with D-CAF regarding data infrastructure worth 4 mill. DKK. The grant is from the Danish Council for Independent Research, Social Sciences	x	
2	Oxford-Man Institute of Quantitative Finance, University of Oxford, UK	Exchange of seminar visitors, PhD students, joint postdoc positions. Director Neil Sheppard in CREATES' Advisory Board. Plans for joint conferences in the new funding period		x
3	Erasmus University Rotterdam, The Netherlands	Exchange of seminar visitors and junior researchers. Joint conferences to be organized		x
4	Thiele Centre for Applied Mathematics in Natural Science, DK	Seminar and research collaboration. Joint seminars and symposia		
5	SoFiE - The Society for Financial Econometrics	CREATES institutional member of SoFiE. Several CREATES members on Council Board. Joint conference in Aarhus 2010		x
6	Stanford University	Co-organizing 2011 SITE conference in Stanford		x
7	Aarhus University, University of Heidelberg, University of Oslo, Imperial College London	AHOI Network Research network to foster basic research in "Ambit Stochastics" and "The Stochastic and Econometric Analysis of Commodity Markets"	x	x

## A.2 CREATES members' long visits/sabbaticals abroad

	Venue/Place	CREATES member	Period
1	UC, Berkeley (Visiting PhD)	Anders Bredahl Kock	1 January - 30 June
2	Princeton (Visiting PhD)	Laurent Callot	1 September - 15 December
3	University of California, San Diego (Visiting Kim Christensen Scholar)		1 July 2011 - 30 June 2012

### A.3 Visitors to CREATES 2011

	Name	Affiliation	Period
1	Michele Costola	University of Padova	18 January-30 June
2	Bjarne Astrup Jensen	Copenhagen Business School	26-28 January
3	Paolo Santucci de Magistris	University of Padova	31 January-12 February
4	Eric Hillebrand	Louisiana State University	31 January-31 March
5	Martin Klint Hansen	Aarhus School of Business	1-25 February
6	Daniel Ventosa Santaulària	Department of Economics and Finance of the Universidad de Guanajuato (Mexico)	1 February-9 November
7	Vanessa Berenguer Rico	Universidad Carlos III de Madrid	6-8 Februar
8	Søren Johansen	University of Copenhagen and CREATES	7-10 February 3-5 May 26-29 June 2-4 October 18-20 December
9	Michel van der Wel	Erasmus University Rotterdam and CREATES	10-11 February 17-18 August 11-12 October 14-16 November
10	Philipp Sibbertsen	Leibniz Universität Hannover Königsworther	21 February-21 March 21-29 June
11	Claudia Klueppelberg	Technische Universität München	23-25 February
12	Andrew C. Harvey	University of Cambridge	2-5 March
13	Christian Hafner	Université catholique de Louvain	10-11 March
14	Dag Tjøstheim	University of Bergen	11-12 March
15	Peter Reinhard Hansen	Stanford University & CREATES	13-18 March 15-July-16 August 18-21 December
16	Hossein Asgharian	Lund University	16-17 March
17	Guglielmo-Maria Caporale	Brunel University, London	30 March-2 April
18	Yushu Li	Linnaeus University, Sweden	4 April-15 July
19	Fred Espen Benth	University of Oslo	4-6 and 11-13 April
20	Peter Exterkate	Erasmus University Rotterdam	13-17 April
21	Atilim Seymen	Centre for European Economic Research	27-29 April
22	Cristina Amado	University of Minho	4-12 May
23	Jeffrey Racine	McMaster University	5-15 May
24	Rickard Sandberg	Stockholm School of Economics	9-27 May
25	John M. Maheu	University of Toronto	10-12 May
26	Lars Stentoft	HEC Montreal and CREATES	17 and 26 May
27	Matt Holt	The University of Alabama	22 May-18 June
28	Dennis Kristensen	Columbia University and CREATES	6-12 June
29	Morten Ø. Nielsen	Queen's University and CREATES	16 June-17 July
30	Adrian Pagan	University of Sydney	17-25 June
31	Mark Podolskij	Heidelberg University and CREATES	28 June-2 July 5-8 October
32	Natalia Sizova	Rice University	26-30 June
33	Paulius Stakenas	University of Amsterdam	26-29 June
34	James Davidson	University Of Exeter	26-30 June
35	Peter Boswijk	University of Amsterdam	26-29 June

36	Joerg Breitung	University of Bonn	26-29 June
37	Javier Hualde	Public University of Navarra	26-30 June
38	Rocco Mosconi	Politecnico di Milano	27-29 June
39	Carlos Velasco	University Carlos III Madrid	26-29 June
40	Michael Jansson	UC Berkeley and CREATES	5 July-9 August
41	Almut Veraat	Imperial College London & CREATES	14-18 August 5-6 December
42	Charles Bos	Free University Amsterdam	14-20 August
43	Tue Gørgens	Australian National University	22 August-6 September
44	Peter Christoffersen	Rotman School of Management and CREATES	23-25 August
45	Mikko Pakkanen	University of Helsinki	30 August
46	Marius Matei	The Romanian Academy	1 September-30 November
47	Xiaoxiao Zhang	Beijing Institute of Technology	1 September-31 August 2012
48	Yin Liao	Australian National University	12-23 September
49	Almut Veraart	Imperial College London and CREATES	14-16 September
50	Carsten Trenkler	University of Mannheim	21-23 September
51	Lieven Baele	Tilburg University	28-30 September
52	Emilio Zanetti Chini	University of Rome "Tor Vergata"	1 October-30 June 2012
53	Tim Bollerslev	Duke University and CREATES	5-6 October 20-22 November
54	Luc Bauwens	Center for Operations Research and Econometrics (CORE)	11 October-30 November
55	Jurgen Doornik	Nuffield College	16-18 October
56	Petra Posedel	Zagreb School of Economics and Management	23-29 October
57	Niels Keiding	University of Copenhagen	26-28 October
58	Michael Sørensen	Copenhagen University and CREATES	3-4 November
59	Dick van Dijk	Erasmus University Rotterdam	15-18 November
60	Jurgen Doornik	Nuffield College	15-16 November
61	Nikolaus Hautsch	Humboldt-Universität zu Berlin	20-26 November
62	Ralf Brüeggemann	University of Konstanz	30 November-2 December
63	Robin Kruse	Leibniz University Hannover and CREATES	7-9 December
64	Mikael Petitjean	Louvain School of Management	7-8 December
65	Torben G. Andersen	Kellogg School of Management, Northwestern University	11-15 December
66	Emmanuel Senyo Fianu	Verona University	16 December-30 June 2012

## Section B: Conferences

### B.1 International conferences, symposia, seminars etc. organised by CREATES

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	Title and date of event
1	13-14 May 2nd Humboldt - Copenhagen Conference on Financial Econometrics Location: Copenhagen University Organizers: Anders Rahbek, Department of Economics, University of Copenhagen and CREATES
2	26 May CREATES Annual Residential Meeting Location: Sandbjerg Manor Organizer: Niels Haldrup, Aarhus University and CREATES
3	27-29 May 6th Nordic Econometric Meeting Location: Sandbjerg Manor Organizers: Henning Bunzel, Dansk Økonometrisk Selskab and Niels Haldrup, CREATES
4	20-22 June Joint SITE-CREATES Workshop on Measuring and Modelling Risk with High Frequency Data Location: Stanford University Organizers: Tim Bollerslev, Duke University and CREATES and Peter Reinhard Hansen, Stanford University and CREATES
5	27-29 June Symposium on Long Memory Location: Aarhus University Organizers: Niels Haldrup, Aarhus University and CREATES, Søren Johansen, University of Copenhagen and CREATES, Katarzyna Lasak, Aarhus University and CREATES and Morten Nielsen, Queen's University and CREATES
6	11-14 September International Workshop "Ambit Stochastics" Location: Sandbjerg Manor Organizers: Ole E. Barndorff-Nielsen, Aarhus University and CREATES, Jürgen Schmiegel, Aarhus University, and Almut E. D. Veraart, Imperial College London, UK and CREATES

## B.2 Weekly seminars

	Date	Speaker	Title
1	7 February	Vanessa Berenguer Rico, Universidad Carlos III de Madrid	Summability of Stochastic Processes, A Generalization of Integration and Co-Integration valid for Non-linear Processes
2	24 February	Claudia Klueppelberg, Technische Universität München	Forward pricing in electricity markets based on stable CARMA spot models
3	10 March	Christian Hafner, School of Statistics, Biostatistics and Actuarial Sciences	Multivariate volatility modelling of electricity futures
4	17 March	Hossein Asgharian, Lund University	A spatial analysis of international stock market linkages
5	31 March	Guglielmo-Maria Caporale, Brunel University, London	Inflation and Inflation Uncertainty in the Euro Area
6	14 April	Peter Exterkate, Erasmus University Rotterdam	Nonlinear Forecasting With Many Predictors Using Kernel Ridge Regression
7	28 April	Atilim Seymen, Centre for European Economic Research	Time-Varying Macroeconomic Dynamics in the US and Germany - A Historical Comparison
8	12 May	John M Maheu, University of Toronto	Modelling Realized Covariances and Returns
9	19 May	Rickard Sandberg, Stockholm School of Economics	Outlier robust unit root tests in nonlinear dynamic models
10	24 August	Peter Christoffersen, Rotman School of Management and CREATES	Is the Potential for International Diversification Disappearing?
11	1 September	Tue Gørgens, Australian National University	Modelling health care costs and life expectancy - Insights from Australian individual health expenditure data (Work in Progress, joint with Philip Clark)
12	15 September	Yin Liao, Australian National University	Testing for co-jumps in high-frequency financial data - an approach based on first-high-low-last prices
13	22 September	Carsten Trenkler, University of Mannheim	Simple Cointegrated VARMA Models and Forecasting US Interest Rates
14	29 September	Lieven Baele, Tilburg University	Of Religion and Redemption - Evidence from Default on Islamic Loans
15	6 October	Mark Podolskij, University of Heidelberg and CREATES	Edgeworth expansion for power variation of semimartingales
16	13 October	Luc Bauwens, Center for Operations Research and Econometrics (CORE)	CAW-DCC: A dynamic model for vast realized covariance matrices
17	17 October	Jurgen Doornik, Nuffield College	Robust Estimation Using Least Trimmed Squares
18	27 October	Niels Keiding, University of Copenhagen	The current duration (backward recurrence time) approach to estimating time to pregnancy
19	3 November	Michael Sørensen, Copenhagen University and CREATES	Martingale estimating functions for stochastic differential equations with jumps
20	17 November	Dick van Dijk, Erasmus University Rotterdam	Bayesian Forecasting of Federal Funds Target Rate Decisions
21	24 November	Nikolaus Hautsch, Humboldt-Universität zu Berlin	Financial Network Systemic Risk Contributions
22	1 December	Ralf Brueggemann, University of Konstanz	Forecasting Contemporaneous Aggregates with Stochastic Aggregation Weights

- |    |             |  |  |
|----|-------------|--|--|
| 23 | 8 December  | Mikael Petitjean, Catholic University of Mons                          | Intraday liquidity dynamics of the DJIA stocks around price jumps            |
| 24 | 14 December | Torben Andersen, Kellogg School of Management, Northwestern University | Coherent Implied Volatility Estimation: A corridor Fix to High-Frequency VIX |

### B.3 Lunch Seminars

	Date	Speaker	Title
1	1 February	1 February Kim Christensen, Aarhus University & CREATES	Fact or friction: Jumps at ultra high frequency
2	22 February	22 February Tom Engsted, Aarhus University & CREATES	Cross-sectional consumption-based asset pricing
3	4 March	Andrew C. Harvey, University of Cambridge	Exponential Conditional Volatility Models
4	4 March	Andrew C. Harvey, University of Cambridge	Exponential Conditional Volatility Models
5	11 March	Dag Tjøstheim, University of Bergen	Local Gaussian correlation
6	15 March	Valeri Voev, Aarhus University & CREATES	Covariance Forecasting with Mixed Frequency Data
7	22 March	Eric Hillebrand, Louisiana State University	Temporal Correlation of Defaults in Subprime Mortgages
8	29 March	Daniel Ventosa-Santaulària, Universidad de Guanajuato	A simple test for spurious regression
9	5 April	Olaf Posch, Aarhus University & CREATES	Bond and Stock Returns and their Correlation under Gaussian-Poisson uncertainty
10	12 April	Paolo Santucci de Magistris, Aarhus University & CREATES	When long memory meets the Kalman filter: A comparative study
11	26 April	Yushu Li, Linnaeus University, Sweden	Wavelet based outlier correcting for a power controlled turning point detecting procedure in surveillance system
12	3 May	Rasmus Varneskov, Aarhus University & CREATES	Combining Long Memory and Level Shifts in Modeling and Forecasting of Persistent Time Series
13	17 May	Robinson Kruse, Aarhus University & CREATES	The Power of Unit Root Tests Against Nonlinear Local Alternatives
14	3 August	Rasmus Varneskov, Aarhus University & CREATES	Generalized Flat-Top Realized Kernel Estimation of Ex-Post Variation of Asset Prices Contaminated by Noise
15	30 August	Yukai Kevin Yang, Aarhus University & CREATES	Specification, estimation and evaluation of Vector Smooth Transition Autoregressive models with applications
16	6 September	Rasmus Varneskov, Aarhus University & CREATES	Flat-Top Realized Kernel Estimation of Quadratic Covariation with Non-Synchronous and Noisy Asset Prices
17	13 September	Marius Matei, The Romanian Academy	Multivariate volatility modeling with high frequency data
18	20 September	Kasper Olesen, Aarhus University & CREATES	Measuring, Modeling and Forecasting Volatility of Energy Forwards
19	27 September	Martin Klint Hansen, Aarhus University & CREATES	And Now, The Rest of The News: Volatility and Firm Specific News
20	4 October	Manuel Lukas, Aarhus University & CREATES	The Role of Decision Rules in Utility-based Forecast Evaluation: The Case of a New Maxmin Rule
21	11 October	Yukai Kevin Yang, Aarhus University & CREATES	Bayesian Analysis of the Cointegrated VAR model
22	25 October	Anders Bredahl Kock, Aarhus University & CREATES	Variable selection in autoregressions with the adaptive LASSO
23	1 November	Xiaoxiao Zhang, Beijing Institute of Technology	Crude Oil Price Forecasting Using Fuzzy Time Series

24	8 November	Peter Exterkate, Aarhus University & CREATES	Nonlinear forecasting with many predictors using kernel ridge regression
25	15 November	Malene Kallestrup-Lamb, Aarhus University & CREATES	Mortality Forecasting at Advanced Ages - Applying the Lee-Carter Model to an Economic Panel
26	22 November	Yukai Kevin Yang, Aarhus University & CREATES	Test against multivariate heteroskedasticity
27	29 November	Emilio Zanetti Chini, University of Rome "Tor Vergata"	Generalizing Smooth Transition Regression Models
28	5 December	Paolo Santucci de Magistris, Aarhus University & CREATES	A dynamic multifactor model for high and low frequency volatility activity
29	13 December	Lasse Bork, Aalborg University	Housing price forecastability: A factor analysis

#### B.4 Distinguished Speaker Seminar Series

	Date	Speaker	Title
1	3 March	Professor Andrew C. Harvey University of Cambridge	Signal Extraction
2	21 June	Professor Adrian Pagan University of Sydney	Econometric Analysis and Prediction of Recurrent Events

Distinguished Speaker Seminars are video recorded and made available in the podcast archive at CREATES' homepage [www.creates.au.dk](http://www.creates.au.dk)

## B.5 PhD Courses organized by CREATES

	Date	Lecturer	Subject
1	9-13 May	Jeffrey Racine, McMaster University	Nonparametric Methods in Econometrics
2	23-25 May	Søren Johansen, Heino B. Nielsen, Anders Rahbek, Katarina Juselius and Andreas Noack Jensen, University of Copenhagen	The cointegrated VAR model for I(2) variables: Theory and Applications
3	22-24 June	Adrian Pagan, University of Sydney	Macroeconomic Modelling with VARs
4	15-19 August	Charles Bos, VU Amsterdam, and Henning Bunzel, Aarhus University and CREATES	Advanced Programming in Quantitative Economics
5	22-26 August	Bent Jesper Christensen, Aarhus University and CREATES	Economic Modeling and Inference
6	14-15 November	Luc Bauwens, Center for Operations Research and Econometrics (CORE)	Multivariate volatility models

## B.6 CREATES members invited to talks at international conferences

	Title of event	Venue	Name(s) of participant(s)
1	JBES Editor's Invited Lecture, ASSA meetings	Denver	Allan Timmermann
2	SITE Workshop: Measuring and Modeling Risk with High Frequency Data	Stanford University, USA	Almut Veraart
3	58th World Statistics Congress (ISI2011)	Dublin, Ireland	Almut Veraart
4	International Workshop on "Ambit Stochastics: Theoretical Developments and Applications to Energy, Turbulence and Finance"	Sandbjerg, Denmark	Almut Veraart
5	Conference in energy finance, Wolfgang Pauli Institute	Vienna, Austria	Almut Veraart
6	Computational and Financial Econometrics (CFE)	London	Anders Rahbek
7	Toulouse School of Economics Conference on Nonlinear and Financial Econometrics	Toulouse	Anders Rahbek
8	Macro and Financial Econometrics	Heidelberg	Anders Rahbek
9	European Finance Association	Stockholm	Andreas Schrimpf
10	Conference on Global Asset Management, McGill University	Montreal	Andreas Schrimpf
11	Humboldt-Copenhagen Conference on Financial Econometrics	Copenhagen	Andreas Schrimpf
12	24th Australasian Conference on Banking and Finance	Sydney	Andreas Schrimpf
13	Tor Vergata Conference on Banking and Finance	Rome	Andreas Schrimpf
14	One-Day Conference on Latest Developments in Financial Econometrics	Brussels	Asger Lunde
15	Financial Econometrics Conference, Copenhagen University	Copenhagen	Asger Lunde
16	Toulouse School Of Economics Financial Econometrics Conference	Toulouse	Asger Lunde
17	SITE workshop, Stanford University	USA	Asger Lunde
18	International Workshop "Ambit Stochastics"	Sandbjerg	Asger Lunde
19	Penge- og Pensionspanelets konference om forbrugernesopsparing og investeringer	Christiansborg Palace	Carsten Tanggaard
20	Annual Meeting of the Danish Society of Theoretical Statistics	Aalborg University	Christian M. Dahl
21	Latest Developments in Financial Econometrics	Uni Libre de Bruxelles	Dennis Kristensen
22	Econometric and Statistical Modelling of Multivariate Time Series	CORE, Belgium	Dennis Kristensen
23	3rd International Conference on Numerical Methods for Finance	Limerick, Ireland	Lars Stentoft
24	The 65th Congress of the European Meeting of the Econometric Society	University of Oslo	Malene Kallestrup_Lamb
25	Longevity 7	Frankfurt, Germany	Malene Kallestrup_Lamb
26	Actuarial and Financial Mathematics Seminars	Maxwell Institute, Heriot-Watt University	Malene Kallestrup-Lamb
27	Second Australasian Workshop on Econometrics and Health Economics	Gold Coast QLD, Australia	Malene Kallestrup-Lamb
28	Research Seminar at the Faculty of Actuarial Science and Insurance	Cass Business School, City University London	Malene Kallestrup-Lamb
29	Stochastic analysis and statistical inference	Tokyo	Mark Podolskij
30	Inference for stochastic processes	Le Mans	Mark Podolskij

31	ISI World Congress	Dublin	Mark Podolskij
32	Ambit stochastics	Sandbjerg	Mark Podolskij
33	DMV Meeting	Cologne	Mark Podolskij
34	Statistische Woche	Leipzig	Mark Podolskij
35	58th World Statistics Congress	Dublin, Ireland	Michael Sørensen
36	Oberwolfach Seminar on Statistics for Stochastic Differential Equations	Oberwolfach, Germany	Michael Sørensen
37	Fifth CIREQ Time Series Conference	Montreal, Canada	Morten Nielsen
38	Workshop „Nonlinear and persistent time series	University of Hannover	Niels Haldrup
39	Time Series Econometrics	Free University Amsterdam	Niels Haldrup
40	New Frontiers in Applied Probability	Sandbjerg	Ole E. Barndorff-Nielsen
41	Canadian Investment Review, Conference	Canada	Peter Christoffersen
42	5th International Conference on Computational and Financial Econometrics (CFE'11)	University of London, United Kingdom	Peter Exterkate
43	The Second International Conference on High-Frequency Data Analysis in Financial Markets	Osaka University	Peter Reinhard Hansen
44	Humbolt-Copenhagen Conference	Copenhagen	Rasmus T. Varneskov
45	Workshop on Persistent and Nonlinear Time Series	Hannover, Germany	Robinson Kruse
46	Asset and Risk Management in the Aftermath of the Financial Crises	Lausanne, Switzerland	Tim Bollerselv
47	Nonlinear and Financial Econometrics Conference	Toulouse	Tim Bollerselv
48	High-Frequency Data Analysis in Finance	Osaka, Japan	Tim Bollerselv
49	Risk and Return After the Crisis	Luxembourg	Tim Bollerselv
50	Keynote Address, Conference on Time Series Econometrics	Gramado, Brazil	Tim Bollerselv
51	The role of non-linear methods in empirical macroeconomics and forecasting	European Central Bank	Timo Teräsvirta
52	Workshop „Nonlinear and persistent time series	University of Hannover	Timo Teräsvirta
53	New developments in time series analysis	European University Institute	Timo Teräsvirta
54	Workshop on “Forecasting the Business Cycle”	Banque de France	Timo Teräsvirta
55	5th CSDA International Conference on Computational and Financial Econometrics	London	Tom Engsted
56	NBER-NSF Time Series Conference 2011	Michigan State University	Torben G. Andersen
57	The Second International Conference on High-Frequency Data Analysis in Financial Markets	Osaka University	Torben G. Andersen

## Section C: Educational activities (only host institution)

	Title of activity	Level	ECTS
1	Microeconomics, Statistics, Mathematics	BA	20
2	Regression Analysis	BA	5
3	Finance and Investments	BA	10
4	Econometrics	BA	10
5	Microeconomics, Math-Econ	BA	10
6	Investment, Math-Econ	BA	10
7	Topics in Applied Economics and Finance	BA/MSc	5
8	Applied Time Series and Financial Econometrics	MSc	10
9	Time Series Econometrics	MSc	10
10	Investments	MSc	10
11	Financial Market Volatility	MSc	10
12	PhD Econometrics	PhD	10
13	Nonparametric Methods in Econometrics	PhD	2
14	The cointegrated VAR model for I(2) variables: Theory and Applications	PhD	2
15	Macroeconomic Modelling with VARs	PhD	2
16	Advanced Programming in Quantitative Economics	PhD	2
17	Economic Modeling and Inference	PhD	2
18	Multivariate volatility models	PhD	2

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### Number of Master Graduates and Bachelor Graduates supervised at the CREATES

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Number of Bachelor Graduates (estimated)	45
Number of Master Graduates (estimated)	35

## Section D: External funding

### D.1 Public Danish Funds

	Funding body	Purpose	Grant holder	Activity period	Granted amount in DKK	Partial amount allocated to the reported year
1	The Danish Council for Independent Research   Social Sciences (FSE)	Dynamic Modelling of Long Memory and Persistence in Economic Time Series	Niels Haldrup	2006-2009	3.225.000	-
2	The Danish Council for Independent Research   Social Sciences	Analysis of Fractionally Integrated and Co-integrated Time Series with applications to Nordic Electricity Market Volatility	Morten Ø. Nielsen	2006-2008	560.000	-
3	The Danish Council for Independent Research   Social Sciences	Guest Professorship, Timo Teräsvirta	Niels Haldrup	2006-2007	912.000	-
4	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship	Katarzyna Lasak	2008-2010	1.300.000	-
5	The Danish Council for Independent Research   Social Sciences	Quantile Regression on panel data in the presence of unobserved heterogeneity	Christian M. Dahl	2007-2008	563.000	-
6	The Danish Council for Independent Research   Social Sciences	Towards Integration of International Financial Markets	Charlotte Christiansen	2006-2008	611.000	-
7	Faculty of Social Sciences, Aarhus University	1-year post doc Faculty Grant	Mark Podolskij	2007-2008	430.000	-
8	Faculty of Social Sciences, Aarhus University	1-year post doc Faculty Grant	Olaf Posch	2007-2008	430.000	-
9	Faculty of Social Sciences, Aarhus University	1-year post doc Faculty Grant	Katarzyna Lasak	2007-2008	430.000	-
10	Faculty of Social Sciences, Aarhus University	2-year post doc Faculty Grant (Globalization)	Jie Zhu	2007-2008	860.000	-
11	Danish Center for Scientific Computing	Computing time at DCSC	Bent Jesper Christensen	2007-2008	400.000	-
12	The Danish Council for Independent Research   Social Sciences	2008 NBER-NSF time series conference, CREATES	Niels Haldrup	2008	96.000	-
13	The Danish Council for Independent Research   Social Sciences	Visiting Professorship, Gilles Teyssiere	Per B. Overgaard	2009	475.000	-

	Funding body	Purpose	Grant holder	Activity period	Granted amount in DKK	Partial amount allocated to the reported year
14	The Danish Council for Independent Research   Social Sciences	Empirical Modeling of Financial Markets during Turbulent periods and Structural Change	Charlotte Christiansen	2009-2011	2.970.000	1.002.825
15	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Estimation, Testing, and Representation in Fractional Integration and Cointegration models subject to non-linearities	Frank S. Nielsen	2009-2011	1.381.000	-
16	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Volatility Modelling: Leverage and Long Memory	Isabel Casas	2009-2011	1.436.000	21.600
17	Ministry of Science, Technology and Innovation	3 PhD Scholarships, Co-financing	Niels Haldrup	2008-2011	1.856.000	650.000
18	The Danish Council for Independent Research   Social Sciences	2-year Post doc Scholarship Fellowship	Robinson Kruse	2009-2011	1.445.520	436.320
19	The Danish Council for Independent Research   Social Sciences	1-year Fellowship	Almut Veraart	2009-2010	723.600	-
20	The Danish Council for Independent Research   Social Sciences	2009 (EC)2-conference, CREATES	Niels Haldrup	2009	122.400	-
21	The Danish Council for Independent Research   Social Sciences	Conference, Periodicity, Non-stationarity and Forecasting	Niels Haldrup	2009	122.000	-
22	The Danish Council for Independent Research   Social Sciences	2010 workshop "Ambit processes, non-semimartingales and applications"	Almut Veraart	2010	57.600	-
23	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Estimating multivariate financial volatility	Kim Christensen	2010-2012	1.861.200	763.200
24	The Danish Council for Independent Research   Social Sciences	Eliteforskerpris 2009	Kim Christensen	2010-2012	288.000	-

	Funding body	Purpose	Grant holder	Activity period	Granted amount in DKK	Partial amount allocated to the reported year
25	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Time-varying expected returns and regime shifts	Thomas Quistgaard Pedersen	2010-2012	1.584.576	770.400
26	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Inference in models with level shifts	Paolo Santucci de Magistris	2011-2013	1.598.400	788.400
27	AUFF	Anders B Kock - UC Berkeley USA	Per Baltzer Overgaard	2011	37.000	37.000
28*	The Danish Council for Independent Research   Social Sciences	FSE Research Unit	Bent Jesper Christensen	2010-2015	4.000.000	1.360.000
29	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Oracle Efficient Econometric Modelling	Anders B Kock	2012-2015	1.007.064	-
30	The Danish Council for Independent Research   Social Sciences	Sapere Aude	Anders B Kock	2012-2013	1.371.856	-
31	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Taming factor-based forecasts using the LASSO	Johannes Tang Kristensen	2012-2013	1.404.541	-
32	The Danish Council for Independent Research   Social Sciences	Post doc Scholarship: Identifying and Understanding Differences in Longevity Trends at Advanced Ages	Malene Kallestrup-Lamb	2011-2013	1.565.659	541.583
33	AUFF	Overgangsstipendium	Stefan Holst Bache	2011-2012	166.144	166.144
34	AUFF	Støtte til udlandshophold for Phd	Laurent Callot - Princeton USA	2011	35.000	35.000
35	AUFF	AU-Ideas "Stochastic and Econometric Analysis of Commodity Markets"	Asger Lunde	2012-2015	3.000.000	-
<b>Total</b>					<b>38.325.560</b>	<b>6.572.472</b>

\* The total grant amounts to DKK 10.006.089 of which 4.000.000 are associated with CREATES activities

Funding to D-CAF (CREATES participates in grant)

Funding body	Purpose	Grant holder	Activity period	Granted amount in DKK	Partial amount allocated to the reported year
1 National Programme for Research Infrastructure under the Danish Ministry of Science, Technology and Innovation	Danish Data Center for Accounting and Finance	Peter Ove Christensen	2010-2015	10.000.000	1.450.000
2 The Danish Council for Independent Research   Social Sciences	Danish Data Center for Accounting and Finance	Peter Ove Christensen	2010-2015	4.000.000	1.401.120
Total				14.000.000	2.851.120

## D.2 Private Danish funds

	Funding body	Purpose	Grant holder	Activity period	Granted amount in DKK	Partial amount allocated to the reported year
1	Danmarks Nationalbank	2008 NBER-NSF time series conference, CREATES	Niels Haldrup	2008	76.000	-
2	Velux Foundation	Visit from Columbia, NY	Anders Rahbek	2010	387.000	-
3	Markedskraft	Report	Per Baltzer Overgaard	2010	450.000	-

### D.3 International funds

	Funding body	Purpose	Grant holder	Activity period	Granted amount in DKK	Partial amount allocated to the reported year
1	NBER-National Bureau of Economic Research and NSF-National Science Foundation	2008 NBER-NSF time series conference, CREATES, 12-13 September 2008, 12.000 USD	Niels Haldrup	2008	66.000	-
2	Stevanovich Center for Mathematical Finance, University of Chicago	Stevanovich Center - CREATES joint conference in 2009: Financial Econometrics and Statistics, Current Themes and New Directions	Niels Haldrup	2009	300.000	-
3	The European Central Bank	2009 (EC)2-conference, CREATES	Niels Haldrup	2009	37.225	-
<b>Total</b>					<b>403.225</b>	<b>-</b>

Note: The list only includes grants for CREATES members at the host Institution, Aarhus University

## Section E: Awards

	Awards	Recipient	Granted amount in DKK
1	International Journal of Forecasting, Best paper 2007-2008 Award. Elusive return predictability. International Journal of Forecasting, 24(1), 1-18	Allan Timmermann	-
2	DFF Ung Eliteforsker (Sapere Aude)	Anders Bredahl Kock	1.000.000
3	BlackRock Best Paper Award, UNSW Sydney	Andreas Schrimpf (and co-authors)	60.000
4	Travel Scholarship, Aage and Yelva Nimbs Foundation	Kasper Vinther Olesen	100.000
5	Forskningsprisen 2011, BSS, AU	Kim Christensen	50.000
6	The Golden Pointer, AU	Kim Christensen	7.500
7	Award for one of 10 Most Cited Articles 2005-2010 in "Stochastic Processes and Their Applications" for the paper "Microstructure Noise in the Continuous Case: The Pre-averaging Approach"	Mark Podolskij	-
8	Veni Grant - NWO Innovational Research Incentives	Michel van der Wel	1.875.000
9	Review of Financial Studies Distinguished Referee Award	Peter Christoffersen	-
10	Købmand Ferdinand Sallings Travel scholarship	Rasmus T. Varneskov	150.000
11	Fellow of the American Statistical Association	Tim Bollerselv	-
12	Best Paper Award at the 2011 China International Conference in Finance, "Stock Return Predictability and Variance Risk Premia: Statistical Inference and International Evidence" (joint with James Marrone, Lai Xu and Hao Zhou)	Tim Bollerselv	-
13	Doctorate honoris causa, University of Turku	Timo Teräsvirta	-
14	Guest Professor, Huazhong University of Technology, Wuhan	Timo Teräsvirta	-

## Section F: Public outreach

### F.1 Electronic media

	Specific media	Type of communication	Subject	Contributor from CREATES
1	TV: DR2	Topic in "Detector"	The probability of winning in Lotto	Michael Sørensen

## F.2 Press

	Specific media	Type of communication	Subject	Contributor from CREATES
1	www.pengeogpensionpanel.dk	Report	Anbefalinger om aktieinvesteringer	Tom Engsted
2	www.pengeogpensionpanel.dk	Report	Anbefalinger om aktieinvesteringer	Charlotte Christiansen
3	Globe & Mail (Canada)	Feature	Features of selected Queen's researchers	Morten Nielsen

### F.3 Other

	Specific type of communication	Subject	Contributor from CREATES
1	Lectures at Open University/Folkeuniversitet	Investments	Carsten Tanggaard
2	Penge- og Pensionspanelet	Konference om forbrugernes opsparing og investeringer	Carsten Tanggaard
3	Money and Pension Panel, Denmark	Bond Investments	Charlotte Christiansen
4	CBS Summer School	LIBOR Market Models	David Skovmand
5	Invited lecture at Dansk Aktionærforening	Stock market investments	Tom Engsted
6	Invited lecture at Penge- og Pensionspanelets konference om forbrugernes opsparing og investeringer	Stock market investments	Tom Engsted

Section G: Patents and applications

## Section H: Publications

Total number of publications in the reported year	Peer reviewed	Not peer reviewed
Number of journal articles	51	
Forthcoming articles	64	
Number of conference proceedings	-	
Number of monographs	-	
Number of book chapters	3	
CREATES Research Papers		53
PhD theses	3	

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### Prioritized list of the most prestigious publication sources within CREATES' research area

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#### General Econometrics:

- 1 Econometrica  
Journal of American Statistical Association
- 2 Econometric Theory  
Journal of Applied Econometrics  
Journal of Business and Economic Statistics  
Journal of Econometrics  
Review of Economics and Statistics
- 3 Econometric Reviews  
Econometrics Journal  
Oxford Bulletin of Economics and Statistics

#### Financial Econometrics:

- 1 Journal of Finance  
Journal of Financial Economics  
Review of Financial Studies
- 2 Journal of Empirical Finance  
Journal of Financial and Quantitative Analysis  
Journal of Financial Econometrics  
Journal of Monetary Economics  
Journal of Money Credit and Banking
- 3 Journal of Banking and Finance  
Journal of International Money and Finance

#### Statistics/Stochastics:

- 1 Annals of Statistics
- 2 Bernoulli  
Finance and Stochastics  
Journal of Royal Statistical Society Series B  
Mathematical Finance  
Scandinavian Journal of Statistics  
Stochastic Processes and its Applications
- 3 Journal of Time Series Analysis

## H.1 Articles published in refereed journals

- 1 2011, Aiolfi, Mark, Luis Catão and Allan Timmermann, Common Factors in Latin America's Business Cycles, Journal of Development Economics 95, 212-228 (PR) (CO)
- 2 2011, Andersen, Torben G., Tim Bollerslev and Nour Meddahi, Realized Volatility Forecasting and Market Microstructure Noise, Journal of Econometrics 160, 220-234 (PR) (CO)
- 3 2011, Andersen, Torben G., Tim Bollerslev and Xin Huang, A Reduced Form Framework for Modeling Volatility of Speculative Prices based on Realized Variation Measures, Journal of Econometrics 160, 176-189 (PR) (CO)
- 4 2011, Bach, Christian and Stig Vinther Møller, Habit-based asset pricing with limited participation consumption, Journal of Banking & Finance 35, 11, 2891-2901 (PR)
- 5 2011, Barndorff-Nielsen, O.E. and S.E. Graversen, Volatility determination in an ambit process setting, Journal of Applied Probability 48A, 263-275 (PR) (CO)
- 6 2011, Barndorff-Nielsen, Ole E. and A. Basse-O'Connor, Quasi Ornstein-Uhlenbeck processes, Bernoulli 17, 3, 916-941 (PR) (CO)
- 7 2011, Barndorff-Nielsen, Ole E., and R. Stelzer, Multivariate supOU processes, Annals of Applied Probability 21, 140-182 (PR) (CO)
- 8 2011, Barndorff-Nielsen, Ole E., J. M. Corcuera and M. Podolskij, Multipower variation for Brownian semi-stationary processes, Bernoulli 17, 1159-1194 (PR) (CO)
- 9 2011, Barndorff-Nielsen, Ole E., Peter Reinhard Hansen, Asger Lunde and Neil Shephard, Subsampling Realized Kernels, Journal of Econometrics 160, 204-219 (PR) (CO)
- 10 2011, Barndorff-Nielsen, Ole E., Stationary Infinitely Divisible Processes, Brazilian Journal of Probability and Statistics 25, 294-322 (PR)
- 11 2011, Barndorff-Nielsen, Ole Eiler, Peter Reinhard Hansen, Asger Lunde, Neil Shephard, Multivariate realised kernels: consistent positive semi-definite estimators of the covariation of equity prices with noise and non-synchronous trading, Journal of Econometrics 162, 2, 149-169 (PR)
- 12 2011, Berkowitz, Jeremy, Peter F. Christoffersen and Denis Pelletier, Evaluating Value-at-Risk Models with Desk-Level Data, Management Science 57, 2213-2227 (PR) (CO)
- 13 2011, Bollerslev, Tim and Viktor Todorov, Estimation of Jump Tails, Econometrica 79, 6, 1727-1783 (PR) (CO)
- 14 2011, Bollerslev, Tim and Viktor Todorov, Tails, Fears, and Risk Premia, Journal of Finance 66, 6, 2165-2221 (PR) (CO)
- 15 2011, Bollerslev, Tim, Bent Jesper Christensen, Niels Haldrup and Asger Lunde, Periodicity, Non-stationarity, and Forecasting of Economic and Financial Time Series: Editors' Introduction, Journal of Time Series Econometrics, 3,1, 0-7 (PR)
- 16 2011, Bollerslev, Tim, Michael Gibson and Hao Zhou, Dynamic Estimation of Volatility Risk Premia and Investor Risk Aversion from Option-Implied and Realized Volatilities, Journal of Econometrics 160, 1, 235-245 (PR) (CO)
- 17 2011, Busch, Thomas, Bent Jesper Christensen, and Morten Ø. Nielsen, The Role of Implied Volatility in Forecasting Future Realized Volatility and Jumps in Foreign Exchange, Stock, and Bond Markets, Journal of Econometrics, 160, 48-57 (PR) (CO)
- 18 2011, Chiriac, Roxana and Valeri Voev, Forecasting Multivariate Volatility using the VARFIMA Model on Realized Covariance Cholesky Factors, Journal of Economics and Statistics (Jahrbücher für Nationalökonomie und Statistik), 231,1, 134-152 (PR) (CO)
- 19 2011, Chiriac, Roxana and Valeri Voev, Modelling and Forecasting Multivariate Realized Volatility, Journal of Applied Econometrics 26, 922-94 (PR) (CO)
- 20 2011, Christiansen, Charlotte, Angelo Ranaldo, and Paul Söderlind, The Time-Varying Systematic Risk of Carry Trade Strategies, Journal of Financial and Quantitative Analysis 46, 4, 1107-1125 (PR) (CO)
- 21 2011, Christiansen, Charlotte, Intertemporal Risk-Return Trade-Off in Foreign Exchange Rates, Journal of International Financial Markets, Institutions, and Money 21, 4, 535-549 (PR)
- 22 2011, Dahl, Christian M. and Emma Iglesias, Modelling the Volatility-Return Tradeoff when Volatility may be Nonstationary, Journal of Time Series Econometrics, Berkeley Electronic Press, 3, 1 (PR) (CO)

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- 25 2011, Haldrup, Niels, A. Montanes, A. Sanso, Detection of additive Outliers in Seasonal Time Series, Journal of Time Series Econometrics 3, 2, 2 (PR) (CO)
- 26 2011, Frederiksen, Per and Morten Ø. Nielsen, Fully modified narrow-band least squares estimation of weak fractional cointegration, Econometrics Journal 14, 77-120 (PR) (CO)
- 27 2011, Hansen, Peter Reinhard, Asger Lunde, and J. M. Nason, The model confidence set, Econometrica 79, 2, 456-497 (PR) (CO)
- 28 2011, Jansson, Michael and Morten Ø. Nielsen, Nearly Efficient Likelihood Ratio Tests for Seasonal Unit Roots, Journal of Time Series Econometrics 3, 1, 5 (PR)
- 29 2011, Johansen, Søren and A.R. Swensen, On a Graphical Technique for Evaluating Some Rational Expectations Models, Journal of Time Series Econometrics 3, 1, 9 (PR) (CO)
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- 36 2011, Kurita, Takamitsu, Heino Bohn Nielsen and Anders Rahbek, An I(2) Cointegration Models with Piecewise Linear Trends, Econometrics Journal 14, 2, 131-155 (PR) (CO)
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- 65 2010, Cattaneo, Matias, Richard Crump and Michael Jansson, Robust Data-Driven Inference for Density-Weighted Average Derivatives, Journal of the American Statistical Association, 105, 1070-1083 (PR) (CO)
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- 9 2009, Andreasen, Martin Møller, DSGE Models and Term Structure Models with Macroeconomic Variables
- 10 2009, Mølgaard, Rune, Essays on Dynamic Asset Allocation and Electricity Derivatives
- 11 2009, Møller, Stig Vinther, Habit persistence, consumption based asset pricing, and time-varying expected returns
- 12 2009, Nielsen, Frank Steen, On the estimation of fractionally integrated processes
- 13 2008, Hjortshøj, Toke Lilhauge, Essays on Empirical Corporate Finance - Managerial Incentives, Information Disclosure, and Bond Covenants
- 14 2008, Lange, Theis, Asymptotic Theory in Financial Time Series Models with Conditional Heteroscedasticity (University of Copenhagen)
- 15 2008, Skovmand, David, Libor Market Models - Theory and Applications
- 16 2008, Zhu, Jie, Essays on Econometric Analysis of Price and Volatility Behavior in Asset Markets

### Specification of 2011 theses

PhD, Christian Bach, The Game of Risk.

Committee: Christian M. Dahl, Professor, Department of Business and Economics, University of Southern Denmark and CREATES; Bjørn N. Jørgensen, Associate Professor, Leeds School of Business, University of Colorado Boulder; Claus Munk, Professor, Department of Economics and Business, Aarhus University

Stay abroad: Columbia University.

Supervisor: Peter Ove Christensen (Aarhus University) and Bent Jesper Christensen (Aarhus University and CREATES).

MSc in Economics and Finance (cand.oecon), Aarhus University, 2008

Present employment: Consultant, Danske Commodities.

PhD, Stefan Holst Bache, Quantile Regression: Three Econometric Studies.

Committee: Søren Leth-Petersen, Professor, Department of Economics, University of Copenhagen; Shakeeb Khan, Professor, Department of Economics, Duke University; Bent Jesper Christensen, Professor, Department of Economics and Business and CREATES, Aarhus University

Stay abroad: University of Illinois, Urbana-Champaign (UIUC).

Supervisors: Niels Haldrup (Aarhus University and CREATES) and Christian M. Dahl, Department of Business and Economics, University of Southern Denmark and CREATES.

MSc in Economics and Finance (cand.oecon), University of Southern Denmark, 2008

Present employment: Assistant Professor, Department of Business and Economics, University of Southern Denmark.

PhD, Anders Bredahl Kock, Forecasting and Oracle Efficient Econometrics.

Committee: Dick van Dijk, Professor, Erasmus University Rotterdam; Jurgen A. Doornik, D. Phil, University of Oxford; Henning Bunzel, Associate Professor, Department of Economics and Business and CREATES, Aarhus University.

Stay abroad: UC, Berkeley.

Supervisors: Niels Haldrup (Aarhus University and CREATES) and Timo Teräsvirta (Aarhus University and CREATES).

MSc in economics (cand.oecon), Aarhus University, 2009

Present employment: Postdoctoral researcher funded by FSE, Department of Economics and Business and CREATES, Aarhus University.

## H.8 Forthcoming articles in refereed journals and books

- 1 Aiolfi, Mark, C. Capistran and Allan Timmermann, Forecast Combinations, Forecast Handbook (Oxford)
- 2 Andersen, Torben G. and Viktor Todorov, Realized Volatility and Multipower Variation, Encyclopedia of Quantitative Finance, Wiley and Sons
- 3 Andersen, Torben G., Dobrislav Dobrev and Ernst Schaumburg, Robust Volatility Estimation using Nearest-Neighbor Truncation, Journal of Econometrics
- 4 Andersen, Torben G., Tim Bollerslev, Peter Christoffersen, and Frank Diebold, Financial Risk Measurement for Financial Risk Management; in G. Constantinides, M. Harris, and R. Stulz (editors): Handbook of the Economics of Finance
- 5 Ang, A. and Dennis Kristensen, Testing Conditional Factor Models, Journal of Financial Economics
- 6 Bache, Stefan Holst, Christian Møller Dahl and Johannes Tang Kristensen, Headlights on tobacco road to low birthweight outcomes: Evidence from a battery of quantile regression estimators and a heterogeneous panel, Empirical Economics
- 7 Barndorff-Nielsen, O.E. and J. Pedersen, Meta-times and extended subordination, Theory of Probability and Its Applications
- 8 Barndorff-Nielsen, O.E. and Stelzer, R, The multivariate supOU stochastic volatility model. Math. Finance
- 9 Barndorff-Nielsen, O.E., D.G. Pollard and N. Shephard, Discrete-valued Lévy processes and low latency financial econometrics, Quantitative Finance
- 10 Barndorff-Nielsen, O.E., J.M. Corcuera, and M. Podolskij, Limit theorems for functionals of higher order differences of Brownian semistationary processes. In Shiryaev, A.N., Varadhan, S.R.S. and Presman, E. (Eds.): Prokhorov and Contemporary Probability Theory, Springer
- 11 Barnett, Richard C., Joydeep Bhattacharya, and Helle Bunzel, Minimum Consumption Requirements and Cycles in an Overlapping Generations Model of Money, Journal of Macroeconomics
- 12 Bollerslev, Tim, Natalia Sizova and George Tauchen, Volatility in Equilibrium: Asymmetries and Dynamic Dependencies, Review of Finance
- 13 Bollerslev, Tim, Natalia Sizova and George Tauchen, Volatility in Equilibrium: Asymmetries and Dynamic Dependencies, Review of Finance
- 14 Bollerslev, Tim, Viktor Todorov and Sophia Zhengzi Li, Jump Tails, Extreme Dependencies, and the Distribution of Stock Returns, Journal of Econometrics
- 15 Caporin, Massimiliano and Paolo Santucci de Magistris, On the evaluation of marginal expected shortfall, Applied Economics Letters
- 16 Cattaneo, Matias, Richard Crump, and Michael Jansson, Optimal Inference for Instrumental Variables Regression with non-Gaussian Errors, Journal of Econometrics
- 17 Cattaneo, Matias, Richard Crump, and Michael Jansson, Small Bandwidth Asymptotics for Density-Weighted Average Derivatives, Econometric Theory
- 18 Cavaliere, G., Anders Rahbek and A.M.R. Taylor, Bootstrap Determination of the Cointegration Rank in VAR Models, Econometrica
- 19 Chang, B., P. Christoffersen, K. Jacobs, and G. Vainberg, Option-Implied Measures of Equity Risk, Review of Finance
- 20 Chang, B., Peter Christoffersen, and K. Jacobs, Market Skewness Risk and the Cross-Section of Stock Returns, Journal of Financial Economics
- 21 Christensen, Bent Jesper, Christian M. Dahl, and Emma M. Iglesias, Semiparametric Inference in a GARCH-in-Mean Model, Journal of Econometrics
- 22 Christensen, Kim, and Mark Podolskij, Asymptotic theory of range-based multipower variation, Journal of Financial Econometrics
- 23 Christiansen, Charlotte, Angelo Rinaldo, and Paul Söderlind, The Time-Varying Systematic Risk of Carry Trade Strategies, Journal of Financial and Quantitative Analysis

- 24 Christensen, Bent Jesper, Christian M. Dahl and Emma M. Iglesias, Semiparametric Inference in a GARCH-in-Mean Model, [Journal of Econometrics](#)
- 25 Christoffersen, P., K. Jacobs, and C. Ornathanalai, Exploring Time-Varying Jump Intensities: Evidence from S&P500 Returns and Options, [Journal of Financial Economics](#)
- 26 Christoffersen, Peter, Elements of Financial Risk Management, [Academic Press](#)
- 27 Engsted, T. and Thomas Q. Pedersen, Return predictability and intertemporal asset allocation: Evidence from a bias-adjusted VAR model, [Journal of Empirical Finance](#)
- 28 Engsted, Tom and Bent Nielsen: Testing for rational bubbles in a co-explosive vector autoregression, [Econometrics Journal](#)
- 29 Engsted, Tom, Aktiv vs. passiv forvaltning, held eller dygtighed, og måling af porteføljeforvalteres performance, [Finans/Invest](#)
- 30 Engsted, Tom, Thomas Q. Pedersen, and Carsten Tanggaard, Pitfalls in VAR based return decompositions: A clarification, [Journal of Banking and Finance](#)
- 31 Engsted, Tom, Thomas Q. Pedersen, and Carsten Tanggaard, The log-linear return approximation, bubbles, and predictability, [Journal of Financial and Quantitative Analysis](#)
- 32 Exterkate, Peter, D. van Dijk, C. Heij, and P.J.F. Groenen, Forecasting the yield curve in a data-rich environment using the Factor-Augmented Nelson-Siegel model, [Journal of Forecasting](#)
- 33 Frederiksen, Per, Frank Steen Nielsen and Morten Ø. Nielsen, Local polynomial Whittle estimation of perturbed fractional processes, [Journal of Econometrics](#)
- 34 Frömmel, Michael and Robinson Kruse, Testing for a rational bubble under long memory, [Quantitative Finance](#)
- 35 Hansen, Peter Reinhard, Zhuo (Albert) Huang and Howard Howan Shek, Realized GARCH: A Joint Model of Returns and Realized Measures of Volatility, [Journal of Applied Econometrics](#)
- 36 Hylleberg, Svend, Seasonal Integration and Cointegration in Economic Time Series, [International Encyclopedia of Statistical Science](#), Springer-Verlag
- 37 Jansson, Michael and Morten M. Ø. Nielsen, Nearly efficient likelihood ratio tests of the unit root hypothesis, [Econometrica](#)
- 38 Jensen, A.T. and Theis Lange, On IGARCH and Convergence of the QMLE for Misspecified GARCH Models, [Journal of Time Series Econometrics](#)
- 39 Jensen, P. S. and Allan Würtz, Estimating the Effect of a Variable in a High-Dimensional Linear Model, [Econometrics Journal](#)
- 40 Jensen, Søren T., Theis Lange and Anders Rahbek, Estimation and Asymptotic Inference in the First Order AR-ARCH Model, [Econometric Reviews](#)
- 41 Johansen, Søren and Katarina Juselius, An Asymptotic Invariance Property of Common Trends under Linear Transformations of the Data, [Journal of Econometrics](#)
- 42 Johansen, Søren and Morten Ø. Nielsen, A Necessary Moment Condition for the Fractional Functional Central Limit Theorem, [Econometric Theory](#)
- 43 Kiefer, Nicholas M., Default Estimation, Correlated Defaults, and Expert Information, [Journal of Applied Econometrics](#)
- 44 Kock, Anders Bredahl, Oracle Efficient Variable Selection in Random and Fixed Effects Panel Data Models, [Econometric Theory](#)
- 45 Kruse, Robinson, and Philipp Sibbertsen, Long memory and changing persistence. [Economics Letters](#)
- 46 Küchler, Uwe and Michael Sørensen, Statistical inference for discrete-time samples from affine stochastic delay differential equations, [Bernoulli](#)
- 47 Menkhoff, Lukas, Lucio Sarno, Maik Schmeling, and Andreas Schrimpf, Carry Trades and Global Foreign Exchange Volatility, [The Journal of Finance](#)
- 48 Menkhoff, Lukas, Lucio Sarno, Maik Schmeling, and Andreas Schrimpf, Currency Momentum Strategies, [Journal of Financial Economics](#)
- 49 Menkveld, A.J., A. Sarkar, and M. Van der Wel, Customer Order Flow, Intermediaries, and Discovery of the Equilibrium Risk-free Rate, [Journal of Financial and Quantitative Analysis](#)

- 50 Nolte, Ingmar and Valeri Voev, Least Squares Inference on Integrated Volatility and the Relationship between Efficient Prices and Noise, Journal of Business and Economic Statistics
- 51 Papapantoleon, Antonis, John Schoenmakers and David Skovmand, Efficient and accurate log-Lévy approximations to Lévy driven LIBOR models, Journal of Computational Finance
- 52 Patton, A.J. and Allan Timmermann, Forecast Rationality Tests Based on Multi-Horizon Bounds, Editor's invited paper, Journal of Business and Economic Statistics
- 53 Péguin-Feissolle, Anne; Birgit Strikholm, and Timo Teräsvirta, Testing the Granger noncausality hypothesis in stationary models of unknown functional form, Communications in Statistics: Simulation and Computation
- 54 Podolskij, Mark and M. Rosenbaum, Testing the local volatility assumption: a statistical approach, Annals of Finance
- 55 Rossi, Eduardo and Paolo Santucci de Magistris, A no-arbitrage fractional cointegration model for futures and spot daily ranges, Journal of Futures Markets
- 56 Schrimpf, Andreas and Qingwei Wang, A Reappraisal of the Leading Indicator Properties of the Yield Curve under Structural Instability, International Journal of Forecasting
- 57 Shin, Y. and Dennis Kristensen, Estimation of Dynamic Models with Nonparametric Simulated Maximum Likelihood, Journal of Econometrics
- 58 Stentoft, Lars, American Option Pricing using Simulation and Regression: Numerical Convergence Results, Topics in Numerical Methods for Finance
- 59 Sørensen, Michael, Estimating functions for diffusion-type processes. To appear in Kessler, M., Lindner, A. and Sørensen, M. (eds.): Statistical Methods for Stochastic Differential Equations, Chapmann and Hall
- 60 Teräsvirta, Timo, Nonlinear models for autoregressive conditional heteroskedasticity, In: Wiley Handbook in Financial Engineering and Econometrics: Volatility models and their applications. ed. / Luc Bauwens ; Christian Hafner ; Sébastien Laurent. John Wiley & Sons Ltd
- 61 Veraart, A.E.D. and Veraart, L.A.M., Stochastic volatility and stochastic leverage, Annals of Finance

## Center: CREATES - Center for Research in Econometric Analysis of Time Series

Personale (Staff)		Ansættelses- periode i 2011 **)	Finansieret af (angives i årsværk *)			Udenlandsk medarbejder (sæt kryds)	Ph.d.-stud. og postdocs: Anfør tidl. uddannelse (cand.scient. etc.)	Ph.d.-stud.: Sæt kryds ved opnået ph.d.-grad
Navn	Stillings- betegnelse		Grundforsk- ningsfonden	Værtsinsti- tutionen	Anden finan- siering ***)			
Centerleder (Center leader)								
Niels Haldrup	Professor	hele perioden	0,4	0,6				
Videnskabeligt personale (Scientific staff)								
Research Fellows, Aarhus								
Allan Würtz (50 %)	Lektor	hele perioden		0,2				
Almut Veraart	Adjunkt	01.01.-30.06.	0,5			x		
Asger Lunde	Professor	hele perioden		0,8				
Bent Jesper Christensen	Professor	hele perioden		0,7	0,1			
Carsten Tanggaard	Professor	hele perioden		0,6				
Charlotte Christiansen	Lektor	hele perioden		0,4	0,4			
Christos Ntantamis	Adjunkt	01.01-31.07.	0,6			x		
Henning Bunzel (20 %)	Lektor	hele perioden		0,2				
Kim Christensen	Adjunkt	hele perioden			1			
Olaf Posch	Adjunkt	hele perioden		0,8		x		
Ole E. Barndorff-Nielsen	Professor	hele perioden	0,1		0,4			
Thomas Quistgaard Pedersen	Adjunkt	hele perioden		0,1	0,9			
Timo Teräsvirta	Professor	hele perioden	1			x		
Tom Engsted	Professor	hele perioden		0,8				
Valeri Voev	Adjunkt	hele perioden				x		
Stig Vinther Møller	Lektor	hele perioden		0,8				
David Skovmand	Adjunkt	hele perioden		0,4				
Research Fellows, KU								
Anders Rahbek	Professor	hele perioden	0,4		0,1			
Michael Sørensen	Professor	hele perioden			0,5			
Søren Johansen	Professor	hele perioden	0,2		0,3			
Research Fellows, SDU								
Christian M. Dahl	Professor	hele perioden			0,5			
Isabel Casas	Associate Professor	01.02.-31.12.			0,5	x		

Personale (Staff)		Ansættelses- periode i 2011 **)	Finansieret af (angives i årsværk *)			Udenlandsk medarbejder (sæt kryds)	Ph.d.-stud. og postdocs: Anfør tidl. uddannelse (cand.scient. etc.)	Ph.d.-stud.: Sæt kryds ved opnået ph.d.-grad
Navn	Stillings- betegnelse		Grundforsk- ningsfonden	Værtsinsti- tutionen	Anden finan- sierung ***)			
Research Fellows, ikke DK								
Allan Timmermann, UC San Diego, USA	Professor	hele perioden				(x)		
Almut Veraart, Imperial College London, UK	Lecturer in Statistics	01.09.-31.12.				x		
Andreas Schrimpf, Bank for International Settlements, Schwtizerland	Dr.	01.09.-31.12.				x		
Christos Ntantamis, Mount Allison University, Canada	Assistant Professor	01.09.-31.12.				x		
Dennis Kristensen, University College London, UK	Reader	hele perioden				(x)		
Helle Bunzel, Iowa State University, USA	Professor	hele perioden				(x)		
Katarzyna Lasak, VU University Amsterdam, The Netherlands	Assistant Professor	01.09.-31.12.				x		
Lars Stentoft, HEC Montreal, Canada	Associate Professor	hele perioden				(x)		
Mark Podolskij, University of Heidelberg, Germany	Professor	hele perioden				x		
Michael Jansson, U.C. Berkeley, USA	Professor	hele perioden	0,1			(x)		
Michel van der Wel, Erasmus University Rotterdam, The Netherlands	Assistant Professor	hele perioden				x		
Morten Ørregaard Nielsen, Queen's University, Canada	Professor	hele perioden	0,1			(x)		
Peter Christoffersen, Rotman School of Management, Canada	Professor	hele perioden				(x)		
Peter R. Hansen, European University Institute, Italy	Professor	hele perioden	0,3			(x)		
Robinson Kruse, Leibniz University Hannover, Germany	Junior Professor, Dr.	01.09.-31.12.				x		
Tim Bollerslev, Duke University, USA	Professor	hele perioden				(x)		
Torben G. Andersen, Northwestern University, USA	Professor	hele perioden				(x)		
Post docs								
Anders Bredahl Kock	Postdoc	01.09.-31.12.	0,3				PhD	
Andreas Schrimpf	Postdoc	01.01.-15.03.		0,2		x	PhD	
Daniela Osterrieder	Postdoc	hele perioden	0,6		0,4	x	PhD	
Isabel Casas	Postdoc	01.01.-31.01.	0,1			x	PhD	
Johannes Tang Kristensen	Postdoc	15.11.-31.12.	0,2				PhD	
Katarzyna Lasak	Postdoc	01.01.-31.07.	0,9			x	PhD	
Malene Kallestrup Lamb	Postdoc	hele perioden	0,2		0,8		PhD	
Paolo Santucci de Magistris	Postdoc	01.04.-31.12.		0,2	0,5	x	PhD	
Peter Exterkate	Postdoc	01.10.-31.12.	0,3			x	PhD	
Robinson Kruse	Postdoc	01.01.-31.07.	0,6			x	PhD	
Stefan Holst Bache	Postdoc	01.09.-31.12.			0,3		PhD	
Stefano Grassi	Postdoc	hele perioden	1			x	PhD	

Personale (Staff)		Ansættelses- periode i 2011 **)	Finansieret af (angives i årsværk *)			Udenlandsk medarbejder (sæt kryds)	Ph.d.-stud. og postdocs: Anfør tidl. uddannelse (cand.scient. etc.)	Ph.d.-stud.: Sæt kryds ved opnået ph.d.-grad
Navn	Stillings- betegnelse		Grundforsk- ningsfonden	Værtsinsti- tutionen	Anden finan- sierung ***)			
Gæsteforskere (Guest scientists)								
Philipp Sibbertsen, Leibniz Universität Hannover Königsworther, Germany	Professor	21.02.-21.03.	0,1			x		
Luc Bauwens	Professor	11.10.-30.11.	0,1			x		
Teknisk personale (Technical staff)								
Flere		hele perioden	0,5					
Administrativt personale (Administrative staff)								
Solveig Nygaard Sørensen	Centeradministrator	hele perioden	1					
Ph.d.-administration		hele perioden		0,3				
Kommunikation		hele perioden		0,1				
Budget og økonomi		hele perioden		0,2				
Adm. support		hele perioden		0,1				
IT-support		hele perioden		0,3				
Andre (Others)								
Advisory Board								
Neil Shephard, Oxford University, UK	Professor	hele perioden						
Nicholas M. Kiefer, Cornell University, USA	Professor	hele perioden						
Robert F. Engle, NY Stern, USA	Professor	hele perioden						
Svend Hylleberg	Professor	hele perioden						
Ph.d.-studerende (Ph.d.-students)								
Aðalheiður Ósk Guðlaugsdóttir	Ph.d.-stud.	01.09.-31.12.		1		x	MSc (econ)	
Anders Bredahl Kock	Ph.d.-stud.	01.01.-31.08.	0,7				PhD	x
Anne Floor Sørensen	Ph.d.-stud.	hele perioden		1			MSc (math.econ)	
Christian Bach Kristensen	Ph.d.-stud.	01.01.-14.09.					PhD	x
Federico Carlini	Ph.d.-stud.	01.09.-31.12.		0,3		x	MSc (ing)	
Johannes Tang Kristensen	Ph.d.-stud.	01.01.-31.08.		0,8			MSc (econ)	
Juan Carlos Parra Alvarez	Ph.d.-stud.	hele perioden		0,7	0,3	x	MSc (econ)	x
Kasper Vinther Olesen	Ph.d.-stud.	hele perioden		1			MSc (econ)	
Kenneth Dencker Petersen	Ph.d.-stud.	hele perioden		1			MSc (econ)	
Laurent Callot	Ph.d.-stud.	hele perioden		1		x	MSc (econ)	
Manuel Sebastian Lukas	Ph.d.-stud.	hele perioden		0,7	0,3	x	BSc (econ)	
Martin Klint Hansen	Ph.d.-stud.	hele perioden		1			MSc(B)	
Mateusz Piotr Dziubinski	Ph.d.-stud.	hele perioden	1			x	MSc (econ)	
Niels Husted Dall-Hansen	Ph.d.-stud.	hele perioden		1			MSc (econ)	
Nima Nonejad	Ph.d.-stud.	hele perioden		0,6	0,4		MSc (econ)	
Rasmus Tangsgaard Varneskov	Ph.d.-stud.	hele perioden		1			MSc (econ)	
Stefan Holst Bache	Ph.d.-stud.	01.01.-31.08.		0,7			PhD (econ)	x
Yukai Yang	Ph.d.-stud.	hele perioden		1		x	MSc (econ)	
Zhenjiang Qin	Ph.d.-stud.	hele perioden			1	x	MSc (stat)	
<b>Total</b>			11,3	20,6	8,7			

\*) Opgøres med max. 1 decimal, og fonden er opmærksom på, at der kan være tale om et skøn

\*\*\*) Kun perioder over 3 uger medregnes

\*\*\*\* Ekstern finansiering (primært FSE). Desuden medarbejdere uden finansiering (egen tid): Ole Barndorff-Nielsen, Søren Johansen.

(x) Danske statsborgere bosiddende i udlandet

Forkortelser:

FSE: Forskningsrådet for Samfund og Erhverv

KU: Københavns Universitet

SDU: Syddansk Universitet

ASB: Aarhus School of Business, Aarhus Universitet

MVTU: Ministeriet for Videnskab, Teknologi og Udvikling

Bemærk, at f.s.v.a. International research fellows, så er flere af disse delvis finansieret af DG bevillingen, selvom de ikke indgår med årsværksbrøker under DG finansieringen. Dette sker f.eks. via udbetaling af diæter m.v.

Personer indgår kun med årsværks-bidrag under DG finansiering, hvis de har været *ansat og dermed aflønnet*.

